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STRUCTURAL CALCULATIONS

Lateral, Gravity, & Foundation

SDA JOB #8465B

EXPIRES

APPLETON RESIDENCE

2742 71ST Ave SE
MERCER ISLAND, WA 98040

DEC 1 3 2018

Design Criteria

Scope of Work: LATERAL, GRAVITY, & FOUNDATION

Site Address: 2742 72ST AVE SE
MERCER ISLAND, WA 98040

Number of Stories: 3 Engineer: LEROY & ALEESHA

Roof Loading

Roofing	Composition	3.0
Sheathing	15/32" Plywood	1.5
Insulation	Roll/Batt	3.0
Ceiling	1/2" GWB	2.2
Framing	Trusses	2.2
Miscellaneous	fixtures, mechanical, electrical, etc.	3.1
	TOTAL DEAD LOAD:	15.0 psf
	ROOF SNOW LOAD:	25.0 psf

Upper Floor Loading

Floor Covering	Carpet/Hardwood/Tile	3.0
Sheathing	3/4" T&G	2.3
Ceiling	1/2" GWB	2.2
Joists	I-JOISTS	2.1
BEAMS		1.0
Miscellaneous	fixtures, mechanical, electrical, etc.	1.4
	TOTAL DEAD LOAD:	12.0 psf
	FLOOR LIVE LOAD:	40.0 psf

Main Floor Loading

Floor Covering	Carpet/Hardwood/Tile	3.0
Sheathing	3/4" T&G	2.3
Ceiling	1/2" GWB	2.2
Joists	I-Joists	2.1
Beams		1.0
Miscellaneous	fixtures, mechanical, electrical, etc.	1.4
	TOTAL DEAD LOAD:	12.0 psf
	FLOOR LIVE LOAD:	40.0 psf

Soil Bearing Capacity:	1500 psf
Frost Depth:	18 in

Type of construction: Residential
Applicable Building Codes: 2015 IBC, ASCE 7-10
Location: 2742 72ST AVE SE, MERCER ISLAND, WA 98040

Work performed : **LATERAL, GRAVITY, & FOUNDATION**

WIND DESIGN:

Ps = λIwPs30Kzt

Exposure :	B	Wind Exposure Category as set forth in Section 26.7.3 of ASCE 7-10
Wind Speed =	110 MPH	Basic Wind Speed as used in Figure 28.6.1 of ASCE 7-10
Ps30 =		Simplified design wind pressure for Exposure B, at h = 30 feet and for I = 1.0, from Figure28.6.1
	1	
λ =	1.00	Adjustment factor for building height and exposure from Figure28.6.1 of ASCE 7-10
KZT =	1.37	Adjustment factor for increased wind speed due to a hill or escarpment

Roof slope :

		rise		run		
Front/Rear	tan-1 (	Flat	/	12	)	= 0.0 degrees
Left/Right	tan-1 (	6	/	12	)	= 26.6 degrees

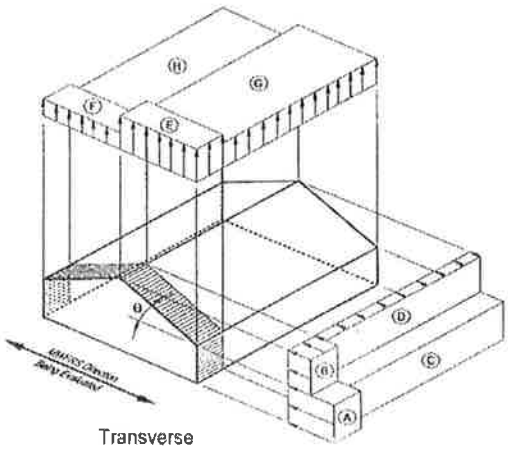
24 ft Mean Elevation

Number of floors: 3

Average uplift (F/R)=	-17.9 psf	Based on wind zones 'G' and 'H'
Average uplift (R/L)=	-10.5 psf	Based on wind zones 'G' and 'H'

	End zone of wall		End zone of roof	
	Front/Rear	Left/Right	Front/Rear	Left/Right
Ps30 =	A = 19.2 psf	23.3 psf	B = -10.0 psf	7.3 psf
Ps =	26.3 psf	31.9 psf	-13.7 psf	10.0 psf

	Interior zone of wall		Interior zone of roof	
	Front/Rear	Left/Right	Front/Rear	Left/Right
Ps30 =	C = 12.7 psf	17.3 psf	D = -5.9 psf	6.4 psf
Ps =	17.4 psf	23.8 psf	-8.1 psf	8.8 psf



WIND LOAD CALCULATIONS
FRONT REAR

ΣV 3RD FLOOR =

WIND ZONE	A	B	D									
AVE. HEIGHT	2	4	4									
AVE. WIDTH	2.5	6	4									
Ps	26.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	132	0	0	0	0	0	0	0	0	0	0	0
TOTAL	720 lbs											

Minimum net pressure controls. The calculated pressure is less than the minimum net pressure, equal to 16psf applied over the entire area. (ASCE 7-05 6.4.2.1.1)

ΣV 2ND FLOOR =

WIND ZONE	A	C										
AVE. HEIGHT	4.1	34.5										
AVE. WIDTH	6	11.43										
Ps	26.30	17.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	647	6861	0	0	0	0	0	0	0	0	0	0
TOTAL	7,508 lbs											

ΣV (1ST FLOOR) =

WIND ZONE	A	C										
AVE. HEIGHT	6	8										
AVE. WIDTH	8.75	46.2										
Ps	26.30	17.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	1381	6431	0	0	0	0	0	0	0	0	0	0
TOTAL	7,812 lbs											

WIND LOAD CALCULATIONS

LEFT **RIGHT**

ΣV 3RD FLOOR =

WIND ZONE	A	B	C	D								
AVE. HEIGHT	6	6	7	5								
AVE. WIDTH	5	10.5	22.9	16.6								
Ps	31.94	10.02	23.75	8.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	958	631	3807	732	0	0	0	0	0	0	0	0
TOTAL	6,129 lbs											

ΣV 2ND FLOOR =

WIND ZONE	A	C										
AVE. HEIGHT	6	8.75										
AVE. WIDTH	8.75	14.25										
Ps	31.94	23.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SUBTOTAL	1677	2962	0	0	0	0	0	0	0	0	0	0
TOTAL	4,639 lbs											

ΣV (1ST FLOOR) =

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 ΧΑΛΧΣ:

3RD FLOOR CALCULATIONS:

Plate Height:	5.75 ft
Total length of Shearwall in Shortest Line:	3.50 ft
Length of Shortest Segment within Shear Line:	3.50 ft
Length of Longest Segment in Shear Line:	3.50 ft

Tributary Area: 1.0
Total Area: 2.0

ρ = **1.30**
ASCE 7-05 12.3.4.2

2ND FLOOR CALCULATIONS:

Plate Height:	7.67 ft
Total length of Shearwall in Shortest Line:	5.75 ft
Length of Shortest Shearwall within Shear Line:	2.75 ft
Length of Longest Wall in Shear Line:	3.00 ft

Tributary Area: 1.0
Total Area: 2.0

ρ = **1.00**
ASCE 7-05 12.3.4.2 a

MAIN FLOOR CALCULATIONS:

Plate Height:	8.25 ft
Total length of Shearwall in Shortest Line:	3.50 ft
Length of Shortest Shearwall within Shear Line:	1.75 ft
Length of Longest Wall in Shear Line:	1.75 ft

Tributary Area: 1.0
Total Area: 2.0

ρ = **1.00**
ASCE 7-05 12.3.4.2 a

All loads in pounds per square foot

WALL DEAD LOAD =	15 psf	ROOF DEAD LOAD =	15.0 psf
FLAT ROOF SNOW LOAD =	25 psf	UPPER FLOOR D.L. =	12.0 psf
RED. S.L. (20%*S.L.) =	0	LOWER FLOOR D.L. =	12.0 psf
		FLOOR LIVE LOAD =	40.0 psf

SEISMIC DESIGN:

E = Eh + Ev

E = ρQE + .2SDSD QE = V = CsW

ρ =	1.30
Site Class =	C
IE =	1
R =	6.5
hn =	28.5

When the Site Class is not specified by Geotech, D will be assumed
Importance factor as defined in Table 1.5.2

Total height of structure

V = 0.7SDSIEW / R SDS = 2/3 SMS

Vmax = SD1IEW / TaR SMS = (Fa)(Ss)

Ta = 0.02hn0.75

Ta = 0.25 s SM1 = (Fv)(S1)

Ss =	138.1%	SMS =	138.1%	**V =**	0.099	**W**
Fa =	1.00	SDS =	92.1%	**E =**	0.129	**W**
S1 =	53.2%	SM1 =	69.1%			
Fv =	1.30	SD1 =	92.1%	**Cs =**	0.099	

P

3RD FLOOR DIAPHRAGM LOADING:

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
28	21.5	15.0	9030
		15.0	0
		15.0	0
		15.0	0
		15.0	0

Area = 602 Sub-Total= 9030

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
		12.0	0
		12.0	0
		12.0	0
		12.0	0
		12.0	0

Area = 0 Sub-Total= 0

W (WALL) =

LENGTH	TRIB. HT	LOAD	TOTAL
6.5	37	15.0	3608
6.5	37	15.0	3608
2.5	9.5	15.0	356
		15.0	0
		15.0	0

Area = 505 Sub-Total= 7571

TOTAL = 16601 lb

2ND FLOOR DIAPHRAGM LOADING:

W (ROOF) =

LENGTH	WIDTH	LOAD	TOTAL
15	21.25	15.0	4781
		15.0	0
		15.0	0
		15.0	0
		15.0	0

Area = 319 Sub-Total= 4781

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
26.25	19.75	12.0	6221
		12.0	0
		12.0	0
		12.0	0
		12.0	0

Area = 518 Sub-Total= 6221

W (WALL) =

LENGTH	TRIB. HT	LOAD	TOTAL
6.5	37	15.0	3608
6.5	37	15.0	3608
2.5	9.5	15.0	356
3.84	40	15.0	2304
3.84	40	15.0	2304

Area = 812 Sub-Total= 12179

TOTAL = 23182 lb

1ST FLOOR DIAPHRAGM LOADING:

W (ROOF) =

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

Area = 0 Sub-Total= 0

W (FLOOR) =

LENGTH	WIDTH	LOAD	TOTAL
55.25	19.75	12.0	13094
		12.0	0
		12.0	0
		12.0	0
		12.0	0

Area = 1091 Sub-Total= 13094

W (WALL) =

LENGTH	TRIB. HT	LOAD	TOTAL
8.25	98.4	15.0	12177
8.25	48.1	15.0	5952
		15.0	0
		15.0	0
		15.0	0

Area = 1209 Sub-Total= 18129

TOTAL = 31224 lb

V (3RD FLOOR) =	.099 x 16601 lb =	1646 lbs
V (2ND FLOOR) =	.099 x 23182 lb =	2298 lbs
V (1ST FLOOR) =	.099 x 31224 lb =	3096 lbs

REDISTRIBUTE:

ΣV x ρ	height	ΣV x height
2140 lb	23.67	50649
2988 lb	16.92	50557
4025 lb	8.25	33202
TOTAL = 9152 lb	TOTAL =	134408

$$E\ (3RD) = \frac{\Sigma V \times height \times \Sigma V\ TOTAL}{\Sigma V \times height\ TOTAL} = 3449\ lb$$

$$E\ (2ND) = \frac{\Sigma V \times height \times \Sigma V\ TOTAL}{\Sigma V \times height\ TOTAL} = 3443\ lb$$

$$E\ (1ST) = \frac{\Sigma V \times height \times \Sigma V\ TOTAL}{\Sigma V \times height\ TOTAL} = 2261\ lb$$

SUMMARY:

	WIND (front-rear)	WIND (left-right)	SEISMIC
ΣV (3RD) =	432 lbs	3678 lbs	3449 lbs
ΣV (2ND) =	4505 lbs	2783 lbs	3443 lbs
ΣV (MAIN) =	4687 lbs	0 lbs	2261 lbs
TOTAL =	9624 lbs	6461 lbs	9152 lbs

DIAPHRAGM SHEAR:

240 PLF

Total diaphragm length = 40.0 ft
Diaphragm width = 20.0 ft
Sub-diaphragm length = 40.0 ft
ΣV (3RD) = 3,678 lbs

$$v = \frac{\Sigma V(1st)}{(2)(width)} = \frac{3678\ lb}{40\ ft} = 92\ PLF$$

0.0 ft
10.0 ft

table 4.3A of the AF&PA SDPWS-2015 240 PLF

USE 15/32 CDX ROOF SHEATHING OR 3/4 T&G CDX SUBFLOORING

CHORD:

Sub-diaphragm length = 40.0 ft
Sub-diaphragm width = 20.0 ft
Total-diaphragm length = 40.0 ft

$$T = \frac{M}{B} = \frac{\Sigma V \times (diaphragm\ length)}{8 \times (diaphragm\ width)} = \frac{3678 \times 40\ ft}{8 \times 20\ ft} = 919\ lbs$$

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

Area = 8.25 in^2
Load duration (CD) = 1.60
Ft = 525 psi
Tallowable = Area x CD x Ft = 6,930 lbs

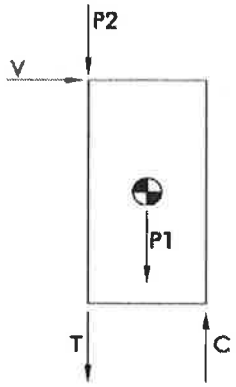
Since T allowable is greater than T applied, OK.

SHEAR CAPACITY OF 10d COMMON NAIL = 102 lbs
102 x Cd x p = 163 lbs
2015 NDS

$$\#\ OF\ NAILS\ PER\ 4\ FT\ SPLICE = \frac{919\ lbs}{163\ lbs} = 6$$

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

Lateral Calculation Key



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

T = V 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 7-10 2.4.1

Tension Equations (Uplift)

7. 0.6D +0.6 W	
8. (0.6 - 0.14SDS)D + E	0.47 D + E
*8. (0.6 - 0.14SDS)D + 2.5 E	0.47 D + 2.5 E

Compression Equations

5. D +0.6 W	
5. (1 + 0.14SDS)D + E	1.13 D + E
6. D + 0.75(0.6W) + 0.75L + 0.75S	
6. (1.0 + 0.105SDS)D + 0.75E + 0.75L + 0.75S	1.10 D + 0.75 E + 0.75 L + 0.75 S
*5. (1 + 0.14SDS)D + 2.5E	1.13 D + 2.5 E
*6. (1.0 + 0.105SDS)D + 1.875E + 0.75L + 0.75S	1.10 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 Eh, but not Ev. Therefore this factor has been omitted from equations 5, 6 and 8 where appropriate.

UPPER FRONT SHEARWALL

Floor Info

Upper	Floor Level, e.g. Upper, Main, Lower
Lt-Rt	Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type Values from table 4.3A of the AF&PA SDPWS-20015
Roof	Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)
33.00 ft	Total Length of Shearwalls

V(from upper)=	3678 lb	3449 lb
V(from main)=	0 lb	0 lb
V(from lower)=	0 lb	0 lb
Σ (Ωιvδ) =	3,678 lb	Σ (Σμχ) = 3,449 lb
v =	56 PLF	v = 52 PLF

WIND

Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Main Floor): tributary width; total width
Tributary Width (Lower Floor): tributary width; total width

SEISMIC

Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Main Floor): tributary area; total area
Tributary Area (Lower Floor): tributary area; total area

Height of Shearwall = 5.8 ft
Length of Shearwall = 15.5 ft
Aspect Ratio OK
Use alternate R factor for seismic? NO

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 3.0 ft
Length of adjoining wall = 3.0 ft

AF&PA SDPWS-2015 0.93 x 230 = 214 PLF USE 1

Seismic controls shearwall design

CTOTAL =	(floor above) + (this floor) =		+	320 lbs	= 320 lbs	Wind controls
TTOTAL =	(floor above) + (this floor) =		+	5 lbs	= 5 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 = 231 lbs

NO HOLDOWNS REQUIRED: OK

UPPER REAR SHEARWALL

Floor Info

Upper	Floor Level, e.g. Upper, Main, Lower
Lt-Rt	Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type Values from table 4.3A of the AF&PA SDPWS-2015
Roof	Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)
33.00 ft	Total Length of Shearwalls

V(from upper)=	3678 lb	3449 lb
V(from main)=	0 lb	0 lb
V(from lower)=	0 lb	0 lb
Σ (Ωιvδ) =	3,678 lb	Σ (Σμχ) = 3,449 lb
v =	56 PLF	v = 52 PLF

WIND

Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Main Floor): tributary width; total width
Tributary Width (Lower Floor): tributary width; total width

SEISMIC

Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Main Floor): tributary area; total area
Tributary Area (Lower Floor): tributary area; total area

Height of Shearwall = 5.8 ft
Length of Shearwall = 15.5 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 3.0 ft
Length of adjoining wall = 3.0 ft

AF&PA SDPWS-2015 0.93 x 230 = 214 PLF USE 1

Seismic controls shearwall design

CTOTAL =	(floor above) + (this floor) =		+	320 lbs	= 320 lbs	Wind controls
TTOTAL =	(floor above) + (this floor) =		+	5 lbs	= 5 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 = 231 lbs

NO HOLDOWNS REQUIRED: OK

UPPER LEFT SHEARWALL

Floor Info

Upper	Floor Level, e.g. Upper, Main, Lower
Ft-Rr	Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type Values from table 4.3A of the AF&PA SDPWS-2015
ROOF	Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)
4.00 ft	Total Length of Shearwalls

V(from upper)=	432 lb	3449 lb
V(from main)=	0 lb	0 lb
V(from lower)=	0 lb	0 lb
Σ (Ωιvδ) =	432 lb	Σ (Σμχ) = 3,449 lb
v =	54 PLF	v = 431 PLF

3x framing required per IBC

WIND

Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Main Floor): tributary width; total width
Tributary Width (Lower Floor): tributary width; total width

SEISMIC

Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Main Floor): tributary area; total area
Tributary Area (Lower Floor): tributary area; total area

Height of Shearwall = 5.5 ft
Length of Shearwall = 2.0 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 3.0 ft
Length of adjoining wall = 2.8 ft

AF&PA SDPWS-2015 (2w/h) x 0.93 x 665 = 450 PLF USE 4

Seismic controls shearwall design

CTOTAL =	(floor above) + (this floor) =		+	1660 lbs	= 1660 lbs	Seismic controls
TTOTAL =	(floor above) + (this floor) =		+	1483 lbs	= 1483 lbs	Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1824 lbs

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

MAIN FRONT — SHEARWALL

Floor Info
- Main — Floor Level, e.g. Upper, Main, Lower
- Lt-Rt — Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)
- CDX — Sheathing type. Values from table 4.3A of the AF&PA SDPWS-2015
- U/FL — Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)
- 24.75 ft — Total Length of Shearwalls

V(from upper)=	3678 lb	3449 lb
V(from main)=	2783 lb	3443 lb
V(from lower)=	0 lb	0 lb
Σ (Ωιvδ) =	6,461 lb	Σ (Σμχ) = 6,891 lb
v =	131 PLF	v = 139 PLF

WIND
- Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
- Tributary Width (Main Floor): 1.0 tributary width; 2.0 total width
- Tributary Width (Lower Floor): tributary width; total width
- Height of Shearwall = 7.7 ft
- Length of Shearwall = 12.0 ft
- Aspect Ratio OK
- Use alternate R factor for seismic? No

SEISMIC
- Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
- Tributary Area (Main Floor): 1.0 tributary area; 2.0 total area
- Tributary Area (Lower Floor): tributary area; total area
- Weight of Shearwall = 10.0 lbs
- Tributary width for dead load = 4.3 ft
- Length of adjoining wall = 3.8 ft

AF&PA SDPWS-2015: 0.93 x 230 = 214 PLF — USE 1

Seismic controls shearwall design

CTOTAL =	(floor above) + (this floor) =	320	+	1001 lbs	=	1321 lbs	Wind controls
TTOTAL =	(floor above) + (this floor) =	5	+	155 lbs	=	160 lbs	Load case 8 controls - Seismic

Wind controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 821 lbs

NO HOLDOWNS REQUIRED — OK

MAIN REAR — SHEARWALL

Floor Info
- MAIN — Floor Level, e.g. Upper, Main, Lower
- Lt-Rt — Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)
- CDX — Sheathing type. Values from table 4.3A of the AF&PA SDPWS-2015
- U/FL — Resisting Dead Load
- 9.25 ft — Total Length of Shearwalls

V(from upper)=	3678 lb	3449 lb
V(from main)=	2783 lb	3443 lb
V(from lower)=	0 lb	0 lb
Σ (Ωιvδ) =	6,461 lb	Σ (Σμχ) = 6,891 lb
v =	349 PLF	v = 373 PLF

3x framing required per IBC

WIND
- Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
- Tributary Width (Main Floor): 1.0 tributary width; 2.0 total width
- Tributary Width (Lower Floor): tributary width; total width
- Height of Shearwall = 8.0 ft
- Length of Shearwall = 2.5 ft
- Aspect Ratio OK
- Use alternate R factor for seismic? No

SEISMIC
- Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
- Tributary Area (Main Floor): 1.0 tributary area; 2.0 total area
- Tributary Area (Lower Floor): tributary area; total area
- Weight of Shearwall = 10.0 lbs
- Tributary width for dead load = 2.5 ft
- Length of adjoining wall = 3.8 ft

AF&PA SDPWS-2015: (2w/h) x 0.93 x 665 = 387 PLF — USE 4

Seismic controls shearwall design

CTOTAL =	(floor above) + (this floor) =	320		2794 lbs	=	3114 lbs	Wind controls
TTOTAL =	(floor above) + (this floor) =	5		2464 lbs	=	2469 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 = 2292 lbs

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

MAIN LEFT — SHEARWALL

Floor Info
- Upper — Floor Level, e.g. Upper, Main, Lower
- Ft-Rr — Load Direction, e.g. Left-Right, Front-Rear (For Left Wall, Use Front-Rear Load Direction)
- CDX — Sheathing type. Values from table 4.3A of the AF&PA SDPWS-2015
- U/FL — Resisting Dead Load (e.g. Roof, Upper Floor, Main Floor)
- 8.75 ft — Total Length of Shearwalls

V(from upper)=	432 lb	3449 lb
V(from main)=	0 lb	0 lb
V(from lower)=	0 lb	0 lb
Σ (Ωιvδ) =	432 lb	Σ (Σμχ) = 3,449 lb
v =	25 PLF	v = 197 PLF

WIND
- Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
- Tributary Width (Main Floor): 1.0 tributary width; 2.0 total width
- Tributary Width (Lower Floor): tributary width; total width
- Height of Shearwall = 7.7 ft
- Length of Shearwall = 2.5 ft
- Aspect Ratio OK
- Use alternate R factor for seismic? No

SEISMIC
- Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
- Tributary Area (Main Floor): 1.0 tributary area; 2.0 total area
- Tributary Area (Lower Floor): tributary area; total area
- Weight of Shearwall = 10.0 lbs
- Tributary width for dead load = 2.5 ft
- Length of adjoining wall = 3.7 ft

AF&PA SDPWS-2015: (2w/h) x 0.93 x 360 = 218 PLF — USE 2

Seismic controls shearwall design

CTOTAL =	(floor above) + (this floor) =	1660		1058 lbs	=	2718 lbs	Seismic controls
TTOTAL =	(floor above) + (this floor) =	1483		811 lbs	=	2294 lbs	Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 1163 lbs

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

MAIN RIGHT — SHEARWALL

Floor Info: Main — Floor Level, e.g. Upper, Main, Lower
Ft-Rr — Load Direction, e.g. Left-Right, Front-Rear
(For Left Wall, Use Front-Rear Load Direction)
CDX — Sheathing type
Values from table 4.3A of the AF&PA SDPWS-2015
U/FL — Resisting Dead Load
(e.g. Roof, Upper Floor, Main Floor)
5.25 ft — Total Length of Shearwalls

V(from upper)=	432 lb	3449 lb
V(from main)=	4505 lb	3443 lb
V(from lower)=	0 lb	0 lb
Σ (Ωiνδ) =	4,937 lb	Σ (Σμχ) = 6,891 lb
v =	470 PLF	v = 656 PLF

3x framing required per IBC

.F&PA SDPWS-2015 (2w/h) x 0.93 x 1330 = 806 PLF USE 7

Seismic controls shearwall design

CTOTAL = (floor above) + (this floor) = 0 — 3606 lbs = 3606 lbs — Wind controls
TTOTAL = (floor above) + (this floor) = 0 — 3077 lbs = 3077 lbs — Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 3872 lbs

USE SIMPSON DESIGNED HOLDOWN: MST48
OR AT FOUNDATION / INTERIOR WALLS USE: STHD10/RJ

WIND

Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Main Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Lower Floor): tributary width; total width

Height of Shearwall = 7.7 ft
Length of Shearwall = 2.5 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

SEISMIC

Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Main Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Lower Floor): tributary area; total area

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 10.3 ft
Length of adjoining wall = 3.5 ft

LOWER FRONT — SHEARWALL

Floor Info: Lower — Floor Level, e.g. Upper, Main, Lower
Lt-Rt — Load Direction, e.g. Left-Right, Front-Rear
(For Left Wall, Use Front-Rear Load Direction)
CDX — Sheathing type
Values from table 4.3A of the AF&PA SDPWS-2015
M/FL — Resisting Dead Load
(e.g. Roof, Upper Floor, Main Floor)
32.50 ft — Total Length of Shearwalls

V(from upper)=	3678 lb	3449 lb
V(from main)=	2783 lb	3443 lb
V(from lower)=	0 lb	2261 lb
Σ (Ωiνδ) =	6,461 lb	Σ (Σμχ) = 9,152 lb
v =	99 PLF	v = 141 PLF

AF&PA SDPWS-2015 (2w/h) x 0.93 x 230 = 143 PLF USE 1

ALT: HDU2 SDS2.5

Seismic controls shearwall design

CTOTAL = (floor above) + (this floor) = 1321 + 820 lbs = 2141 lbs — Wind controls
TTOTAL = (floor above) + (this floor) = 160 + 515 lbs = 675 lbs — Load case 8 controls - Seismic

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 894 lbs

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

WIND

Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Main Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Lower Floor): 1.0 tributary width; 2.0 total width

Height of Shearwall = 8.3 ft
Length of Shearwall = 2.8 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

SEISMIC

Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Main Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Lower Floor): 1.0 tributary area; 2.0 total area

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 2.5 ft
Length of adjoining wall = 4.3 ft
MAIN LEFT INTEI

LOWER REAR — SHEARWALL

Floor Info: Lower — Floor Level, e.g. Upper, Main, Lower
Lt/Rt — Load Direction, e.g. Left-Right, Front-Rear
(For Left Wall, Use Front-Rear Load Direction)
CDX — Sheathing type
Values from table 4.3A of the AF&PA SDPWS-2015
M/FL — Resisting Dead Load
(e.g. Roof, Upper Floor, Main Floor)
32.75 ft — Total Length of Shearwalls

V(from upper)=	432 lb	3449 lb
V(from main)=	4505 lb	3443 lb
V(from lower)=	4687 lb	2261 lb
Σ (Ωiνδ) =	9,624 lb	Σ (Σμχ) = 9,152 lb
v =	147 PLF	v = 140 PLF

AF&PA SDPWS-2015 0.93 x 230 = 214 PLF USE 1

ALT: HDU4 - SDS2.5

Seismic controls shearwall design

CTOTAL = (floor above) + (this floor) = 3114 + 1212 lbs = 4326 lbs — Wind controls
TTOTAL = (floor above) + (this floor) = 2469 + 75 lbs = 2544 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 = 887 lbs

NO HOLDOWNS REQUIRED
OR AT FOUNDATION / INTERIOR WALLS USE: MST48 / STHD10/RJ

WIND

Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Main Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Lower Floor): 1.0 tributary width; 2.0 total width

Height of Shearwall = 8.3 ft
Length of Shearwall = 11.0 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

SEISMIC

Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Main Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Lower Floor): 1.0 tributary area; 2.0 total area

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 9.8 ft
Length of adjoining wall = 4.0 ft

LOWER LEFT SHEARWALL

Floor Info

Lower	Floor Level, e.g. Upper, Main, Lower
Ft/Rr	Load Direction, e.g. Left-Right, Front-Rear
	(For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type
	Values from table 4.3A of the AF&PA SDPWS-2015
M/FL	Resisting Dead Load
	(e.g. Roof, Upper Floor, Main Floor)
3.50 ft	Total Length of Shearwalls

WIND

Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Main Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Lower Floor): 1.0 tributary width; 2.0 total width

SEISMIC

Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Main Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Lower Floor): 1.0 tributary area; 2.0 total area

V(from upper)=	432 lb	3449 lb
V(from main)=	4505 lb	3443 lb
V(from lower)=	4687 lb	2261 lb
Σ (Ωιvδ) =	9,624 lb	Σ (Σμχ) = 9,152 lb
v =	1375 PLF	v = 1307 PLF

Height of Shearwall = 5.8 ft
Length of Shearwall = 1.8 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 2.5 ft
Length of adjoining wall = 4.0 ft

3x framing required per IBC

\F&PA SDPWS-2015 (2w/h) x 0.93 x 1740 = 985 PLF USE 8

CHOOSE LARGER SIZE HOLDOWN!

Seismic controls shearwall design

CTOTAL =	(floor above) + (this floor) =	2718	+	7905 lbs	=	10623 lbs	Wind controls
TTOTAL =	(floor above) + (this floor) =	2294	+	7649 lbs	=	9943 lbs	Load case 8 controls - Wind

Seismic controls holdown design

Where overstrength factor is applicable, use this value for E in equations 5, 6, and 8: E = 5783 lbs

USE SIMPSON DESIGNED HOLDOWN: HHDQ14-SDS2.5

LOWER RIGHT SHEARWALL

Floor Info

Lower	Floor Level, e.g. Upper, Main, Lower
Ft/Rr	Load Direction, e.g. Left-Right, Front-Rear
	(For Left Wall, Use Front-Rear Load Direction)
CDX	Sheathing type
	Values from table 4.3A of the AF&PA SDPWS-2015
M/FL	Resisting Dead Load
	(e.g. Roof, Upper Floor, Main Floor)
4.75 ft	Total Length of Shearwalls

WIND

Tributary Width (Upper Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Main Floor): 1.0 tributary width; 2.0 total width
Tributary Width (Lower Floor): 1.0 tributary width; 2.0 total width

SEISMIC

Tributary Area (Upper Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Main Floor): 1.0 tributary area; 2.0 total area
Tributary Area (Lower Floor): 1.0 tributary area; 2.0 total area

V(from upper)=	432 lb	3449 lb
V(from main)=	4505 lb	3443 lb
V(from lower)=	4687 lb	2261 lb
Σ (Ωιvδ) =	9,624 lb	Σ (Σμχ) = 9,152 lb
v =	1013 PLF	v = 963 PLF

Height of Shearwall = 8.3 ft
Length of Shearwall = 2.4 ft
Aspect Ratio OK
Use alternate R factor for seismic? No

Weight of Shearwall = 10.0 lbs
Tributary width for dead load = 10.5 ft
Length of adjoining wall = 4.0 ft

3x framing required per IBC

.F&PA SDPWS-2015 (2w/h) x 0.93 x 1740 = 926 PLF USE 8

CHOOSE LARGER SIZE HOLDOWN!

Seismic controls shearwall design

CTOTAL =	(floor above) + (this floor) =	3606	+	8358 lbs	=	11964 lbs	Wind controls
TTOTAL =	(floor above) + (this floor) =	3077	+	7710 lbs	=	10787 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 = 6114 lbs

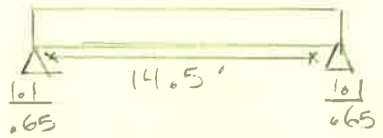
USE SIMPSON DESIGNED HOLDOWN: HHDQ14-SDS2.5

APPLETON	07/11/2018	8465

BEAM (9A)

$w = (15psf + 25psf)(6ft) = \frac{150}{\text{COMPUTER GENERATED 9A 9C}}$ plf

6X10 PT DF #1



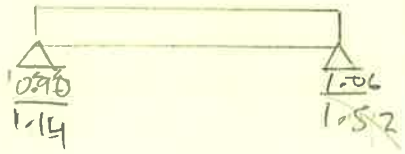
BEAM (9B)

$w_1 = (15psf + 25psf)(2ft)$

$w_2 = (15psf + 25psf)(3.75ft) + (8ft \times 10lb)$

COMPUTER GENERATED

5.125 X 12 GLULAM 24F-V4

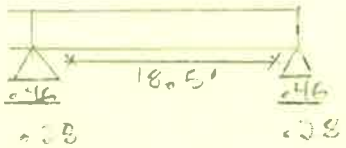


BEAM (9C)

$w = (15psf + 25psf)(2ft) = \frac{.05}{.03}$ plf

COMPUTER GENERATED 9C

2X12 : DF #1

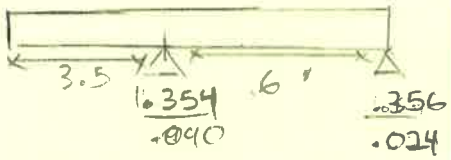


BEAM (9D) (edit)

$w = (10psf + 90psf)(2ft) = \frac{180}{20}$ plf

COMPUTER GENERATED 9D

2X8 PT HF #1

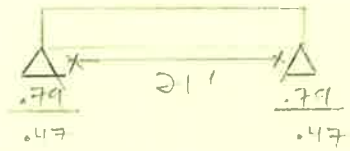


BEAM (9E)

$w = (15psf + 25psf)(3ft) = \frac{75}{45}$ plf

COMPUTER GENERATED 9E

6X12 DF #1

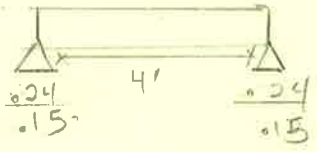


BEAM (9F)

$w = (15psf + 25psf)(3.25ft) = \frac{81.25}{48.75}$

COMPUTER GENERATED 9F

2-2X12 PT DF #2



BEAM (9G)

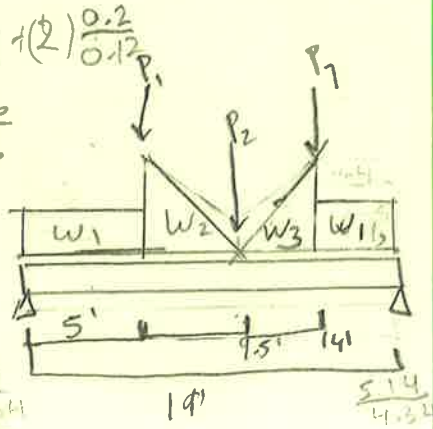
$w_1 = (9+10.5')(15+25) = \frac{0.488}{0.293}$ KIP $P_1 = \frac{1.06}{1.52}$

$w_2 = (2.25 \times 10 \div 5')(15+25) = \frac{0.319}{0.191}$ KIP

w_2 to 0 over 4.5'

$w_3 = 0 \rightarrow w_2$ over 4.5'

$P_2 = \frac{1.06}{1.52} + (2)\frac{0.2}{0.12} = \frac{1.46}{1.76}$



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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 11 JUL 2018, 4:26PM

File = C:\Users\sdapg\DOCUME~1\ENERCA~1\8465.ec6

Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 1

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

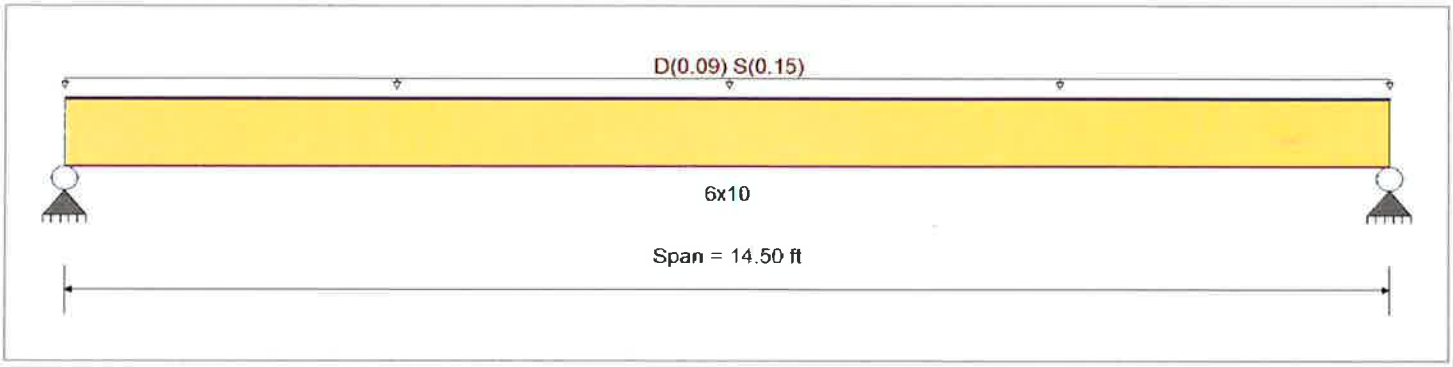
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

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

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.20 pcf



Applied Loads

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

Uniform Load : D = 0.090, S = 0.150 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.737 : 1	Maximum Shear Stress Ratio	=	0.287 : 1
Section used for this span		6x10	Section used for this span		6x10
fb : Actual	=	914.91 psi	fv : Actual	=	44.85 psi
FB : Allowable	=	1,242.00 psi	Fv : Allowable	=	156.40 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
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	0.251 in	Ratio =	692 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.402 in	Ratio =	432 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.353	0.137	0.90	1.000	0.80	1.00	1.00	1.00	1.00	2.37	343.09	972.00	0.59	16.82	122.40
+D+L+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.318	0.124	1.00	1.000	0.80	1.00	1.00	1.00	1.00	2.37	343.09	1080.00	0.59	16.82	136.00
+D+Lr+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.254	0.099	1.25	1.000	0.80	1.00	1.00	1.00	1.00	2.37	343.09	1350.00	0.59	16.82	170.00
+D+S+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.737	0.287	1.15	1.000	0.80	1.00	1.00	1.00	1.00	6.31	914.91	1242.00	1.56	44.85	156.40
+D+0.750Lr+0.750L+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.254	0.099	1.25	1.000	0.80	1.00	1.00	1.00	1.00	2.37	343.09	1350.00	0.59	16.82	170.00

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 11 JUL 2018, 4:26PM

Wood Beam

File = C:\Users\sdapg\DOCUME~1\ENERCA~1\8465.ec6

Lic. # : KW-06011301 **Licensee : Covington**

Description : BEAM 1

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+0.750L+0.750S+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.622	0.242	1.15	1.000	0.80	1.00	1.00	1.00	1.00	5.32	771.96	1242.00	1.32	37.84	156.40
+D+0.60W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.199	0.077	1.60	1.000	0.80	1.00	1.00	1.00	1.00	2.37	343.09	1728.00	0.59	16.82	217.60
+D+0.70E+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.199	0.077	1.60	1.000	0.80	1.00	1.00	1.00	1.00	2.37	343.09	1728.00	0.59	16.82	217.60
+D+0.750Lr+0.750L+0.450W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.199	0.077	1.60	1.000	0.80	1.00	1.00	1.00	1.00	2.37	343.09	1728.00	0.59	16.82	217.60
+D+0.750L+0.750S+0.450W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.447	0.174	1.60	1.000	0.80	1.00	1.00	1.00	1.00	5.32	771.96	1728.00	1.32	37.84	217.60
+D+0.750L+0.750S+0.5250E+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.447	0.174	1.60	1.000	0.80	1.00	1.00	1.00	1.00	5.32	771.96	1728.00	1.32	37.84	217.60
+0.60D+0.60W+0.60H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.119	0.046	1.60	1.000	0.80	1.00	1.00	1.00	1.00	1.42	205.86	1728.00	0.35	10.09	217.60
+0.60D+0.70E+0.60H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 14.50 ft	1	0.119	0.046	1.60	1.000	0.80	1.00	1.00	1.00	1.00	1.42	205.86	1728.00	0.35	10.09	217.60

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.4020	7.303		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.740	1.740
Overall MINimum	1.088	1.088
+D+H	0.653	0.653
+D+L+H	0.653	0.653
+D+Lr+H	0.653	0.653
+D+S+H	1.740	1.740
+D+0.750Lr+0.750L+H	0.653	0.653
+D+0.750L+0.750S+H	1.468	1.468
+D+0.60W+H	0.653	0.653
+D+0.70E+H	0.653	0.653
+D+0.750Lr+0.750L+0.450W+H	0.653	0.653
+D+0.750L+0.750S+0.450W+H	1.468	1.468
+D+0.750L+0.750S+0.5250E+H	1.468	1.468
+0.60D+0.60W+0.60H	0.392	0.392
+0.60D+0.70E+0.60H	0.392	0.392
D Only	0.653	0.653
Lr Only		
L Only		
S Only	1.088	1.088
W Only		
E Only		
H Only		

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 12 JUL 2018, 8:07AM

Wood Beam

File = C:\Users\sdapg\DOCUME~1\ENERCA~1\8465.ec6

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 2

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

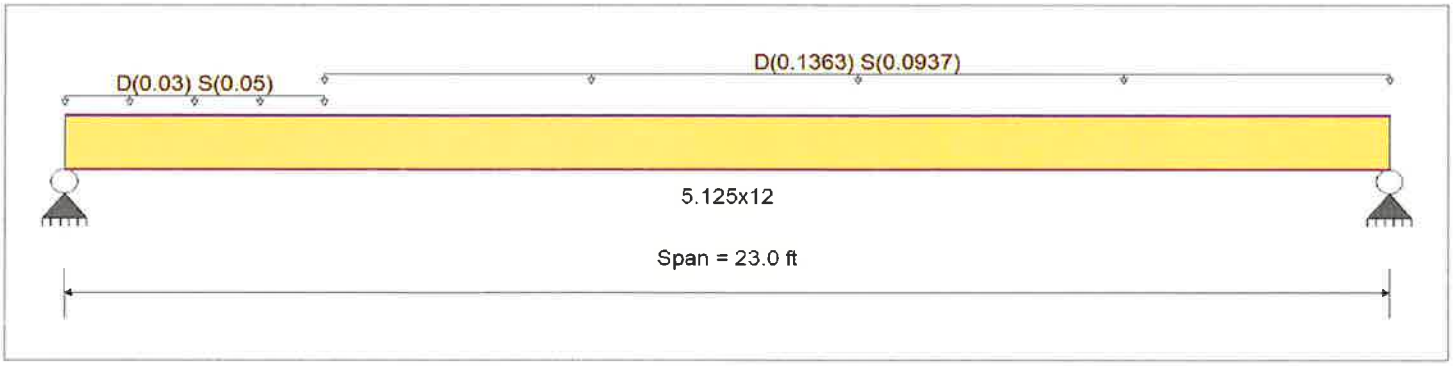
Wood Species : DF/DF
Wood Grade : 24F - V4

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	31.20 pcf



Applied Loads

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

Load for Span Number 1
Uniform Load : D = 0.030, S = 0.050 k/ft, Extent = 0.0 -->> 4.50 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.1363, S = 0.09370 k/ft, Extent = 4.50 -->> 23.0 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.520 : 1	Maximum Shear Stress Ratio	=	0.189 : 1
Section used for this span		5.125x12	Section used for this span		5.125x12
fb : Actual	=	1,410.61 psi	fv : Actual	=	57.72 psi
FB : Allowable	=	2,710.24 psi	Fv : Allowable	=	304.75 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	11.752 ft	Location of maximum on span	=	22.077 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.451 in	Ratio =	612 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	1.087 in	Ratio =	253 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.390	0.143	0.90	0.991	1.00	1.00	1.00	1.00	1.00	8.48	827.58	2121.06	1.39	34.02	238.50
+D+L+H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.351	0.128	1.00	0.991	1.00	1.00	1.00	1.00	1.00	8.48	827.58	2356.73	1.39	34.02	265.00
+D+Lr+H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.281	0.103	1.25	0.991	1.00	1.00	1.00	1.00	1.00	8.48	827.58	2945.91	1.39	34.02	331.25

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 12 JUL 2018, 8:07AM

Wood Beam

File = C:\Users\sdapg\DOCUME~1\ENERCA~1\8465.ec6

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Description : BEAM 2

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+S+H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.520	0.189	1.15	0.991	1.00	1.00	1.00	1.00	1.00	14.46	1,410.61	2710.24	2.37	57.72	304.75
+D+0.750Lr+0.750L+H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.281	0.103	1.25	0.991	1.00	1.00	1.00	1.00	1.00	8.48	827.58	2945.91	1.39	34.02	331.25
+D+0.750L+0.750S+H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.467	0.170	1.15	0.991	1.00	1.00	1.00	1.00	1.00	12.96	1,264.84	2710.24	2.12	51.80	304.75
+D+0.60W+H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.219	0.080	1.60	0.991	1.00	1.00	1.00	1.00	1.00	8.48	827.58	3770.77	1.39	34.02	424.00
+D+0.70E+H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.219	0.080	1.60	0.991	1.00	1.00	1.00	1.00	1.00	8.48	827.58	3770.77	1.39	34.02	424.00
+D+0.750Lr+0.750L+0.450W+H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.219	0.080	1.60	0.991	1.00	1.00	1.00	1.00	1.00	8.48	827.58	3770.77	1.39	34.02	424.00
+D+0.750L+0.750S+0.450W+H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.335	0.122	1.60	0.991	1.00	1.00	1.00	1.00	1.00	12.96	1,264.84	3770.77	2.12	51.80	424.00
+D+0.750L+0.750S+0.5250E+H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.335	0.122	1.60	0.991	1.00	1.00	1.00	1.00	1.00	12.96	1,264.84	3770.77	2.12	51.80	424.00
+0.60D+0.60W+0.60H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.132	0.048	1.60	0.991	1.00	1.00	1.00	1.00	1.00	5.09	496.55	3770.77	0.84	20.41	424.00
+0.60D+0.70E+0.60H					0.991	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 23.0 ft	1	0.132	0.048	1.60	0.991	1.00	1.00	1.00	1.00	1.00	5.09	496.55	3770.77	0.84	20.41	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	1.0868	11.668		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.036	2.579
Overall MINimum	0.900	1.058
+D+H	1.136	1.521
+D+L+H	1.136	1.521
+D+Lr+H	1.136	1.521
+D+S+H	2.036	2.579
+D+0.750Lr+0.750L+H	1.136	1.521
+D+0.750L+0.750S+H	1.811	2.314
+D+0.60W+H	1.136	1.521
+D+0.70E+H	1.136	1.521
+D+0.750Lr+0.750L+0.450W+H	1.136	1.521
+D+0.750L+0.750S+0.450W+H	1.811	2.314
+D+0.750L+0.750S+0.5250E+H	1.811	2.314
+0.60D+0.60W+0.60H	0.682	0.912
+0.60D+0.70E+0.60H	0.682	0.912
D Only	1.136	1.521
Lr Only		
L Only		
S Only	0.900	1.058
W Only		
E Only		
H Only		

Title Block Line 1
You can change this area
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and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 11 JUL 2018, 4:29PM

Wood Beam

File = C:\Users\sdapg\DOCUME~1\ENERCA~1\8465.ec6

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 3

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Douglas Fir - Larch
Wood Grade : No.1

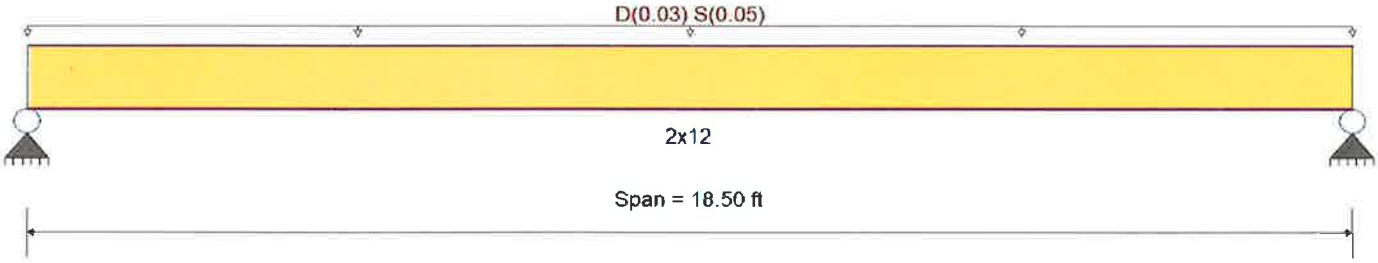
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	1,350.0 psi
Fb -	1,350.0 psi
Fc - Prll	925.0 psi
Fc - Perp	625.0 psi
Fv	170.0 psi
Ft	675.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	31.20 pcf

Repetitive Member Stress Increase



Applied Loads

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

Uniform Load : D = 0.030, S = 0.050 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.909** : 1	Maximum Shear Stress Ratio	=	**0.381** : 1
Section used for this span		**2x12**	Section used for this span		**2x12**
fb : Actual	=	1,298.01 psi	fv : Actual	=	59.54 psi
FB : Allowable	=	1,428.30 psi	Fv : Allowable	=	156.40 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	9.250 ft	Location of maximum on span	=	17.622 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.490 in	Ratio =	453 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.784 in	Ratio =	283 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.435	0.182	0.90	1.000	0.80	1.15	1.00	1.00	1.00	1.28	486.76	1117.80	0.25	22.33	122.40
+D+L+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.392	0.164	1.00	1.000	0.80	1.15	1.00	1.00	1.00	1.28	486.76	1242.00	0.25	22.33	136.00
+D+Lr+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.314	0.131	1.25	1.000	0.80	1.15	1.00	1.00	1.00	1.28	486.76	1552.50	0.25	22.33	170.00
+D+S+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.909	0.381	1.15	1.000	0.80	1.15	1.00	1.00	1.00	3.42	1,298.01	1428.30	0.67	59.54	156.40
+D+0.750Lr+0.750L+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.314	0.131	1.25	1.000	0.80	1.15	1.00	1.00	1.00	1.28	486.76	1552.50	0.25	22.33	170.00

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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Wood Beam

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Description : BEAM 3

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+0.750L+0.750S+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.767	0.321	1.15	1.000	0.80	1.15	1.00	1.00	1.00	2.89	1,095.20	1428.30	0.57	50.23	156.40
+D+0.60W+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.245	0.103	1.60	1.000	0.80	1.15	1.00	1.00	1.00	1.28	486.76	1987.20	0.25	22.33	217.60
+D+0.70E+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.245	0.103	1.60	1.000	0.80	1.15	1.00	1.00	1.00	1.28	486.76	1987.20	0.25	22.33	217.60
+D+0.750Lr+0.750L+0.450W+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.245	0.103	1.60	1.000	0.80	1.15	1.00	1.00	1.00	1.28	486.76	1987.20	0.25	22.33	217.60
+D+0.750L+0.750S+0.450W+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.551	0.231	1.60	1.000	0.80	1.15	1.00	1.00	1.00	2.89	1,095.20	1987.20	0.57	50.23	217.60
+D+0.750L+0.750S+0.5250E+H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.551	0.231	1.60	1.000	0.80	1.15	1.00	1.00	1.00	2.89	1,095.20	1987.20	0.57	50.23	217.60
+0.60D+0.60W+0.60H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.147	0.062	1.60	1.000	0.80	1.15	1.00	1.00	1.00	0.77	292.05	1987.20	0.15	13.40	217.60
+0.60D+0.70E+0.60H					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.50 ft	1	0.147	0.062	1.60	1.000	0.80	1.15	1.00	1.00	1.00	0.77	292.05	1987.20	0.15	13.40	217.60

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.7839	9.318		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.740	0.740
Overall MINimum	0.463	0.463
+D+H	0.278	0.278
+D+L+H	0.278	0.278
+D+Lr+H	0.278	0.278
+D+S+H	0.740	0.740
+D+0.750Lr+0.750L+H	0.278	0.278
+D+0.750L+0.750S+H	0.624	0.624
+D+0.60W+H	0.278	0.278
+D+0.70E+H	0.278	0.278
+D+0.750Lr+0.750L+0.450W+H	0.278	0.278
+D+0.750L+0.750S+0.450W+H	0.624	0.624
+D+0.750L+0.750S+0.5250E+H	0.624	0.624
+0.60D+0.60W+0.60H	0.167	0.167
+0.60D+0.70E+0.60H	0.167	0.167
D Only	0.278	0.278
Lr Only		
L Only		
S Only	0.463	0.463
W Only		
E Only		
H Only		

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

4D

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : ROOF DECK JOISTS

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

Wood Species : Hem Fir
Wood Grade : No.1

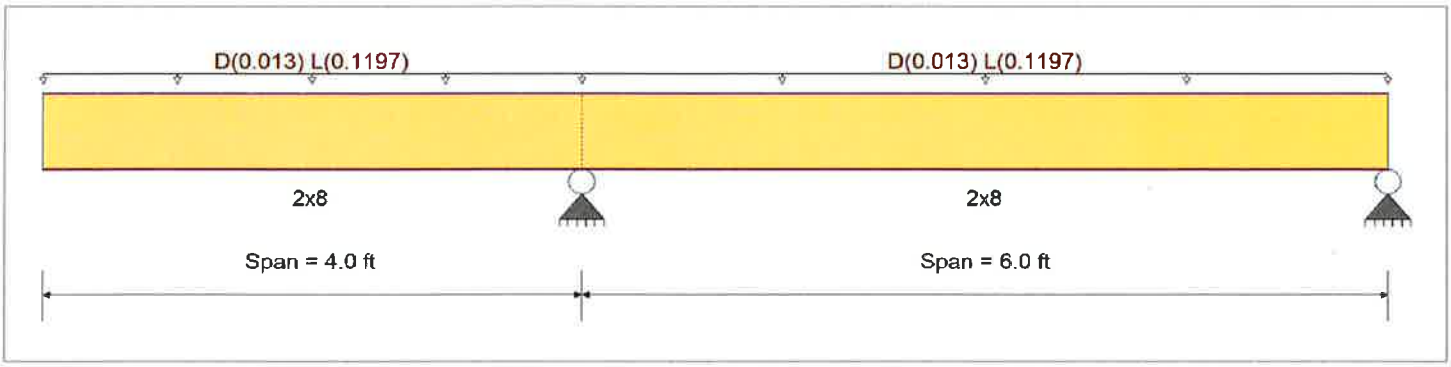
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	975 psi
Fb -	975 psi
Fc - Prll	850 psi
Fc - Perp	405 psi
Fv	140 psi
Ft	650 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	26.83 pcf

Repetitive Member Stress Increase



Applied Loads

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

Load for Span Number 1
Uniform Load : D = 0.0130, L = 0.1197 , Tributary Width = 1.0 ft

Load for Span Number 2
Uniform Load : D = 0.0130, L = 0.1197 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.693 : 1	Maximum Shear Stress Ratio	=	0.469 : 1
Section used for this span		2x8	Section used for this span		2x8
fb : Actual	=	969.45 psi	fv : Actual	=	68.27 psi
FB : Allowable	=	1,399.32 psi	Fv : Allowable	=	145.60 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
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	0.211 in	Ratio =	454 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.234 in	Ratio =	408 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.075	0.051	0.90	1.200	0.80	1.15	1.30	1.00	1.00	0.10	94.97	1259.39	0.05	6.69	131.04
Length = 6.0 ft	2	0.075	0.051	0.90	1.200	0.80	1.15	1.30	1.00	1.00	0.10	94.97	1259.39	0.05	6.69	131.04
+D+L+H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.693	0.469	1.00	1.200	0.80	1.15	1.30	1.00	1.00	1.06	969.45	1399.32	0.49	68.27	145.60

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

9D

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : ROOF DECK JOISTS

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 = 6.0 ft	2	0.693	0.469	1.00	1.200	0.80	1.15	1.30	1.00	1.00	1.06	969.45	1399.32	0.49	68.27	145.60
+D+Lr+H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.054	0.037	1.25	1.200	0.80	1.15	1.30	1.00	1.00	0.10	94.97	1749.15	0.05	6.69	182.00
Length = 6.0 ft	2	0.054	0.037	1.25	1.200	0.80	1.15	1.30	1.00	1.00	0.10	94.97	1749.15	0.05	6.69	182.00
+D+S+H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.059	0.040	1.15	1.200	0.80	1.15	1.30	1.00	1.00	0.10	94.97	1609.22	0.05	6.69	167.44
Length = 6.0 ft	2	0.059	0.040	1.15	1.200	0.80	1.15	1.30	1.00	1.00	0.10	94.97	1609.22	0.05	6.69	167.44
+D+0.750Lr+0.750L+H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.429	0.291	1.25	1.200	0.80	1.15	1.30	1.00	1.00	0.82	750.83	1749.15	0.38	52.88	182.00
Length = 6.0 ft	2	0.429	0.291	1.25	1.200	0.80	1.15	1.30	1.00	1.00	0.82	750.83	1749.15	0.38	52.88	182.00
+D+0.750L+0.750S+H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.467	0.316	1.15	1.200	0.80	1.15	1.30	1.00	1.00	0.82	750.83	1609.22	0.38	52.88	167.44
Length = 6.0 ft	2	0.467	0.316	1.15	1.200	0.80	1.15	1.30	1.00	1.00	0.82	750.83	1609.22	0.38	52.88	167.44
+D+0.60W+H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.042	0.029	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.10	94.97	2238.91	0.05	6.69	232.96
Length = 6.0 ft	2	0.042	0.029	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.10	94.97	2238.91	0.05	6.69	232.96
+D+0.70E+H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.042	0.029	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.10	94.97	2238.91	0.05	6.69	232.96
Length = 6.0 ft	2	0.042	0.029	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.10	94.97	2238.91	0.05	6.69	232.96
+D+0.750Lr+0.750L+0.450W+H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.335	0.227	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.82	750.83	2238.91	0.38	52.88	232.96
Length = 6.0 ft	2	0.335	0.227	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.82	750.83	2238.91	0.38	52.88	232.96
+D+0.750L+0.750S+0.450W+H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.335	0.227	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.82	750.83	2238.91	0.38	52.88	232.96
Length = 6.0 ft	2	0.335	0.227	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.82	750.83	2238.91	0.38	52.88	232.96
+D+0.750L+0.750S+0.5250E+H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.335	0.227	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.82	750.83	2238.91	0.38	52.88	232.96
Length = 6.0 ft	2	0.335	0.227	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.82	750.83	2238.91	0.38	52.88	232.96
+0.60D+0.60W+0.60H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.025	0.017	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.06	56.98	2238.91	0.03	4.01	232.96
Length = 6.0 ft	2	0.025	0.017	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.06	56.98	2238.91	0.03	4.01	232.96
+0.60D+0.70E+0.60H					1.200	0.80	1.15	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.025	0.017	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.06	56.98	2238.91	0.03	4.01	232.96
Length = 6.0 ft	2	0.025	0.017	1.60	1.200	0.80	1.15	1.30	1.00	1.00	0.06	56.98	2238.91	0.03	4.01	232.96

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2343	0.000		0.0000	0.000
+D+L+H	2	0.0027	4.760	+D+L+H	-0.0153	1.274

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum		1.106	0.221
Overall MINimum		0.998	0.200
+D+H		0.108	0.022
+D+L+H		1.106	0.221
+D+Lr+H		0.108	0.022
+D+S+H		0.108	0.022
+D+0.750Lr+0.750L+H		0.856	0.171
+D+0.750L+0.750S+H		0.856	0.171
+D+0.60W+H		0.108	0.022
+D+0.70E+H		0.108	0.022
+D+0.750Lr+0.750L+0.450W+H		0.856	0.171
+D+0.750L+0.750S+0.450W+H		0.856	0.171
+D+0.750L+0.750S+0.5250E+H		0.856	0.171
+0.60D+0.60W+0.60H		0.065	0.013
+0.60D+0.70E+0.60H		0.065	0.013
D Only		0.108	0.022
Lr Only			

Wood Beam

Description : ROOF DECK JOISTS

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
L Only		0.998	0.200
S Only			
W Only			
E Only			
H Only			

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Title Block Line 6

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Wood Beam

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Lic. # : KW-06011301 — Licensee : Covington

Description : BEAM 5

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

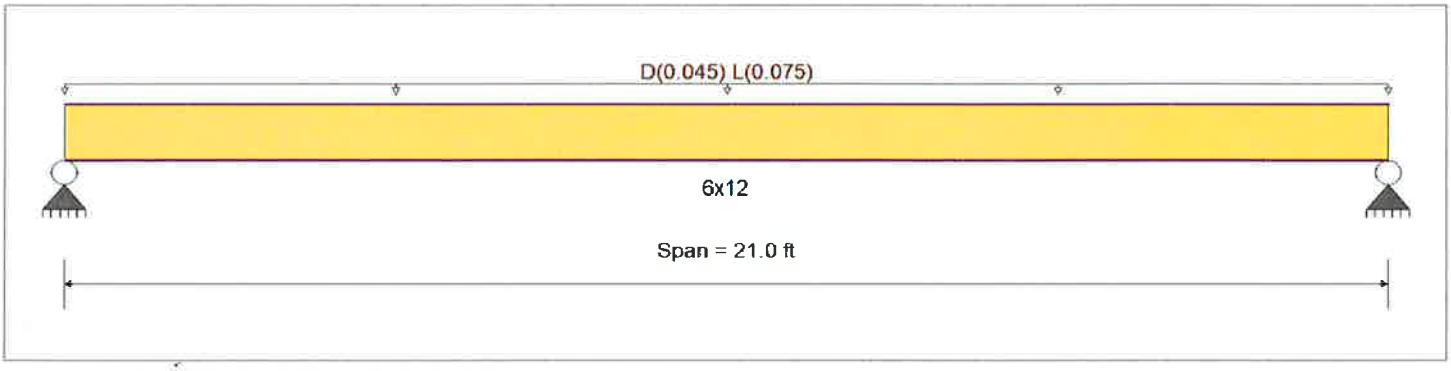
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

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

Fb +	1200 psi
Fb -	1200 psi
Fc - Prll	1000 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	825 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.2 pcf



Applied Loads

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

Uniform Load : D = 0.0450, L = 0.0750 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.682 : 1	Maximum Shear Stress Ratio	=	0.200 : 1
Section used for this span		6x12	Section used for this span		6x12
fb : Actual	=	654.79 psi	fv : Actual	=	27.26 psi
FB : Allowable	=	960.00 psi	Fv : Allowable	=	136.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	10.500 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	0.312 in	Ratio =	808 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.498 in	Ratio =	505 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.284	0.084	0.90	1.000	0.80	1.00	1.00	1.00	1.00	2.48	245.55	864.00	0.43	10.22	122.40
+D+L+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.682	0.200	1.00	1.000	0.80	1.00	1.00	1.00	1.00	6.62	654.79	960.00	1.15	27.26	136.00
+D+Lr+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.205	0.060	1.25	1.000	0.80	1.00	1.00	1.00	1.00	2.48	245.55	1200.00	0.43	10.22	170.00
+D+S+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.222	0.065	1.15	1.000	0.80	1.00	1.00	1.00	1.00	2.48	245.55	1104.00	0.43	10.22	156.40
+D+0.750Lr+0.750L+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.460	0.135	1.25	1.000	0.80	1.00	1.00	1.00	1.00	5.58	552.48	1200.00	0.97	23.00	170.00

Title Block Line 1
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Wood Beam

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Description : BEAM 5

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+0.750L+0.750S+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.500	0.147	1.15	1.000	0.80	1.00	1.00	1.00	1.00	5.58	552.48	1104.00	0.97	23.00	156.40
+D+0.60W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.160	0.047	1.60	1.000	0.80	1.00	1.00	1.00	1.00	2.48	245.55	1536.00	0.43	10.22	217.60
+D+0.70E+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.160	0.047	1.60	1.000	0.80	1.00	1.00	1.00	1.00	2.48	245.55	1536.00	0.43	10.22	217.60
+D+0.750Lr+0.750L+0.450W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.360	0.106	1.60	1.000	0.80	1.00	1.00	1.00	1.00	5.58	552.48	1536.00	0.97	23.00	217.60
+D+0.750L+0.750S+0.450W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.360	0.106	1.60	1.000	0.80	1.00	1.00	1.00	1.00	5.58	552.48	1536.00	0.97	23.00	217.60
+D+0.750L+0.750S+0.5250E+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.360	0.106	1.60	1.000	0.80	1.00	1.00	1.00	1.00	5.58	552.48	1536.00	0.97	23.00	217.60
+0.60D+0.60W+0.60H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.096	0.028	1.60	1.000	0.80	1.00	1.00	1.00	1.00	1.49	147.33	1536.00	0.26	6.13	217.60
+0.60D+0.70E+0.60H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 21.0 ft	1	0.096	0.028	1.60	1.000	0.80	1.00	1.00	1.00	1.00	1.49	147.33	1536.00	0.26	6.13	217.60

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.4985	10.577		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.260	1.260
Overall MINimum	0.788	0.788
+D+H	0.473	0.473
+D+L+H	1.260	1.260
+D+Lr+H	0.473	0.473
+D+S+H	0.473	0.473
+D+0.750Lr+0.750L+H	1.063	1.063
+D+0.750L+0.750S+H	1.063	1.063
+D+0.60W+H	0.473	0.473
+D+0.70E+H	0.473	0.473
+D+0.750Lr+0.750L+0.450W+H	1.063	1.063
+D+0.750L+0.750S+0.450W+H	1.063	1.063
+D+0.750L+0.750S+0.5250E+H	1.063	1.063
+0.60D+0.60W+0.60H	0.284	0.284
+0.60D+0.70E+0.60H	0.284	0.284
D Only	0.473	0.473
Lr Only		
L Only	0.788	0.788
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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Wood Beam

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Description : BEAM 6

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

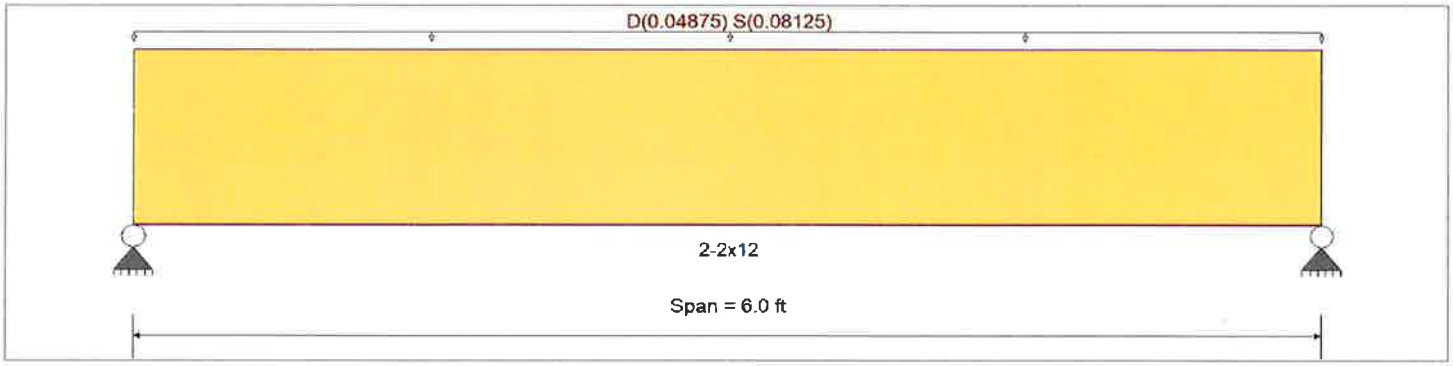
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

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

Fb +	1200 psi
Fb -	1200 psi
Fc - Prll	1000 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	825 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.2 pcf



Applied Loads

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

Uniform Load : D = 0.04875, S = 0.08125 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.100 : 1	Maximum Shear Stress Ratio	=	0.077 : 1
Section used for this span		2-2x12	Section used for this span		2-2x12
fb : Actual	=	110.93 psi	fv : Actual	=	12.02 psi
FB : Allowable	=	1,104.00 psi	Fv : Allowable	=	156.40 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
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	0.004 in	Ratio =	16346 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.007 in	Ratio =	10216 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.048	0.037	0.90							0.22	41.60	864.00	0.10	4.51	122.40
+D+L+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.043	0.033	1.00							0.22	41.60	960.00	0.10	4.51	136.00
+D+Lr+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.035	0.027	1.25							0.22	41.60	1200.00	0.10	4.51	170.00
+D+S+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.100	0.077	1.15							0.59	110.93	1104.00	0.27	12.02	156.40
+D+0.750Lr+0.750L+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.035	0.027	1.25							0.22	41.60	1200.00	0.10	4.51	170.00

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Wood Beam

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Description : BEAM 6

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+0.750L+0.750S+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.085	0.065	1.15	1.000	0.80	1.00	1.00	1.00	1.00	0.49	93.60	1104.00	0.23	10.14	156.40
+D+0.60W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.027	0.021	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.22	41.60	1536.00	0.10	4.51	217.60
+D+0.70E+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.027	0.021	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.22	41.60	1536.00	0.10	4.51	217.60
+D+0.750Lr+0.750L+0.450W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.027	0.021	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.22	41.60	1536.00	0.10	4.51	217.60
+D+0.750L+0.750S+0.450W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.061	0.047	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.49	93.60	1536.00	0.23	10.14	217.60
+D+0.750L+0.750S+0.5250E+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.061	0.047	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.49	93.60	1536.00	0.23	10.14	217.60
+0.60D+0.60W+0.60H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.016	0.012	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.13	24.96	1536.00	0.06	2.70	217.60
+0.60D+0.70E+0.60H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.016	0.012	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.13	24.96	1536.00	0.06	2.70	217.60

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.0070	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.390	0.390
Overall MINimum	0.244	0.244
+D+H	0.146	0.146
+D+L+H	0.146	0.146
+D+Lr+H	0.146	0.146
+D+S+H	0.390	0.390
+D+0.750Lr+0.750L+H	0.146	0.146
+D+0.750L+0.750S+H	0.329	0.329
+D+0.60W+H	0.146	0.146
+D+0.70E+H	0.146	0.146
+D+0.750Lr+0.750L+0.450W+H	0.146	0.146
+D+0.750L+0.750S+0.450W+H	0.329	0.329
+D+0.750L+0.750S+0.5250E+H	0.329	0.329
+0.60D+0.60W+0.60H	0.088	0.088
+0.60D+0.70E+0.60H	0.088	0.088
D Only	0.146	0.146
Lr Only		
L Only		
S Only	0.244	0.244
W Only		
E Only		
H Only		

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Wood Beam

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Description : BEAM 7

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

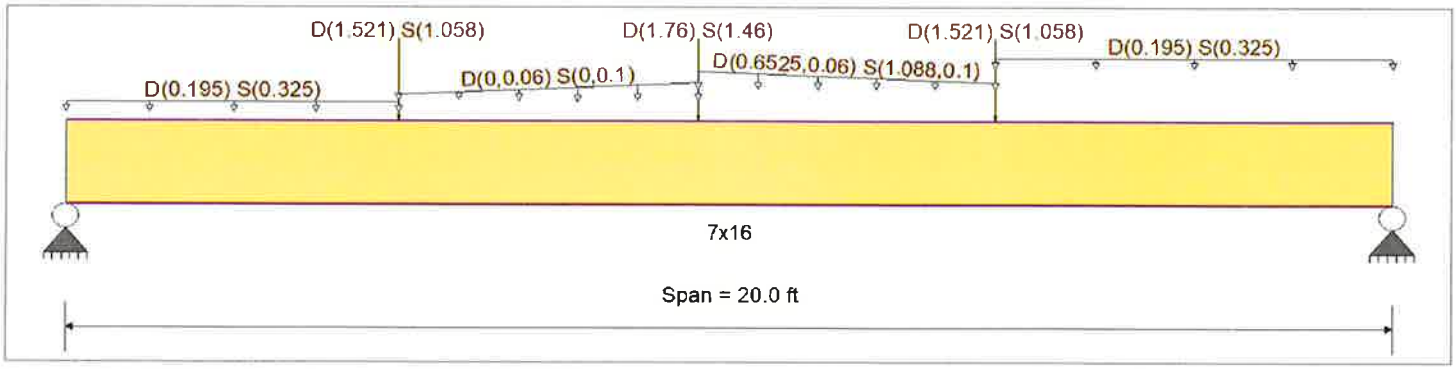
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.2E

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

Fb +	2900 psi
Fb -	2900 psi
Fc - Prll	2900 psi
Fc - Perp	625 psi
Fv	290 psi
Ft	2025 psi

E : Modulus of Elasticity

Ebend- xx	2200 ksi
Eminbend - xx	1118.19 ksi
Density	45.05 pcf



Applied Loads

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

Point Load : D = 1.521, S = 1.058 k @ 5.0 ft

Point Load : D = 1.521, S = 1.058 k @ 14.0 ft

Point Load : D = 1.760, S = 1.460 k @ 9.50 ft

Uniform Load : D = 0.1950, S = 0.3250 k/ft, Extent = 0.0 -->> 5.0 ft, Tributary Width = 1.0 ft

Varying Uniform Load : D= 0.0->0.060, S= 0.0->0.10 k/ft, Extent = 5.0 -->> 9.50 ft, Trib Width = 1.0 ft

Varying Uniform Load : D= 0.6525->0.060, S= 1.088->0.10 k/ft, Extent = 9.50 -->> 14.0 ft, Trib Width = 1.0 ft

Uniform Load : D = 0.1950, S = 0.3250 k/ft, Extent = 14.0 -->> 20.0 ft, Tributary Width = 1.0 ft

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Description : BEAM 7

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.717 : 1	Maximum Shear Stress Ratio	=	0.353 : 1
Section used for this span		7x16	Section used for this span		7x16
fb : Actual	=	2,316.14 psi	fv : Actual	=	117.81 psi
FB : Allowable	=	3,230.19 psi	Fv : Allowable	=	333.50 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
Location of maximum on span	=	9.781 ft	Location of maximum on span	=	18.686 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.419 in	Ratio =	573 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.797 in	Ratio =	301 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.435	0.210	0.90	0.969	1.00	1.00	1.00	1.00	1.00	27.37	1,099.78	2527.97	4.09	54.74	261.00
+D+L+H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.392	0.189	1.00	0.969	1.00	1.00	1.00	1.00	1.00	27.37	1,099.78	2808.86	4.09	54.74	290.00
+D+Lr+H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.313	0.151	1.25	0.969	1.00	1.00	1.00	1.00	1.00	27.37	1,099.78	3511.07	4.09	54.74	362.50
+D+S+H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.717	0.353	1.15	0.969	1.00	1.00	1.00	1.00	1.00	57.65	2,316.14	3230.19	8.80	117.81	333.50
+D+0.750Lr+0.750L+H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.313	0.151	1.25	0.969	1.00	1.00	1.00	1.00	1.00	27.37	1,099.78	3511.07	4.09	54.74	362.50
+D+0.750L+0.750S+H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.623	0.306	1.15	0.969	1.00	1.00	1.00	1.00	1.00	50.07	2,011.70	3230.19	7.62	102.04	333.50
+D+0.60W+H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.245	0.118	1.60	0.969	1.00	1.00	1.00	1.00	1.00	27.37	1,099.78	4494.17	4.09	54.74	464.00
+D+0.70E+H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.245	0.118	1.60	0.969	1.00	1.00	1.00	1.00	1.00	27.37	1,099.78	4494.17	4.09	54.74	464.00
+D+0.750Lr+0.750L+0.450W+H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.245	0.118	1.60	0.969	1.00	1.00	1.00	1.00	1.00	27.37	1,099.78	4494.17	4.09	54.74	464.00
+D+0.750L+0.750S+0.450W+H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.448	0.220	1.60	0.969	1.00	1.00	1.00	1.00	1.00	50.07	2,011.70	4494.17	7.62	102.04	464.00
+D+0.750L+0.750S+0.5250E+H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.448	0.220	1.60	0.969	1.00	1.00	1.00	1.00	1.00	50.07	2,011.70	4494.17	7.62	102.04	464.00
+0.60D+0.60W+0.60H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.147	0.071	1.60	0.969	1.00	1.00	1.00	1.00	1.00	16.42	659.87	4494.17	2.45	32.84	464.00
+0.60D+0.70E+0.60H					0.969	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.147	0.071	1.60	0.969	1.00	1.00	1.00	1.00	1.00	16.42	659.87	4494.17	2.45	32.84	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.7969	10.073		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.255	9.479
Overall MINimum	4.913	5.136
+D+H	4.342	4.343
+D+L+H	4.342	4.343
+D+Lr+H	4.342	4.343
+D+S+H	9.255	9.479
+D+0.750Lr+0.750L+H	4.342	4.343
+D+0.750L+0.750S+H	8.027	8.195

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Wood Beam

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Description : BEAM 7

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
+D+0.60W+H	4.342	4.343
+D+0.70E+H	4.342	4.343
+D+0.750Lr+0.750L+0.450W+H	4.342	4.343
+D+0.750L+0.750S+0.450W+H	8.027	8.195
+D+0.750L+0.750S+0.5250E+H	8.027	8.195
+0.60D+0.60W+0.60H	2.605	2.606
+0.60D+0.70E+0.60H	2.605	2.606
D Only	4.342	4.343
Lr Only		
L Only		
S Only	4.913	5.136
W Only		
E Only		
H Only		

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Wood Column

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Description : BEAM 7 POST

Code References

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 9.0 ft
(Used for non-slender calculations)

Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Fb +	1200 psi	Fv	170 psi
Fb -	1200 psi	Ft	825 psi
Fc - Prll	1000 psi	Density	31.2 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1600	1600	1600 ksi
Minimum	580	580	

Wood Section Name : 4x6
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	3.50	in
Exact Depth	5.50	in
Area	19.250	in^2
Ix	48.526	in^4
Iy	19.651	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compression	1.10
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 0 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 37.538 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 9.0 ft, D = 4.340, L = 5.140 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.6834 : 1**

Load Combination	+D+L+H
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	9.518 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	723.49 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D+0.70E+0.60H
Location of max.above base	9.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	272.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y : 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X : 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.900	0.695	0.3305	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+L+H	1.000	0.658	0.6834	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+Lr+H	1.250	0.574	0.2882	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+S+H	1.150	0.606	0.2968	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750Lr+0.750L+H	1.250	0.574	0.5420	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750L+0.750S+H	1.150	0.606	0.5582	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.60W+H	1.600	0.480	0.2690	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.70E+H	1.600	0.480	0.2690	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750Lr+0.750L+0.450W+H	1.600	0.480	0.5059	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750L+0.750S+0.450W+H	1.600	0.480	0.5059	PASS	0.0 ft	0.0	PASS	9.0 ft
+D+0.750L+0.750S+0.5250E+H	1.600	0.480	0.5059	PASS	0.0 ft	0.0	PASS	9.0 ft

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Wood Column

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Description : BEAM 7 POST

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+0.60D+0.60W+0.60H	1.600	0.480	0.1614	PASS	0.0 ft	0.0	PASS	9.0 ft
+0.60D+0.70E+0.60H	1.600	0.480	0.1614	PASS	0.0 ft	0.0	PASS	9.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction k @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
+D+H					4.378				
+D+L+H					9.518				
+D+Lr+H					4.378				
+D+S+H					4.378				
+D+0.750Lr+0.750L+H					8.233				
+D+0.750L+0.750S+H					8.233				
+D+0.60W+H					4.378				
+D+0.70E+H					4.378				
+D+0.750Lr+0.750L+0.450W+H					8.233				
+D+0.750L+0.750S+0.450W+H					8.233				
+D+0.750L+0.750S+0.5250E+H					8.233				
+0.60D+0.60W+0.60H					2.627				
+0.60D+0.70E+0.60H					2.627				
D Only					4.378				
Lr Only									
L Only					5.140				
S Only									
W Only									
E Only									
H Only									

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

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Wood Column

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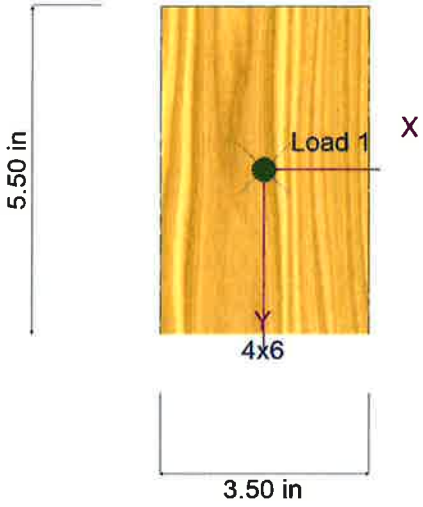
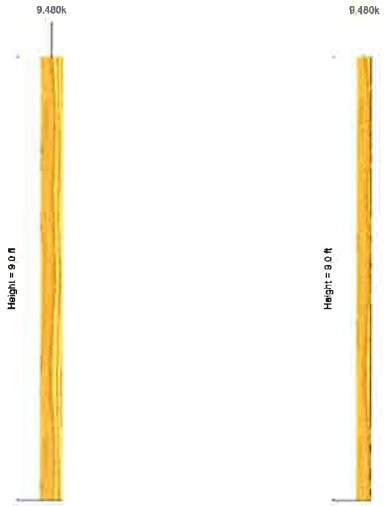
Description : BEAM 7 POST

Sketches





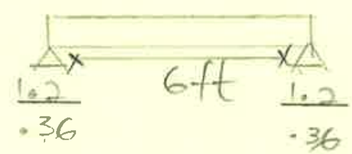
10

BEAM 10A

2X8 PT HF#1 W/ STAGGERED
1/4" X 4 1/2" SDS SCREWS
22" O/C

BEAM 10B

w = (12psf + 40psf)(10ft) = 400/120 plf

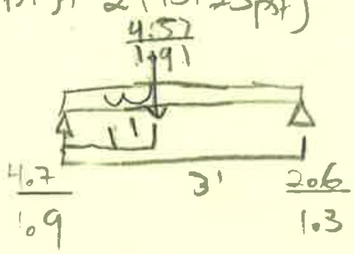


COMPUTER GENERATED 10B
2X12 PT HF#1

BEAM 10C

w = (10' (10+90psf) 10' + (16ft x 10plf) + 10'(10psf + 30psf) + 2'(15 + 25psf)

= 1.250 / 0.39   3' span



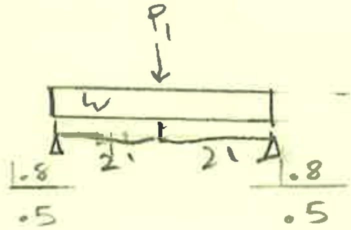
COMPUTER PRINT OUT 10C
USE PARALLAM 3.5x11.25

BEAM 10E

w = 7'(10psf + 90psf)

= 0.63 / 0.07 kips

P_1 0.998 / 0.65



USE 4X8 DF#1 PRINT OUT 10E

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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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Wood Beam

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 9

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

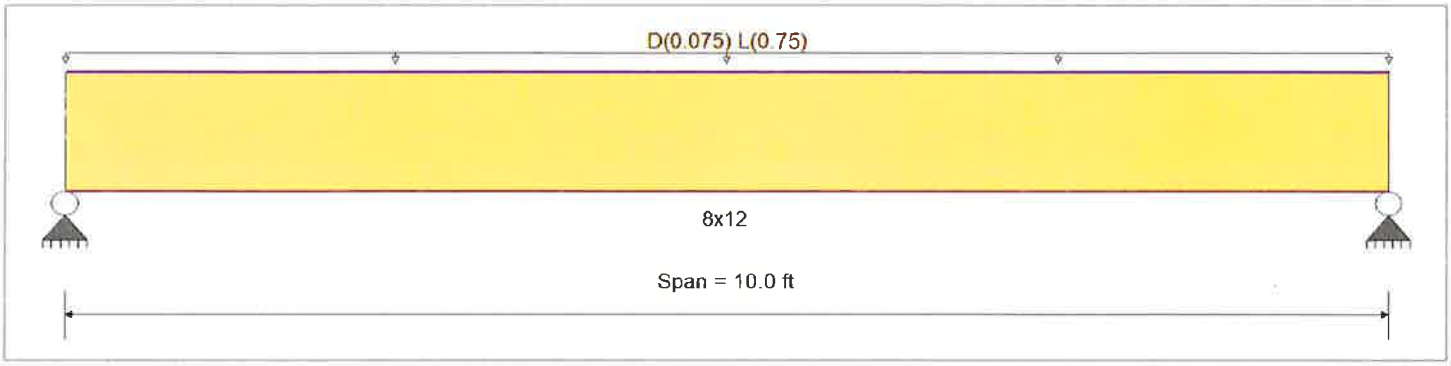
Wood Species : Hem Fir
Wood Grade : No.1

Fb +	1,050.0 psi
Fb -	1,050.0 psi
Fc - Prll	750.0 psi
Fc - Perp	405.0 psi
Fv	140.0 psi
Ft	525.0 psi

E : Modulus of Elasticity

Ebend- xx	1,300.0 ksi
Eminbend - xx	470.0 ksi
Density	26.830 pcf

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



Applied Loads

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

Uniform Load : D = 0.0750, L = 0.750 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.891 : 1	Maximum Shear Stress Ratio	=	0.519 : 1
Section used for this span		8x12	Section used for this span		8x12
fb : Actual	=	748.58 psi	fv : Actual	=	58.12 psi
FB : Allowable	=	840.00 psi	Fv : Allowable	=	112.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.000 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	0.145 in	Ratio =	829 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.159 in	Ratio =	754 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.090	0.052	0.90	1.000	0.80	1.00	1.00	1.00	1.00	0.94	68.05	756.00	0.30	5.28	100.80
+D+L+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.891	0.519	1.00	1.000	0.80	1.00	1.00	1.00	1.00	10.31	748.58	840.00	3.34	58.12	112.00
+D+Lr+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.065	0.038	1.25	1.000	0.80	1.00	1.00	1.00	1.00	0.94	68.05	1050.00	0.30	5.28	140.00
+D+S+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.070	0.041	1.15	1.000	0.80	1.00	1.00	1.00	1.00	0.94	68.05	966.00	0.30	5.28	128.80
+D+0.750Lr+0.750L+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.551	0.321	1.25	1.000	0.80	1.00	1.00	1.00	1.00	7.97	578.45	1050.00	2.58	44.91	140.00

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 9

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+0.750L+0.750S+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.599	0.349	1.15	1.000	0.80	1.00	1.00	1.00	1.00	7.97	578.45	966.00	2.58	44.91	128.80
+D+0.60W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.051	0.029	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.94	68.05	1344.00	0.30	5.28	179.20
+D+0.70E+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.051	0.029	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.94	68.05	1344.00	0.30	5.28	179.20
+D+0.750Lr+0.750L+0.450W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.430	0.251	1.60	1.000	0.80	1.00	1.00	1.00	1.00	7.97	578.45	1344.00	2.58	44.91	179.20
+D+0.750L+0.750S+0.450W+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.430	0.251	1.60	1.000	0.80	1.00	1.00	1.00	1.00	7.97	578.45	1344.00	2.58	44.91	179.20
+D+0.750L+0.750S+0.5250E+H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.430	0.251	1.60	1.000	0.80	1.00	1.00	1.00	1.00	7.97	578.45	1344.00	2.58	44.91	179.20
+0.60D+0.60W+0.60H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.030	0.018	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.56	40.83	1344.00	0.18	3.17	179.20
+0.60D+0.70E+0.60H					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.030	0.018	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.56	40.83	1344.00	0.18	3.17	179.20

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1590	5.036		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.125	4.125
Overall MINimum	3.750	3.750
+D+H	0.375	0.375
+D+L+H	4.125	4.125
+D+Lr+H	0.375	0.375
+D+S+H	0.375	0.375
+D+0.750Lr+0.750L+H	3.188	3.188
+D+0.750L+0.750S+H	3.188	3.188
+D+0.60W+H	0.375	0.375
+D+0.70E+H	0.375	0.375
+D+0.750Lr+0.750L+0.450W+H	3.188	3.188
+D+0.750L+0.750S+0.450W+H	3.188	3.188
+D+0.750L+0.750S+0.5250E+H	3.188	3.188
+0.60D+0.60W+0.60H	0.225	0.225
+0.60D+0.70E+0.60H	0.225	0.225
D Only	0.375	0.375
Lr Only		
L Only	3.750	3.750
S Only		
W Only		
E Only		
H Only		

Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 10

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

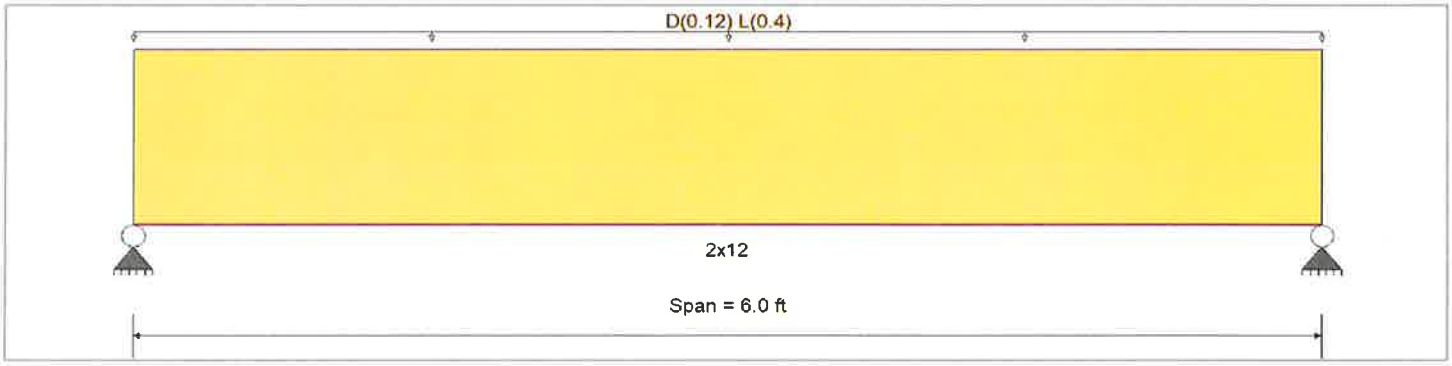
Wood Species : Hem Fir
Wood Grade : No.1

Fb +	1050 psi
Fb -	1050 psi
Fc - Prll	750 psi
Fc - Perp	405 psi
Fv	140 psi
Ft	525 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	26.83 pcf

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



Applied Loads

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

Uniform Load : D = 0.120, L = 0.40 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.845 : 1	Maximum Shear Stress Ratio	=	0.687 : 1
Section used for this span		2x12	Section used for this span		2x12
fb : Actual	=	887.47 psi	fv : Actual	=	96.16 psi
FB : Allowable	=	1,050.00 psi	Fv : Allowable	=	140.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
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	0.051 in	Ratio =	1419 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.066 in	Ratio =	1092 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 6.0 ft	1	0.217	0.176	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.54	204.80	945.00	0.25	22.19	126.00
+D+L+H					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	0.845	0.687	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.34	887.47	1050.00	1.08	96.16	140.00
+D+Lr+H					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	0.156	0.127	1.25	1.000	1.00	1.00	1.00	1.00	1.00	0.54	204.80	1312.50	0.25	22.19	175.00
+D+S+H					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	0.170	0.138	1.15	1.000	1.00	1.00	1.00	1.00	1.00	0.54	204.80	1207.50	0.25	22.19	161.00
+D+0.750Lr+0.750L+H					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	0.546	0.444	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.89	716.80	1312.50	0.87	77.66	175.00

Wood Beam

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Description : BEAM 10

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+0.750L+0.750S+H					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	0.594	0.482	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.89	716.80	1207.50	0.87	77.66	161.00
+D+0.60W+H					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	0.122	0.099	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.54	204.80	1680.00	0.25	22.19	224.00
+D+0.70E+H					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	0.122	0.099	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.54	204.80	1680.00	0.25	22.19	224.00
+D+0.750Lr+0.750L+0.450W+H					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	0.427	0.347	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.89	716.80	1680.00	0.87	77.66	224.00
+D+0.750L+0.750S+0.450W+H					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	0.427	0.347	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.89	716.80	1680.00	0.87	77.66	224.00
+D+0.750L+0.750S+0.5250E+H					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	0.427	0.347	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.89	716.80	1680.00	0.87	77.66	224.00
+0.60D+0.60W+0.60H					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	0.073	0.059	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.32	122.88	1680.00	0.15	13.31	224.00
+0.60D+0.70E+0.60H					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	0.073	0.059	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.32	122.88	1680.00	0.15	13.31	224.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0659	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.560	1.560
Overall MINimum	1.200	1.200
+D+H	0.360	0.360
+D+L+H	1.560	1.560
+D+Lr+H	0.360	0.360
+D+S+H	0.360	0.360
+D+0.750Lr+0.750L+H	1.260	1.260
+D+0.750L+0.750S+H	1.260	1.260
+D+0.60W+H	0.360	0.360
+D+0.70E+H	0.360	0.360
+D+0.750Lr+0.750L+0.450W+H	1.260	1.260
+D+0.750L+0.750S+0.450W+H	1.260	1.260
+D+0.750L+0.750S+0.5250E+H	1.260	1.260
+0.60D+0.60W+0.60H	0.216	0.216
+0.60D+0.70E+0.60H	0.216	0.216
D Only	0.360	0.360
Lr Only		
L Only	1.200	1.200
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 17 JUL 2018, 4:21PM

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : GARAGE HEADER

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

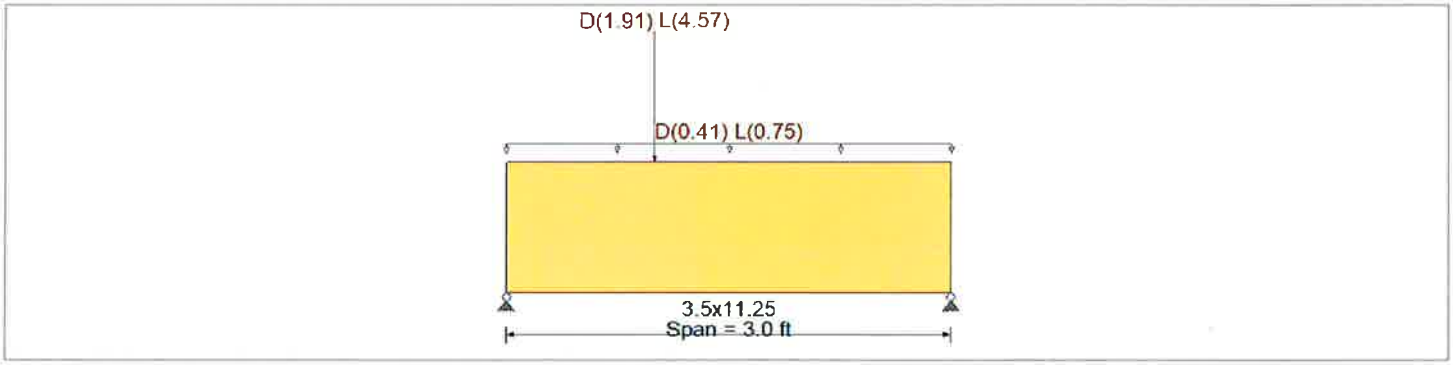
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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

Fb +	2900 psi
Fb -	2900 psi
Fc - Prll	2900 psi
Fc - Perp	625 psi
Fv	290 psi
Ft	2025 psi

E : Modulus of Elasticity

Ebend- xx	2000 ksi
Eminbend - xx	1016.535 ksi
Density	45.05 pcf



Applied Loads

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

Uniform Load : D = 0.410, L = 0.750 , Tributary Width = 1.0 ft

Point Load : D = 1.910, L = 4.570 k @ 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.306 : 1	Maximum Shear Stress Ratio	=	0.654 : 1
Section used for this span		3.5x11.25	Section used for this span		3.5x11.25
fb : Actual	=	888.84 psi	fv : Actual	=	189.73 psi
FB : Allowable	=	2,900.00 psi	Fv : Allowable	=	290.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	1.007 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	0.006 in	Ratio =	5738 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.009 in	Ratio =	3953 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

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+H					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	0.105	0.220	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.68	273.09	2610.00	1.51	57.40	261.00
+D+L+H					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	0.306	0.654	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.47	888.84	2900.00	4.98	189.73	290.00
+D+Lr+H					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	0.075	0.158	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.68	273.09	3625.00	1.51	57.40	362.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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Wood Beam

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Description : GARAGE HEADER

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 = 3.0 ft	1	0.082	0.172	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.68	273.09	3335.00	1.51	57.40	333.50
+D+0.750Lr+0.750L+H					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	0.203	0.432	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.52	734.90	3625.00	4.11	156.65	362.50
+D+0.750L+0.750S+H					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	0.220	0.470	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.52	734.90	3335.00	4.11	156.65	333.50
+D+0.60W+H					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	0.059	0.124	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.68	273.09	4640.00	1.51	57.40	464.00
+D+0.70E+H					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	0.059	0.124	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.68	273.09	4640.00	1.51	57.40	464.00
+D+0.750Lr+0.750L+0.450W+H					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	0.158	0.338	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.52	734.90	4640.00	4.11	156.65	464.00
+D+0.750L+0.750S+0.450W+H					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	0.158	0.338	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.52	734.90	4640.00	4.11	156.65	464.00
+D+0.750L+0.750S+0.5250E+H					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	0.158	0.338	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.52	734.90	4640.00	4.11	156.65	464.00
+0.60D+0.60W+0.60H					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	0.035	0.074	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.01	163.86	4640.00	0.90	34.44	464.00
+0.60D+0.70E+0.60H					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	0.035	0.074	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.01	163.86	4640.00	0.90	34.44	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0091	1.412		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.060	3.900
Overall MINimum	4.172	2.648
+D+H	1.888	1.252
+D+L+H	6.060	3.900
+D+Lr+H	1.888	1.252
+D+S+H	1.888	1.252
+D+0.750Lr+0.750L+H	5.017	3.238
+D+0.750L+0.750S+H	5.017	3.238
+D+0.60W+H	1.888	1.252
+D+0.70E+H	1.888	1.252
+D+0.750Lr+0.750L+0.450W+H	5.017	3.238
+D+0.750L+0.750S+0.450W+H	5.017	3.238
+D+0.750L+0.750S+0.5250E+H	5.017	3.238
+0.60D+0.60W+0.60H	1.133	0.751
+0.60D+0.70E+0.60H	1.133	0.751
D Only	1.888	1.252
Lr Only		
L Only	4.172	2.648
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
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Project Descr:

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Wood Beam

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Description : UPPER FLOOR HDR

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

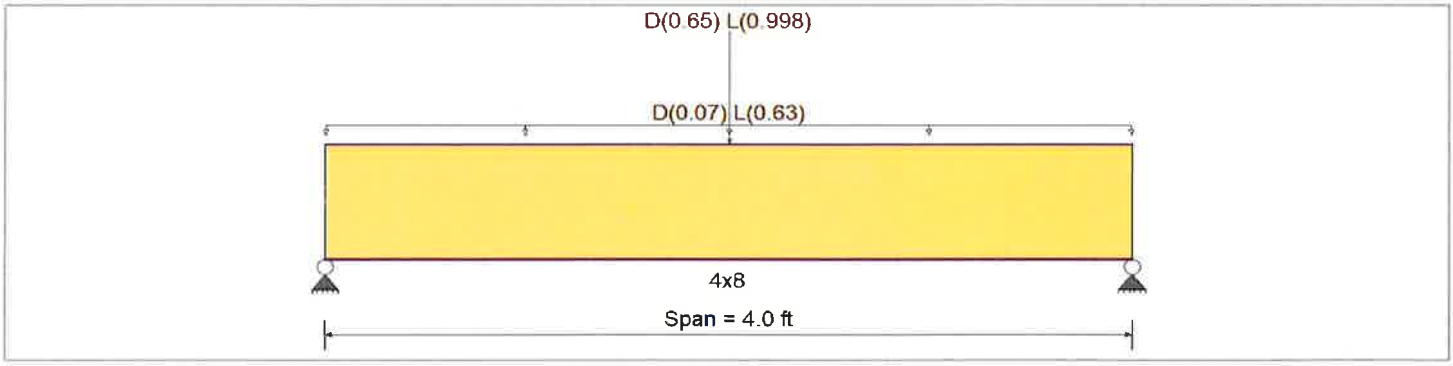
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

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

Fb +	1350 psi
Fb -	1350 psi
Fc - Prll	925 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.2 pcf



Applied Loads

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

Uniform Load : D = 0.070, L = 0.630 , Tributary Width = 1.0 ft

Point Load : D = 0.650, L = 0.9980 k @ 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.680 : 1	Maximum Shear Stress Ratio	=	0.628 : 1
Section used for this span		4x8	Section used for this span		4x8
fb : Actual	=	1,192.90 psi	fv : Actual	=	106.70 psi
FB : Allowable	=	1,755.00 psi	Fv : Allowable	=	170.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.000 ft	Location of maximum on span	=	3.401 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.034 in	Ratio =	1431 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.044 in	Ratio =	1084 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.196	0.163	0.90							0.79	309.18	1579.50	0.42	25.01	153.00
+D+L+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.680	0.628	1.00							3.05	1,192.90	1755.00	1.81	106.70	170.00
+D+Lr+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.141	0.118	1.25							0.79	309.18	2193.75	0.42	25.01	212.50
+D+S+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
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Wood Beam

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Description : UPPER FLOOR HDR

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
Length = 4.0 ft	1	0.153	0.128	1.15	1.300	1.00	1.00	1.00	1.00	1.00	0.79	309.18	2018.25	0.42	25.01	195.50
+D+0.750Lr+0.750L+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.443	0.406	1.25	1.300	1.00	1.00	1.00	1.00	1.00	2.48	971.97	2193.75	1.46	86.28	212.50
+D+0.750L+0.750S+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.482	0.441	1.15	1.300	1.00	1.00	1.00	1.00	1.00	2.48	971.97	2018.25	1.46	86.28	195.50
+D+0.60W+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.110	0.092	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.79	309.18	2808.00	0.42	25.01	272.00
+D+0.70E+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.110	0.092	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.79	309.18	2808.00	0.42	25.01	272.00
+D+0.750Lr+0.750L+0.450W+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.346	0.317	1.60	1.300	1.00	1.00	1.00	1.00	1.00	2.48	971.97	2808.00	1.46	86.28	272.00
+D+0.750L+0.750S+0.450W+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.346	0.317	1.60	1.300	1.00	1.00	1.00	1.00	1.00	2.48	971.97	2808.00	1.46	86.28	272.00
+D+0.750L+0.750S+0.5250E+H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.346	0.317	1.60	1.300	1.00	1.00	1.00	1.00	1.00	2.48	971.97	2808.00	1.46	86.28	272.00
+0.60D+0.60W+0.60H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.066	0.055	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.47	185.51	2808.00	0.25	15.01	272.00
+0.60D+0.70E+0.60H					1.300	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.066	0.055	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.47	185.51	2808.00	0.25	15.01	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0443	2.015		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.224	2.224
Overall MINimum	1.759	1.759
+D+H	0.465	0.465
+D+L+H	2.224	2.224
+D+Lr+H	0.465	0.465
+D+S+H	0.465	0.465
+D+0.750Lr+0.750L+H	1.784	1.784
+D+0.750L+0.750S+H	1.784	1.784
+D+0.60W+H	0.465	0.465
+D+0.70E+H	0.465	0.465
+D+0.750Lr+0.750L+0.450W+H	1.784	1.784
+D+0.750L+0.750S+0.450W+H	1.784	1.784
+D+0.750L+0.750S+0.5250E+H	1.784	1.784
+0.60D+0.60W+0.60H	0.279	0.279
+0.60D+0.70E+0.60H	0.279	0.279
D Only	0.465	0.465
Lr Only		
L Only	1.759	1.759
S Only		
W Only		
E Only		
H Only		

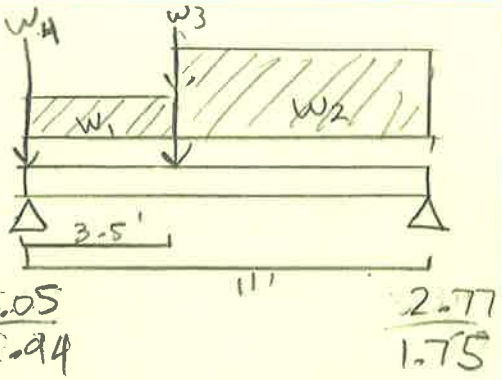
BEAM 11A

$W_1 = (12+30)12 + (16\times10) = \frac{0.36}{0.304}$ kps

$W_2 = (1.33)(12+30) + (12+40)12 + (16\times10)$
$= \frac{0.520}{0.320}$ kps

$W_3 = \frac{1.788}{0.81}$ kps (reaction from BEAM 12)

$W_4 = \frac{1.879}{0.42}$ kps (react. from beam 13).

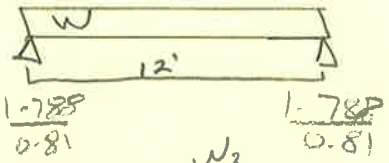


COMPUTER PRINT OUT 11A USE
3.5x11.25 TIMBERSTRAND LSL 1.5 SE

BEAM 11B

$W = (8\times9) + (12+30)3.25 + 2(12+100) = \frac{0.298}{0.135}$ kps

COMPUTER PRINT OUT 11B
USE 1.75 x 11.25 TIMBERSTRAND LSL

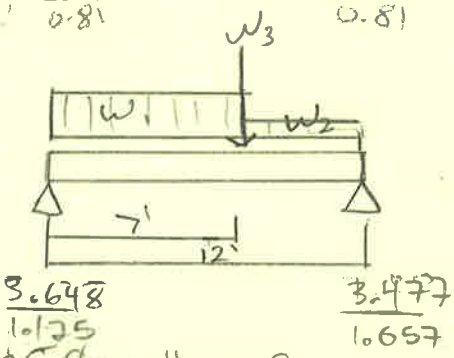


BEAM 11C

$W_1 = (9.25)(12+30) + 2(12+100) = \frac{0.3275}{0.075}$ kps

$W_2 = (1.33)(12+30) + 2(12+100) = \frac{0.24}{0.04}$ kps

W_3 = RH React of BEAM 12 COMPUTER PRINT OUT = $\frac{1.788}{0.81}$

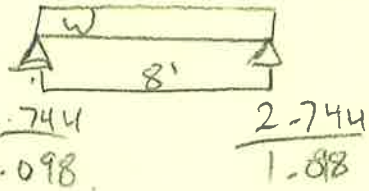


11C USE: 3.5x11.25 Parallam PSL 2.0E

BEAM 11D

$W = (1.33+9.25)(12+30) = \frac{0.686}{0.275}$ kps

COMPUTER PRINT OUT 11D
USE 2-2x12. HF #1.

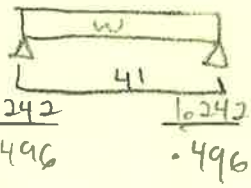


BEAM 11E

$W = (9.25)(12+30) + 3(10+95) + (8\times9) + (2.33)(15+25)$
$= \frac{0.62075}{0.24795}$ kps

COMPUTER PRINT OUT 11E

USE 4x8 DF #2



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Title Block Line 6

Project Title:
Engineer:
Project ID:
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1A

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 11

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

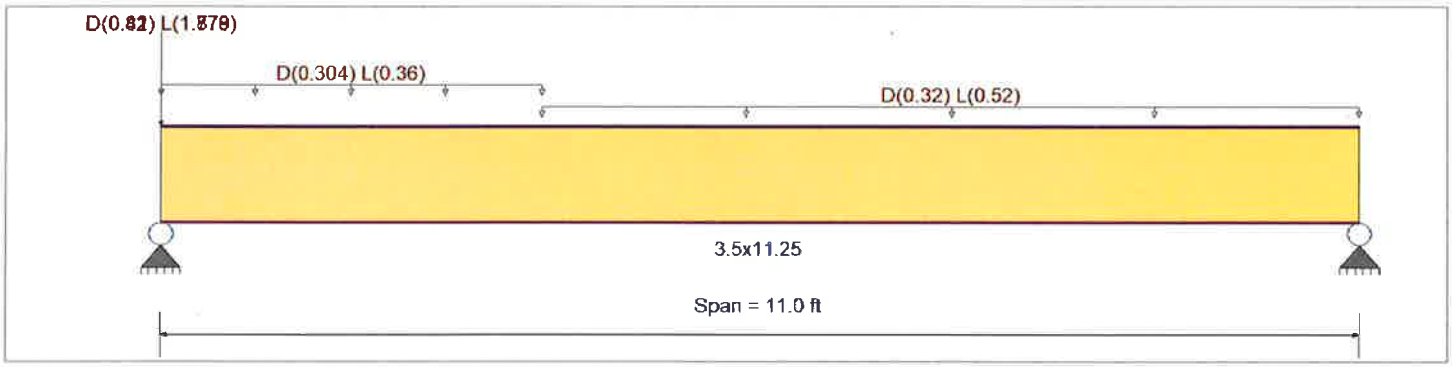
Wood Species : Trus Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2,325.0 psi
Fb -	2,325.0 psi
Fc - Prll	2,170.0 psi
Fc - Perp	900.0 psi
Fv	310.0 psi
Ft	1,070.0 psi

E : Modulus of Elasticity

Ebend- xx	1,550.0 ksi
Eminbend - xx	787.82 ksi
Density	44.990 pcf



Applied Loads

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

Point Load : D = 0.810, L = 1.778 k @ 0.0 ft

Uniform Load : D = 0.320, L = 0.520 k/ft, Extent = 3.50 -->> 11.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.3040, L = 0.360 k/ft, Extent = 0.0 -->> 3.50 ft, Tributary Width = 1.0 ft

Point Load : D = 0.420, L = 1.879 k @ 0.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.655 : 1	Maximum Shear Stress Ratio	=	0.354 : 1
Section used for this span		3.5x11.25	Section used for this span		3.5x11.25
fb : Actual	=	1,978.39 psi	fv : Actual	=	142.72 psi
FB : Allowable	=	3,022.50 psi	Fv : Allowable	=	403.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	5.620 ft	Location of maximum on span	=	10.077 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.192 in	Ratio =	689 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.317 in	Ratio =	416 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.286	0.153	0.90	1.000	1.00	1.00	1.30	1.00	1.00	4.79	778.74	2720.25	1.46	55.45	362.70

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
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Wood Beam

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Lic. # : KW-06011301 **Licensee : Covington**

Description : BEAM 11

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+L+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.655	0.354	1.00	1.000	1.00	1.00	1.30	1.00	1.00	12.17	1,978.39	3022.50	3.75	142.72	403.00
+D+Lr+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.206	0.110	1.25	1.000	1.00	1.00	1.30	1.00	1.00	4.79	778.74	3778.13	1.46	55.45	503.75
+D+S+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.224	0.120	1.15	1.000	1.00	1.00	1.30	1.00	1.00	4.79	778.74	3475.88	1.46	55.45	463.45
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.444	0.240	1.25	1.000	1.00	1.00	1.30	1.00	1.00	10.33	1,678.42	3778.13	3.17	120.90	503.75
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.483	0.261	1.15	1.000	1.00	1.00	1.30	1.00	1.00	10.33	1,678.42	3475.88	3.17	120.90	463.45
+D+0.60W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.161	0.086	1.60	1.000	1.00	1.00	1.30	1.00	1.00	4.79	778.74	4836.00	1.46	55.45	644.80
+D+0.70E+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.161	0.086	1.60	1.000	1.00	1.00	1.30	1.00	1.00	4.79	778.74	4836.00	1.46	55.45	644.80
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.347	0.188	1.60	1.000	1.00	1.00	1.30	1.00	1.00	10.33	1,678.42	4836.00	3.17	120.90	644.80
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.347	0.188	1.60	1.000	1.00	1.00	1.30	1.00	1.00	10.33	1,678.42	4836.00	3.17	120.90	644.80
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.347	0.188	1.60	1.000	1.00	1.00	1.30	1.00	1.00	10.33	1,678.42	4836.00	3.17	120.90	644.80
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.097	0.052	1.60	1.000	1.00	1.00	1.30	1.00	1.00	2.87	467.25	4836.00	0.87	33.27	644.80
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.097	0.052	1.60	1.000	1.00	1.00	1.30	1.00	1.00	2.87	467.25	4836.00	0.87	33.27	644.80

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.3168	5.540		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	8.989	4.522
Overall MINimum	6.046	2.771
+D+H	2.943	1.751
+D+L+H	8.989	4.522
+D+Lr+H	2.943	1.751
+D+S+H	2.943	1.751
+D+0.750Lr+0.750L+H	7.477	3.829
+D+0.750L+0.750S+H	7.477	3.829
+D+0.60W+H	2.943	1.751
+D+0.70E+H	2.943	1.751
+D+0.750Lr+0.750L+0.450W+H	7.477	3.829
+D+0.750L+0.750S+0.450W+H	7.477	3.829
+D+0.750L+0.750S+0.5250E+H	7.477	3.829
+0.60D+0.60W+0.60H	1.766	1.051
+0.60D+0.70E+0.60H	1.766	1.051
D Only	2.943	1.751
Lr Only		
L Only	6.046	2.771
S Only		
W Only		
E Only		
H Only		

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Wood Column

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 13 POSTS

Code References

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 10.0 ft
(Used for non-slender calculations)

Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Fb +	1,200.0 psi	Fv	170.0 psi
Fb -	1,200.0 psi	Ft	825.0 psi
Fc - Prll	1,000.0 psi	Density	31.20 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Wood Section Name : 6x6
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	5.50	in
Exact Depth	5.50	in
Area	30.250	in^2
Ix	76.255	in^4
Iy	76.255	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.0
Cf or Cv for Compression	1.0
Cf or Cv for Tension	1.0
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 65.542 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 3.620, L = 10.550 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.6805 : 1**

Load Combination	+D+L+H
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	14.236 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	691.51 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D+0.70E+0.60H
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	272.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.900	0.727	0.1863	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L+H	1.000	0.692	0.6805	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr+H	1.250	0.610	0.1597	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S+H	1.150	0.641	0.1652	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+H	1.250	0.610	0.5027	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+H	1.150	0.641	0.5198	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W+H	1.600	0.516	0.1476	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.70E+H	1.600	0.516	0.1476	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+0.450W+H	1.600	0.516	0.4644	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.450W+H	1.600	0.516	0.4644	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.5250E+H	1.600	0.516	0.4644	PASS	0.0 ft	0.0	PASS	10.0 ft

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Wood Column

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Description : BEAM 13 POSTS

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+0.60D+0.60W+0.60H	1.600	0.516	0.08855	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D+0.70E+0.60H	1.600	0.516	0.08855	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	My - End Moments @ Base	My - End Moments @ Top	k-ft	Mx - End Moments @ Base	Mx - End Moments @ Top
+D+H						3.686					
+D+L+H						14.236					
+D+Lr+H						3.686					
+D+S+H						3.686					
+D+0.750Lr+0.750L+H						11.598					
+D+0.750L+0.750S+H						11.598					
+D+0.60W+H						3.686					
+D+0.70E+H						3.686					
+D+0.750Lr+0.750L+0.450W+H						11.598					
+D+0.750L+0.750S+0.450W+H						11.598					
+D+0.750L+0.750S+0.5250E+H						11.598					
+0.60D+0.60W+0.60H						2.211					
+0.60D+0.70E+0.60H						2.211					
D Only						3.686					
Lr Only											
L Only						10.550					
S Only											
W Only											
E Only											
H Only											

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

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11(A-G)

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Wood Column

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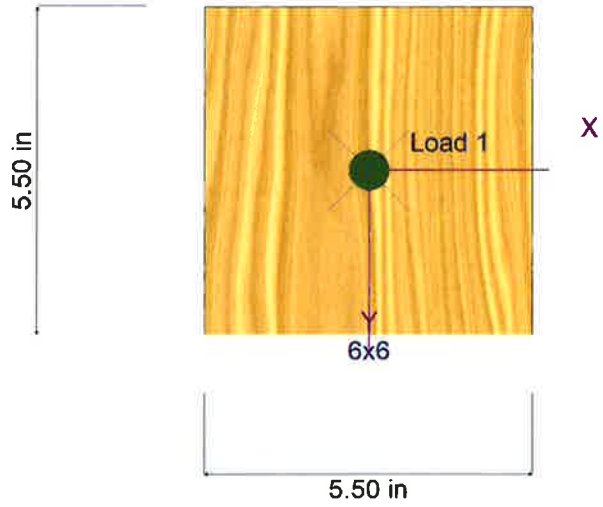
Description : BEAM 13 POSTS

Sketches



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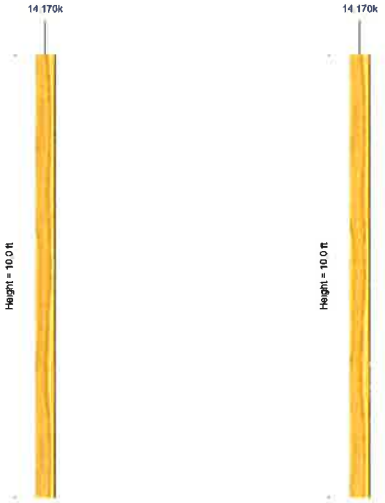

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Project Descr:

11A(11)

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Wood Column

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 11 POST

Code References

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 10.0 ft
(Used for non-slender calculations)

Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Fb +	1200 psi	Fv	170 psi
Fb -	1200 psi	Ft	825 psi
Fc - Prll	1000 psi	Density	31.2 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1600	1600	1600 ksi
Minimum	580	580	

Wood Section Name : **4x6**
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	**3.50**	in
Exact Depth	**5.50**	in
Area	19.250	in^2
Ix	48.526	in^4
Iy	19.651	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compression	1.10
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 0 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10.0 ft, K = 1.0

Applied Loads

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

Column self weight included : 41.708 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 1.520, L = 3.340 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3520 : 1**

Load Combination	+D+L+H
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	4.902 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	723.49 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D+0.70E+0.60H
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	272.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.900	0.695	0.1179	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L+H	1.000	0.658	0.3520	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr+H	1.250	0.574	0.1028	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S+H	1.150	0.606	0.1059	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+H	1.250	0.574	0.2677	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+H	1.150	0.606	0.2757	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W+H	1.600	0.480	0.09598	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.70E+H	1.600	0.480	0.09598	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+0.450W+H	1.600	0.480	0.2499	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.450W+H	1.600	0.480	0.2499	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.5250E+H	1.600	0.480	0.2499	PASS	0.0 ft	0.0	PASS	10.0 ft

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Wood Column

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Description : BEAM 11 POST

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+0.60D+0.60W+0.60H	1.600	0.480	0.05759	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D+0.70E+0.60H	1.600	0.480	0.05759	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction k @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
+D+H					1.562				
+D+L+H					4.902				
+D+Lr+H					1.562				
+D+S+H					1.562				
+D+0.750Lr+0.750L+H					4.067				
+D+0.750L+0.750S+H					4.067				
+D+0.60W+H					1.562				
+D+0.70E+H					1.562				
+D+0.750Lr+0.750L+0.450W+H					4.067				
+D+0.750L+0.750S+0.450W+H					4.067				
+D+0.750L+0.750S+0.5250E+H					4.067				
+0.60D+0.60W+0.60H					0.937				
+0.60D+0.70E+0.60H					0.937				
D Only					1.562				
Lr Only									
L Only					3.340				
S Only									
W Only									
E Only									
H Only									

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

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Wood Column

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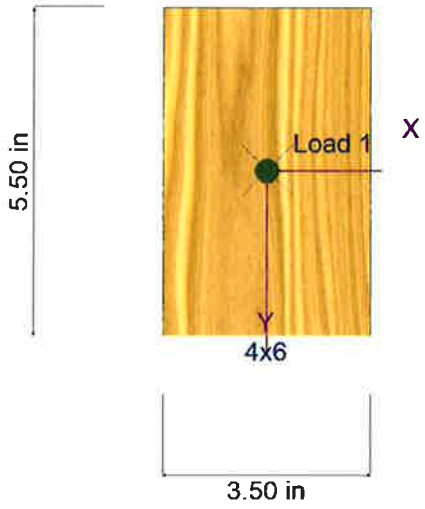
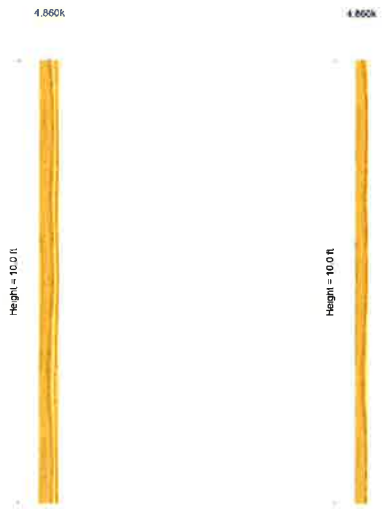
Description : BEAM 11 POST

Sketches





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Project ID:
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11A(iii)

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Wood Column

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 11 2ND POST

Code References

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top & Bottom Pinned
Overall Column Height : 10.0 ft
(Used for non-slender calculations)

Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Fb +	1200 psi	Fv	170 psi
Fb -	1200 psi	Ft	825 psi
Fc - Prll	1000 psi	Density	31.2 pcf
Fc - Perp	625 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1600	1600	1600 ksi
Minimum	580	580	

Wood Section Name : **4x6**
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	**3.50**	in
Exact Depth	**5.50**	in
Area	19.250	in^2
Ix	48.526	in^4
Iy	19.651	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compression	1.10
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10 ft, K = 1.0

Applied Loads

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

Column self weight included : 41.708 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 1.751, L = 2.771 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3277 : 1**
Load Combination : +D+L+H
Governing NDS Forumla : Comp Only, fc/Fc'
Location of max.above base : 0.0 ft
At maximum location values are . . .
Applied Axial : 4.564 k
Applied Mx : 0.0 k-ft
Applied My : 0.0 k-ft
Fc : Allowable : 723.49 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**
Load Combination : +0.60D+0.70E+0.60H
Location of max.above base : 10.0 ft
Applied Design Shear : 0.0 psi
Allowable Shear : 272.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y : 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X : 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.900	0.695	0.1354	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L+H	1.000	0.658	0.3277	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr+H	1.250	0.574	0.1180	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S+H	1.150	0.606	0.1216	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+H	1.250	0.574	0.2549	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+H	1.150	0.606	0.2625	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W+H	1.600	0.480	0.1102	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.70E+H	1.600	0.480	0.1102	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+0.450W+H	1.600	0.480	0.2379	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.450W+H	1.600	0.480	0.2379	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.5250E+H	1.600	0.480	0.2379	PASS	0.0 ft	0.0	PASS	10.0 ft

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Wood Column

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Description : BEAM 11 2ND POST

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+0.60D+0.60W+0.60H	1.600	0.480	0.06610	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D+0.70E+0.60H	1.600	0.480	0.06610	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction k @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
+D+H					1.793				
+D+L+H					4.564				
+D+Lr+H					1.793				
+D+S+H					1.793				
+D+0.750Lr+0.750L+H					3.871				
+D+0.750L+0.750S+H					3.871				
+D+0.60W+H					1.793				
+D+0.70E+H					1.793				
+D+0.750Lr+0.750L+0.450W+H					3.871				
+D+0.750L+0.750S+0.450W+H					3.871				
+D+0.750L+0.750S+0.5250E+H					3.871				
+0.60D+0.60W+0.60H					1.076				
+0.60D+0.70E+0.60H					1.076				
D Only					1.793				
Lr Only									
L Only					2.771				
S Only									
W Only									
E Only									
H Only									

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

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Wood Column

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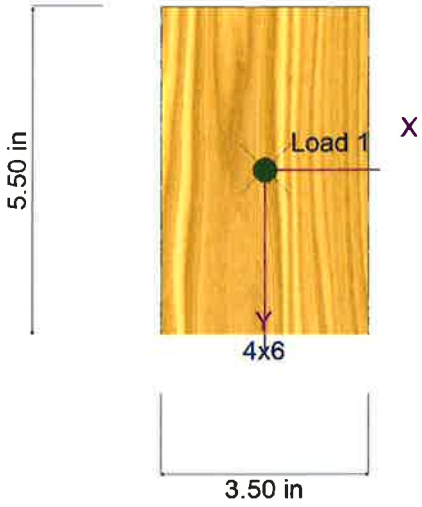
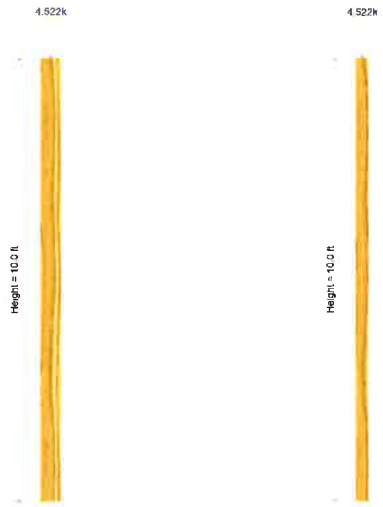
Description : BEAM 11 2ND POST

Sketches





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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 12

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

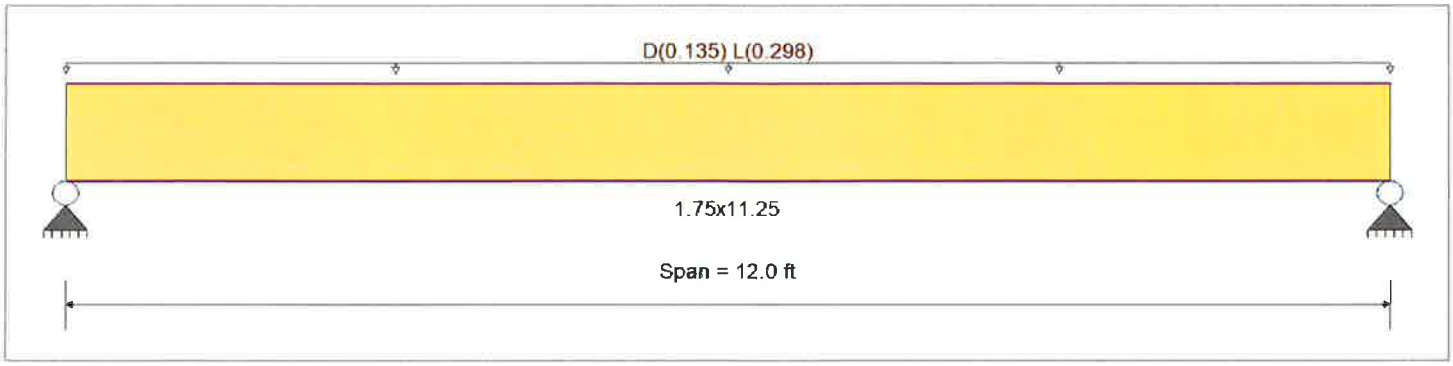
Wood Species : Trus Joist
Wood Grade : TimberStrand LSL 1.55E

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

Fb +	2325 psi
Fb -	2325 psi
Fc - Prll	2170 psi
Fc - Perp	900 psi
Fv	310 psi
Ft	1070 psi

E : Modulus of Elasticity

Ebend- xx	1550 ksi
Eminbend - xx	787.815 ksi
Density	44.99 pcf



Applied Loads

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

Uniform Load : D = 0.1350, L = 0.2980 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.838 : 1	Maximum Shear Stress Ratio	=	0.416 : 1
Section used for this span		1.75x11.25	Section used for this span		1.75x11.25
fb : Actual	=	2,533.67 psi	fv : Actual	=	167.60 psi
FB : Allowable	=	3,022.50 psi	Fv : Allowable	=	403.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
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	0.334 in	Ratio =	430 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.486 in	Ratio =	296 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.290	0.144	0.90	1.000	1.00	1.00	1.30	1.00	1.00	2.43	789.94	2720.25	0.69	52.25	362.70
+D+L+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.838	0.416	1.00	1.000	1.00	1.00	1.30	1.00	1.00	7.79	2,533.67	3022.50	2.20	167.60	403.00
+D+Lr+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.209	0.104	1.25	1.000	1.00	1.00	1.30	1.00	1.00	2.43	789.94	3778.13	0.69	52.25	503.75
+D+S+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.227	0.113	1.15	1.000	1.00	1.00	1.30	1.00	1.00	2.43	789.94	3475.88	0.69	52.25	463.45
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.555	0.275	1.25	1.000	1.00	1.00	1.30	1.00	1.00	6.45	2,097.74	3778.13	1.82	138.76	503.75

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Wood Beam

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Description : BEAM 12

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+0.750L+0.750S+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.604	0.299	1.15	1.000	1.00	1.00	1.30	1.00	1.00	6.45	2,097.74	3475.88	1.82	138.76	463.45
+D+0.60W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.163	0.081	1.60	1.000	1.00	1.00	1.30	1.00	1.00	2.43	789.94	4836.00	0.69	52.25	644.80
+D+0.70E+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.163	0.081	1.60	1.000	1.00	1.00	1.30	1.00	1.00	2.43	789.94	4836.00	0.69	52.25	644.80
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.434	0.215	1.60	1.000	1.00	1.00	1.30	1.00	1.00	6.45	2,097.74	4836.00	1.82	138.76	644.80
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.434	0.215	1.60	1.000	1.00	1.00	1.30	1.00	1.00	6.45	2,097.74	4836.00	1.82	138.76	644.80
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.434	0.215	1.60	1.000	1.00	1.00	1.30	1.00	1.00	6.45	2,097.74	4836.00	1.82	138.76	644.80
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.098	0.049	1.60	1.000	1.00	1.00	1.30	1.00	1.00	1.46	473.97	4836.00	0.41	31.35	644.80
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.098	0.049	1.60	1.000	1.00	1.00	1.30	1.00	1.00	1.46	473.97	4836.00	0.41	31.35	644.80

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.4857	6.044		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.598	2.598
Overall MINimum	1.788	1.788
+D+H	0.810	0.810
+D+L+H	2.598	2.598
+D+Lr+H	0.810	0.810
+D+S+H	0.810	0.810
+D+0.750Lr+0.750L+H	2.151	2.151
+D+0.750L+0.750S+H	2.151	2.151
+D+0.60W+H	0.810	0.810
+D+0.70E+H	0.810	0.810
+D+0.750Lr+0.750L+0.450W+H	2.151	2.151
+D+0.750L+0.750S+0.450W+H	2.151	2.151
+D+0.750L+0.750S+0.5250E+H	2.151	2.151
+0.60D+0.60W+0.60H	0.486	0.486
+0.60D+0.70E+0.60H	0.486	0.486
D Only	0.810	0.810
Lr Only		
L Only	1.788	1.788
S Only		
W Only		
E Only		
H Only		

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Wood Beam

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Description : BEAM 13

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

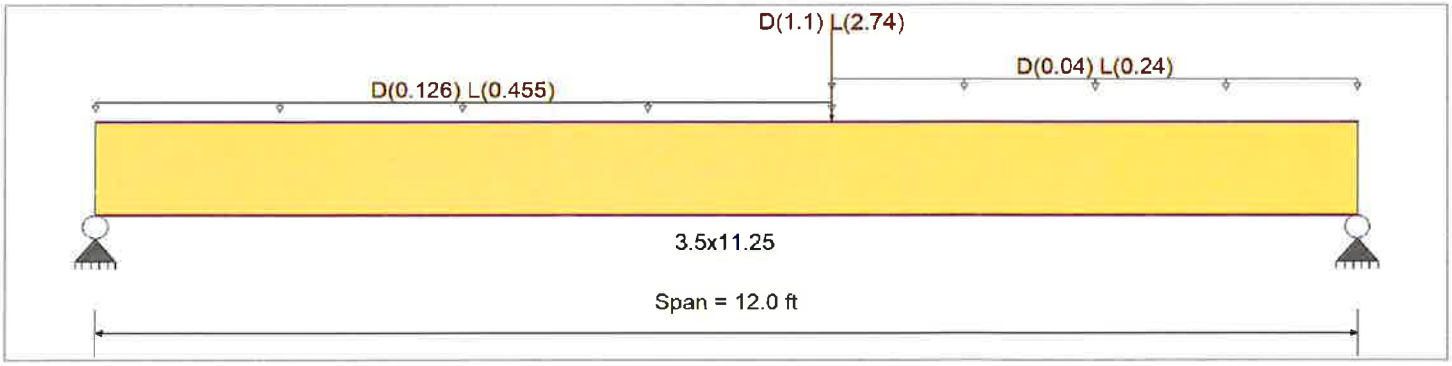
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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

Fb +	2900 psi
Fb -	2900 psi
Fc - Prll	2900 psi
Fc - Perp	625 psi
Fv	290 psi
Ft	2025 psi

E : Modulus of Elasticity

Ebend- xx	2000 ksi
Eminbend - xx	1016.535 ksi
Density	45.05 pcf



Applied Loads

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

Load for Span Number 1

Uniform Load : D = 0.1260, L = 0.4550 k/ft, Extent = 0.0 -->> 7.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.040, L = 0.240 k/ft, Extent = 7.0 -->> 12.0 ft, Tributary Width = 1.0 ft

Point Load : D = 1.10, L = 2.740 k @ 7.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.826 : 1	Maximum Shear Stress Ratio	=	0.432 : 1
Section used for this span		3.5x11.25	Section used for this span		3.5x11.25
fb : Actual	=	3,112.61 psi	fv : Actual	=	162.93 psi
FB : Allowable	=	3,770.00 psi	Fv : Allowable	=	377.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	7.007 ft	Location of maximum on span	=	11.080 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.316 in	Ratio =	455 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.418 in	Ratio =	344 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.229	0.115	0.90	1.000	1.00	1.00	1.30	1.00	1.00	4.78	776.94	3393.00	1.02	38.87	339.30
+D+L+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.826	0.432	1.00	1.000	1.00	1.00	1.30	1.00	1.00	19.15	3,112.61	3770.00	4.28	162.93	377.00

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 13

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+Lr+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.165	0.082	1.25	1.000	1.00	1.00	1.30	1.00	1.00	4.78	776.94	4712.50	1.02	38.87	471.25
+D+S+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.179	0.090	1.15	1.000	1.00	1.00	1.30	1.00	1.00	4.78	776.94	4335.50	1.02	38.87	433.55
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.537	0.280	1.25	1.000	1.00	1.00	1.30	1.00	1.00	15.56	2,528.69	4712.50	3.46	131.92	471.25
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.583	0.304	1.15	1.000	1.00	1.00	1.30	1.00	1.00	15.56	2,528.69	4335.50	3.46	131.92	433.55
+D+0.60W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.129	0.064	1.60	1.000	1.00	1.00	1.30	1.00	1.00	4.78	776.94	6032.00	1.02	38.87	603.20
+D+0.70E+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.129	0.064	1.60	1.000	1.00	1.00	1.30	1.00	1.00	4.78	776.94	6032.00	1.02	38.87	603.20
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.419	0.219	1.60	1.000	1.00	1.00	1.30	1.00	1.00	15.56	2,528.69	6032.00	3.46	131.92	603.20
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.419	0.219	1.60	1.000	1.00	1.00	1.30	1.00	1.00	15.56	2,528.69	6032.00	3.46	131.92	603.20
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.419	0.219	1.60	1.000	1.00	1.00	1.30	1.00	1.00	15.56	2,528.69	6032.00	3.46	131.92	603.20
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.077	0.039	1.60	1.000	1.00	1.00	1.30	1.00	1.00	2.87	466.16	6032.00	0.61	23.32	603.20
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.077	0.039	1.60	1.000	1.00	1.00	1.30	1.00	1.00	2.87	466.16	6032.00	0.61	23.32	603.20

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.4181	6.131		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.772	4.535
Overall MINimum	3.648	3.477
+D+H	1.125	1.057
+D+L+H	4.772	4.535
+D+Lr+H	1.125	1.057
+D+S+H	1.125	1.057
+D+0.750Lr+0.750L+H	3.861	3.665
+D+0.750L+0.750S+H	3.861	3.665
+D+0.60W+H	1.125	1.057
+D+0.70E+H	1.125	1.057
+D+0.750Lr+0.750L+0.450W+H	3.861	3.665
+D+0.750L+0.750S+0.450W+H	3.861	3.665
+D+0.750L+0.750S+0.5250E+H	3.861	3.665
+0.60D+0.60W+0.60H	0.675	0.634
+0.60D+0.70E+0.60H	0.675	0.634
D Only	1.125	1.057
Lr Only		
L Only	3.648	3.477
S Only		
W Only		
E Only		
H Only		

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Wood Beam

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 14

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

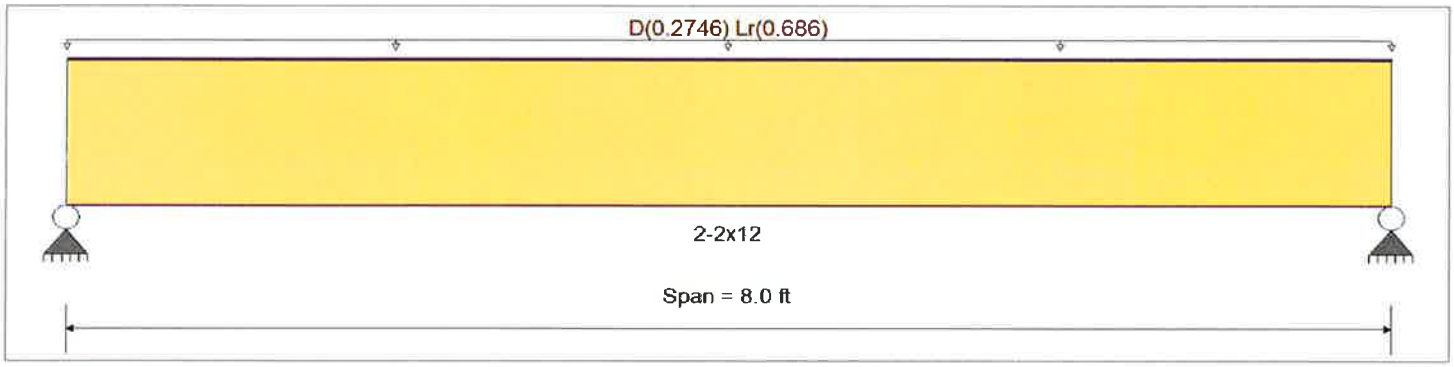
Wood Species : Hem Fir
Wood Grade : No.1

Fb +	1050 psi
Fb -	1050 psi
Fc - Prll	750 psi
Fc - Perp	405 psi
Fv	140 psi
Ft	525 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	26.83 pcf

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



Applied Loads

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

Uniform Load : D = 0.2746, Lr = 0.6860 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.854 : 1	Maximum Shear Stress Ratio	=	0.575 : 1
Section used for this span		2-2x12	Section used for this span		2-2x12
fb : Actual	=	1,457.27 psi	fv : Actual	=	130.88 psi
FB : Allowable	=	1,706.25 psi	Fv : Allowable	=	227.50 psi
Load Combination		+D+Lr+H	Load Combination		+D+Lr+H
Location of maximum on span	=	4.000 ft	Location of maximum on span	=	7.066 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.106 in	Ratio =	908 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.148 in	Ratio =	648 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.339	0.228	0.90	1.000	1.00	1.00	1.30	1.00	1.00	2.20	416.58	1228.50	0.84	37.42	163.80
+D+L+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.305	0.206	1.00	1.000	1.00	1.00	1.30	1.00	1.00	2.20	416.58	1365.00	0.84	37.42	182.00
+D+Lr+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.854	0.575	1.25	1.000	1.00	1.00	1.30	1.00	1.00	7.68	1,457.27	1706.25	2.94	130.88	227.50
+D+S+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.265	0.179	1.15	1.000	1.00	1.00	1.30	1.00	1.00	2.20	416.58	1569.75	0.84	37.42	209.30
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.702	0.473	1.25	1.000	1.00	1.00	1.30	1.00	1.00	6.31	1,197.09	1706.25	2.42	107.52	227.50

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11D

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Description : BEAM 14

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.265	0.179	1.15	1.000	1.00	1.00	1.30	1.00	1.00	2.20	416.58	1569.75	0.84	37.42	209.30
+D+0.60W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.191	0.128	1.60	1.000	1.00	1.00	1.30	1.00	1.00	2.20	416.58	2184.00	0.84	37.42	291.20
+D+0.70E+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.191	0.128	1.60	1.000	1.00	1.00	1.30	1.00	1.00	2.20	416.58	2184.00	0.84	37.42	291.20
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.548	0.369	1.60	1.000	1.00	1.00	1.30	1.00	1.00	6.31	1,197.09	2184.00	2.42	107.52	291.20
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.191	0.128	1.60	1.000	1.00	1.00	1.30	1.00	1.00	2.20	416.58	2184.00	0.84	37.42	291.20
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.191	0.128	1.60	1.000	1.00	1.00	1.30	1.00	1.00	2.20	416.58	2184.00	0.84	37.42	291.20
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.114	0.077	1.60	1.000	1.00	1.00	1.30	1.00	1.00	1.32	249.95	2184.00	0.51	22.45	291.20
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.114	0.077	1.60	1.000	1.00	1.00	1.30	1.00	1.00	1.32	249.95	2184.00	0.51	22.45	291.20

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.1480	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	3.842	3.842
Overall MINimum	2.744	2.744
+D+H	1.098	1.098
+D+L+H	1.098	1.098
+D+Lr+H	3.842	3.842
+D+S+H	1.098	1.098
+D+0.750Lr+0.750L+H	3.156	3.156
+D+0.750L+0.750S+H	1.098	1.098
+D+0.60W+H	1.098	1.098
+D+0.70E+H	1.098	1.098
+D+0.750Lr+0.750L+0.450W+H	3.156	3.156
+D+0.750L+0.750S+0.450W+H	1.098	1.098
+D+0.750L+0.750S+0.5250E+H	1.098	1.098
+0.60D+0.60W+0.60H	0.659	0.659
+0.60D+0.70E+0.60H	0.659	0.659
D Only	1.098	1.098
Lr Only	2.744	2.744
L Only		
S Only		
W Only		
E Only		
H Only		

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 15(HDR)

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

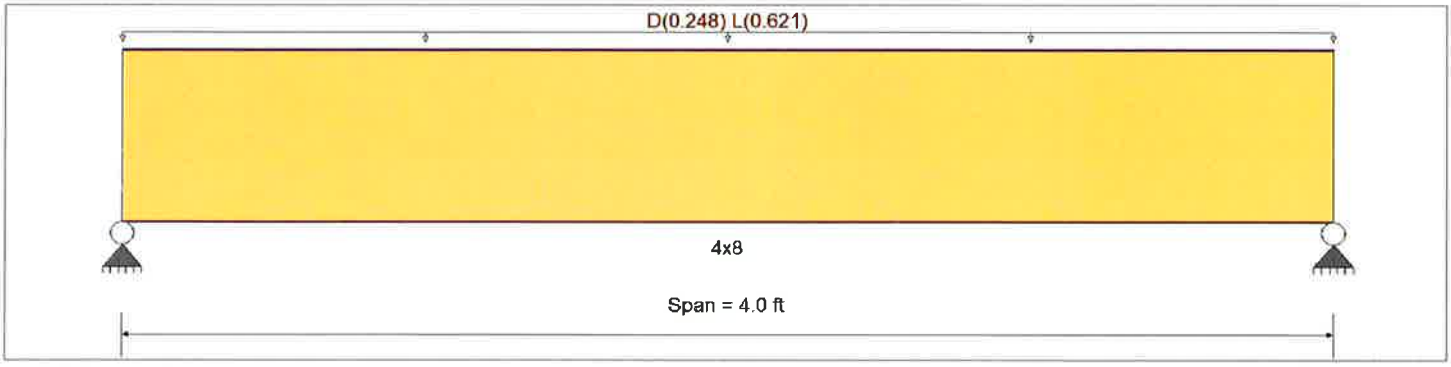
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Fb +	750 psi
Fb -	750 psi
Fc - Prll	700 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	475 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	31.2 pcf

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



Applied Loads

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

Uniform Load : D = 0.2480, L = 0.6210 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.537** : 1	Maximum Shear Stress Ratio	=	**0.326** : 1
Section used for this span		**4x8**	Section used for this span		**4x8**
fb : Actual	=	680.20 psi	fv : Actual	=	71.99 psi
FB : Allowable	=	1,267.50 psi	Fv : Allowable	=	221.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.000 ft	Location of maximum on span	=	3.401 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.019 in	Ratio =	2506 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.027 in	Ratio =	1790 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.170	0.103	0.90							0.50	194.12	1140.75	0.35	20.55	198.90
+D+L+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.537	0.326	1.00							1.74	680.20	1267.50	1.22	71.99	221.00
+D+Lr+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.123	0.074	1.25							0.50	194.12	1584.38	0.35	20.55	276.25
+D+S+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.133	0.081	1.15							0.50	194.12	1457.63	0.35	20.55	254.15
+D+0.750Lr+0.750L+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.353	0.214	1.25							1.43	558.68	1584.38	1.00	59.13	276.25

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 15(HDR)

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+0.750L+0.750S+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.383	0.233	1.15	1.300	1.00	1.00	1.30	1.00	1.00	1.43	558.68	1457.63	1.00	59.13	254.15
+D+0.60W+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.096	0.058	1.60	1.300	1.00	1.00	1.30	1.00	1.00	0.50	194.12	2028.00	0.35	20.55	353.60
+D+0.70E+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.096	0.058	1.60	1.300	1.00	1.00	1.30	1.00	1.00	0.50	194.12	2028.00	0.35	20.55	353.60
+D+0.750Lr+0.750L+0.450W+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.275	0.167	1.60	1.300	1.00	1.00	1.30	1.00	1.00	1.43	558.68	2028.00	1.00	59.13	353.60
+D+0.750L+0.750S+0.450W+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.275	0.167	1.60	1.300	1.00	1.00	1.30	1.00	1.00	1.43	558.68	2028.00	1.00	59.13	353.60
+D+0.750L+0.750S+0.5250E+H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.275	0.167	1.60	1.300	1.00	1.00	1.30	1.00	1.00	1.43	558.68	2028.00	1.00	59.13	353.60
+0.60D+0.60W+0.60H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.057	0.035	1.60	1.300	1.00	1.00	1.30	1.00	1.00	0.30	116.47	2028.00	0.21	12.33	353.60
+0.60D+0.70E+0.60H					1.300	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.057	0.035	1.60	1.300	1.00	1.00	1.30	1.00	1.00	0.30	116.47	2028.00	0.21	12.33	353.60

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0268	2.015		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

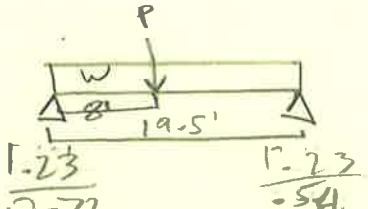
Load Combination	Support 1	Support 2
Overall MAXimum	1.738	1.738
Overall MINimum	1.242	1.242
+D+H	0.496	0.496
+D+L+H	1.738	1.738
+D+Lr+H	0.496	0.496
+D+S+H	0.496	0.496
+D+0.750Lr+0.750L+H	1.428	1.428
+D+0.750L+0.750S+H	1.428	1.428
+D+0.60W+H	0.496	0.496
+D+0.70E+H	0.496	0.496
+D+0.750Lr+0.750L+0.450W+H	1.428	1.428
+D+0.750L+0.750S+0.450W+H	1.428	1.428
+D+0.750L+0.750S+0.5250E+H	1.428	1.428
+0.60D+0.60W+0.60H	0.298	0.298
+0.60D+0.70E+0.60H	0.298	0.298
D Only	0.496	0.496
Lr Only		
L Only	1.242	1.242
S Only		
W Only		
E Only		
H Only		

APPLETON | 11-JUL-2018 | 8465

BEAM 12A

$W = 1.33(10+95) = \frac{0.12635}{0.0133}$ KPS.

P = 1000 lbs

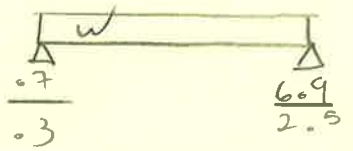


COMPUTER PRINT OUT 12Aa & 12Ab.
USE 4 x 12 DF#1 or 5.5 x 10.5 GLULAM 24F-V4

BEAM 12B

$w = 1.33(12+40) + (8\times10) + (10+90)\,2.66$.

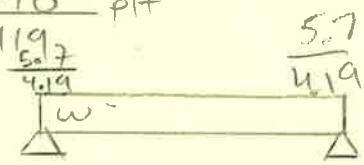
$= \frac{0.2926}{0.1226}$ KPS



COMPUTER PRINT OUT .. 12B
USE 6 X 12 HT #1

BEAM 12C

$w = (15psf + 25psf)(11ft) + (10lb \times 8ft) + (10psf + 30psf)(5.5ft) + (10lb \times 8ft) + (12psf + 40psf)(3.25ft) = \frac{570}{419}$ plf



5.25 x 16 PARALLAM PSL 2.0E
PRINT OUT 12C

BEAM 12D

$w = (10psf + 40psf)(4) = \frac{360}{40}$ plf

2 X 10 PT HF #1 PRINT OUT 12D

BEAM 12E

$w = (12psf + 25psf)(9.5ft) + (10lb \times 8ft) + (10psf + 30psf)(4ft) + (10lb \times 6ft) + (15psf + 25psf)(3) = \frac{.4325}{.239}$

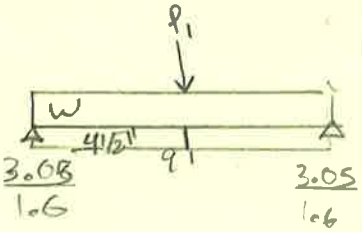
2 X 8 HF #2 PRINT OUT 12E

BEAM 12F

$w = 3'(12+40psf) + (8plf \times 10') + 2'(15+25plf)$

$= \frac{0.170}{0.146}$ KPS

$P_1 = \frac{4.57}{1.91}$ KPS.



USE GL 5 1/8 X 12 (24F-V4) PRINTOUT 12F

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Project ID:
Project Descr:

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 16

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
Length = 19.50 ft	1	0.389	0.106	1.15	1.100	1.00	1.00	1.30	1.00	1.00	5.31	863.65	2220.08	0.71	26.94	254.15
+D+0.750Lr+0.750L+H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.652	0.213	1.25	1.100	1.00	1.00	1.30	1.00	1.00	9.68	1,573.58	2413.13	1.54	58.81	276.25
+D+0.750L+0.750S+H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.709	0.231	1.15	1.100	1.00	1.00	1.30	1.00	1.00	9.68	1,573.58	2220.08	1.54	58.81	254.15
+D+0.60W+H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.280	0.076	1.60	1.100	1.00	1.00	1.30	1.00	1.00	5.31	863.65	3088.80	0.71	26.94	353.60
+D+0.70E+H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.280	0.076	1.60	1.100	1.00	1.00	1.30	1.00	1.00	5.31	863.65	3088.80	0.71	26.94	353.60
+D+0.750Lr+0.750L+0.450W+H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.509	0.166	1.60	1.100	1.00	1.00	1.30	1.00	1.00	9.68	1,573.58	3088.80	1.54	58.81	353.60
+D+0.750L+0.750S+0.450W+H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.509	0.166	1.60	1.100	1.00	1.00	1.30	1.00	1.00	9.68	1,573.58	3088.80	1.54	58.81	353.60
+D+0.750L+0.750S+0.5250E+H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.509	0.166	1.60	1.100	1.00	1.00	1.30	1.00	1.00	9.68	1,573.58	3088.80	1.54	58.81	353.60
+0.60D+0.60W+0.60H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.168	0.046	1.60	1.100	1.00	1.00	1.30	1.00	1.00	3.19	518.19	3088.80	0.42	16.16	353.60
+0.60D+0.70E+0.60H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.168	0.046	1.60	1.100	1.00	1.00	1.30	1.00	1.00	3.19	518.19	3088.80	0.42	16.16	353.60

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.8264	9.608		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.952	1.772
Overall MINimum	1.232	1.232
+D+H	0.719	0.540
+D+L+H	1.952	1.772
+D+Lr+H	0.719	0.540
+D+S+H	0.719	0.540
+D+0.750Lr+0.750L+H	1.644	1.464
+D+0.750L+0.750S+H	1.644	1.464
+D+0.60W+H	0.719	0.540
+D+0.70E+H	0.719	0.540
+D+0.750Lr+0.750L+0.450W+H	1.644	1.464
+D+0.750L+0.750S+0.450W+H	1.644	1.464
+D+0.750L+0.750S+0.5250E+H	1.644	1.464
+0.60D+0.60W+0.60H	0.432	0.324
+0.60D+0.70E+0.60H	0.432	0.324
D Only	0.719	0.540
Lr Only		
L Only	1.232	1.232
S Only		
W Only		
E Only		
H Only		

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12Aa

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 16

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

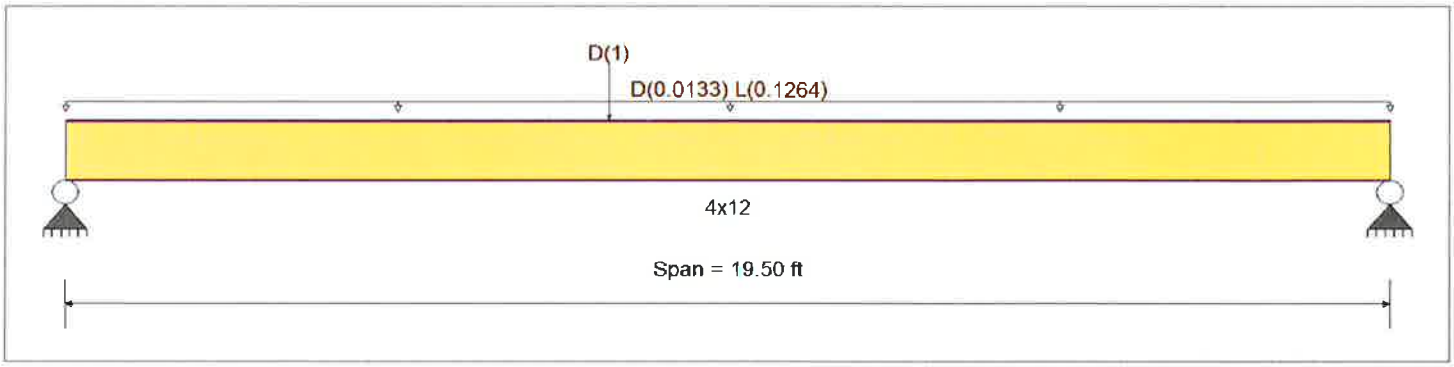
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

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

Fb +	1350 psi
Fb -	1350 psi
Fc - Prll	925 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.2 pcf



Applied Loads

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

Uniform Load : D = 0.01330, L = 0.1264 , Tributary Width = 1.0 ft

Point Load : D = 1.0 k @ 8.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.938 : 1	Maximum Shear Stress Ratio	=	0.314 : 1
Section used for this span		4x12	Section used for this span		4x12
fb : Actual	=	1,810.22 psi	fv : Actual	=	69.43 psi
FB : Allowable	=	1,930.50 psi	Fv : Allowable	=	221.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.042 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	0.479 in	Ratio =	488 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.826 in	Ratio =	283 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.497	0.135	0.90	1.100	1.00	1.00	1.30	1.00	1.00	5.31	863.65	1737.45	0.71	26.94	198.90
+D+L+H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.938	0.314	1.00	1.100	1.00	1.00	1.30	1.00	1.00	11.14	1,810.22	1930.50	1.82	69.43	221.00
+D+Lr+H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.358	0.098	1.25	1.100	1.00	1.00	1.30	1.00	1.00	5.31	863.65	2413.13	0.71	26.94	276.25
+D+S+H					1.100	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00

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Engineer:
Project ID:
Project Descr:

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Wood Beam

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 16

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

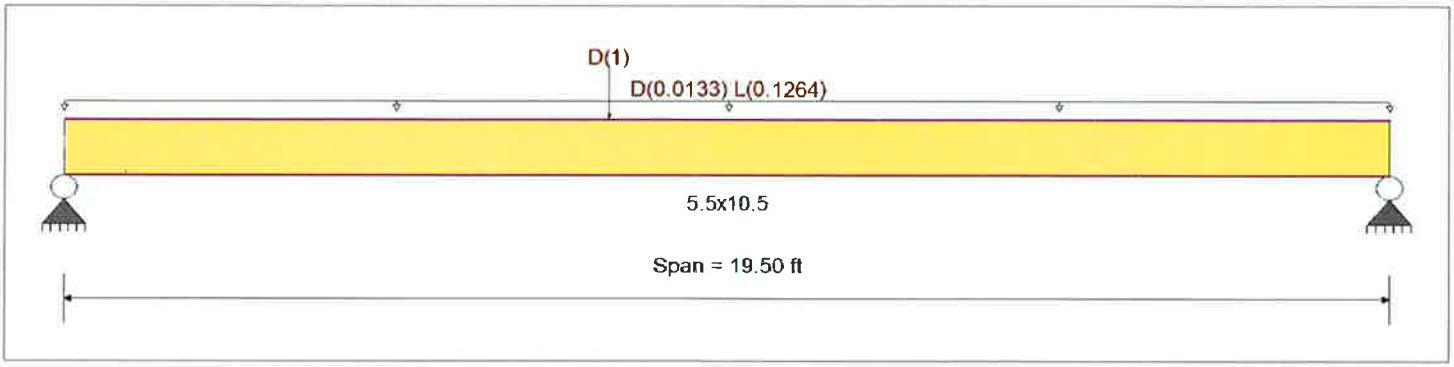
Wood Species : DF/DF
Wood Grade : 24F - V4

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	31.2 pcf



Applied Loads

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

Uniform Load : D = 0.01330, L = 0.1264 , Tributary Width = 1.0 ft

Point Load : D = 1.0 k @ 8.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.424 : 1	Maximum Shear Stress Ratio	=	0.138 : 1
Section used for this span		5.5x10.5	Section used for this span		5.5x10.5
fb : Actual	=	1,322.40 psi	fv : Actual	=	47.60 psi
FB : Allowable	=	3,120.00 psi	Fv : Allowable	=	344.50 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.042 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	0.333 in	Ratio =	702 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.575 in	Ratio =	407 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.225	0.059	0.90	1.000	1.00	1.00	1.30	1.00	1.00	5.31	630.92	2808.00	0.71	18.39	310.05
+D+L+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.424	0.138	1.00	1.000	1.00	1.00	1.30	1.00	1.00	11.14	1,322.40	3120.00	1.83	47.60	344.50
+D+Lr+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.162	0.043	1.25	1.000	1.00	1.00	1.30	1.00	1.00	5.31	630.92	3900.00	0.71	18.39	430.63
+D+S+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00

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Wood Beam

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Description : BEAM 16

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 = 19.50 ft	1	0.176	0.046	1.15	1.000	1.00	1.00	1.30	1.00	1.00	5.31	630.92	3588.00	0.71	18.39	396.18
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.295	0.094	1.25	1.000	1.00	1.00	1.30	1.00	1.00	9.68	1,149.53	3900.00	1.55	40.30	430.63
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.320	0.102	1.15	1.000	1.00	1.00	1.30	1.00	1.00	9.68	1,149.53	3588.00	1.55	40.30	396.18
+D+0.60W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.126	0.033	1.60	1.000	1.00	1.00	1.30	1.00	1.00	5.31	630.92	4992.00	0.71	18.39	551.20
+D+0.70E+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.126	0.033	1.60	1.000	1.00	1.00	1.30	1.00	1.00	5.31	630.92	4992.00	0.71	18.39	551.20
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.230	0.073	1.60	1.000	1.00	1.00	1.30	1.00	1.00	9.68	1,149.53	4992.00	1.55	40.30	551.20
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.230	0.073	1.60	1.000	1.00	1.00	1.30	1.00	1.00	9.68	1,149.53	4992.00	1.55	40.30	551.20
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.230	0.073	1.60	1.000	1.00	1.00	1.30	1.00	1.00	9.68	1,149.53	4992.00	1.55	40.30	551.20
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.076	0.020	1.60	1.000	1.00	1.00	1.30	1.00	1.00	3.19	378.55	4992.00	0.42	11.03	551.20
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.50 ft	1	0.076	0.020	1.60	1.000	1.00	1.00	1.30	1.00	1.00	3.19	378.55	4992.00	0.42	11.03	551.20

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.5749	9.608		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.952	1.772
Overall MINimum	1.232	1.232
+D+H	0.719	0.540
+D+L+H	1.952	1.772
+D+Lr+H	0.719	0.540
+D+S+H	0.719	0.540
+D+0.750Lr+0.750L+H	1.644	1.464
+D+0.750L+0.750S+H	1.644	1.464
+D+0.60W+H	0.719	0.540
+D+0.70E+H	0.719	0.540
+D+0.750Lr+0.750L+0.450W+H	1.644	1.464
+D+0.750L+0.750S+0.450W+H	1.644	1.464
+D+0.750L+0.750S+0.5250E+H	1.644	1.464
+0.60D+0.60W+0.60H	0.432	0.324
+0.60D+0.70E+0.60H	0.432	0.324
D Only	0.719	0.540
Lr Only		
L Only	1.232	1.232
S Only		
W Only		
E Only		
H Only		

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Wood Beam

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 17

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

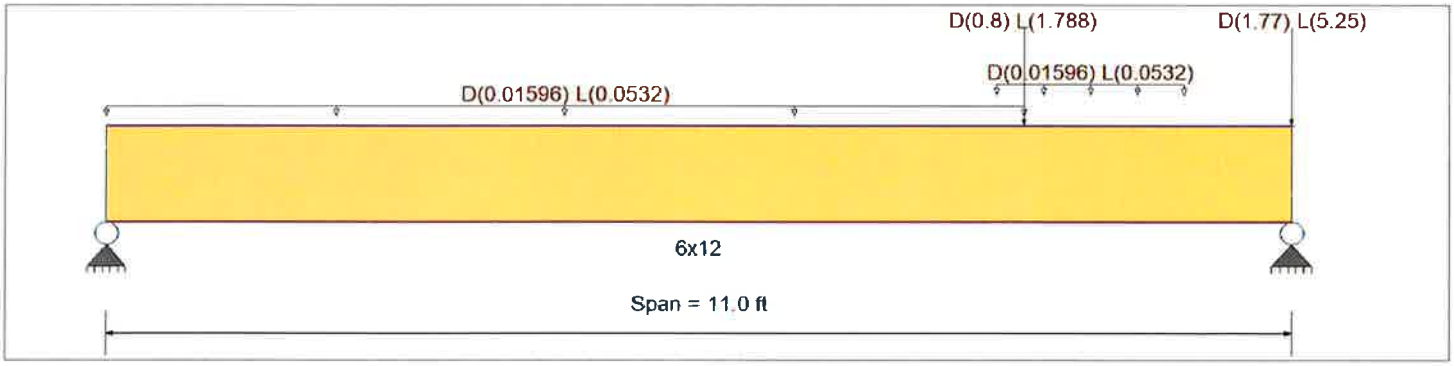
Wood Species : Hem Fir
Wood Grade : No.1

Fb +	975 psi
Fb -	975 psi
Fc - Prll	850 psi
Fc - Perp	405 psi
Fv	140 psi
Ft	650 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	26.83 pcf

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



Applied Loads

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

Load for Span Number 1

Uniform Load : D = 0.01596, L = 0.05320 k/ft, Extent = 0.0 -->> 8.50 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.01596, L = 0.05320 k/ft, Extent = 8.250 -->> 10.0 ft, Tributary Width = 1.0 ft

Point Load : D = 0.80, L = 1.788 k @ 8.50 ft

Point Load : D = 1.770, L = 5.250 k @ 11.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.582** : 1	Maximum Shear Stress Ratio	=	**0.394** : 1
Section used for this span		**6x12**	Section used for this span		**6x12**
fb : Actual	=	567.18 psi	fv : Actual	=	55.19 psi
FB : Allowable	=	975.00 psi	Fv : Allowable	=	140.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.471 ft	Location of maximum on span	=	10.036 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.081 in	Ratio =	1636 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.114 in	Ratio =	1158 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00

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Title Block Line 6

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Wood Beam

Lic. # : KW-06011301 **Licensee : Covington**

Description : BEAM 17

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 = 11.0 ft	1	0.193	0.131	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.71	169.53	877.50	0.69	16.45	126.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.582	0.394	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.73	567.18	975.00	2.33	55.19	140.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.139	0.094	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.71	169.53	1218.75	0.69	16.45	175.00
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.151	0.102	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.71	169.53	1121.25	0.69	16.45	161.00
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.384	0.260	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.73	467.76	1218.75	1.92	45.51	175.00
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.417	0.283	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.73	467.76	1121.25	1.92	45.51	161.00
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.109	0.073	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.71	169.53	1560.00	0.69	16.45	224.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.109	0.073	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.71	169.53	1560.00	0.69	16.45	224.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.300	0.203	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.73	467.76	1560.00	1.92	45.51	224.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.300	0.203	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.73	467.76	1560.00	1.92	45.51	224.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.300	0.203	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.73	467.76	1560.00	1.92	45.51	224.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.065	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.03	101.72	1560.00	0.42	9.87	224.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.065	0.044	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.03	101.72	1560.00	0.42	9.87	224.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1139	6.062		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.970	9.347
Overall MINimum	0.700	6.884
+D+H	0.270	2.464
+D+L+H	0.970	9.347
+D+Lr+H	0.270	2.464
+D+S+H	0.270	2.464
+D+0.750Lr+0.750L+H	0.795	7.626
+D+0.750L+0.750S+H	0.795	7.626
+D+0.60W+H	0.270	2.464
+D+0.70E+H	0.270	2.464
+D+0.750Lr+0.750L+0.450W+H	0.795	7.626
+D+0.750L+0.750S+0.450W+H	0.795	7.626
+D+0.750L+0.750S+0.5250E+H	0.795	7.626
+0.60D+0.60W+0.60H	0.162	1.478
+0.60D+0.70E+0.60H	0.162	1.478
D Only	0.270	2.464
Lr Only		
L Only	0.700	6.884
S Only		
W Only		
E Only		
H Only		

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 18

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

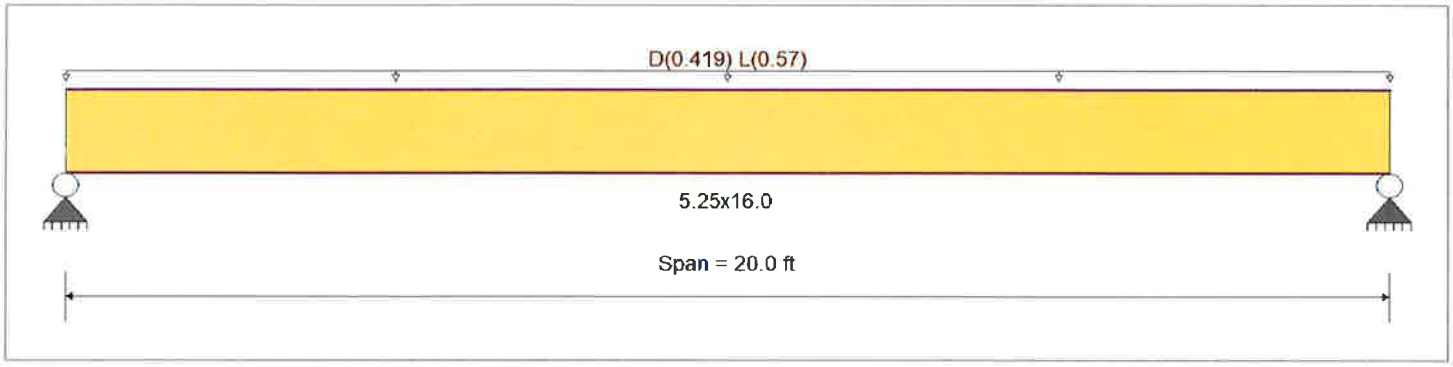
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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	625.0 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	45.050 pcf



Applied Loads

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

Uniform Load : D = 0.4190, L = 0.570 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.725 : 1	Maximum Shear Stress Ratio	=	0.407 : 1
Section used for this span		5.25x16.0	Section used for this span		5.25x16.0
fb : Actual	=	2,649.11 psi	fv : Actual	=	153.40 psi
FB : Allowable	=	3,651.52 psi	Fv : Allowable	=	377.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	10.000 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	0.443 in	Ratio =	541 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.769 in	Ratio =	312 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.342	0.192	0.90	0.969	1.00	1.00	1.30	1.00	1.00	20.95	1,122.32	3286.36	3.64	64.99	339.30
+D+L+H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.725	0.407	1.00	0.969	1.00	1.00	1.30	1.00	1.00	49.45	2,649.11	3651.52	8.59	153.40	377.00
+D+Lr+H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.246	0.138	1.25	0.969	1.00	1.00	1.30	1.00	1.00	20.95	1,122.32	4564.39	3.64	64.99	471.25
+D+S+H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.267	0.150	1.15	0.969	1.00	1.00	1.30	1.00	1.00	20.95	1,122.32	4199.24	3.64	64.99	433.55
+D+0.750Lr+0.750L+H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.497	0.279	1.25	0.969	1.00	1.00	1.30	1.00	1.00	42.33	2,267.41	4564.39	7.35	131.30	471.25

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 18

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+0.750L+0.750S+H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.540	0.303	1.15	0.969	1.00	1.00	1.30	1.00	1.00	42.33	2,267.41	4199.24	7.35	131.30	433.55
+D+0.60W+H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.192	0.108	1.60	0.969	1.00	1.00	1.30	1.00	1.00	20.95	1,122.32	5842.42	3.64	64.99	603.20
+D+0.70E+H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.192	0.108	1.60	0.969	1.00	1.00	1.30	1.00	1.00	20.95	1,122.32	5842.42	3.64	64.99	603.20
+D+0.750Lr+0.750L+0.450W+H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.388	0.218	1.60	0.969	1.00	1.00	1.30	1.00	1.00	42.33	2,267.41	5842.42	7.35	131.30	603.20
+D+0.750L+0.750S+0.450W+H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.388	0.218	1.60	0.969	1.00	1.00	1.30	1.00	1.00	42.33	2,267.41	5842.42	7.35	131.30	603.20
+D+0.750L+0.750S+0.5250E+H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.388	0.218	1.60	0.969	1.00	1.00	1.30	1.00	1.00	42.33	2,267.41	5842.42	7.35	131.30	603.20
+0.60D+0.60W+0.60H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.115	0.065	1.60	0.969	1.00	1.00	1.30	1.00	1.00	12.57	673.39	5842.42	2.18	38.99	603.20
+0.60D+0.70E+0.60H					0.969	1.00	1.00	1.30	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.115	0.065	1.60	0.969	1.00	1.00	1.30	1.00	1.00	12.57	673.39	5842.42	2.18	38.99	603.20

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.7686	10.073		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.890	9.890
Overall MINimum	5.700	5.700
+D+H	4.190	4.190
+D+L+H	9.890	9.890
+D+Lr+H	4.190	4.190
+D+S+H	4.190	4.190
+D+0.750Lr+0.750L+H	8.465	8.465
+D+0.750L+0.750S+H	8.465	8.465
+D+0.60W+H	4.190	4.190
+D+0.70E+H	4.190	4.190
+D+0.750Lr+0.750L+0.450W+H	8.465	8.465
+D+0.750L+0.750S+0.450W+H	8.465	8.465
+D+0.750L+0.750S+0.5250E+H	8.465	8.465
+0.60D+0.60W+0.60H	2.514	2.514
+0.60D+0.70E+0.60H	2.514	2.514
D Only	4.190	4.190
Lr Only		
L Only	5.700	5.700
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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Wood Column

Lic. # : KW-06011301 — **Licensee : Covington**

Description : COL UNDER BEAM 18

Code References

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Analysis Method :	Allowable Stress Design
End Fixities	Top Free, Bottom Fixed
Overall Column Height	10.0 ft
(Used for non-slender calculations)	
Wood Species	Hem Fir
Wood Grade	No.2

Fb +	575.0 psi	Fv	140.0 psi
Fb -	575.0 psi	Ft	375.0 psi
Fc - Prll	575.0 psi	Density	26.830 pcf
Fc - Perp	405.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,100.0	1,100.0	1,100.0 ksi
Minimum	400.0	400.0	

Wood Section Name	4x6		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	3.50 in	Allow Stress Modification Factors	
Exact Depth	5.50 in	Cf or Cv for Bending	1.30
Area	19.250 in^2	Cf or Cv for Compression	1.150
Ix	48.526 in^4	Cf or Cv for Tension	1.30
Iy	19.651 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Fully braced against buckling along Y-Y Axis

Applied Loads

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

Column self weight included : 35.866 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 3.940, L = 5.70 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.7601 : 1**

Load Combination	+D+L+H
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	9.676 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	661.25 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D+0.70E+0.60H
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	224.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.900	1.000	0.3471	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L+H	1.000	1.000	0.7601	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr+H	1.250	1.000	0.2499	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S+H	1.150	1.000	0.2716	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+H	1.250	1.000	0.5186	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+H	1.150	1.000	0.5636	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W+H	1.600	1.000	0.1952	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.70E+H	1.600	1.000	0.1952	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+0.450W+H	1.600	1.000	0.4051	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.450W+H	1.600	1.000	0.4051	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.5250E+H	1.600	1.000	0.4051	PASS	0.0 ft	0.0	PASS	10.0 ft

Title Block Line 1
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Project Title:
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12C(1)

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Wood Column

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : COL UNDER BEAM 18

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+0.60D+0.60W+0.60H	1.600	1.000	0.1171	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D+0.70E+0.60H	1.600	1.000	0.1171	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	k-ft	My - End Moments @ Base	My - End Moments @ Top	Mx - End Moments @ Base	Mx - End Moments @ Top
+D+H						3.976					
+D+L+H						9.676					
+D+Lr+H						3.976					
+D+S+H						3.976					
+D+0.750Lr+0.750L+H						8.251					
+D+0.750L+0.750S+H						8.251					
+D+0.60W+H						3.976					
+D+0.70E+H						3.976					
+D+0.750Lr+0.750L+0.450W+H						8.251					
+D+0.750L+0.750S+0.450W+H						8.251					
+D+0.750L+0.750S+0.5250E+H						8.251					
+0.60D+0.60W+0.60H						2.386					
+0.60D+0.70E+0.60H						2.386					
D Only						3.976					
Lr Only											
L Only						5.700					
S Only											
W Only											
E Only											
H Only											

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

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Engineer:
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Project Descr:

12C(1)

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Wood Column

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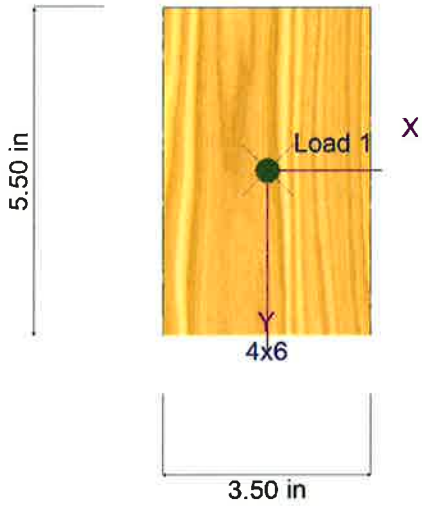
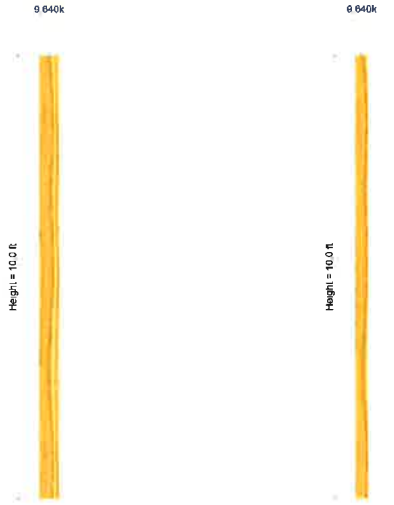
Description : COL UNDER BEAM 18

Sketches





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Project Title:
Engineer:
Project ID:
Project Descr:

12D

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Wood Beam

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : BEAM 19(HDR UNDER BACK DOOR OVERHANG)

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

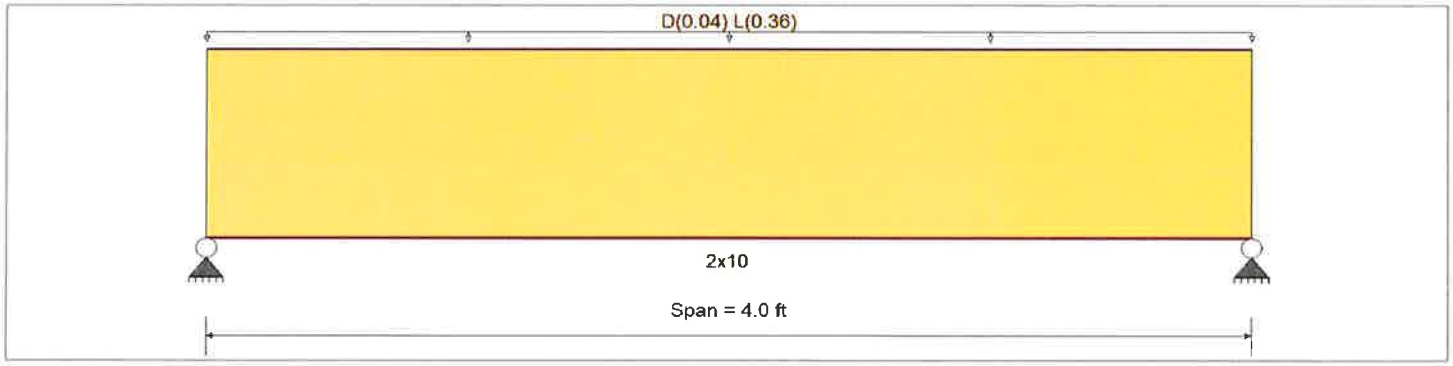
Wood Species : Hem Fir
Wood Grade : No.1

Fb +	1050 psi
Fb -	1050 psi
Fc - Prll	750 psi
Fc - Perp	405 psi
Fv	140 psi
Ft	525 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	26.83 pcf

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



Applied Loads

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

Uniform Load : D = 0.040, L = 0.360 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.389 : 1	Maximum Shear Stress Ratio	=	0.383 : 1
Section used for this span		2x10	Section used for this span		2x10
fb : Actual	=	448.79 psi	fv : Actual	=	53.66 psi
FB : Allowable	=	1,155.00 psi	Fv : Allowable	=	140.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.000 ft	Location of maximum on span	=	3.241 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.016 in	Ratio =	2959 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.018 in	Ratio =	2663 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.043	0.043	0.90	1.100	1.00	1.00	1.00	1.00	1.00	0.08	44.88	1039.50	0.05	5.37	126.00
+D+L+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.389	0.383	1.00	1.100	1.00	1.00	1.00	1.00	1.00	0.80	448.79	1155.00	0.50	53.66	140.00
+D+Lr+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.031	0.031	1.25	1.100	1.00	1.00	1.00	1.00	1.00	0.08	44.88	1443.75	0.05	5.37	175.00
+D+S+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.034	0.033	1.15	1.100	1.00	1.00	1.00	1.00	1.00	0.08	44.88	1328.25	0.05	5.37	161.00
+D+0.750Lr+0.750L+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.241	0.238	1.25	1.100	1.00	1.00	1.00	1.00	1.00	0.62	347.82	1443.75	0.38	41.59	175.00

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12D

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Wood Beam

Lic. # : KW-06011301 **Licensee : Covington**

Description : BEAM 19(HDR UNDER BACK DOOR OVERHANG)

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+0.750L+0.750S+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.262	0.258	1.15	1.100	1.00	1.00	1.00	1.00	1.00	0.62	347.82	1328.25	0.38	41.59	161.00
+D+0.60W+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.024	0.024	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.08	44.88	1848.00	0.05	5.37	224.00
+D+0.70E+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.024	0.024	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.08	44.88	1848.00	0.05	5.37	224.00
+D+0.750Lr+0.750L+0.450W+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.188	0.186	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.62	347.82	1848.00	0.38	41.59	224.00
+D+0.750L+0.750S+0.450W+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.188	0.186	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.62	347.82	1848.00	0.38	41.59	224.00
+D+0.750L+0.750S+0.5250E+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.188	0.186	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.62	347.82	1848.00	0.38	41.59	224.00
+0.60D+0.60W+0.60H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.015	0.014	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.05	26.93	1848.00	0.03	3.22	224.00
+0.60D+0.70E+0.60H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 4.0 ft	1	0.015	0.014	1.60	1.100	1.00	1.00	1.00	1.00	1.00	0.05	26.93	1848.00	0.03	3.22	224.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0180	2.015		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.800	0.800
Overall MINimum	0.720	0.720
+D+H	0.080	0.080
+D+L+H	0.800	0.800
+D+Lr+H	0.080	0.080
+D+S+H	0.080	0.080
+D+0.750Lr+0.750L+H	0.620	0.620
+D+0.750L+0.750S+H	0.620	0.620
+D+0.60W+H	0.080	0.080
+D+0.70E+H	0.080	0.080
+D+0.750Lr+0.750L+0.450W+H	0.620	0.620
+D+0.750L+0.750S+0.450W+H	0.620	0.620
+D+0.750L+0.750S+0.5250E+H	0.620	0.620
+0.60D+0.60W+0.60H	0.048	0.048
+0.60D+0.70E+0.60H	0.048	0.048
D Only	0.080	0.080
Lr Only		
L Only	0.720	0.720
S Only		
W Only		
E Only		
H Only		

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i2 E

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Wood Beam

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : MECH ROOM HEADER

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

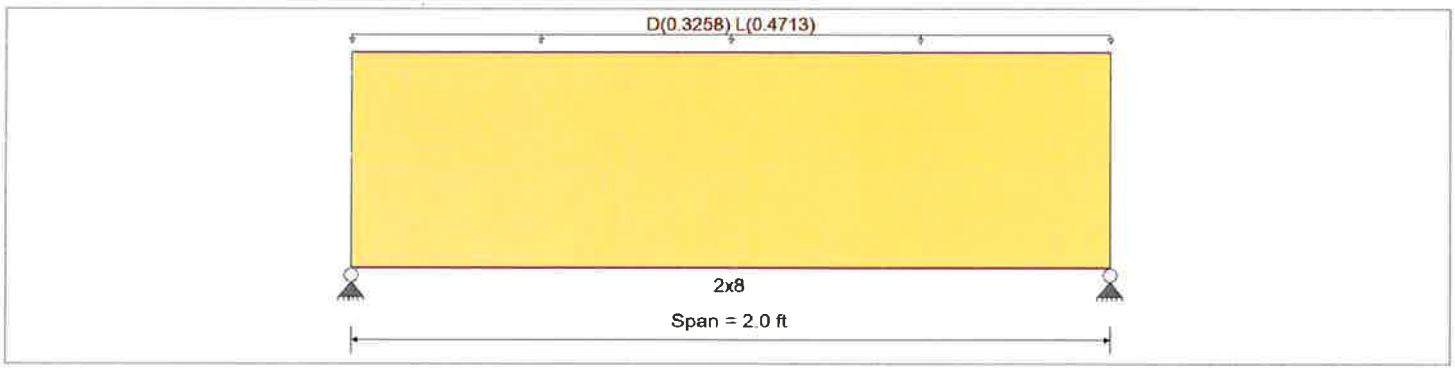
Wood Species : Hem Fir
Wood Grade : No.2

Fb +	575 psi
Fb -	575 psi
Fc - Prll	575 psi
Fc - Perp	405 psi
Fv	140 psi
Ft	375 psi

E : Modulus of Elasticity

Ebend- xx	1100 ksi
Eminbend - xx	400 ksi
Density	26.83 pcf

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



Applied Loads

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

Uniform Load : D = 0.3258, L = 0.4713 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.527 : 1	Maximum Shear Stress Ratio	=	0.315 : 1
Section used for this span		2x8	Section used for this span		2x8
fb : Actual	=	363.96 psi	fv : Actual	=	44.14 psi
FB : Allowable	=	690.00 psi	Fv : Allowable	=	140.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	1.000 ft	Location of maximum on span	=	1.401 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.003 in	Ratio =	7368 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.006 in	Ratio =	4356 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.240	0.143	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.16	148.76	621.00	0.13	18.04	126.00
+D+L+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.527	0.315	1.00	1.200	1.00	1.00	1.00	1.00	1.00	0.40	363.96	690.00	0.32	44.14	140.00
+D+Lr+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.172	0.103	1.25	1.200	1.00	1.00	1.00	1.00	1.00	0.16	148.76	862.50	0.13	18.04	175.00
+D+S+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.187	0.112	1.15	1.200	1.00	1.00	1.00	1.00	1.00	0.16	148.76	793.50	0.13	18.04	161.00
+D+0.750Lr+0.750L+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.360	0.215	1.25	1.200	1.00	1.00	1.00	1.00	1.00	0.34	310.16	862.50	0.27	37.61	175.00

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Engineer:
Project ID:
Project Descr:

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Wood Beam

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : MECH ROOM HEADER

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	C_{FV}	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+0.750L+0.750S+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.391	0.234	1.15	1.200	1.00	1.00	1.00	1.00	1.00	0.34	310.16	793.50	0.27	37.61	161.00
+D+0.60W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.135	0.081	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.16	148.76	1104.00	0.13	18.04	224.00
+D+0.70E+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.135	0.081	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.16	148.76	1104.00	0.13	18.04	224.00
+D+0.750Lr+0.750L+0.450W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.281	0.168	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.34	310.16	1104.00	0.27	37.61	224.00
+D+0.750L+0.750S+0.450W+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.281	0.168	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.34	310.16	1104.00	0.27	37.61	224.00
+D+0.750L+0.750S+0.5250E+H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.281	0.168	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.34	310.16	1104.00	0.27	37.61	224.00
+0.60D+0.60W+0.60H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.081	0.048	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.10	89.26	1104.00	0.08	10.82	224.00
+0.60D+0.70E+0.60H					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.081	0.048	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.10	89.26	1104.00	0.08	10.82	224.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.0055	1.007		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.797	0.797
Overall MINimum	0.471	0.471
+D+H	0.326	0.326
+D+L+H	0.797	0.797
+D+Lr+H	0.326	0.326
+D+S+H	0.326	0.326
+D+0.750Lr+0.750L+H	0.679	0.679
+D+0.750L+0.750S+H	0.679	0.679
+D+0.60W+H	0.326	0.326
+D+0.70E+H	0.326	0.326
+D+0.750Lr+0.750L+0.450W+H	0.679	0.679
+D+0.750L+0.750S+0.450W+H	0.679	0.679
+D+0.750L+0.750S+0.5250E+H	0.679	0.679
+0.60D+0.60W+0.60H	0.195	0.195
+0.60D+0.70E+0.60H	0.195	0.195
D Only	0.326	0.326
Lr Only		
L Only	0.471	0.471
S Only		
W Only		
E Only		
H Only		

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and then using the "Printing &
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

12F

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : EXTERIOR OVERHANG BEAM

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	1	0.204	0.117	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.78	563.49	2760.00	1.47	35.81	304.75
+D+0.750Lr+0.750L+H					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	0.481	0.267	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.78	1,441.81	3000.00	3.63	88.54	331.25
+D+0.750L+0.750S+H					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	0.522	0.291	1.15	1.000	1.00	1.00	1.00	1.00	1.00	14.78	1,441.81	2760.00	3.63	88.54	304.75
+D+0.60W+H					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	0.147	0.084	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.78	563.49	3840.00	1.47	35.81	424.00
+D+0.70E+H					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	0.147	0.084	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.78	563.49	3840.00	1.47	35.81	424.00
+D+0.750Lr+0.750L+0.450W+H					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	0.375	0.209	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.78	1,441.81	3840.00	3.63	88.54	424.00
+D+0.750L+0.750S+0.450W+H					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	0.375	0.209	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.78	1,441.81	3840.00	3.63	88.54	424.00
+D+0.750L+0.750S+0.5250E+H					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	0.375	0.209	1.60	1.000	1.00	1.00	1.00	1.00	1.00	14.78	1,441.81	3840.00	3.63	88.54	424.00
+0.60D+0.60W+0.60H					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	0.088	0.051	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.47	338.09	3840.00	0.88	21.48	424.00
+0.60D+0.70E+0.60H					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	0.088	0.051	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.47	338.09	3840.00	0.88	21.48	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1727	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	4.662	4.662
Overall MINimum	3.050	3.050
+D+H	1.612	1.612
+D+L+H	4.662	4.662
+D+Lr+H	1.612	1.612
+D+S+H	1.612	1.612
+D+0.750Lr+0.750L+H	3.900	3.900
+D+0.750L+0.750S+H	3.900	3.900
+D+0.60W+H	1.612	1.612
+D+0.70E+H	1.612	1.612
+D+0.750Lr+0.750L+0.450W+H	3.900	3.900
+D+0.750L+0.750S+0.450W+H	3.900	3.900
+D+0.750L+0.750S+0.5250E+H	3.900	3.900
+0.60D+0.60W+0.60H	0.967	0.967
+0.60D+0.70E+0.60H	0.967	0.967
D Only	1.612	1.612
Lr Only		
L Only	3.050	3.050
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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Project Title:
Engineer:
Project ID:
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Wood Beam

File = C:\Users\sdapg\DOCUME~1\ENERCA~1\8465.ec6

Lic. # : KW-06011301 — **Licensee : Covington**

Description : EXTERIOR OVERHANG BEAM

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

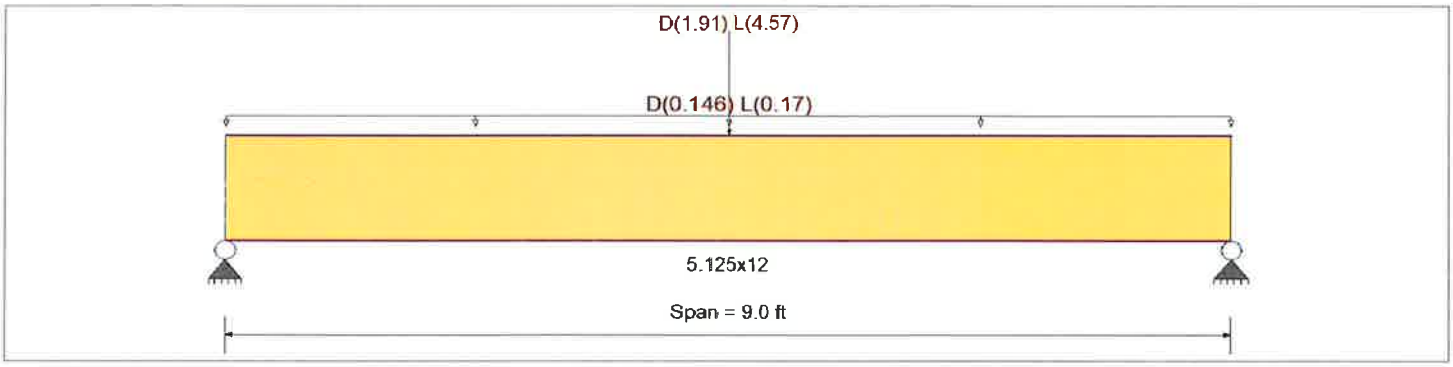
Wood Species : DF/DF
Wood Grade : 24F - V4

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	31.20 pcf



Applied Loads

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

Uniform Load : D = 0.1460, L = 0.170 , Tributary Width = 1.0 ft

Point Load : D = 1.910, L = 4.570 k @ 4.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.723 : 1	Maximum Shear Stress Ratio	=	0.400 : 1
Section used for this span		5.125x12	Section used for this span		5.125x12
fb : Actual	=	1,734.59 psi	fv : Actual	=	106.11 psi
FB : Allowable	=	2,400.00 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
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

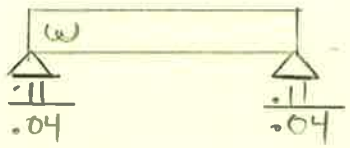
Max Downward Transient Deflection	0.116 in	Ratio =	934 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.173 in	Ratio =	625 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.261	0.150	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.78	563.49	2160.00	1.47	35.81	238.50
+D+L+H					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	0.723	0.400	1.00	1.000	1.00	1.00	1.00	1.00	1.00	17.78	1,734.59	2400.00	4.35	106.11	265.00
+D+Lr+H					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	0.188	0.108	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.78	563.49	3000.00	1.47	35.81	331.25
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

BEAM 13A

$w = (15psf + 25psf)(3ft) = \frac{75}{45}$ plf



COMPUTER GENERATED 13A
4X8 DF #2

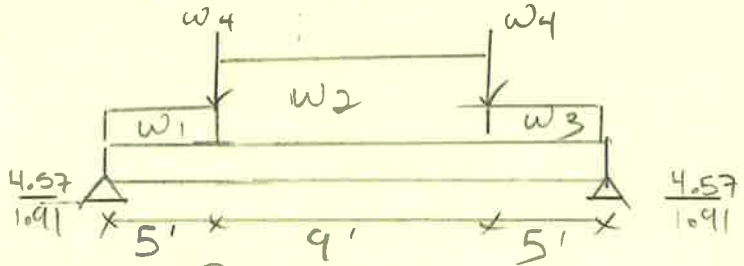
BEAM 13B

$w_1 = (15psf + 25psf)(12.25ft) = \frac{306.25}{183.75}$ plf

$w_2 = (10psf + 90psf)(5ft) + (12psf + 40psf)(2ft) + (10lb \times 9ft) +$
$+ (15psf + 25psf)(2ft) = \frac{580}{194}$ plf

$w_3 = (15psf + 25psf)(12.25ft) = \frac{306.25}{183.75}$ plf

$w_4 = \frac{.1955}{.0216}$ kips



COMPUTER GENERATED 13B
5.5 X 15 DF/DF V-4

↳ COL

COMP. GEN 13.C

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Engineer:
Project ID:
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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : ROOF HEADER

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

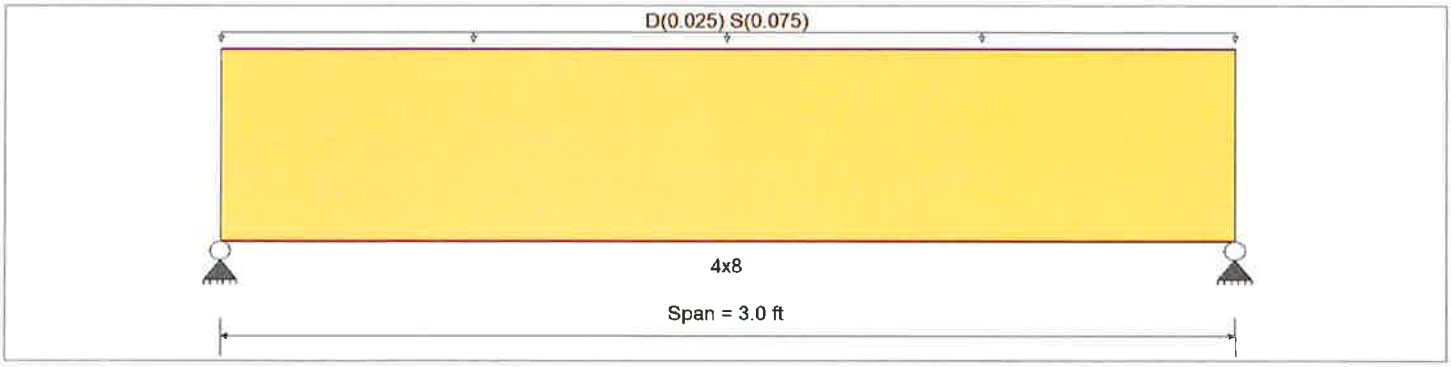
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	31.2 pcf



Applied Loads

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

Uniform Load : D = 0.0250, S = 0.0750 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.034 : 1	Maximum Shear Stress Ratio	=	0.027 : 1
Section used for this span		4x8	Section used for this span		4x8
fb : Actual	=	44.03 psi	fv : Actual	=	5.31 psi
FB : Allowable	=	1,308.13 psi	Fv : Allowable	=	195.50 psi
Load Combination		+D+S+H	Load Combination		+D+S+H
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	0.000 in	Ratio =	0 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.001 in	Ratio =	28376 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

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+H													0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.011	0.009	0.90	1.300	1.00	1.00	1.00	1.00	1.00	0.03	11.01	1023.75	0.02	1.33	153.00
+D+L+H					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	0.010	0.008	1.00	1.300	1.00	1.00	1.00	1.00	1.00	0.03	11.01	1137.50	0.02	1.33	170.00
+D+Lr+H					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	0.008	0.006	1.25	1.300	1.00	1.00	1.00	1.00	1.00	0.03	11.01	1421.88	0.02	1.33	212.50
+D+S+H					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	0.034	0.027	1.15	1.300	1.00	1.00	1.00	1.00	1.00	0.11	44.03	1308.13	0.09	5.31	195.50
+D+0.750Lr+0.750L+H					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	0.008	0.006	1.25	1.300	1.00	1.00	1.00	1.00	1.00	0.03	11.01	1421.88	0.02	1.33	212.50

Title Block Line 1
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Title Block Line 6

Project Title:
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Wood Beam

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Lic. # : KW-06011301 **Licensee : Covington**

Description : ROOF HEADER

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+0.750L+0.750S+H					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	0.027	0.022	1.15	1.300	1.00	1.00	1.00	1.00	1.00	0.09	35.77	1308.13	0.07	4.31	195.50
+D+0.60W+H					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	0.006	0.005	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.03	11.01	1820.00	0.02	1.33	272.00
+D+0.70E+H					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	0.006	0.005	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.03	11.01	1820.00	0.02	1.33	272.00
+D+0.750Lr+0.750L+0.450W+H					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	0.006	0.005	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.03	11.01	1820.00	0.02	1.33	272.00
+D+0.750L+0.750S+0.450W+H					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	0.020	0.016	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.09	35.77	1820.00	0.07	4.31	272.00
+D+0.750L+0.750S+0.5250E+H					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	0.020	0.016	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.09	35.77	1820.00	0.07	4.31	272.00
+0.60D+0.60W+0.60H					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	0.004	0.003	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.02	6.60	1820.00	0.01	0.80	272.00
+0.60D+0.70E+0.60H					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	0.004	0.003	1.60	1.300	1.00	1.00	1.00	1.00	1.00	0.02	6.60	1820.00	0.01	0.80	272.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S+H	1	0.0013	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	0.150	0.150
Overall MINimum	0.113	0.113
+D+H	0.038	0.038
+D+L+H	0.038	0.038
+D+Lr+H	0.038	0.038
+D+S+H	0.150	0.150
+D+0.750Lr+0.750L+H	0.038	0.038
+D+0.750L+0.750S+H	0.122	0.122
+D+0.60W+H	0.038	0.038
+D+0.70E+H	0.038	0.038
+D+0.750Lr+0.750L+0.450W+H	0.038	0.038
+D+0.750L+0.750S+0.450W+H	0.122	0.122
+D+0.750L+0.750S+0.5250E+H	0.122	0.122
+0.60D+0.60W+0.60H	0.023	0.023
+0.60D+0.70E+0.60H	0.023	0.023
D Only	0.038	0.038
Lr Only		
L Only		
S Only	0.113	0.113
W Only		
E Only		
H Only		

Title Block Line 1
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Title Block Line 6

Project Title:
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Wood Beam

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : ROOF DECK SUPPORT BEAM

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

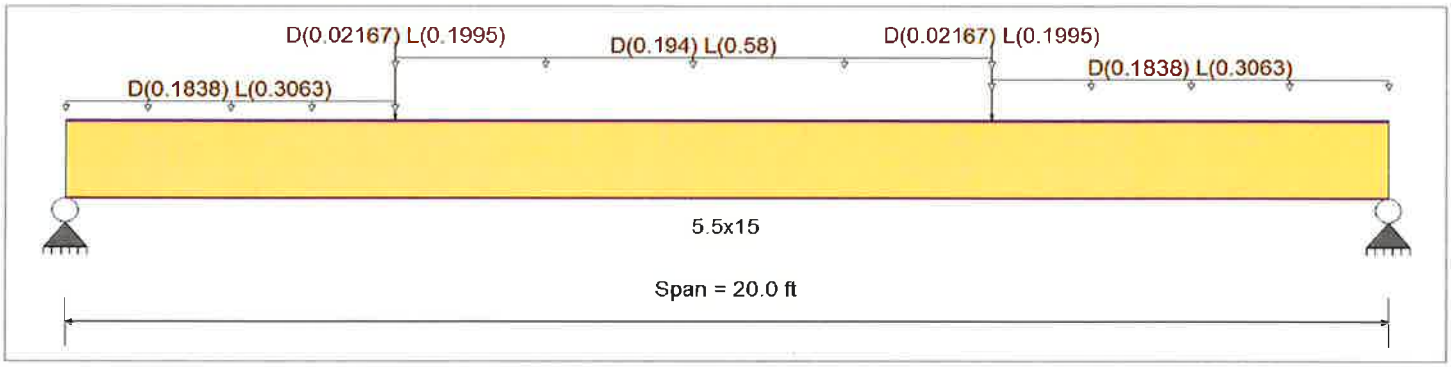
Wood Species : DF/DF
Wood Grade : 24F - V4

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	31.2 pcf



Applied Loads

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

Point Load : D = 0.02167, L = 0.1995 k @ 5.0 ft, (CANTDECK1)

Point Load : D = 0.02167, L = 0.1995 k @ 14.0 ft, (CANTDECK2)

Uniform Load : D = 0.1838, L = 0.3063 k/ft, Extent = 0.0 -->> 5.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.1838, L = 0.3063 k/ft, Extent = 14.0 -->> 20.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.1940, L = 0.580 k/ft, Extent = 5.0 -->> 14.0 ft, Tributary Width = 1.0 ft, (DECK)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.906 : 1	Maximum Shear Stress Ratio	=	0.403 : 1
Section used for this span		5.5x15	Section used for this span		5.5x15
fb : Actual	=	2,070.68 psi	fv : Actual	=	106.66 psi
FB : Allowable	=	2,285.25 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	9.927 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	0.662 in	Ratio =	362 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.913 in	Ratio =	262 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Title Block Line 1
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Title Block Line 6

Project Title:
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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : ROOF DECK SUPPORT BEAM

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+H													0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.273	0.128	0.90	0.976	1.00	1.00	1.00	1.00	1.00	9.66	562.25	2056.72	1.68	30.56	238.50
+D+L+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.906	0.403	1.00	0.976	1.00	1.00	1.00	1.00	1.00	35.59	2,070.68	2285.25	5.87	106.66	265.00
+D+Lr+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.197	0.092	1.25	0.976	1.00	1.00	1.00	1.00	1.00	9.66	562.25	2856.56	1.68	30.56	331.25
+D+S+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.214	0.100	1.15	0.976	1.00	1.00	1.00	1.00	1.00	9.66	562.25	2628.04	1.68	30.56	304.75
+D+0.750Lr+0.750L+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.593	0.265	1.25	0.976	1.00	1.00	1.00	1.00	1.00	29.11	1,693.57	2856.56	4.82	87.64	331.25
+D+0.750L+0.750S+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.644	0.288	1.15	0.976	1.00	1.00	1.00	1.00	1.00	29.11	1,693.57	2628.04	4.82	87.64	304.75
+D+0.60W+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.154	0.072	1.60	0.976	1.00	1.00	1.00	1.00	1.00	9.66	562.25	3656.40	1.68	30.56	424.00
+D+0.70E+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.154	0.072	1.60	0.976	1.00	1.00	1.00	1.00	1.00	9.66	562.25	3656.40	1.68	30.56	424.00
+D+0.750Lr+0.750L+0.450W+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.463	0.207	1.60	0.976	1.00	1.00	1.00	1.00	1.00	29.11	1,693.57	3656.40	4.82	87.64	424.00
+D+0.750L+0.750S+0.450W+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.463	0.207	1.60	0.976	1.00	1.00	1.00	1.00	1.00	29.11	1,693.57	3656.40	4.82	87.64	424.00
+D+0.750L+0.750S+0.5250E+H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.463	0.207	1.60	0.976	1.00	1.00	1.00	1.00	1.00	29.11	1,693.57	3656.40	4.82	87.64	424.00
+0.60D+0.60W+0.60H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.092	0.043	1.60	0.976	1.00	1.00	1.00	1.00	1.00	5.80	337.35	3656.40	1.01	18.34	424.00
+0.60D+0.70E+0.60H					0.976	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.092	0.043	1.60	0.976	1.00	1.00	1.00	1.00	1.00	5.80	337.35	3656.40	1.01	18.34	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.9126	10.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.475	6.325
Overall MINimum	4.566	4.423
+D+H	1.909	1.902
+D+L+H	6.475	6.325
+D+Lr+H	1.909	1.902
+D+S+H	1.909	1.902
+D+0.750Lr+0.750L+H	5.333	5.219
+D+0.750L+0.750S+H	5.333	5.219
+D+0.60W+H	1.909	1.902
+D+0.70E+H	1.909	1.902
+D+0.750Lr+0.750L+0.450W+H	5.333	5.219
+D+0.750L+0.750S+0.450W+H	5.333	5.219
+D+0.750L+0.750S+0.5250E+H	5.333	5.219
+0.60D+0.60W+0.60H	1.145	1.141
+0.60D+0.70E+0.60H	1.145	1.141
D Only	1.909	1.902
Lr Only		
L Only	4.566	4.423
S Only		
W Only		
E Only		
H Only		

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Wood Column

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Lic. # : KW-06011301 — **Licensee : Covington**

Description : ROOF DECK SUPPORT BEAM COLUMN

Code References

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Analysis Method :	Allowable Stress Design		
End Fixities	Top Pinned, Bottom Fixed		
Overall Column Height	10.0 ft		
(Used for non-slender calculations)			
Wood Species	Hem Fir		
Wood Grade	No.2		
Fb +	575.0 psi	Fv	140.0 psi
Fb -	575.0 psi	Ft	375.0 psi
Fc - Prll	575.0 psi	Density	26.830 pcf
Fc - Perp	405.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,100.0	1,100.0	1,100.0 ksi
Minimum	400.0	400.0	

Wood Section Name	4x6		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	3.50 in	Allow Stress Modification Factors	
Exact Depth	5.50 in	Cf or Cv for Bending	1.30
Area	19.250 in^2	Cf or Cv for Compression	1.10
Ix	48.526 in^4	Cf or Cv for Tension	1.30
Iy	19.651 in^4	Cm : Wet Use Factor	1.0
		Ct : Temperature Factor	1.0
		Cfu : Flat Use Factor	1.0
		Kf : Built-up columns	1.0 *NDS 15.3.2*
		Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = 10 ft, K = 0.65

Applied Loads

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

Column self weight included : 35.866 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 1.910, L = 4.570 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5926 : 1**

Load Combination	+D+L+H
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	6.516 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	571.16 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D+0.70E+0.60H
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	224.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination : n/a				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination : n/a				

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.900	0.915	0.1942	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L+H	1.000	0.903	0.5926	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr+H	1.250	0.873	0.1465	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S+H	1.150	0.885	0.1570	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+H	1.250	0.873	0.4046	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+H	1.150	0.885	0.4336	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W+H	1.600	0.827	0.1208	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.70E+H	1.600	0.827	0.1208	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+0.450W+H	1.600	0.827	0.3336	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.450W+H	1.600	0.827	0.3336	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.5250E+H	1.600	0.827	0.3336	PASS	0.0 ft	0.0	PASS	10.0 ft

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Wood Column

Lic. # : KW-06011301 — **Licensee : Covington**

Description : ROOF DECK SUPPORT BEAM COLUMN

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+0.60D+0.60W+0.60H	1.600	0.827	0.07250	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D+0.70E+0.60H	1.600	0.827	0.07250	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
+D+H					1.946				
+D+L+H					6.516				
+D+Lr+H					1.946				
+D+S+H					1.946				
+D+0.750Lr+0.750L+H					5.373				
+D+0.750L+0.750S+H					5.373				
+D+0.60W+H					1.946				
+D+0.70E+H					1.946				
+D+0.750Lr+0.750L+0.450W+H					5.373				
+D+0.750L+0.750S+0.450W+H					5.373				
+D+0.750L+0.750S+0.5250E+H					5.373				
+0.60D+0.60W+0.60H					1.168				
+0.60D+0.70E+0.60H					1.168				
D Only					1.946				
Lr Only									
L Only					4.570				
S Only									
W Only									
E Only									
H Only									

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

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Wood Column

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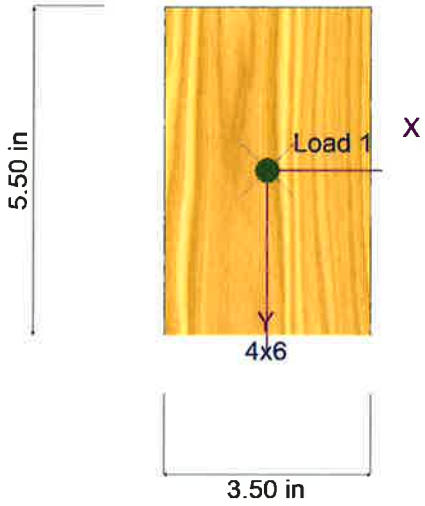
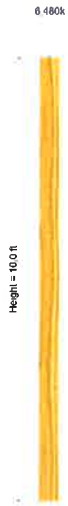
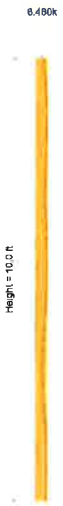
Description : ROOF DECK SUPPORT BEAM COLUMN

Sketches







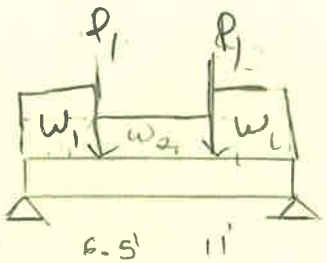
APPLETON	18-JUL-2018	8465

BEAM 14A

$w_1 = (15psf + 25psf)(11ft) + (10lb \times 8ft) + (10psf + 30psf)(2ft) = \frac{335}{265}$

$w_2 = (15psf + 25psf)(11ft) + (10lb \times 8ft) = \frac{275}{245}$

$P_1 = \frac{1.08}{0.36}$ kips.

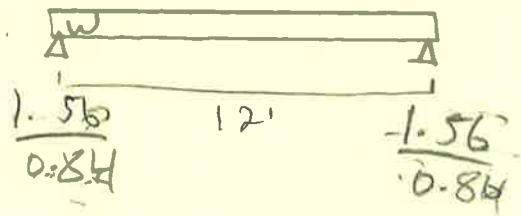


USE 1 GL: 5 1/2" X 16 (24F-V4), UPSET WALL ABOVE. FLUSH TO CEILING

COMP PRINT OUT 14A

BEAM 14B

$w = 6ft(10psf + 30psf) + 8ft \times 10plf = \frac{0.26}{0.14}$ kips



COMP PRINT OUT 14B

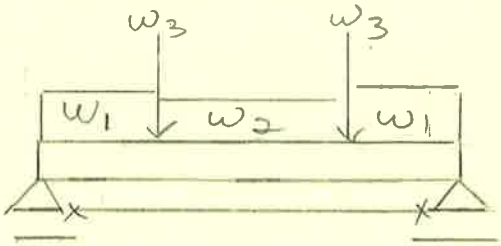
USE 3 - 2X12 HF #1

BEAM 14C

$w_1 = \frac{.120}{.040}$ k

$w_2 = \frac{.060}{.020}$ k

$w_3 = \frac{1.560}{.860}$ k



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Wood Beam

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Description : UPPER LEVEL TRPL SIS JSTS

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

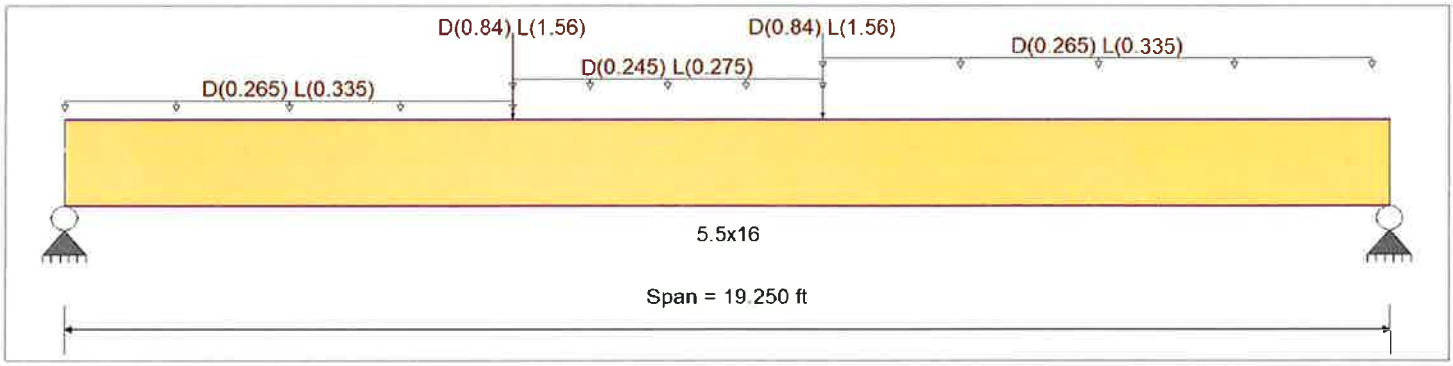
Wood Species : DF/DF
Wood Grade : 24F - V4

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	31.20 pcf



Applied Loads

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

Load for Span Number 1

Uniform Load : D = 0.2650, L = 0.3350 k/ft, Extent = 0.0 -->> 6.50 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.2450, L = 0.2750 k/ft, Extent = 6.50 -->> 11.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.2650, L = 0.3350 k/ft, Extent = 11.0 -->> 19.0 ft, Tributary Width = 1.0 ft

Point Load : D = 0.840, L = 1.560 k @ 6.50 ft

Point Load : D = 0.840, L = 1.560 k @ 11.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.991 : 1	Maximum Shear Stress Ratio	=	0.478 : 1
Section used for this span		5.5x16	Section used for this span		5.5x16
fb : Actual	=	2,252.75 psi	fv : Actual	=	126.77 psi
FB : Allowable	=	2,273.25 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	10.117 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	0.506 in	Ratio =	456 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.861 in	Ratio =	268 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

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Wood Column

Lic. # : KW-06011301 — **Licensee : Covington**

Description : UPPER LVL SKYLIGHT FRAMING POST

Code References

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2018

General Information

Analysis Method : Allowable Stress Design
End Fixities : Top Fixed, Bottom Fixed
Overall Column Height : 10.0 ft
(Used for non-slender calculations)

Wood Species : Hem Fir
Wood Grade : No.2

Fb +	675 psi	Fv	140 psi
Fb -	675 psi	Ft	350 psi
Fc - Prll	500 psi	Density	26.83 pcf
Fc - Perp	405 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1100	1100	1100 ksi
Minimum	400	400	

Wood Section Name : **4x6**
Wood Grading/Manuf. : Graded Lumber
Wood Member Type : Sawn

Exact Width	**3.50**	in
Exact Depth	**5.50**	in
Area	19.250	in^2
Ix	48.526	in^4
Iy	19.651	in^4

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compression	1.150
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 *NDS 15.3.2*
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Fully braced against buckling along X-X Axis
Y-Y (depth) axis : Fully braced against buckling along Y-Y Axis

Applied Loads

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

Column self weight included : 35.866 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 10.0 ft, D = 9.0 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9070 : 1**

Load Combination	+D+H
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	9.036 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	517.50 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D+0.70E+0.60H
Location of max.above base	10.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	224.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.900	1.000	0.9070	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+L+H	1.000	1.000	0.8163	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+Lr+H	1.250	1.000	0.6531	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+S+H	1.150	1.000	0.7099	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+H	1.250	1.000	0.6531	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+H	1.150	1.000	0.7099	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W+H	1.600	1.000	0.5102	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.70E+H	1.600	1.000	0.5102	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750Lr+0.750L+0.450W+H	1.600	1.000	0.5102	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.450W+H	1.600	1.000	0.5102	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.750L+0.750S+0.5250E+H	1.600	1.000	0.5102	PASS	0.0 ft	0.0	PASS	10.0 ft

14(A(1)

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Wood Column

Lic. # : KW-06011301 — **Licensee : Covington**

Description : UPPER LVL SKYLIGHT FRAMING POST

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+0.60D+0.60W+0.60H	1.600	1.000	0.3061	PASS	0.0 ft	0.0	PASS	10.0 ft
+0.60D+0.70E+0.60H	1.600	1.000	0.3061	PASS	0.0 ft	0.0	PASS	10.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	k-ft	My - End Moments @ Base	My - End Moments @ Top	Mx - End Moments @ Base	Mx - End Moments @ Top
+D+H						9.036					
+D+L+H						9.036					
+D+Lr+H						9.036					
+D+S+H						9.036					
+D+0.750Lr+0.750L+H						9.036					
+D+0.750L+0.750S+H						9.036					
+D+0.60W+H						9.036					
+D+0.70E+H						9.036					
+D+0.750Lr+0.750L+0.450W+H						9.036					
+D+0.750L+0.750S+0.450W+H						9.036					
+D+0.750L+0.750S+0.5250E+H						9.036					
+0.60D+0.60W+0.60H						5.422					
+0.60D+0.70E+0.60H						5.422					
D Only						9.036					
Lr Only											
L Only											
S Only											
W Only											
E Only											
H Only											

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

14A(1)

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Wood Column

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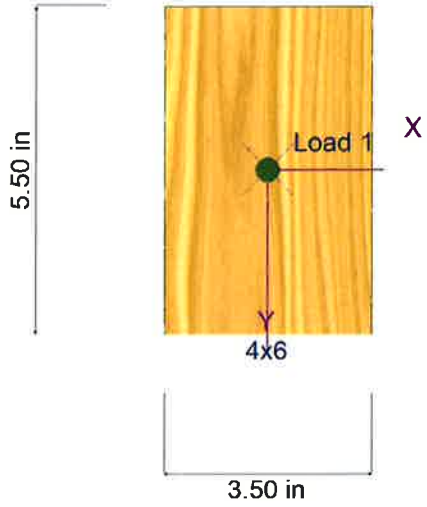
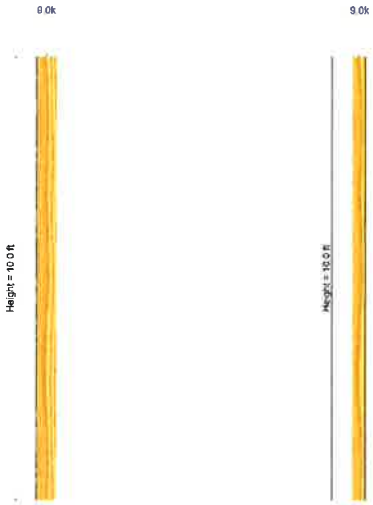
Lic. # : KW-06011301

Licensee : Covington

Description : UPPER LVL SKYLIGHT FRAMING POST

Sketches





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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : HUNG SKYLIGHT BEAMS

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

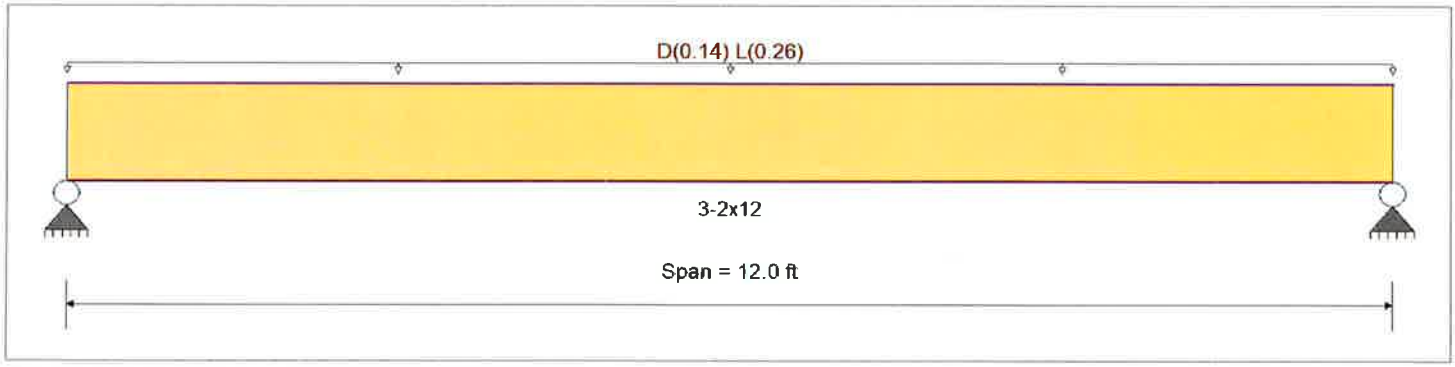
Wood Species : Hem Fir
Wood Grade : No.1

Fb +	975 psi
Fb -	975 psi
Fc - Prll	850 psi
Fc - Perp	405 psi
Fv	140 psi
Ft	650 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	26.83 pcf

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



Applied Loads

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

Uniform Load : D = 0.140, L = 0.260 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.934 : 1	Maximum Shear Stress Ratio	=	0.430 : 1
Section used for this span		3-2x12	Section used for this span		3-2x12
fb : Actual	=	910.22 psi	fv : Actual	=	60.21 psi
FB : Allowable	=	975.00 psi	Fv : Allowable	=	140.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
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	0.176 in	Ratio =	819 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.270 in	Ratio =	532 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H					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	0.363	0.167	0.90							2.52	318.58	877.50	0.71	21.07	126.00
+D+L+H					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	0.934	0.430	1.00							7.20	910.22	975.00	2.03	60.21	140.00
+D+Lr+H					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	0.261	0.120	1.25							2.52	318.58	1218.75	0.71	21.07	175.00
+D+S+H					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	0.284	0.131	1.15							2.52	318.58	1121.25	0.71	21.07	161.00
+D+0.750Lr+0.750L+H					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	0.625	0.288	1.25							6.03	762.31	1218.75	1.70	50.43	175.00

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14B

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : HUNG SKYLIGHT BEAMS

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+0.750L+0.750S+H					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	0.680	0.313	1.15	1.000	1.00	1.00	1.00	1.00	1.00	6.03	762.31	1121.25	1.70	50.43	161.00
+D+0.60W+H					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	0.204	0.094	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.52	318.58	1560.00	0.71	21.07	224.00
+D+0.70E+H					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	0.204	0.094	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.52	318.58	1560.00	0.71	21.07	224.00
+D+0.750Lr+0.750L+0.450W+H					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	0.489	0.225	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.03	762.31	1560.00	1.70	50.43	224.00
+D+0.750L+0.750S+0.450W+H					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	0.489	0.225	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.03	762.31	1560.00	1.70	50.43	224.00
+D+0.750L+0.750S+0.5250E+H					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	0.489	0.225	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.03	762.31	1560.00	1.70	50.43	224.00
+0.60D+0.60W+0.60H					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	0.123	0.056	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.51	191.15	1560.00	0.43	12.64	224.00
+0.60D+0.70E+0.60H					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	0.123	0.056	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.51	191.15	1560.00	0.43	12.64	224.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2704	6.044		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.400	2.400
Overall MINimum	1.560	1.560
+D+H	0.840	0.840
+D+L+H	2.400	2.400
+D+Lr+H	0.840	0.840
+D+S+H	0.840	0.840
+D+0.750Lr+0.750L+H	2.010	2.010
+D+0.750L+0.750S+H	2.010	2.010
+D+0.60W+H	0.840	0.840
+D+0.70E+H	0.840	0.840
+D+0.750Lr+0.750L+0.450W+H	2.010	2.010
+D+0.750L+0.750S+0.450W+H	2.010	2.010
+D+0.750L+0.750S+0.5250E+H	2.010	2.010
+0.60D+0.60W+0.60H	0.504	0.504
+0.60D+0.70E+0.60H	0.504	0.504
D Only	0.840	0.840
Lr Only		
L Only	1.560	1.560
S Only		
W Only		
E Only		
H Only		

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Wood Beam

Lic. # : KW-06011301 — Licensee : Covington

Description : UPPER LEVEL TRPL SIS JSTS

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+H													0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.453	0.220	0.90	0.973	1.00	1.00	1.00	1.00	1.00	18.11	925.93	2045.93	3.08	52.54	238.50
+D+L+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.991	0.478	1.00	0.973	1.00	1.00	1.00	1.00	1.00	44.05	2,252.75	2273.25	7.44	126.77	265.00
+D+Lr+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.326	0.159	1.25	0.973	1.00	1.00	1.00	1.00	1.00	18.11	925.93	2841.56	3.08	52.54	331.25
+D+S+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.354	0.172	1.15	0.973	1.00	1.00	1.00	1.00	1.00	18.11	925.93	2614.24	3.08	52.54	304.75
+D+0.750Lr+0.750L+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.676	0.327	1.25	0.973	1.00	1.00	1.00	1.00	1.00	37.57	1,921.02	2841.56	6.35	108.21	331.25
+D+0.750L+0.750S+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.735	0.355	1.15	0.973	1.00	1.00	1.00	1.00	1.00	37.57	1,921.02	2614.24	6.35	108.21	304.75
+D+0.60W+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.255	0.124	1.60	0.973	1.00	1.00	1.00	1.00	1.00	18.11	925.93	3637.20	3.08	52.54	424.00
+D+0.70E+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.255	0.124	1.60	0.973	1.00	1.00	1.00	1.00	1.00	18.11	925.93	3637.20	3.08	52.54	424.00
+D+0.750Lr+0.750L+0.450W+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.528	0.255	1.60	0.973	1.00	1.00	1.00	1.00	1.00	37.57	1,921.02	3637.20	6.35	108.21	424.00
+D+0.750L+0.750S+0.450W+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.528	0.255	1.60	0.973	1.00	1.00	1.00	1.00	1.00	37.57	1,921.02	3637.20	6.35	108.21	424.00
+D+0.750L+0.750S+0.5250E+H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.528	0.255	1.60	0.973	1.00	1.00	1.00	1.00	1.00	37.57	1,921.02	3637.20	6.35	108.21	424.00
+0.60D+0.60W+0.60H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.153	0.074	1.60	0.973	1.00	1.00	1.00	1.00	1.00	10.86	555.56	3637.20	1.85	31.52	424.00
+0.60D+0.70E+0.60H					0.973	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 19.250 ft	1	0.153	0.074	1.60	0.973	1.00	1.00	1.00	1.00	1.00	10.86	555.56	3637.20	1.85	31.52	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.8608	9.625		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	8.196	7.644
Overall MINimum	4.778	4.437
+D+H	3.417	3.208
+D+L+H	8.196	7.644
+D+Lr+H	3.417	3.208
+D+S+H	3.417	3.208
+D+0.750Lr+0.750L+H	7.001	6.535
+D+0.750L+0.750S+H	7.001	6.535
+D+0.60W+H	3.417	3.208
+D+0.70E+H	3.417	3.208
+D+0.750Lr+0.750L+0.450W+H	7.001	6.535
+D+0.750L+0.750S+0.450W+H	7.001	6.535
+D+0.750L+0.750S+0.5250E+H	7.001	6.535
+0.60D+0.60W+0.60H	2.050	1.925
+0.60D+0.70E+0.60H	2.050	1.925
D Only	3.417	3.208
Lr Only		
L Only	4.778	4.437
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

14C

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : UPPER LVL SIS (OVER OFFICE+KITCHEN)

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

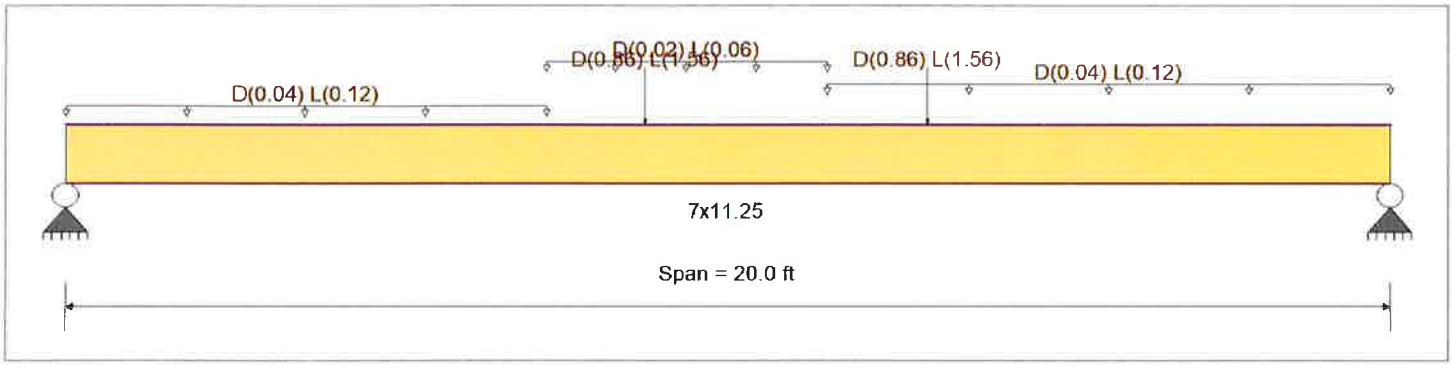
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.2E

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	625.0 psi
Fv	290.0 psi
Ft	2,025.0 psi

E : Modulus of Elasticity

Ebend- xx	2,200.0 ksi
Eminbend - xx	1,118.19 ksi
Density	45.050 pcf



Applied Loads

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

Load for Span Number 1

Uniform Load : D = 0.040, L = 0.120 k/ft, Extent = 0.0 -->> 7.250 ft, Tributary Width = 1.0 ft

Point Load : D = 0.860, L = 1.560 k @ 8.750 ft

Point Load : D = 0.860, L = 1.560 k @ 13.0 ft

Uniform Load : D = 0.040, L = 0.120 k/ft, Extent = 11.50 -->> 20.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.020, L = 0.060 k/ft, Extent = 7.250 -->> 11.50 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.720** : 1	Maximum Shear Stress Ratio	=	**0.258** : 1
Section used for this span		**7x11.25**	Section used for this span		**7x11.25**
fb : Actual	=	2,089.13 psi	fv : Actual	=	74.90 psi
FB : Allowable	=	2,900.00 psi	Fv : Allowable	=	290.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.759 ft	Location of maximum on span	=	19.124 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.657 in	Ratio =	365 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.977 in	Ratio =	245 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

14C

Printed: 18 JUL 2018, 9:25AM

Wood Beam

File = C:\Users\sdapg\DOCUME~1\ENERCA~1\8465.ec6

Lic. # : KW-06011301 — **Licensee : Covington**

Description : UPPER LVL SIS (OVER OFFICE+KITCHEN)

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.263	0.092	0.90	1.000	1.00	1.00	1.00	1.00	1.00	8.46	687.73	2610.00	1.26	24.01	261.00
+D+L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.720	0.258	1.00	1.000	1.00	1.00	1.00	1.00	1.00	25.71	2,089.13	2900.00	3.93	74.90	290.00
+D+Lr+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.190	0.066	1.25	1.000	1.00	1.00	1.00	1.00	1.00	8.46	687.73	3625.00	1.26	24.01	362.50
+D+S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.206	0.072	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.46	687.73	3335.00	1.26	24.01	333.50
+D+0.750Lr+0.750L+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.480	0.172	1.25	1.000	1.00	1.00	1.00	1.00	1.00	21.40	1,738.78	3625.00	3.26	62.18	362.50
+D+0.750L+0.750S+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.521	0.186	1.15	1.000	1.00	1.00	1.00	1.00	1.00	21.40	1,738.78	3335.00	3.26	62.18	333.50
+D+0.60W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.148	0.052	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.46	687.73	4640.00	1.26	24.01	464.00
+D+0.70E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.148	0.052	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.46	687.73	4640.00	1.26	24.01	464.00
+D+0.750Lr+0.750L+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.375	0.134	1.60	1.000	1.00	1.00	1.00	1.00	1.00	21.40	1,738.78	4640.00	3.26	62.18	464.00
+D+0.750L+0.750S+0.450W+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.375	0.134	1.60	1.000	1.00	1.00	1.00	1.00	1.00	21.40	1,738.78	4640.00	3.26	62.18	464.00
+D+0.750L+0.750S+0.5250E+H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.375	0.134	1.60	1.000	1.00	1.00	1.00	1.00	1.00	21.40	1,738.78	4640.00	3.26	62.18	464.00
+0.60D+0.60W+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.089	0.031	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.08	412.64	4640.00	0.76	14.40	464.00
+0.60D+0.70E+0.60H					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.089	0.031	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.08	412.64	4640.00	0.76	14.40	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.9766	10.146		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.628	4.072
Overall MINimum	2.488	2.777
+D+H	1.140	1.295
+D+L+H	3.628	4.072
+D+Lr+H	1.140	1.295
+D+S+H	1.140	1.295
+D+0.750Lr+0.750L+H	3.006	3.378
+D+0.750L+0.750S+H	3.006	3.378
+D+0.60W+H	1.140	1.295
+D+0.70E+H	1.140	1.295
+D+0.750Lr+0.750L+0.450W+H	3.006	3.378
+D+0.750L+0.750S+0.450W+H	3.006	3.378
+D+0.750L+0.750S+0.5250E+H	3.006	3.378
+0.60D+0.60W+0.60H	0.684	0.777
+0.60D+0.70E+0.60H	0.684	0.777
D Only	1.140	1.295
Lr Only		
L Only	2.488	2.777
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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Wood Beam

Lic. # : KW-06011301 — **Licensee : Covington**

Description : UPPER LVL SIS (OVER OFFICE+KITCHEN)

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

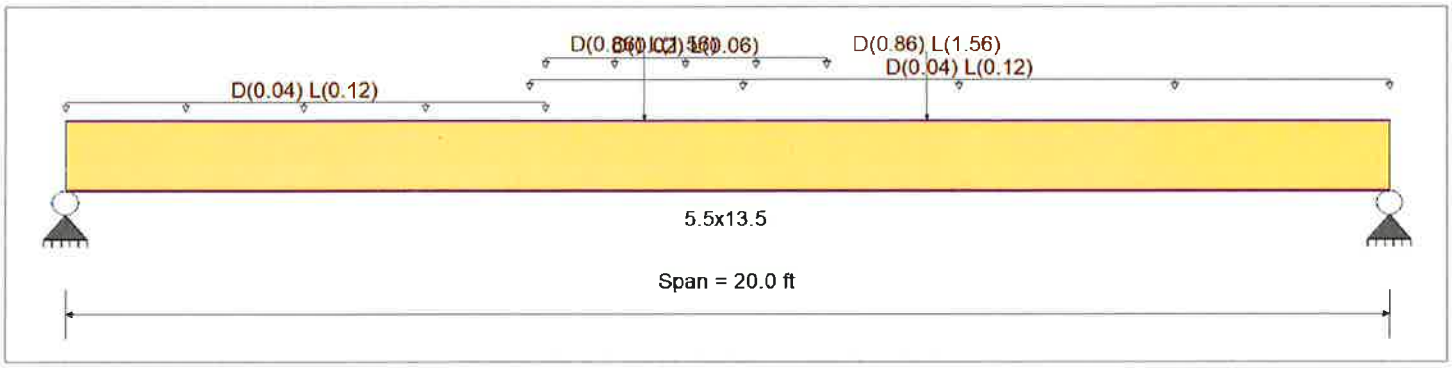
Wood Species : DF/DF
Wood Grade : 24F - V4

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	31.2 pcf



Applied Loads

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

Load for Span Number 1

Uniform Load : D = 0.040, L = 0.120 k/ft, Extent = 0.0 -->> 7.250 ft, Tributary Width = 1.0 ft

Point Load : D = 0.860, L = 1.560 k @ 8.750 ft

Point Load : D = 0.860, L = 1.560 k @ 13.0 ft

Uniform Load : D = 0.040, L = 0.120 k/ft, Extent = 7.0 -->> 20.0 ft, Tributary Width = 1.0 ft

Uniform Load : D = 0.020, L = 0.060 k/ft, Extent = 7.250 -->> 11.50 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.888** : 1	Maximum Shear Stress Ratio	=	**0.322** : 1
Section used for this span		**5.5x13.5**	Section used for this span		**5.5x13.5**
fb : Actual	=	2,072.31 psi	fv : Actual	=	85.46 psi
FB : Allowable	=	2,333.91 psi	Fv : Allowable	=	265.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	8.905 ft	Location of maximum on span	=	18.905 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.666 in	Ratio =	360 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.979 in	Ratio =	245 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Title Block Line 1
You can change this area
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Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

14C

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Wood Beam

Lic. # : KW-06011301 **Licensee : Covington**

Description : UPPER LVL SIS (OVER OFFICE+KITCHEN)

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H													0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.316	0.113	0.90	0.986	1.00	1.00	1.00	1.00	1.00	9.25	664.27	2100.52	1.33	26.97	238.50
+D+L+H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.888	0.322	1.00	0.986	1.00	1.00	1.00	1.00	1.00	28.85	2,072.31	2333.91	4.23	85.46	265.00
+D+Lr+H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.228	0.081	1.25	0.986	1.00	1.00	1.00	1.00	1.00	9.25	664.27	2917.39	1.33	26.97	331.25
+D+S+H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.247	0.088	1.15	0.986	1.00	1.00	1.00	1.00	1.00	9.25	664.27	2684.00	1.33	26.97	304.75
+D+0.750Lr+0.750L+H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.590	0.214	1.25	0.986	1.00	1.00	1.00	1.00	1.00	23.95	1,720.25	2917.39	3.51	70.84	331.25
+D+0.750L+0.750S+H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.641	0.232	1.15	0.986	1.00	1.00	1.00	1.00	1.00	23.95	1,720.25	2684.00	3.51	70.84	304.75
+D+0.60W+H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.178	0.064	1.60	0.986	1.00	1.00	1.00	1.00	1.00	9.25	664.27	3734.26	1.33	26.97	424.00
+D+0.70E+H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.178	0.064	1.60	0.986	1.00	1.00	1.00	1.00	1.00	9.25	664.27	3734.26	1.33	26.97	424.00
+D+0.750Lr+0.750L+0.450W+H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.461	0.167	1.60	0.986	1.00	1.00	1.00	1.00	1.00	23.95	1,720.25	3734.26	3.51	70.84	424.00
+D+0.750L+0.750S+0.450W+H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.461	0.167	1.60	0.986	1.00	1.00	1.00	1.00	1.00	23.95	1,720.25	3734.26	3.51	70.84	424.00
+D+0.750L+0.750S+0.5250E+H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.461	0.167	1.60	0.986	1.00	1.00	1.00	1.00	1.00	23.95	1,720.25	3734.26	3.51	70.84	424.00
+0.60D+0.60W+0.60H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.107	0.038	1.60	0.986	1.00	1.00	1.00	1.00	1.00	5.55	398.56	3734.26	0.80	16.18	424.00
+0.60D+0.70E+0.60H					0.986	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.107	0.038	1.60	0.986	1.00	1.00	1.00	1.00	1.00	5.55	398.56	3734.26	0.80	16.18	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.9786	10.146		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.015	4.405
Overall MINimum	2.778	3.027
+D+H	1.236	1.379
+D+L+H	4.015	4.405
+D+Lr+H	1.236	1.379
+D+S+H	1.236	1.379
+D+0.750Lr+0.750L+H	3.320	3.649
+D+0.750L+0.750S+H	3.320	3.649
+D+0.60W+H	1.236	1.379
+D+0.70E+H	1.236	1.379
+D+0.750Lr+0.750L+0.450W+H	3.320	3.649
+D+0.750L+0.750S+0.450W+H	3.320	3.649
+D+0.750L+0.750S+0.5250E+H	3.320	3.649
+0.60D+0.60W+0.60H	0.742	0.827
+0.60D+0.70E+0.60H	0.742	0.827
D Only	1.236	1.379
Lr Only		
L Only	2.778	3.027
S Only		
W Only		
E Only		
H Only		

APPLETON	15-AUG-2018	8465

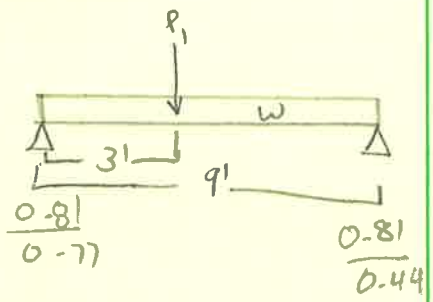
REVISED ROOF DECK

1 FRONT ROOF DECK BEAM (SUPPORTS SPIRAL STAIR)

P_1 = 1000lbs (spiral staircase)

$W = 2' (90+12psf) = \frac{.180}{0.024}$ KIPS

PRINTOUT IS A
USE 4X12 HF #2
W LUS410 EA SIDE

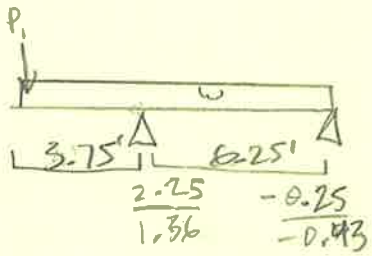


↑ Lt-Rt ROOF DECK BEAMS (CANT. FROM HOUSE)

P_1 = React from front beam.
↳ Worst case = $\frac{0.81}{0.77}$

$W = 1.33' (90+12psf) = \frac{0.1197}{0.01596}$ KIPS

PRINTOUT IS B
USE 4X12 DF #1.
W LUS410 to HOUSE.



Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 16 AUG 2018, 8:36AM

Wood Beam

Lic. # : KW-06011301 — Licensee : Covington

Description : ROOF DECK FRONT BEAM (SPIRAL STAIR SUPPORT)

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

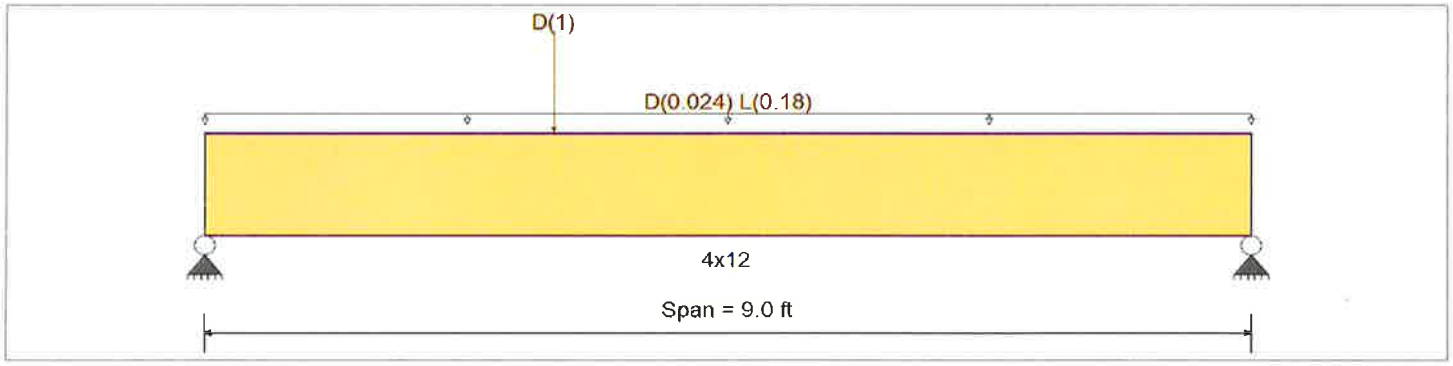
Wood Species : Hem Fir
Wood Grade : No.2

Fb +	675.0 psi
Fb -	675.0 psi
Fc - Prll	500.0 psi
Fc - Perp	405.0 psi
Fv	140.0 psi
Ft	350.0 psi

E : Modulus of Elasticity

Ebend- xx	1,100.0 ksi
Eminbend - xx	400.0 ksi
Density	26.830 pcf

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



Applied Loads

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

Uniform Load : D = 0.0240, L = 0.180 , Tributary Width = 1.0 ft

Point Load : D = 1.0 k @ 3.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.840 : 1	Maximum Shear Stress Ratio	=	0.380 : 1
Section used for this span		4x12	Section used for this span		4x12
fb : Actual	=	623.40 psi	fv : Actual	=	53.22 psi
FB : Allowable	=	742.50 psi	Fv : Allowable	=	140.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.022 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	0.059 in	Ratio =	1845 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.116 in	Ratio =	932 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
+D+H					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	0.537	0.228	0.90							2.21	359.13	668.25	0.75	28.67	126.00
+D+L+H					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	0.840	0.380	1.00							3.84	623.40	742.50	1.40	53.22	140.00
+D+Lr+H					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	0.387	0.164	1.25							2.21	359.13	928.13	0.75	28.67	175.00
+D+S+H					1.100	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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Wood Beam

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Lic. # : KW-06011301 — Licensee : Covington

Description : ROOF DECK FRONT BEAM (SPIRAL STAIR SUPPORT)

Load Combination / Segment Length	Span #	Max Stress Ratios M	Max Stress Ratios V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values M	Moment Values fb	Moment Values F'b	Shear Values V	Shear Values fv	Shear Values F'v
Length = 9.0 ft	1	0.421	0.178	1.15	1.100	1.00	1.00	1.00	1.00	1.00	2.21	359.13	853.88	0.75	28.67	161.00
+D+0.750Lr+0.750L+H					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	0.600	0.269	1.25	1.100	1.00	1.00	1.00	1.00	1.00	3.43	557.33	928.13	1.24	47.08	175.00
+D+0.750L+0.750S+H					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	0.653	0.292	1.15	1.100	1.00	1.00	1.00	1.00	1.00	3.43	557.33	853.88	1.24	47.08	161.00
+D+0.60W+H					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	0.302	0.128	1.60	1.100	1.00	1.00	1.00	1.00	1.00	2.21	359.13	1188.00	0.75	28.67	224.00
+D+0.70E+H					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	0.302	0.128	1.60	1.100	1.00	1.00	1.00	1.00	1.00	2.21	359.13	1188.00	0.75	28.67	224.00
+D+0.750Lr+0.750L+0.450W+H					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	0.469	0.210	1.60	1.100	1.00	1.00	1.00	1.00	1.00	3.43	557.33	1188.00	1.24	47.08	224.00
+D+0.750L+0.750S+0.450W+H					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	0.469	0.210	1.60	1.100	1.00	1.00	1.00	1.00	1.00	3.43	557.33	1188.00	1.24	47.08	224.00
+D+0.750L+0.750S+0.5250E+H					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	0.469	0.210	1.60	1.100	1.00	1.00	1.00	1.00	1.00	3.43	557.33	1188.00	1.24	47.08	224.00
+0.60D+0.60W+0.60H					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	0.181	0.077	1.60	1.100	1.00	1.00	1.00	1.00	1.00	1.33	215.48	1188.00	0.45	17.20	224.00
+0.60D+0.70E+0.60H					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	0.181	0.077	1.60	1.100	1.00	1.00	1.00	1.00	1.00	1.33	215.48	1188.00	0.45	17.20	224.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.1158	4.336		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.585	1.251
Overall MINimum	0.810	0.810
+D+H	0.775	0.441
+D+L+H	1.585	1.251
+D+Lr+H	0.775	0.441
+D+S+H	0.775	0.441
+D+0.750Lr+0.750L+H	1.382	1.049
+D+0.750L+0.750S+H	1.382	1.049
+D+0.60W+H	0.775	0.441
+D+0.70E+H	0.775	0.441
+D+0.750Lr+0.750L+0.450W+H	1.382	1.049
+D+0.750L+0.750S+0.450W+H	1.382	1.049
+D+0.750L+0.750S+0.5250E+H	1.382	1.049
+0.60D+0.60W+0.60H	0.465	0.265
+0.60D+0.70E+0.60H	0.465	0.265
D Only	0.775	0.441
Lr Only		
L Only	0.810	0.810
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
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Wood Beam

File = C:\Users\sdapg\DOCUME~1\ENERCA~1\8465.ec6

Lic. # : KW-06011301 — Licensee : Covington

Description : LI-RI ROOF DECK BEAM (CANT. FROM HOUSE)

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2018

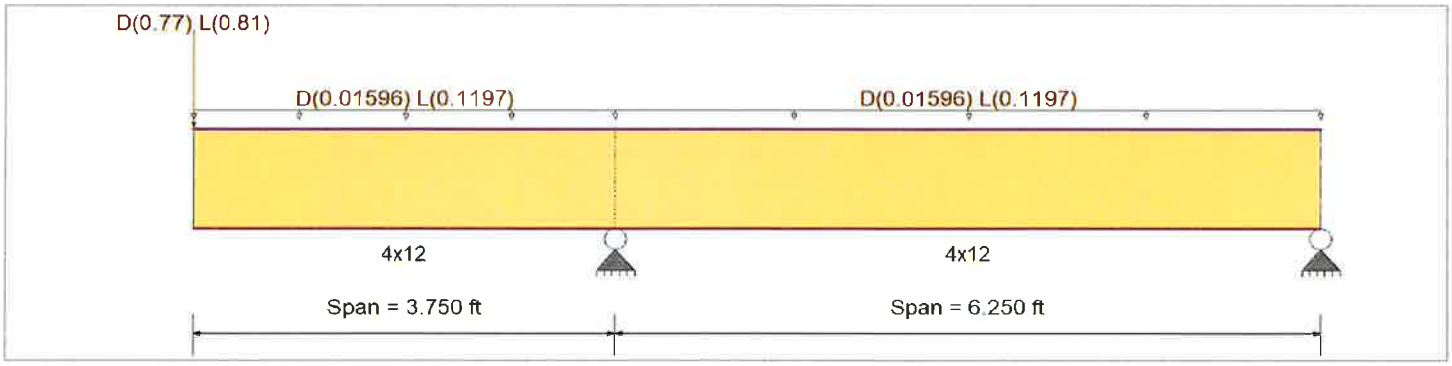
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

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

Fb +	1350 psi
Fb -	1350 psi
Fc - Prll	925 psi
Fc - Perp	625 psi
Fv	170 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 ksi
Density	31.2 pcf



Applied Loads

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

Load for Span Number 1
Uniform Load : D = 0.01596, L = 0.1197 , Tributary Width = 1.0 ft

Point Load : D = 0.770, L = 0.810 k @ 0.0 ft

Load for Span Number 2
Uniform Load : D = 0.01596, L = 0.1197 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.941 : 1	Maximum Shear Stress Ratio	=	0.550 : 1
Section used for this span		4x12	Section used for this span		4x12
fb : Actual	=	1,118.09 psi	fv : Actual	=	74.81 psi
FB : Allowable	=	1,188.00 psi	Fv : Allowable	=	136.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.750 ft	Location of maximum on span	=	2.828 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.118 in	Ratio =	764 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.219 in	Ratio =	410 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

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+H													0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.456	0.254	0.90	1.100	0.80	1.00	1.00	1.00	1.00	3.00	487.57	1069.20	0.82	31.05	122.40
Length = 6.250 ft	2	0.456	0.254	0.90	1.100	0.80	1.00	1.00	1.00	1.00	3.00	487.57	1069.20	0.52	31.05	122.40

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 16 AUG 2018, 8:47AM

Wood Beam

Lic. # : KW-06011301 Licensee : Covington

Description : Lt-Rt ROOF DECK BEAM (CANT. FROM HOUSE)

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
D Only		1.360	-0.430
Lr Only			
L Only		2.254	-0.247
S Only			
W Only			
E Only			
H Only			

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.
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Printed: 16 AUG 2018, 8:47AM

Wood Beam

File = C:\Users\sdapg\DOCUME~1\ENERCA~1\8465.ec6

Lic. # : KW-06011301 — Licensee : Covington

Description : Lt-Rt ROOF DECK BEAM (CANT. FROM HOUSE)

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+H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.941	0.550	1.00	1.100	0.80	1.00	1.00	1.00	1.00	6.88	1,118.09	1188.00	1.96	74.81	136.00
Length = 6.250 ft	2	0.941	0.550	1.00	1.100	0.80	1.00	1.00	1.00	1.00	6.88	1,118.09	1188.00	1.40	74.81	136.00
+D+Lr+H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.328	0.183	1.25	1.100	0.80	1.00	1.00	1.00	1.00	3.00	487.57	1485.00	0.82	31.05	170.00
Length = 6.250 ft	2	0.328	0.183	1.25	1.100	0.80	1.00	1.00	1.00	1.00	3.00	487.57	1485.00	0.52	31.05	170.00
+D+S+H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.357	0.199	1.15	1.100	0.80	1.00	1.00	1.00	1.00	3.00	487.57	1366.20	0.82	31.05	156.40
Length = 6.250 ft	2	0.357	0.199	1.15	1.100	0.80	1.00	1.00	1.00	1.00	3.00	487.57	1366.20	0.52	31.05	156.40
+D+0.750Lr+0.750L+H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.647	0.376	1.25	1.100	0.80	1.00	1.00	1.00	1.00	5.91	960.46	1485.00	1.68	63.87	170.00
Length = 6.250 ft	2	0.647	0.376	1.25	1.100	0.80	1.00	1.00	1.00	1.00	5.91	960.46	1485.00	1.18	63.87	170.00
+D+0.750L+0.750S+H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.703	0.408	1.15	1.100	0.80	1.00	1.00	1.00	1.00	5.91	960.46	1366.20	1.68	63.87	156.40
Length = 6.250 ft	2	0.703	0.408	1.15	1.100	0.80	1.00	1.00	1.00	1.00	5.91	960.46	1366.20	1.18	63.87	156.40
+D+0.60W+H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.257	0.143	1.60	1.100	0.80	1.00	1.00	1.00	1.00	3.00	487.57	1900.80	0.82	31.05	217.60
Length = 6.250 ft	2	0.257	0.143	1.60	1.100	0.80	1.00	1.00	1.00	1.00	3.00	487.57	1900.80	0.52	31.05	217.60
+D+0.70E+H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.257	0.143	1.60	1.100	0.80	1.00	1.00	1.00	1.00	3.00	487.57	1900.80	0.82	31.05	217.60
Length = 6.250 ft	2	0.257	0.143	1.60	1.100	0.80	1.00	1.00	1.00	1.00	3.00	487.57	1900.80	0.52	31.05	217.60
+D+0.750Lr+0.750L+0.450W+H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.505	0.294	1.60	1.100	0.80	1.00	1.00	1.00	1.00	5.91	960.46	1900.80	1.68	63.87	217.60
Length = 6.250 ft	2	0.505	0.294	1.60	1.100	0.80	1.00	1.00	1.00	1.00	5.91	960.46	1900.80	1.18	63.87	217.60
+D+0.750L+0.750S+0.450W+H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.505	0.294	1.60	1.100	0.80	1.00	1.00	1.00	1.00	5.91	960.46	1900.80	1.68	63.87	217.60
Length = 6.250 ft	2	0.505	0.294	1.60	1.100	0.80	1.00	1.00	1.00	1.00	5.91	960.46	1900.80	1.18	63.87	217.60
+D+0.750L+0.750S+0.5250E+H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.505	0.294	1.60	1.100	0.80	1.00	1.00	1.00	1.00	5.91	960.46	1900.80	1.68	63.87	217.60
Length = 6.250 ft	2	0.505	0.294	1.60	1.100	0.80	1.00	1.00	1.00	1.00	5.91	960.46	1900.80	1.18	63.87	217.60
+0.60D+0.60W+0.60H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.154	0.086	1.60	1.100	0.80	1.00	1.00	1.00	1.00	1.80	292.54	1900.80	0.49	18.63	217.60
Length = 6.250 ft	2	0.154	0.086	1.60	1.100	0.80	1.00	1.00	1.00	1.00	1.80	292.54	1900.80	0.31	18.63	217.60
+0.60D+0.70E+0.60H					1.100	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.750 ft	1	0.154	0.086	1.60	1.100	0.80	1.00	1.00	1.00	1.00	1.80	292.54	1900.80	0.49	18.63	217.60
Length = 6.250 ft	2	0.154	0.086	1.60	1.100	0.80	1.00	1.00	1.00	1.00	1.80	292.54	1900.80	0.31	18.63	217.60

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2185	0.000		0.0000	0.000
	2	0.0000	0.000	+D+L+H	-0.0407	2.549

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum		3.613	-0.677
Overall MINimum		2.254	-0.430
+D+H		1.360	-0.430
+D+L+H		3.613	-0.677
+D+Lr+H		1.360	-0.430
+D+S+H		1.360	-0.430
+D+0.750Lr+0.750L+H		3.050	-0.615
+D+0.750L+0.750S+H		3.050	-0.615
+D+0.60W+H		1.360	-0.430
+D+0.70E+H		1.360	-0.430
+D+0.750Lr+0.750L+0.450W+H		3.050	-0.615
+D+0.750L+0.750S+0.450W+H		3.050	-0.615
+D+0.750L+0.750S+0.5250E+H		3.050	-0.615
+0.60D+0.60W+0.60H		0.816	-0.258
+0.60D+0.70E+0.60H		0.816	-0.258

APPLETON | 11-6-18 | B465 | R1

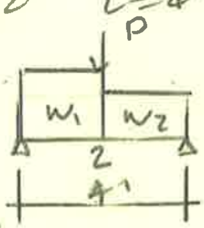
POST @ EXIST HDR
L = 4.75   w = 3(40) + 8(10)(4.75/2) = 475   178/297

ROOF BEAM (14A)   R = 4437/3208 + 178/297 = 4615/3505
COMP R1A   USE 4x6 DF#1 (FLAT)

HDR @ UPPER DECK   P = 2254/1136 @ 2'   L = 4'

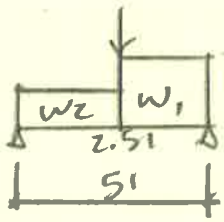
w1 = 5(40+60) = 500 PLF   425/75

w2 = 2.5(40) = 100 PLF   63/37



COMP R1B   USE 4x10 DF#2
ALT. COMP R1C   USE 3 1/2 x 7 PSL

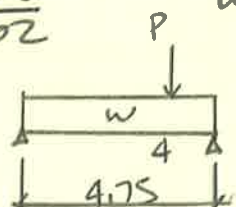
L = 5'   w1 = 425/75   w2 = 63/37   P = 2254/1360   RL = 2605 1794/811   Rr = 2205 1432/773



COMP R1C
USE 4x12 DF#1
ALT. COMP R1D
USE 3 1/2 x 7 PSL

L = 4'-0"   w = 425/75   COMP R1D
USE 4x8 DF#1

HDR w/ GL 13B REACTION
P = 4423/1902   w = 3(40) = 120   75/45   L = 4.75'



COMP R1E
USE 4x10 DF#1

RL = 1264 876/407   Rr = 564 3903/1709

STAIR BEAM REACTION

L = 11'   w = 1.33(52) = 53.3/16   P = 1248 960/288 @ 3.8'

RL = .95/.28   Rr = .6/.18

INTERIOR FTG
P = 6046 + 2143 = 8139#   AREQ'D = 5.43 SF
USE 30

P = 6003#   AREQ'D = 4.02   => 30

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 5 NOV 2018, 3:18PM

Wood Column

File = D:\Documents\ENERCALC Data Files\8465.ec6

Lic. # : KW-06011301 — Licensee : Covington

Description : --None--

Code References

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combinations Used : IBC 2015

General Information

Analysis Method :	Allowable Stress Design	Wood Section Name	4x6
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Graded Lumber
Overall Column Height	7.75 ft	Wood Member Type	Sawn
(Used for non-slender calculations)			
Wood Species	Douglas Fir - Larch	Exact Width	5.5 in
Wood Grade	No.1	Exact Depth	3.5 in
Fb +	1000 psi	Fv	180 psi
Fb -	1000 psi	Ft	675 psi
Fc - Prll	1500 psi	Density	31.21 pcf
Fc - Perp	625 psi		

	Area	Ix	Iy
	19.250 in^2	19.651 in^4	48.526 in^4

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1700	1700	1700 ksi
Minimum	620	620	

Allow Stress Modification Factors

Cf or Cv for Bending	1.30
Cf or Cv for Compression	1.10
Cf or Cv for Tension	1.30
Cm : Wet Use Factor	1.0
Ct : Temperature Factor	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0 NDS 15.3.2
Use Cr : Repetitive ?	No

Brace condition for deflection (buckling) along columns :
X-X (width) axis : Unbraced Length for X-X Axis buckling = 7.75 ft, K = 1.0
Y-Y (depth) axis : Unbraced Length for Y-Y Axis buckling = .5 ft, K = 1.0

Applied Loads

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

Column self weight included : 32.334 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 7.750 ft, D = 3.505, L = 4.615 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3580 : 1**

Load Combination	+D+L+H
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are . . .	
Applied Axial	8.152 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,183.04 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D+0.70E+0.60H
Location of max.above base	7.750 ft
Applied Design Shear	0.0 psi
Allowable Shear	288.0 psi

Maximum SERVICE Lateral Load Reactions . . -

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a

Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+H	0.900	0.750	0.1650	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+L+H	1.000	0.717	0.3580	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+Lr+H	1.250	0.639	0.1395	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+S+H	1.150	0.669	0.1448	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+0.750Lr+0.750L+H	1.250	0.639	0.2760	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+0.750L+0.750S+H	1.150	0.669	0.2864	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+0.60W+H	1.600	0.545	0.1278	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+0.70E+H	1.600	0.545	0.1278	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+0.750Lr+0.750L+0.450W+H	1.600	0.545	0.2528	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+0.750L+0.750S+0.450W+H	1.600	0.545	0.2528	PASS	0.0 ft	0.0	PASS	7.750 ft
+D+0.750L+0.750S+0.5250E+H	1.600	0.545	0.2528	PASS	0.0 ft	0.0	PASS	7.750 ft
+0.60D+0.60W+0.60H	1.600	0.545	0.07666	PASS	0.0 ft	0.0	PASS	7.750 ft

R1A

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Wood Column

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Description : --None--

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+0.60D+0.70E+0.60H	1.600	0.545	0.07666	PASS	0.0 ft	0.0	PASS	7.750 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+D+H						3.537					
+D+L+H						8.152					
+D+Lr+H						3.537					
+D+S+H						3.537					
+D+0.750Lr+0.750L+H						6.999					
+D+0.750L+0.750S+H						6.999					
+D+0.60W+H						3.537					
+D+0.70E+H						3.537					
+D+0.750Lr+0.750L+0.450W+H						6.999					
+D+0.750L+0.750S+0.450W+H						6.999					
+D+0.750L+0.750S+0.5250E+H						6.999					
+0.60D+0.60W+0.60H						2.122					
+0.60D+0.70E+0.60H						2.122					
D Only						3.537					
Lr Only											
L Only						4.615					
S Only											
W Only											
E Only											
H Only											

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
+D+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.70E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.750L+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.450W+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750L+0.750S+0.5250E+H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.70E+0.60H	0.0000 in	0.000 ft	0.000 in	0.000 ft
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
E Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
H Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

R1A

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Wood Column

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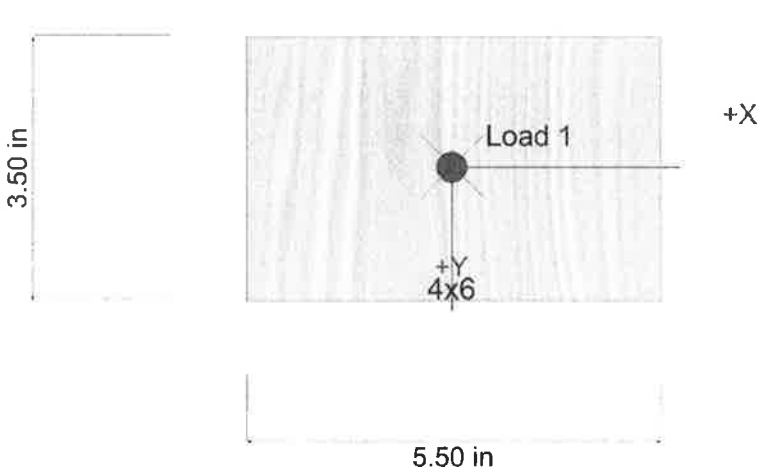
Description : --None--

Sketches



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R1B

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Wood Beam

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Lic. # : KW-06011301 — Licensee : Covington

Description : HDR @ ROOF DECK

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

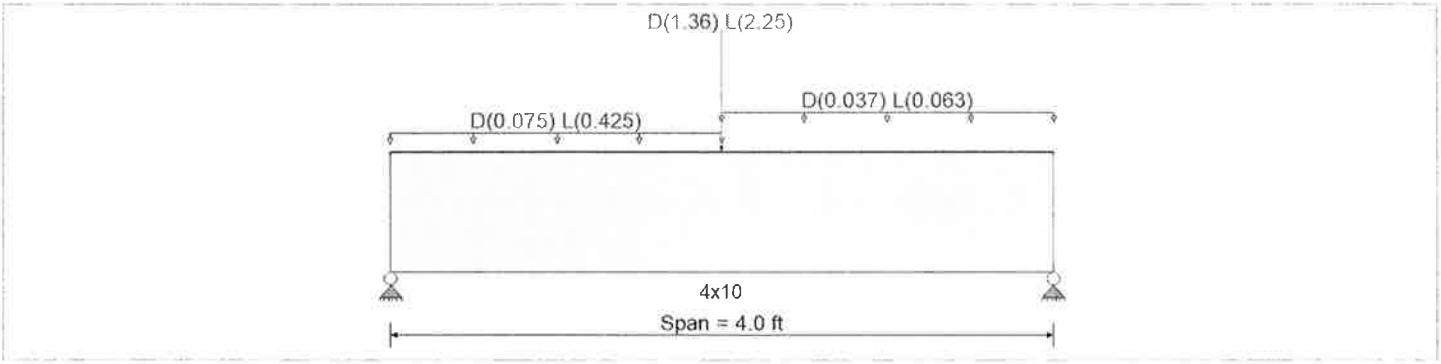
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Fb +	1000 psi
Fb -	1000 psi
Fc - Prll	1500 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1700 ksi
Eminbend - xx	620 ksi
Density	31.21 pcf

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



Applied Loads

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

Load for Span Number 1
Uniform Load : D = 0.0750, L = 0.4250 k/ft, Extent = 0.0 -->> 2.0 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.0370, L = 0.0630 k/ft, Extent = 2.0 -->> 4.0 ft, Tributary Width = 1.0 ft
Point Load : D = 1.360, L = 2.250 k @ 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.843 : 1	Maximum Shear Stress Ratio	=	0.573 : 1
Section used for this span		4x10	Section used for this span		4x10
fb : Actual	=	1,012.19 psi	fv : Actual	=	103.11 psi
FB : Allowable	=	1,200.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.000 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	0.017 in	Ratio =	2841 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.026 in	Ratio =	1864 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.605	2.205
Overall MINimum	1.794	1.432
+D+H	0.811	0.773
+D+L+H	2.605	2.205
+D+Lr+H	0.811	0.773
+D+S+H	0.811	0.773
+D+0.750Lr+0.750L+H	2.157	1.847
+D+0.750L+0.750S+H	2.157	1.847
+D+0.60W+H	0.811	0.773
+D+0.70E+H	0.811	0.773

Wood Beam

Description : HDR @ ROOF DECK

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+0.450W+H	2.157	1.847
+D+0.750L+0.750S+0.450W+H	2.157	1.847
+D+0.750L+0.750S+0.5250E+H	2.157	1.847
+0.60D+0.60W+0.60H	0.487	0.464
+0.60D+0.70E+0.60H	0.487	0.464
D Only	0.811	0.773
Lr Only		
L Only	1.794	1.432
S Only		
W Only		
E Only		
H Only		

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RLC

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Wood Beam

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Description : UPPER DECK HDR

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

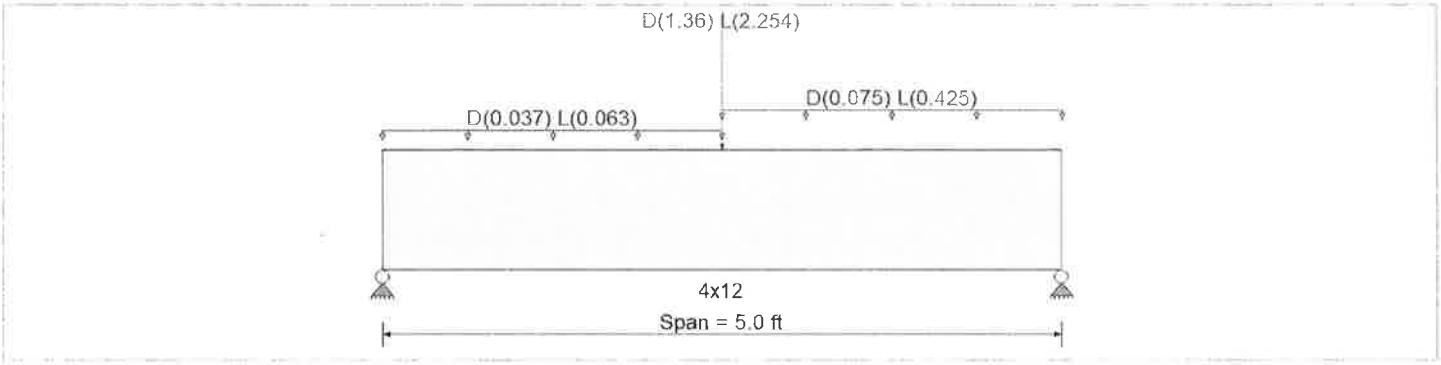
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Fb +	1000 psi
Fb -	1000 psi
Fc - Prll	1500 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1700 ksi
Eminbend - xx	620 ksi
Density	31.21 pcf

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



Applied Loads

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

Load for Span Number 1
Uniform Load : D = 0.0370, L = 0.0630 k/ft, Extent = 0.0 -->> 2.50 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.0750, L = 0.4250 k/ft, Extent = 2.50 -->> 5.0 ft, Tributary Width = 1.0 ft
Point Load : D = 1.360, L = 2.254 k @ 2.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.806 : 1	Maximum Shear Stress Ratio	=	0.496 : 1
Section used for this span		4x12	Section used for this span		4x12
fb : Actual	=	886.65 psi	fv : Actual	=	89.21 psi
FB : Allowable	=	1,100.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.500 ft	Location of maximum on span	=	4.069 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.019 in	Ratio =	3102 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.029 in	Ratio =	2056 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.307	2.807
Overall MINimum	1.511	1.963
+D+H	0.796	0.844
+D+L+H	2.307	2.807
+D+Lr+H	0.796	0.844
+D+S+H	0.796	0.844
+D+0.750Lr+0.750L+H	1.929	2.316
+D+0.750L+0.750S+H	1.929	2.316
+D+0.60W+H	0.796	0.844
+D+0.70E+H	0.796	0.844

RLC

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Wood Beam

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Description : UPPER DECK HDR

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+0.450W+H	1.929	2.316
+D+0.750L+0.750S+0.450W+H	1.929	2.316
+D+0.750L+0.750S+0.5250E+H	1.929	2.316
+0.60D+0.60W+0.60H	0.478	0.506
+0.60D+0.70E+0.60H	0.478	0.506
D Only	0.796	0.844
Lr Only		
L Only	1.511	1.963
S Only		
W Only		
E Only		
H Only		

RIC

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Project Title:
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Wood Beam

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Lic. # : KW-06011301 — Licensee : Covington

Description : HDR @ ROOF DECK

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination IBC 2015

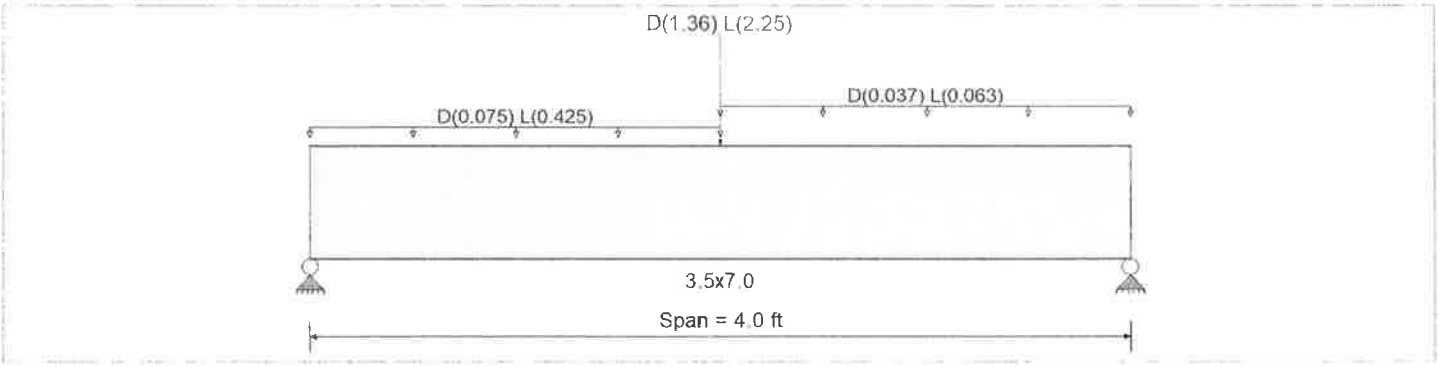
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

Fb +	2900 psi
Fb -	2900 psi
Fc - Prll	2900 psi
Fc - Perp	625 psi
Fv	290 psi
Ft	2025 psi

E : Modulus of Elasticity

Ebend- xx	2000 ksi
Eminbend - xx	1016.535 ksi
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.

Load for Span Number 1
Uniform Load : D = 0.0750, L = 0.4250 k/ft, Extent = 0.0 -->> 2.0 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.0370, L = 0.0630 k/ft, Extent = 2.0 -->> 4.0 ft, Tributary Width = 1.0 ft
Point Load : D = 1.360, L = 2.250 k @ 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.609 : 1	Maximum Shear Stress Ratio	=	0.490 : 1
Section used for this span		3.5x7.0	Section used for this span		3.5x7.0
fb : Actual	=	1,767.46 psi	fv : Actual	=	142.06 psi
FB : Allowable	=	2,900.00 psi	Fv : Allowable	=	290.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.000 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	0.033 in	Ratio =	1449 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.050 in	Ratio =	950 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.605	2.205
Overall MINimum	1.794	1.432
+D+H	0.811	0.773
+D+L+H	2.605	2.205
+D+Lr+H	0.811	0.773
+D+S+H	0.811	0.773
+D+0.750Lr+0.750L+H	2.157	1.847
+D+0.750L+0.750S+H	2.157	1.847
+D+0.60W+H	0.811	0.773
+D+0.70E+H	0.811	0.773

RIC

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Wood Beam

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Description : HDR @ ROOF DECK

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+0.450W+H	2.157	1.847
+D+0.750L+0.750S+0.450W+H	2.157	1.847
+D+0.750L+0.750S+0.5250E+H	2.157	1.847
+0.60D+0.60W+0.60H	0.487	0.464
+0.60D+0.70E+0.60H	0.487	0.464
D Only	0.811	0.773
Lr Only		
L Only	1.794	1.432
S Only		
W Only		
E Only		
H Only		

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Engineer:
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Project Descr:

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Wood Beam

Lic. # : KW-06011301 — Licensee : Covington

Description : UPPER DECK HDR

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

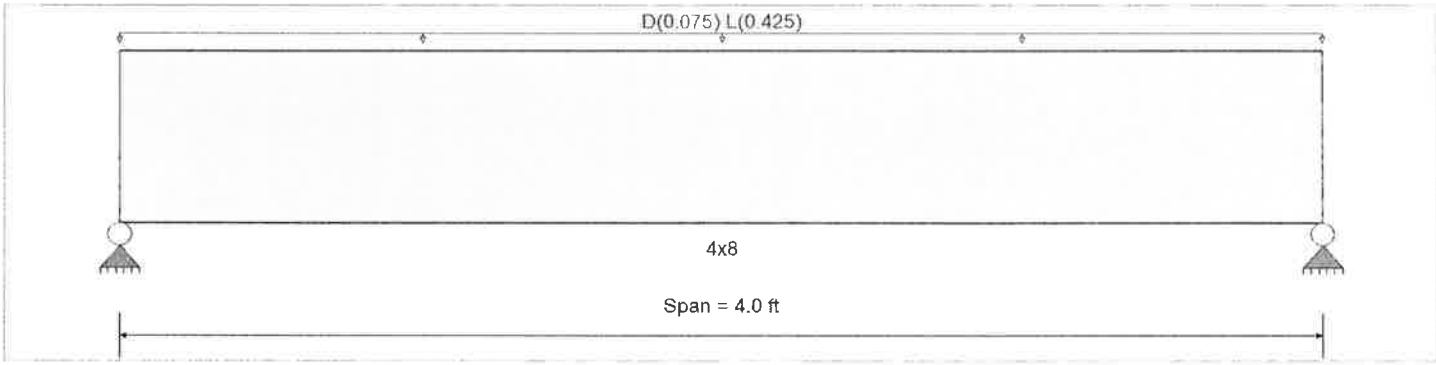
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Fb +	1000 psi
Fb -	1000 psi
Fc - Prll	1500 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1700 ksi
Eminbend - xx	620 ksi
Density	31.21 pcf

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



Applied Loads

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

Uniform Load : D = 0.0750, L = 0.4250 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.301 : 1	Maximum Shear Stress Ratio	=	0.230 : 1
Section used for this span		4x8	Section used for this span		4x8
fb : Actual	=	391.37 psi	fv : Actual	=	41.42 psi
FB : Allowable	=	1,300.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.000 ft	Location of maximum on span	=	3.401 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.013 in	Ratio =	3683 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.015 in	Ratio =	3130 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.000	1.000
Overall MINimum	0.850	0.850
+D+H	0.150	0.150
+D+L+H	1.000	1.000
+D+Lr+H	0.150	0.150
+D+S+H	0.150	0.150
+D+0.750Lr+0.750L+H	0.788	0.788
+D+0.750L+0.750S+H	0.788	0.788
+D+0.60W+H	0.150	0.150
+D+0.70E+H	0.150	0.150
+D+0.750Lr+0.750L+0.450W+H	0.788	0.788
+D+0.750L+0.750S+0.450W+H	0.788	0.788
+D+0.750L+0.750S+0.5250E+H	0.788	0.788

RID

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Wood Beam

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Lic. # : KW-06011301 Licensee : Covington

Description : UPPER DECK HDR

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+0.60D+0.60W+0.60H	0.090	0.090
+0.60D+0.70E+0.60H	0.090	0.090
D Only	0.150	0.150
Lr Only		
L Only	0.850	0.850
S Only		
W Only		
E Only		
H Only		

Title Block Line 1
You can change this area
using the "Settings" menu item
and then using the "Printing &
Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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Wood Beam

Lic. # : KW-06011301 — Licensee : Covington

Description : UPPER DECK HDR

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

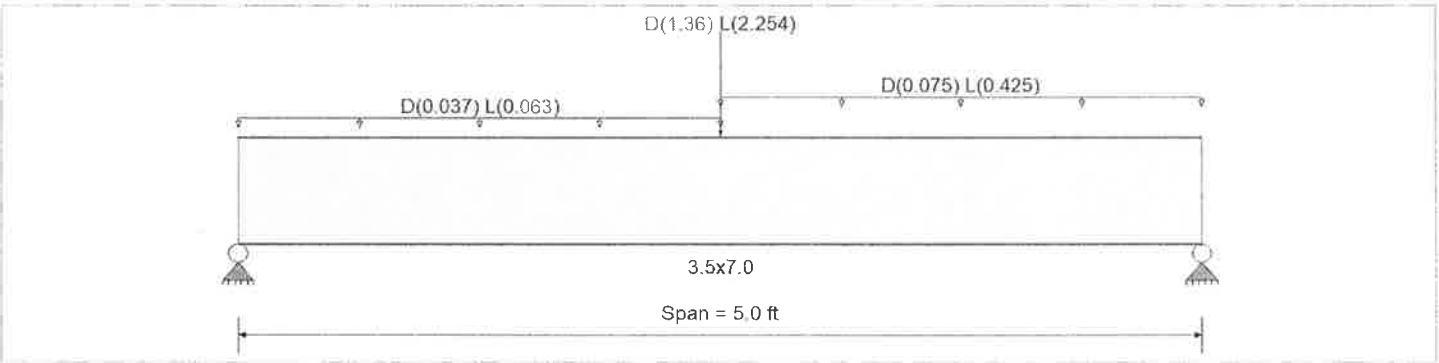
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

Fb +	2900 psi
Fb -	2900 psi
Fc - Prll	2900 psi
Fc - Perp	625 psi
Fv	290 psi
Ft	2025 psi

E : Modulus of Elasticity

Ebend- xx	2000 ksi
Eminbend - xx	1016.535 ksi
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.

Load for Span Number 1
Uniform Load : D = 0.0370, L = 0.0630 k/ft, Extent = 0.0 -->> 2.50 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.0750, L = 0.4250 k/ft, Extent = 2.50 -->> 5.0 ft, Tributary Width = 1.0 ft
Point Load : D = 1.360, L = 2.254 k @ 2.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.790 : 1	Maximum Shear Stress Ratio	=	0.533 : 1
Section used for this span		3.5x7.0	Section used for this span		3.5x7.0
fb : Actual	=	2,290.15 psi	fv : Actual	=	154.54 psi
FB : Allowable	=	2,900.00 psi	Fv : Allowable	=	290.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	2.500 ft	Location of maximum on span	=	4.434 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.068 in	Ratio =	879 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.103 in	Ratio =	582 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.307	2.807
Overall MINimum	1.511	1.963
+D+H	0.796	0.844
+D+L+H	2.307	2.807
+D+Lr+H	0.796	0.844
+D+S+H	0.796	0.844
+D+0.750Lr+0.750L+H	1.929	2.316
+D+0.750L+0.750S+H	1.929	2.316
+D+0.60W+H	0.796	0.844
+D+0.70E+H	0.796	0.844

R1D

Title Block Line 1
You can change this area
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Title Block Line 6

Project Title:
Engineer:
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Wood Beam

Lic. # : KW-06011301 Licensee : Covington

Description : UPPER DECK HDR

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+0.450W+H	1.929	2.316
+D+0.750L+0.750S+0.450W+H	1.929	2.316
+D+0.750L+0.750S+0.5250E+H	1.929	2.316
+0.60D+0.60W+0.60H	0.478	0.506
+0.60D+0.70E+0.60H	0.478	0.506
D Only	0.796	0.844
Lr Only		
L Only	1.511	1.963
S Only		
W Only		
E Only		
H Only		

RLE

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 6 NOV 2018, 9:00AM

Wood Beam

File = D:\Documents\ENERCALC Data Files\8465.ec6

Lic. # : KW-06011301 — Licensee : Covington

Description : HDR AT GLB(13B) REACTION

CODE REFERENCES

Calculations per NDS 2015, IBC 2015, CBC 2016, ASCE 7-10
Load Combination Set : IBC 2015

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2015

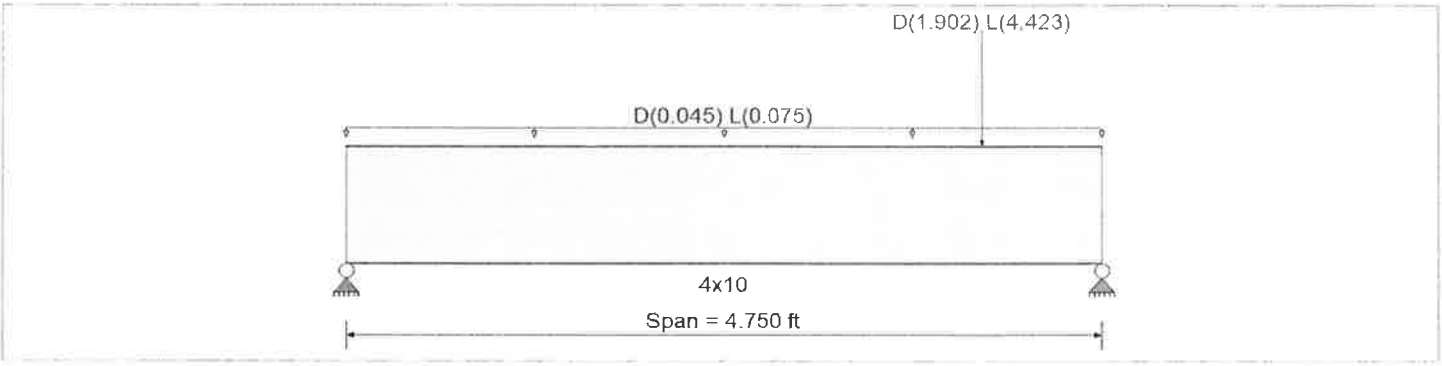
Wood Species : Douglas Fir - Larch
Wood Grade : No.1

Fb +	1000 psi
Fb -	1000 psi
Fc - Prll	1500 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	675 psi

E : Modulus of Elasticity

Ebend- xx	1700 ksi
Eminbend - xx	620 ksi
Density	31.21 pcf

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



Applied Loads

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

Uniform Load : D = 0.0450, L = 0.0750 , Tributary Width = 1.0 ft
Point Load : D = 1.902, L = 4.423 k @ 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.834 : 1	Maximum Shear Stress Ratio	=	0.307 : 1
Section used for this span		4x10	Section used for this span		4x10
fb : Actual	=	1,001.24 psi	fv : Actual	=	55.23 psi
FB : Allowable	=	1,200.00 psi	Fv : Allowable	=	180.00 psi
Load Combination		+D+L+H	Load Combination		+D+L+H
Location of maximum on span	=	3.987 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.023 in	Ratio =	2521 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.033 in	Ratio =	1743 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Vertical Reactions

Support notation : Far left is #1 — Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.284	5.611
Overall MINimum	0.876	3.903
+D+H	0.407	1.709
+D+L+H	1.284	5.611
+D+Lr+H	0.407	1.709
+D+S+H	0.407	1.709
+D+0.750Lr+0.750L+H	1.065	4.636
+D+0.750L+0.750S+H	1.065	4.636
+D+0.60W+H	0.407	1.709
+D+0.70E+H	0.407	1.709
+D+0.750Lr+0.750L+0.450W+H	1.065	4.636
+D+0.750L+0.750S+0.450W+H	1.065	4.636

RLB

Title Block Line 1
You can change this area using the "Settings" menu item and then using the "Printing & Title Block" selection.
Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 6 NOV 2018, 9:00AM

Wood Beam

File = D:\Documents\ENERCALC Data Files\8465.ec6

Lic. # : KW-06011301 Licensee : Covington

Description : HDR AT GLB(13B) REACTION

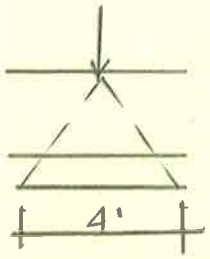
Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750L+0.750S+0.5250E+H	1.065	4.636
+0.60D+0.60W+0.60H	0.244	1.025
+0.60D+0.70E+0.60H	0.244	1.025
D Only	0.407	1.709
Lr Only		
L Only	0.876	3.903
S Only		
W Only		
E Only		
H Only		

APPLETON | 11-6-18 | B465 | R2

LOAD ON FDN WALL & FTG W/OUT SPREAD FTG



$P_{LL} = 1500(4)(1.33) = 7960\#$

P = 8196# AREQ'D = 5.46 SF → 30 → 2 PILES

P = 9255 AREQ'D = $\frac{9255}{1500}$ = 6.17 → 30 → 3 PILES

P = $\frac{9890\#}{4000\#}$ = 2.47 → USE (3) PILES

P = 13501# PILES REQ'D = 3.26 → (4) PILES

P = $\frac{7645\#}{4000}$ = 1.91 → USE (2) PILES

HOLDDOWN ALTERNATE

MAIN FRONT P = 1261

USE HDU2 - SDS2.5

MAIN LEFT PUP = HHDQ14 $DL_{SLAB} = 10(10)(.33)(150) = 4950$

DL REQ'D = 10787 − 6960 = 3827

DL WALL = 21.67(150)(10) = 2010

TOTAL DL = 6960

TRY FTG 3x6x1.5(150) = 4050

USE FTG 3' WIDE x 6' LONG x 18" THK W/ #5 @ 12" O.C. EA WAY TOP & BOT

C = 11866 PILES REQ'D = $\frac{11866}{4000}$ = 2.96 → 3 PILES

MAIN RIGHT PUP = 5227# USE HDU11 - SDS2.5