

Calculations required to be provided by
the Permittee on site for all Inspections

PRCTI20250103

STRUCTURAL CALCULATIONS

FOR

**BPLC PROPERTIES
MEZZANINE ADDITION
PUYALLUP, WA**

**City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE**

SKinnear
06/24/2025
3:29:06 PM



**PREPARED BY
DONALD R. SCOTT, P.E., S.E.**



City of Puyallup Development & Permitting Services ISSUED PERMIT	
Building	Planning
Engineering	Public Works
Fire	Traffic

**MARCH 1, 2025
25-01**

Design Criteria:

- Structural calculations for steel, LVL, and lumber members were done using Enercalc, see attached reports for results
- Structural calculations for TJI members were done by comparing maximum calculated bending moments to manufacturer's tables, see attached
- The smallest possible size was assumed when the true size of the existing member was unknown
- All steel was assumed to have a yield strength of 50 ksi
- All lumber was assumed to be DF-L No. 2, $F_b = 900$ psi
- All LVL was assumed to have $F_b = 2900$ psi, $E = 2000000$ psi
- 2021 IBC, ASCE 7-16, NDS 2018 codes were used
- Floor Dead Load = 5 psf (Assumed, does not include self weight)
- Floor Live Load = 50 psf (Office Load)
= 125 psf (Storage Load)
- See attached floor loading diagram

Project: BPLC Properties Mezz Framing

Job No: 25-01

Subject: _____ Sheet _____

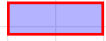
Name: DRS

Date: 01 March 2025

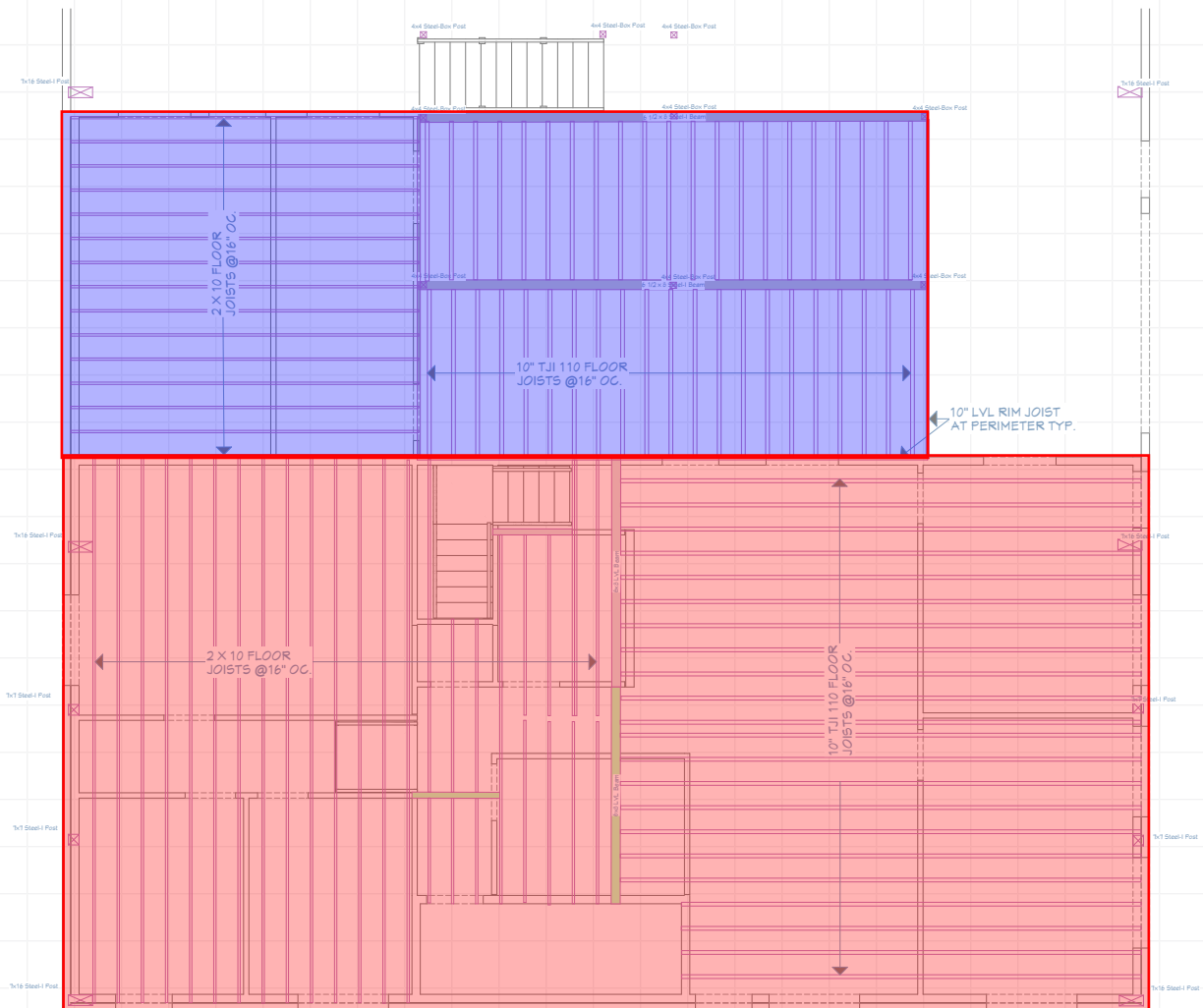
Key:



Office Load = 50 psf



Storage Load = 125 psf



FLOOR LIVE LOAD DIAGRAM

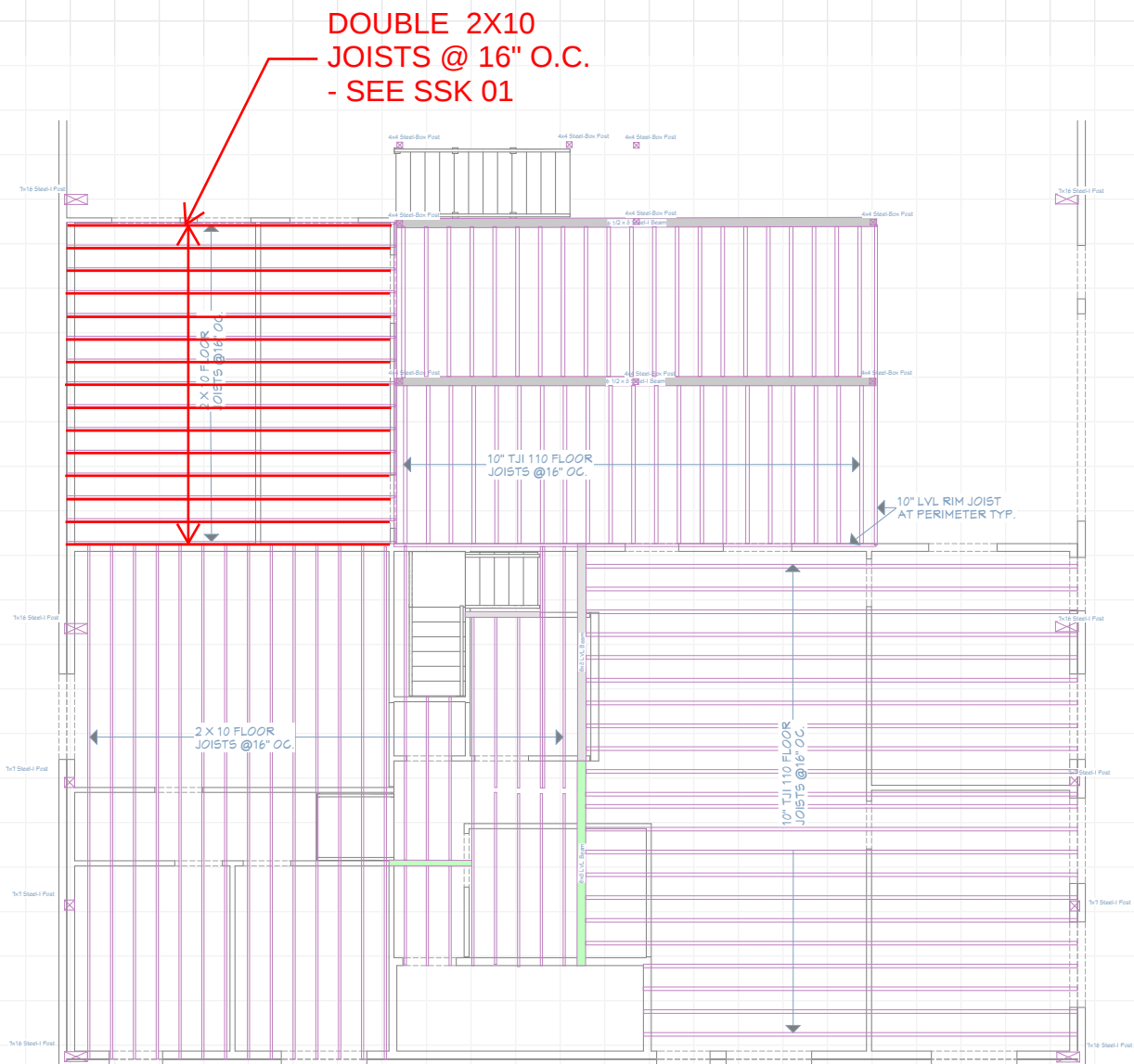
Project: BPLC Properties Mezz Framing

Job No: 25-01

Subject: _____ Sheet _____

Name: DRS

Date: 01 March 2025

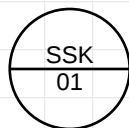
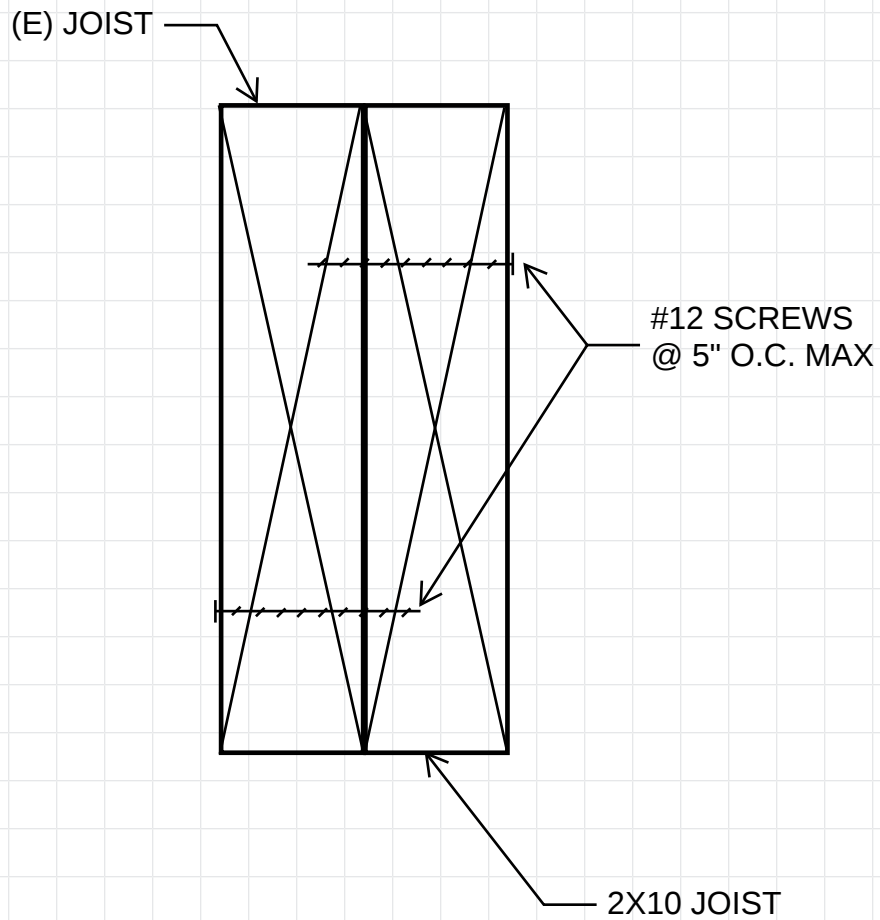


MEZZANINE PLAN VIEW

Project: BPLC Properties Mezz Framing Job No: 25-01

Subject: _____ Sheet _____ Name: DRS

Date: 01 March 2025



SECTION
NO SCALE

Double 2x10 Joists:

From Enercalc, $f_v = 60$ psi

$$\text{Area} = 2(13.875 \text{ in}^2) = 27.75 \text{ in}^2$$

$$V_{\max} = 60 \text{ psi} (27.75 \text{ in}^2) = 1665 \#$$

* Need to resist shear over $\frac{1}{2}$ of beam span for adequate composite action between 2x10's

Try #12 screws, $Z = 147$ #/screw (NDS Table 12L)

$$C_D = 1.0, C_M = 1.0, C_t = 1.0, C_g = 1.0 (D < 1.4")$$

$$C_{eg} = 1.0, C_{tn} = 1.0, C_{di} = 1.0, C_A = 1.0 (D < 1.4")$$

$$\text{Therefore: } Z' = 147 \text{ #/screw}$$

$$\text{Screws required} = 1665 \# / 147 \text{ #/screw} = 11.3 \text{ screws.}$$

Therefore: Need 12 screws

$$\frac{1}{2} \text{ Beam Span} = 11.5'(12)/2 = 69"$$

$$\text{Spacing} = 69" / 12 \text{ screws} = 5.75" / \text{screw}$$

Therefore: Use #12 screws at 5" o.c. maximum

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
 PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Office 2x10 Floor Joist

CODE REFERENCES

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

Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Stress Design
 Load Combination IBC 2018

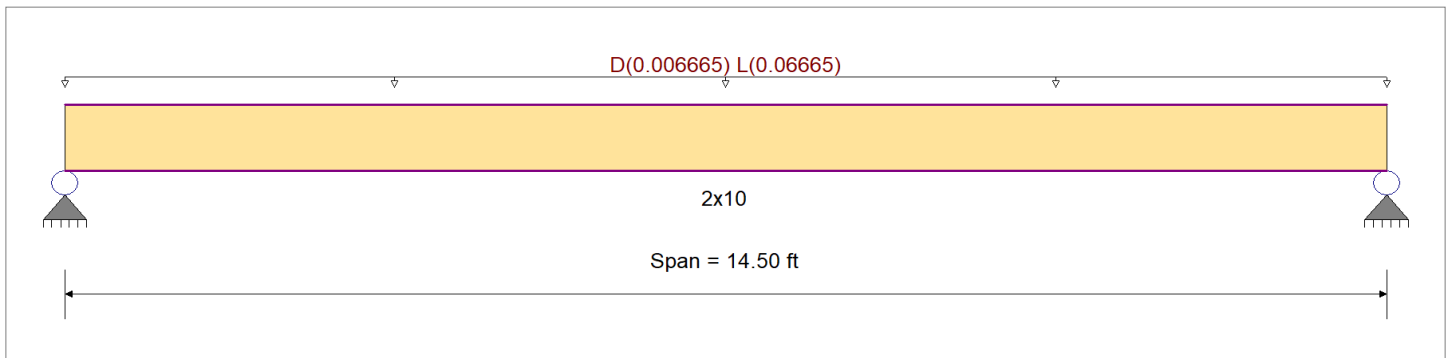
Wood Species : Douglas Fir-Larch
 Wood Grade : No.2

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

Fb + 900.0 psi
 Fb - 900.0 psi
 Fc - Prll 1,350.0 psi
 Fc - Perp 625.0 psi
 Fv 180.0 psi
 Ft 575.0 psi

E : Modulus of Elasticity
 Ebend- xx 1,600.0 ksi
 Eminbend - xx 580.0 ksi

Density 31.210 pcf
 Repetitive Member Stress Increase



Applied Loads

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

Uniform Load : D = 0.0050, L = 0.050 ksf, Tributary Width = 1.333 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.949	1	Maximum Shear Stress Ratio	=	0.287	1
Section used for this span		2x10		Section used for this span		2x10	
	=	1,080.93 psi			=	51.59 psi	
	=	1,138.50 psi			=	180.00 psi	
Load Combination		+D+L		Load Combination		+D+L	
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		0.421 in	Ratio =	413	>=	360	
Max Upward Transient Deflection		0.000 in	Ratio =	0	<	360	
Max Downward Total Deflection		0.463 in	Ratio =	375	>=	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		C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	Moment Values			Shear Values		
			M	V								M	f _b	F' _b	V	f _v	F' _v
D Only	Length = 14.50 ft	1	0.096	0.029	0.90	1.100	1.00	1.15	1.00	1.00	1.00	0.18	98.27	1024.65	0.04	4.69	162.00
+D+L	Length = 14.50 ft	1	0.949	0.287	1.00	1.100	1.00	1.15	1.00	1.00	1.00	1.93	1,080.93	1138.50	0.48	51.59	180.00
+D+0.750L	Length = 14.50 ft	1	0.587	0.177	1.25	1.100	1.00	1.15	1.00	1.00	1.00	1.49	835.26	1423.13	0.37	39.87	225.00
+0.60D	Length = 14.50 ft	1	0.032	0.010	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.11	58.96	1821.60	0.03	2.81	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.4634	7.303		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

File: 20379 Calcs JTG 08-11-20.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
PCS STRUCTURAL SOLUTIONS

Lic. # : KW-06002327

DESCRIPTION: Office 2x10 Floor Joist

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.532	0.532
Overall MINimum	0.483	0.483
D Only	0.048	0.048
+D+L	0.532	0.532
+D+0.750L	0.411	0.411
+0.60D	0.029	0.029
L Only	0.483	0.483

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Lic. #: KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
 PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Office 6x8 LVL

CODE REFERENCES

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

Load Combination Set : IBC 2018

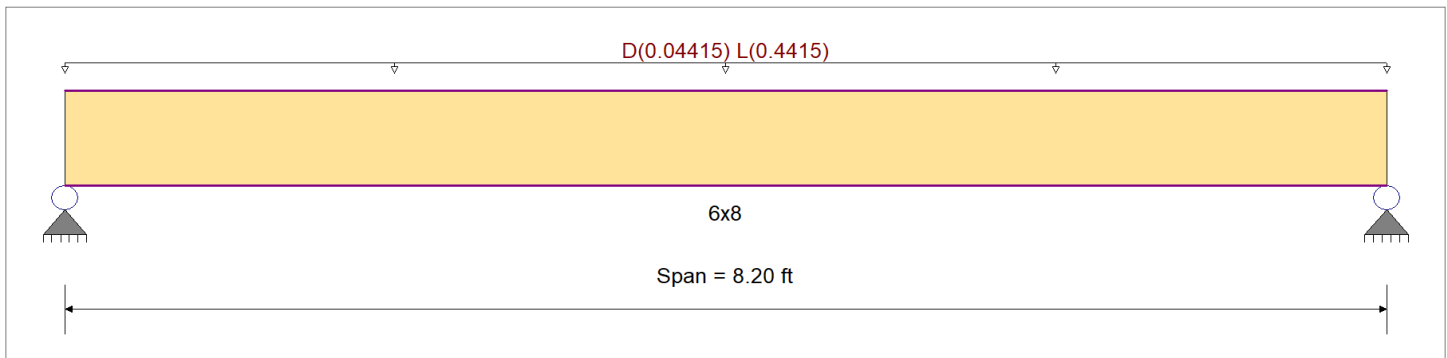
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination IBC 2018

Wood Species : RedBuilt
 Wood Grade : RedLam LVL Beam/Joist

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

Fb + 2,900.0 psi E : Modulus of Elasticity
 Fb - 2,900.0 psi Ebend- xx 2,000.0 ksi
 Fc - Prll 2,635.0 psi Eminbend - xx 1,036.83 ksi
 Fc - Perp 750.0 psi
 Fv 285.0 psi
 Ft 1,660.0 psi Density 42.010 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : D = 0.0050, L = 0.050 ksf, Tributary Width = 8.830 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.420	1	Maximum Shear Stress Ratio	=	0.278	1
Section used for this span	=	6x8		Section used for this span	=	6x8	
	=	973.51 psi			=	63.37 psi	
	=	2,320.00 psi			=	228.00 psi	
Load Combination	=	+D+L		Load Combination	=	+D+L	
Location of maximum on span	=	4.100 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		0.123 in	Ratio =	800	>=	360	
Max Upward Transient Deflection		0.000 in	Ratio =	0	<	360	
Max Downward Total Deflection		0.139 in	Ratio =	709	>=	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								Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv
D Only														0.00	0.00	0.00
Length = 8.20 ft	1	0.053	0.035	0.90	1.000	0.80	1.00	1.00	1.00	1.00	0.47	109.90	2088.00	0.20	7.15	205.20
+D+L					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.420	0.278	1.00	1.000	0.80	1.00	1.00	1.00	1.00	4.18	973.51	2320.00	1.74	63.37	228.00
+D+0.750L					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.261	0.173	1.25	1.000	0.80	1.00	1.00	1.00	1.00	3.26	757.60	2900.00	1.36	49.31	285.00
+0.60D					1.000	0.80	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.20 ft	1	0.018	0.012	1.60	1.000	0.80	1.00	1.00	1.00	1.00	0.28	65.94	3712.00	0.12	4.29	364.80

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1386	4.130		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Office 6x8 LVL

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.041	2.041
Overall MINimum	1.810	1.810
D Only	0.230	0.230
+D+L	2.041	2.041
+D+0.750L	1.588	1.588
+0.60D	0.138	0.138
L Only	1.810	1.810

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Office Steel "7x7" Column

Code References

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2018

General Information

Steel Section Name :	W6x25
Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	50.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height 8.0 ft
 Top & Bottom Fixity **Top & Bottom Pinned**
 Brace condition for deflection (buckling) along columns :
 X-X (width) axis :
 Unbraced Length for buckling ABOUT Y-Y Axis = 8 ft, $K = 1.0$
 Y-Y (depth) axis :
 Unbraced Length for buckling ABOUT X-X Axis = 8 ft, $K = 1.0$

Applied Loads

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

Column self weight included : 200.0 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 8.0 ft, $D = 0.4410$, $L = 4.410$ k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =
Load Combination
Location of max.above base
At maximum location values are ...
Pa : Axial
Pn / Omega : Allowable
Ma-x : Applied
Mn-x / Omega : Allowable
Ma-y : Applied
Mn-y / Omega : Allowable

PASS Maximum Shear Stress Ratio =
Load Combination
Location of max.above base
At maximum location values are ...
Va : Applied
Vn / Omega : Allowable

0.03077	:	1
+D+L+H		
0.0	ft	
5.051	k	
164.166	k	
0.0	k-ft	
44.583	k-ft	
0.0	k-ft	
21.357	k-ft	
0.0	:	1
0.0		
0.0	ft	
0.0	k	
0.0	k	

Maximum Load Reactions . .

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

Maximum Load Deflections . . .

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

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

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cbx	Cby	KxLx/Rx	KyLy/Ry	Maximum Shear Ratios		
	Stress Ratio	Status	Location	Stress Ratio					Status	Location	
+D+H	0.004	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+D+L+H	0.031	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+D+Lr+H	0.004	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+D+S+H	0.004	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+D+0.750Lr+0.750L+H	0.024	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+D+0.750L+0.750S+H	0.024	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+D+0.60W+H	0.004	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+D+0.70E+H	0.004	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+D+0.750Lr+0.750L+0.450W+H	0.024	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+D+0.750L+0.750S+0.450W+H	0.024	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+D+0.750L+0.750S+0.5250E+H	0.024	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+0.60D+0.60W+0.60H	0.002	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	
+0.60D+0.70E+0.60H	0.002	PASS	0.00 ft	1.00	1.00	35.56	63.16	0.000	PASS	0.00 ft	

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction	X-X Axis Reaction	k	Y-Y Axis Reaction	Mx - End Moments	k-ft	My - End Moments
	@ Base	@ Base @ Top		@ Base @ Top	@ Base @ Top		@ Base @ Top
+D+H	0.641						
+D+L+H	5.051						

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
 PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Office Steel "7x7" Column

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
+D+Lr+H	0.641						
+D+S+H	0.641						
+D+0.750Lr+0.750L+H	3.949						
+D+0.750L+0.750S+H	3.949						
+D+0.60W+H	0.641						
+D+0.70E+H	0.641						
+D+0.750Lr+0.750L+0.450W+H	3.949						
+D+0.750L+0.750S+0.450W+H	3.949						
+D+0.750L+0.750S+0.5250E+H	3.949						
+0.60D+0.60W+0.60H	0.385						
+0.60D+0.70E+0.60H	0.385						
D Only	0.641						
Lr Only							
L Only	4.410						
S Only							
W Only							
E Only							
H Only							

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	5.051						
"	Minimum							
Reaction, X-X Axis Base	Maximum	0.641						
"	Minimum	0.641						
Reaction, Y-Y Axis Base	Maximum	0.641						
"	Minimum	0.641						
Reaction, X-X Axis Top	Maximum	0.641						
"	Minimum	0.641						
Reaction, Y-Y Axis Top	Maximum	0.641						
"	Minimum	0.641						
Moment, X-X Axis Base	Maximum	0.641						
"	Minimum	0.641						
Moment, Y-Y Axis Base	Maximum	0.641						
"	Minimum	0.641						
Moment, X-X Axis Top	Maximum	0.641						
"	Minimum	0.641						
Moment, Y-Y Axis Top	Maximum	0.641						
"	Minimum	0.641						

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

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

File: 20379 Calcs JTG 08-11-20.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31

Lic. # : KW-06002327

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Office Steel "7x7" Column

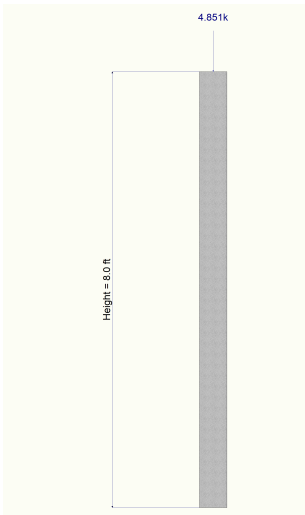
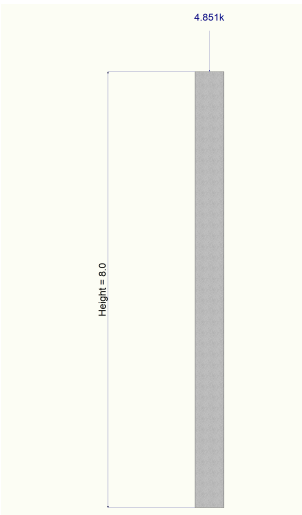
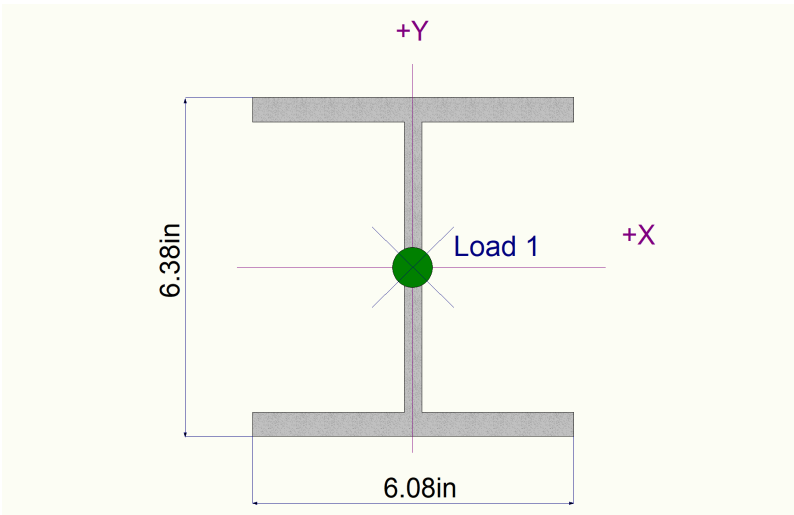
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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

Steel Section Properties : W6x25

Depth	=	6.380 in	I xx	=	53.40 in^4	J	=	0.461 in^4
Web Thick	=	0.320 in	S xx	=	16.70 in^3	Cw	=	150.00 in^6
Flange Width	=	6.080 in	R xx	=	2.700 in			
Flange Thick	=	0.455 in	Zx	=	18.900 in^3			
Area	=	7.340 in^2	I yy	=	17.100 in^4			
Weight	=	25.000 plf	S yy	=	5.610 in^3	Wno	=	9.010 in^2
Kdesign	=	0.705 in	R yy	=	1.520 in	Sw	=	6.230 in^4
K1	=	0.563 in	Zy	=	8.560 in^3	Qf	=	3.880 in^3
rts	=	1.740 in				Qw	=	9.390 in^3
Ycg	=	0.000 in						

Sketches



Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
 PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Office "16x7" Steel Column

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
+D+Lr+H	0.818						
+D+S+H	0.818						
+D+0.750Lr+0.750L+H	4.793						
+D+0.750L+0.750S+H	4.793						
+D+0.60W+H	0.818						
+D+0.70E+H	0.818						
+D+0.750Lr+0.750L+0.450W+H	4.793						
+D+0.750L+0.750S+0.450W+H	4.793						
+D+0.750L+0.750S+0.5250E+H	4.793						
+0.60D+0.60W+0.60H	0.491						
+0.60D+0.70E+0.60H	0.491						
D Only	0.818						
Lr Only							
L Only	5.300						
S Only							
W Only							
E Only							
H Only							

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	6.118						
"	Minimum							
Reaction, X-X Axis Base	Maximum	0.818						
"	Minimum	0.818						
Reaction, Y-Y Axis Base	Maximum	0.818						
"	Minimum	0.818						
Reaction, X-X Axis Top	Maximum	0.818						
"	Minimum	0.818						
Reaction, Y-Y Axis Top	Maximum	0.818						
"	Minimum	0.818						
Moment, X-X Axis Base	Maximum	0.818						
"	Minimum	0.818						
Moment, Y-Y Axis Base	Maximum	0.818						
"	Minimum	0.818						
Moment, X-X Axis Top	Maximum	0.818						
"	Minimum	0.818						
Moment, Y-Y Axis Top	Maximum	0.818						
"	Minimum	0.818						

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

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

File: 20379 Calcs JTG 08-11-20.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
PCS STRUCTURAL SOLUTIONS

Lic. # : KW-06002327

DESCRIPTION: Office "16x7" Steel Column

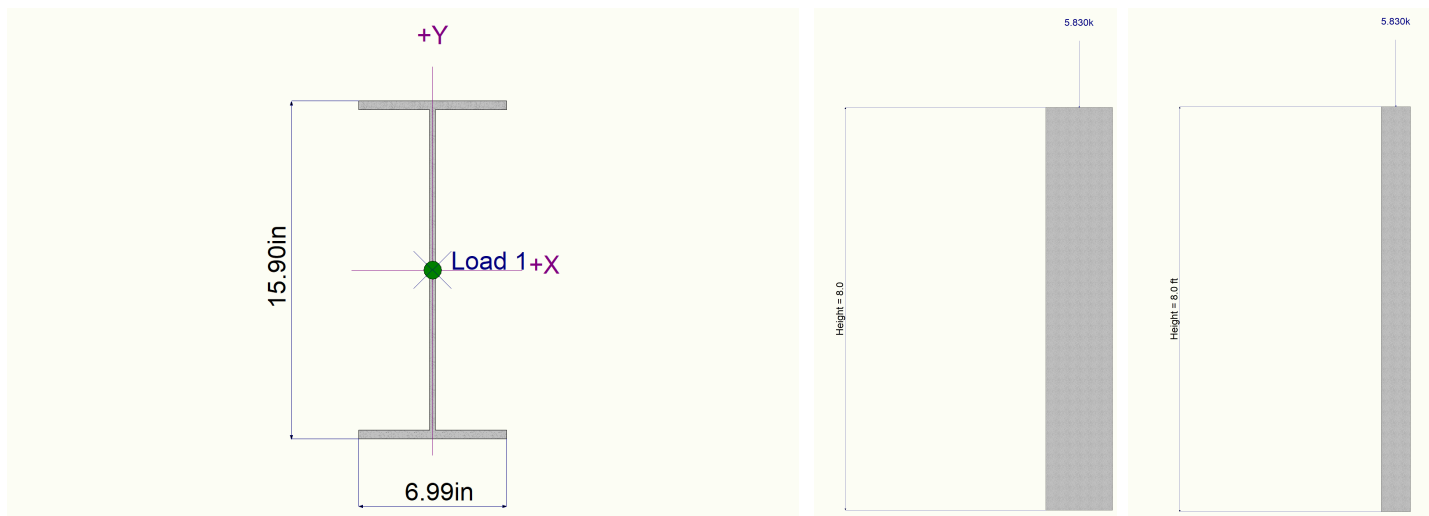
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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

Steel Section Properties : W16x36

Depth	=	15.900 in	I xx	=	448.00 in ⁴	J	=	0.545 in ⁴
Web Thick	=	0.295 in	S xx	=	56.50 in ³	Cw	=	1,460.00 in ⁶
Flange Width	=	6.990 in	R xx	=	6.510 in			
Flange Thick	=	0.430 in	Zx	=	64.000 in ³			
Area	=	10.600 in ²	I yy	=	24.500 in ⁴			
Weight	=	36.000 plf	S yy	=	7.000 in ³	Wno	=	27.000 in ²
Kdesign	=	0.832 in	R yy	=	1.520 in	Sw	=	20.300 in ⁴
K1	=	0.750 in	Zy	=	10.800 in ³	Qf	=	11.100 in ³
rts	=	1.830 in				Qw	=	31.600 in ³
Ycg	=	0.000 in						

Sketches



Project Title:
 Engineer:
 Project ID:
 Project Descr.:

Wood Beam

Lic. #: KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
 PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Storage 6x8 LVL

CODE REFERENCES

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

Load Combination Set : IBC 2018

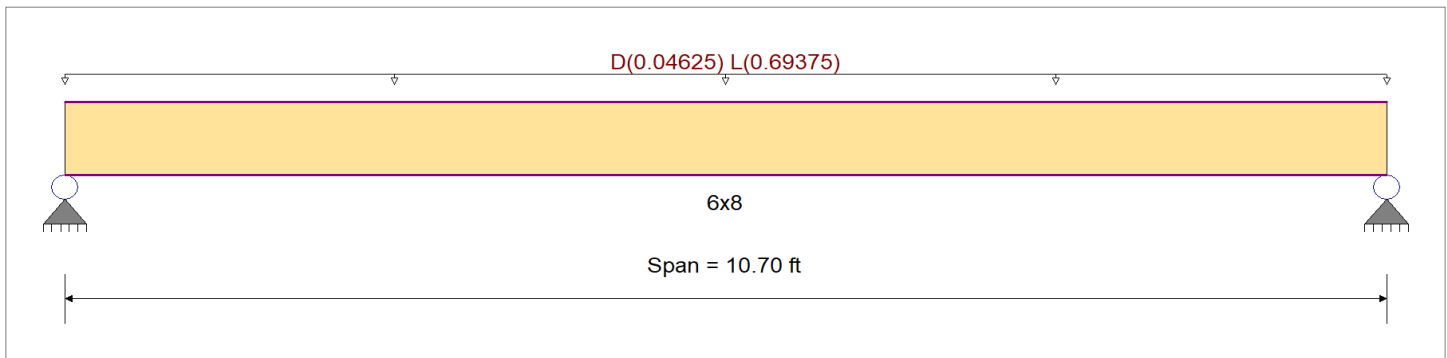
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination IBC 2018

Wood Species : RedBuilt
 Wood Grade : RedLam LVL Beam/Joist

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

F_b + 2,900.0 psi
 F_b - 2,900.0 psi
 F_c - Prll 2,635.0 psi
 F_c - Perp 750.0 psi
 F_v 285.0 psi
 F_t 1,660.0 psi
 E : Modulus of Elasticity
 E_{bend} - xx 2,000.0 ksi
 E_{minbend} - xx 1,036.83 ksi
 Density 42.010 pcf



Applied Loads

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

Beam self weight calculated and added to loads

Uniform Load : D = 0.0050, L = 0.0750 ksf, Tributary Width = 9.250 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.864	1	Maximum Shear Stress Ratio	=	0.453	1
Section used for this span	=	6x8		Section used for this span	=	6x8	
	=	2,504.74 psi			=	129.22 psi	
	=	2,900.00 psi			=	285.00 psi	
Load Combination	=	+D+L		Load Combination	=	+D+L	
Location of maximum on span	=	5.350 ft		Location of maximum on span	=	10.075 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.532 in	Ratio = 241				
Max Upward Transient Deflection		0.000 in	Ratio = 0				
Max Downward Total Deflection		0.577 in	Ratio = 222				
Max Upward Total Deflection		0.000 in	Ratio = 0				

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values		
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	f _b	F'b	V	f _v	F'v	
D Only																		
Length = 10.70 ft	1	0.074	0.039	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.83	194.12	2610.00	0.00	0.00	0.00		
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00		
Length = 10.70 ft	1	0.864	0.453	1.00	1.000	1.00	1.00	1.00	1.00	1.00	10.76	2,504.74	2900.00	3.55	129.22	285.00		
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00		
Length = 10.70 ft	1	0.532	0.279	1.25	1.000	1.00	1.00	1.00	1.00	1.00	8.28	1,927.08	3625.00	2.73	99.42	356.25		
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00		
Length = 10.70 ft	1	0.025	0.013	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.50	116.47	4640.00	0.17	6.01	456.00		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.5769	5.389		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Storage 6x8 LVL

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.023	4.023
Overall MINimum	3.712	3.712
D Only	0.312	0.312
+D+L	4.023	4.023
+D+0.750L	3.095	3.095
+0.60D	0.187	0.187
L Only	3.712	3.712

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Beam

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
 PCS STRUCTURAL SOLUTIONS

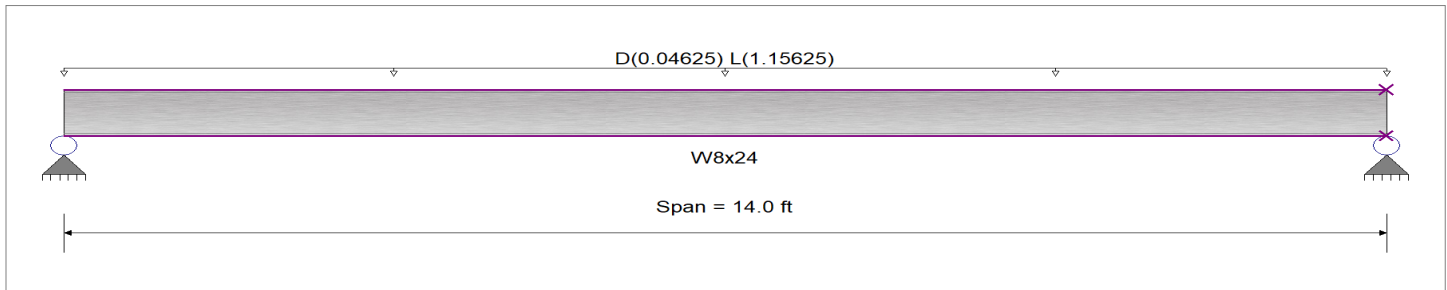
DESCRIPTION: Storage W8x24 Beam

CODE REFERENCES

Calculations per AISC 360-10, IBC 2012, CBC 2013, ASCE 7-10
 Load Combination Set : IBC 2018

Material Properties

Analysis Method : Allowable Strength Design
 Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
 Bending Axis : Major Axis Bending
 Fy : Steel Yield : 50.0 ksi
 E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight NOT internally calculated and added
 Uniform Load : D = 0.0050, L = 0.1250 ksf, Tributary Width = 9.250 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.511 : 1	Maximum Shear Stress Ratio =	0.217 : 1
Section used for this span	W8x24	Section used for this span	W8x24
Ma : Applied	29.461 k-ft	Va : Applied	8.418 k
Mn / Omega : Allowable	57.635 k-ft	Vn / Omega : Allowable	38.857 k
Load Combination	+D+L	Load Combination	+D+L
Location of maximum on span	7.000 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	0.418 in	Ratio =	401 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.435 in	Ratio =	386 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 14.00 ft	1	0.020	0.008	1.13		1.13	96.25	57.63	1.00	1.00	0.32	58.29	38.86
+D+L													
Dsgn. L = 14.00 ft	1	0.511	0.217	29.46		29.46	96.25	57.63	1.00	1.00	8.42	58.29	38.86
+D+0.750L													
Dsgn. L = 14.00 ft	1	0.388	0.165	22.38		22.38	96.25	57.63	1.00	1.00	6.39	58.29	38.86
+0.60D													
Dsgn. L = 14.00 ft	1	0.012	0.005	0.68		0.68	96.25	57.63	1.00	1.00	0.19	58.29	38.86

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.4354	7.040		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	8.418	8.418
Overall MINimum	0.194	0.194
D Only	0.324	0.324
+D+L	8.418	8.418
+D+0.750L	6.394	6.394
+0.60D	0.194	0.194
L Only	8.094	8.094

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Steel Column

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
 PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Storage "4x4 Steel Post"

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
+D+Lr+H	0.692						
+D+S+H	0.692						
+D+0.750Lr+0.750L+H	12.692						
+D+0.750L+0.750S+H	12.692						
+D+0.60W+H	0.692						
+D+0.70E+H	0.692						
+D+0.750Lr+0.750L+0.450W+H	12.692						
+D+0.750L+0.750S+0.450W+H	12.692						
+D+0.750L+0.750S+0.5250E+H	12.692						
+0.60D+0.60W+0.60H	0.415						
+0.60D+0.70E+0.60H	0.415						
D Only	0.692						
Lr Only							
L Only	16.000						
S Only							
W Only							
E Only							
H Only							

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	16.692						
"	Minimum							
Reaction, X-X Axis Base	Maximum	0.692						
"	Minimum	0.692						
Reaction, Y-Y Axis Base	Maximum	0.692						
"	Minimum	0.692						
Reaction, X-X Axis Top	Maximum	0.692						
"	Minimum	0.692						
Reaction, Y-Y Axis Top	Maximum	0.692						
"	Minimum	0.692						
Moment, X-X Axis Base	Maximum	0.692						
"	Minimum	0.692						
Moment, Y-Y Axis Base	Maximum	0.692						
"	Minimum	0.692						
Moment, X-X Axis Top	Maximum	0.692						
"	Minimum	0.692						
Moment, Y-Y Axis Top	Maximum	0.692						
"	Minimum	0.692						

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

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
Software copyright ENERCALC, INC. 1983-2020, Build:12.20.5.31
PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Storage "4x4 Steel Post"

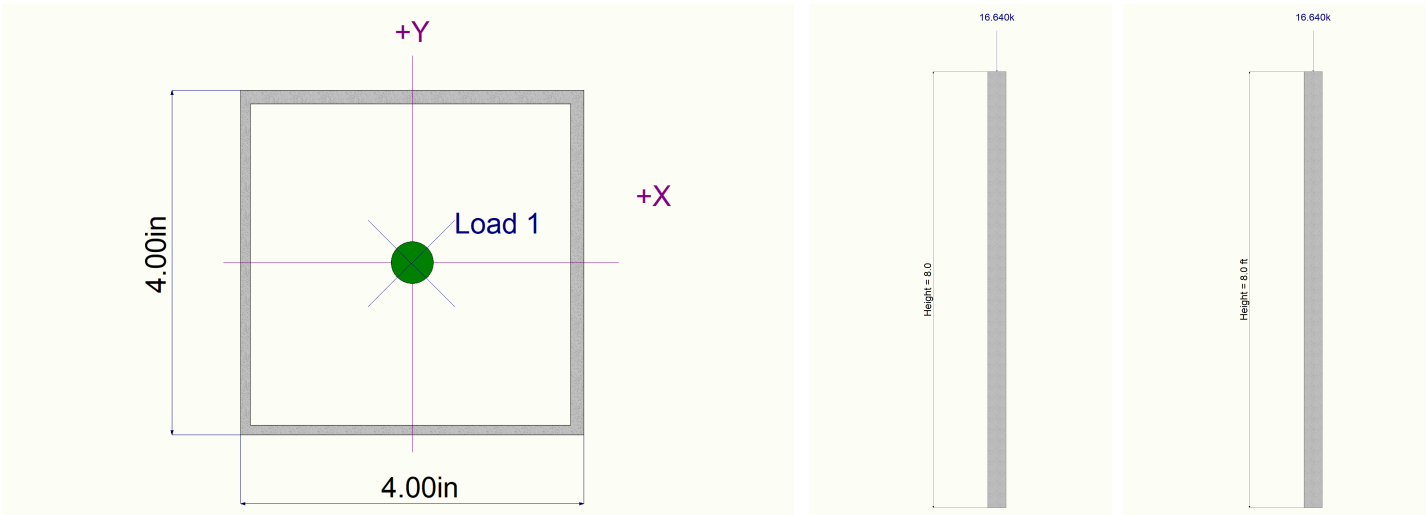
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
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

Steel Section Properties : HSS4x4x1/8

Depth	=	4.000 in	I xx	=	4.40 in^4	J	=	6.910 in^4
Design Thick	=	0.116 in	S xx	=	2.20 in^3			
Width	=	4.000 in	R xx	=	1.580 in			
Wall Thick	=	0.125 in	Zx	=	2.560 in^3			
Area	=	1.770 in^2	I yy	=	4.400 in^4	C	=	3.490 in^3
Weight	=	6.460 plf	S yy	=	2.200 in^3			
			R yy	=	1.580 in			
Ycg	=	0.000 in						

Sketches



Project Title:
 Engineer:
 Project ID:
 Project Descr:

Wood Beam

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24
 PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Storage Double 2x10 Joist

CODE REFERENCES

Calculations per NDS 2012, IBC 2012, CBC 2013, ASCE 7-10

Load Combination Set : IBC 2018

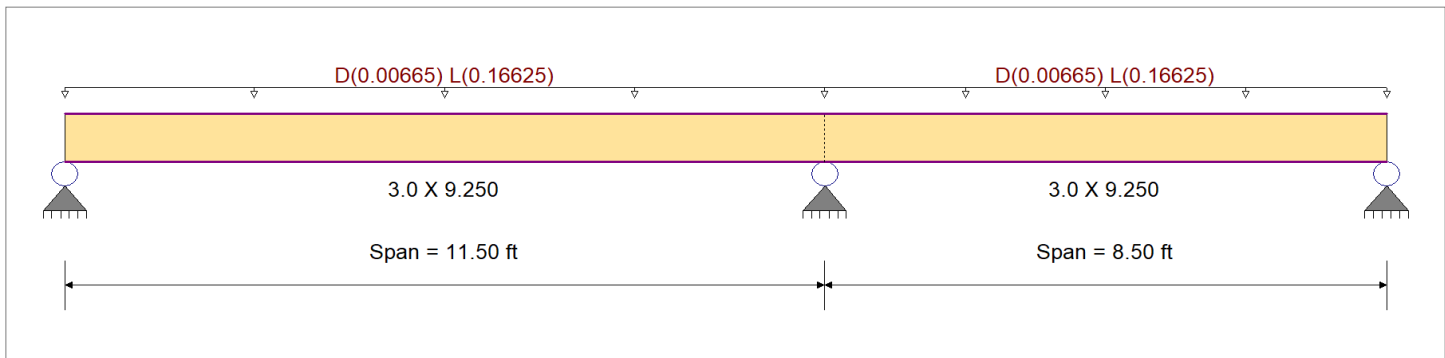
Material Properties

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 + 900.0 psi E : Modulus of Elasticity
 Fb - 900.0 psi Ebend- xx 1,600.0 ksi
 Fc - Prll 1,350.0 psi Eminbend - xx 580.0 ksi
 Fc - Perp 625.0 psi
 Fv 180.0 psi
 Ft 575.0 psi
 Density 31.210 pcf
 Repetitive Member Stress Increase



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 0.0050, L = 0.1250 ksf, Tributary Width = 1.330 ft

Load for Span Number 2

Uniform Load : D = 0.0050, L = 0.1250 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.588	1	Maximum Shear Stress Ratio	=	0.333	1
Section used for this span		3.0 X 9.250		Section used for this span		3.0 X 9.250	
fb: Actual	=	669.65	psi	fv: Actual	=	60.00	psi
Fb: Allowable	=	1,138.50	psi	Fv: Allowable	=	180.00	psi
Load Combination		+D+L		Load Combination		+D+L	
Location of maximum on span	=	11.500	ft	Location of maximum on span	=	10.793	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.110	in	Ratio =		1260	>=360
Max Upward Transient Deflection		-0.006	in	Ratio =		16199	>=360
Max Downward Total Deflection		0.118	in	Ratio =		1170	>=180
Max Upward Total Deflection		-0.007	in	Ratio =		15052	>=180

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only														0.00	0.00	0.00	0.00
Length = 11.50 ft	1		0.046	0.026	0.90	1.100	1.00	1.15	1.00	1.00	1.00	0.17	47.40	1024.65	0.08	4.25	162.00
Length = 8.50 ft	2		0.046	0.026	0.90	1.100	1.00	1.15	1.00	1.00	1.00	0.17	47.40	1024.65	0.06	4.25	162.00
+D+L						1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.50 ft	1		0.588	0.333	1.00	1.100	1.00	1.15	1.00	1.00	1.00	2.39	669.65	1138.50	1.11	60.00	180.00
Length = 8.50 ft	2		0.588	0.333	1.00	1.100	1.00	1.15	1.00	1.00	1.00	2.39	669.65	1138.50	0.91	60.00	180.00
+D+0.750L						1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.50 ft	1		0.361	0.205	1.25	1.100	1.00	1.15	1.00	1.00	1.00	1.83	514.09	1423.13	0.85	46.06	225.00
Length = 8.50 ft	2		0.361	0.205	1.25	1.100	1.00	1.15	1.00	1.00	1.00	1.83	514.09	1423.13	0.70	46.06	225.00
+0.60D						1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Lic. # : KW-06002327

File: 20379 Calcs JTG 08-11-20.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.24

PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Storage Double 2x10 Joist

Load Combination	Segment Length	Span #	Max Stress Ratios		C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	Moment Values			Shear Values		
			M	V								M	fb	F'b	V	fv	Fv
Length = 11.50 ft		1	0.016	0.009	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.10	28.44	1821.60	0.05	2.55	288.00
Length = 8.50 ft		2	0.016	0.009	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.10	28.44	1821.60	0.04	2.55	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1179	5.140		0.0000	0.000
+D+L	2	0.0109	5.746	+D+L	-0.0068	1.235

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.821	2.278	0.480
Overall MINimum	0.763	2.116	0.446
D Only	0.058	0.161	0.034
+D+L	0.821	2.278	0.480
+D+0.750L	0.630	1.749	0.368
+0.60D	0.035	0.097	0.020
L Only	0.763	2.116	0.446

Check TJI Members: (Assuming 9.5" depth)

Checking D+L ASD Load Combination

With Office Live Load: $L = 16.33'$

$$M = 50 + 5\text{psf} \times 1.33' \times 16.33'^2 \times (1/8) = 2444 \text{ lb-ft} < 2500 \text{ lb-ft} \quad \text{OK}$$

With Storage Live Load: $L = 9.25'$

$$M = 125 + 5\text{psf} \times 1.33' \times 9.25'^2 \times (1/8) = 1854 \text{ lb-ft} < 2500 \text{ lb-ft} \quad \text{OK}$$

9.5" TJI 110 OK for both conditions

This section contains design information for 9½"-16" deep Trus Joist® TJI® joists.

These standard-size TJI® joists are readily available through your local Weyerhaeuser dealer or distributor. Offered with the flange sizes shown below, they come in lengths up to 60' (in 1' increments).

Design Properties (100% Load Duration)

Depth	TJI®	Basic Properties				Reaction Properties					
		Joist Weight (lbs/ft)	Maximum Resistive Moment ⁽¹⁾ (ft-lbs)	Joist Only EI x 10 ⁶ (in. ² -lbs)	Maximum Vertical Shear (lbs)	1¼" End Reaction (lbs)	3½" End Reaction (lbs)	3½" Intermediate Reaction (lbs)		5¼" Intermediate Reaction (lbs)	
								No Web Stiffeners	With Web Stiffeners ⁽²⁾	No Web Stiffeners	With Web Stiffeners ⁽²⁾
9½"	110	2.3	2,500	157	1,220	910	1,220	1,935	N.A.	2,350	N.A.
	210	2.6	3,000	186	1,330	1,005	1,330	2,145	N.A.	2,565	N.A.
	230	2.7	3,330	206	1,330	1,060	1,330	2,410	N.A.	2,790	N.A.
11⅞"	110	2.5	3,160	267	1,560	910	1,375	1,935	2,295	2,350	2,705
	210	2.8	3,795	315	1,655	1,005	1,460	2,145	2,505	2,565	2,925
	230	3.0	4,215	347	1,655	1,060	1,485	2,410	2,765	2,790	3,150
	360	3.0	6,180	419	1,705	1,080	1,505	2,460	2,815	3,000	3,360
14"	560	4.0	9,500	636	2,050	1,265	1,725	3,000	3,475	3,455	3,930
	110	2.8	3,740	392	1,860	910	1,375	1,935	2,295	2,350	2,705
	210	3.1	4,490	462	1,945	1,005	1,460	2,145	2,505	2,565	2,925
	230	3.3	4,990	509	1,945	1,060	1,485	2,410	2,765	2,790	3,150
16"	360	3.3	7,335	612	1,955	1,080	1,505	2,460	2,815	3,000	3,360
	560	4.2	11,275	926	2,390	1,265	1,725	3,000	3,475	3,455	3,930
	110	3.0	4,280	535	2,145	910	1,375	1,935	2,295	2,350	2,705
	210	3.3	5,140	629	2,190	1,005	1,460	2,145	2,505	2,565	2,925
16"	230	3.5	5,710	691	2,190	1,060	1,485	2,410	2,765	2,790	3,150
	360	3.5	8,405	830	2,190	1,080	1,505	2,460	2,815	3,000	3,360
	560	4.5	12,925	1,252	2,710	1,265	1,725	3,000	3,475	3,455	3,930

(1) **Caution:** Do not increase joist moment design properties by a repetitive member use factor.

(2) See detail W on page 27 for web stiffener requirements and nailing information.

General Notes

- Design reaction includes all loads on the joist. Design shear is computed at the inside face of supports and includes all loads on the span(s). Allowable shear may sometimes be increased at interior supports in accordance with ICC-ES ESR-1153, and these increases are reflected in span tables.
- The formulas at right approximate the uniform load deflection of Δ (inches).

TJI® joists are intended for dry-use applications

Some TJI® joist series may not be available in your region. Contact your Weyerhaeuser representative for information.

For TJI® 110, 210, 230, and 360 Joists

$$\Delta = \frac{22.5 wL^4}{EI} + \frac{2.67 wL^2}{d \times 10^5}$$

For TJI® 560 Joists

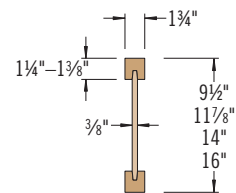
$$\Delta = \frac{22.5 wL^4}{EI} + \frac{2.29 wL^2}{d \times 10^5}$$

w = uniform load in pounds per linear foot

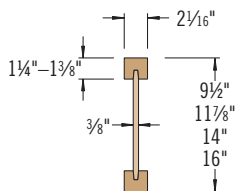
L = span in feet

d = out-to-out depth of the joist in inches

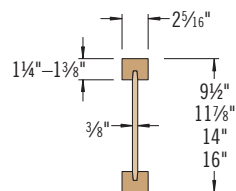
EI = value from table above



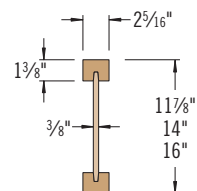
TJI® 110 joists



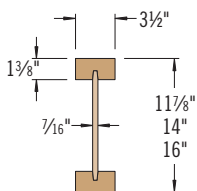
TJI® 210 joists



TJI® 230 joists



TJI® 360 joists



TJI® 560 joists



DO NOT walk on joists until braced. INJURY MAY RESULT.



DO NOT stack building materials on unsheathed joists. Stack only over beams or walls.



DO NOT walk on joists that are lying flat.

WARNING

Joists are unstable until braced laterally

Bracing Includes:

- Blocking
- Hangers
- Rim Board
- Sheathing
- Rim Joist
- Strut Lines

WARNING NOTES: Lack of proper bracing during construction can result in serious accidents. Observe the following guidelines:

- All blocking, hangers, rim boards, and rim joists at the end supports of the TJI® joists must be completely installed and properly nailed.
- Lateral strength, like a braced end wall or an existing deck, must be established at the ends of the bay. This can also be accomplished by a temporary or permanent deck (sheathing) fastened to the first 4 feet of joists at the end of the bay.
- Safety bracing of 1x4 (minimum) must be nailed to a braced end wall or sheathed area (as in note 2) and to each joist. Without this bracing, buckling sideways or rollover is highly probable under light construction loads—such as a worker or one layer of unnailed sheathing.
- Sheathing must be completely attached to each TJI® joist before additional loads can be placed on the system.
- Ends of cantilevers require safety bracing on both the top and bottom flanges.
- The flanges must remain straight within a tolerance of ½" from true alignment.

L/480 Live Load Deflection

Depth	TJI®	40 PSF Live Load / 10 PSF Dead Load				40 PSF Live Load / 20 PSF Dead Load			
		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
9½"	110	16'-11"	15'-6"	14'-7"	13'-7"	16'-11"	15'-6"	14'-3"	12'-9"
	210	17'-9"	16'-3"	15'-4"	14'-3"	17'-9"	16'-3"	15'-4"	14'-0"
	230	18'-3"	16'-8"	15'-9"	14'-8"	18'-3"	16'-8"	15'-9"	14'-8"
11⅞"	110	20'-2"	18'-5"	17'-4"	15'-9" ⁽¹⁾	20'-2"	17'-8"	16'-1" ⁽¹⁾	14'-4" ⁽¹⁾
	210	21'-1"	19'-3"	18'-2"	16'-11"	21'-1"	19'-3"	17'-8"	15'-9" ⁽¹⁾
	230	21'-8"	19'-10"	18'-8"	17'-5"	21'-8"	19'-10"	18'-7"	16'-7" ⁽¹⁾
	360	22'-11"	20'-11"	19'-8"	18'-4"	22'-11"	20'-11"	19'-8"	17'-10" ⁽¹⁾
	560	26'-1"	23'-8"	22'-4"	20'-9"	26'-1"	23'-8"	22'-4"	20'-9" ⁽¹⁾
14"	110	22'-10"	20'-11"	19'-2"	17'-2" ⁽¹⁾	22'-2"	19'-2"	17'-6" ⁽¹⁾	15'-0" ⁽¹⁾
	210	23'-11"	21'-10"	20'-8"	18'-10" ⁽¹⁾	23'-11"	21'-1"	19'-2" ⁽¹⁾	16'-7" ⁽¹⁾
	230	24'-8"	22'-6"	21'-2"	19'-9" ⁽¹⁾	24'-8"	22'-2"	20'-3" ⁽¹⁾	17'-6" ⁽¹⁾
	360	26'-0"	23'-8"	22'-4"	20'-9" ⁽¹⁾	26'-0"	23'-8"	22'-4" ⁽¹⁾	17'-10" ⁽¹⁾
	560	29'-6"	26'-10"	25'-4"	23'-6"	29'-6"	26'-10"	25'-4" ⁽¹⁾	20'-11" ⁽¹⁾
16"	110	25'-4"	22'-6"	20'-7" ⁽¹⁾	18'-1" ⁽¹⁾	23'-9"	20'-7" ⁽¹⁾	18'-9" ⁽¹⁾	15'-0" ⁽¹⁾
	210	26'-6"	24'-3"	22'-6" ⁽¹⁾	19'-11" ⁽¹⁾	26'-0"	22'-6" ⁽¹⁾	20'-7" ⁽¹⁾	16'-7" ⁽¹⁾
	230	27'-3"	24'-10"	23'-6"	21'-1" ⁽¹⁾	27'-3"	23'-9"	21'-8" ⁽¹⁾	17'-6" ⁽¹⁾
	360	28'-9"	26'-3"	24'-8" ⁽¹⁾	21'-5" ⁽¹⁾	28'-9"	26'-3" ⁽¹⁾	22'-4" ⁽¹⁾	17'-10" ⁽¹⁾
	560	32'-8"	29'-8"	28'-0"	25'-2" ⁽¹⁾	32'-8"	29'-8"	26'-3" ⁽¹⁾	20'-11" ⁽¹⁾

L/360 Live Load Deflection (Minimum Criteria per Code)

Depth	TJI®	40 PSF Live Load / 10 PSF Dead Load				40 PSF Live Load / 20 PSF Dead Load			
		12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
9½"	110	18'-9"	17'-2"	15'-8"	14'-0"	18'-1"	15'-8"	14'-3"	12'-9"
	210	19'-8"	18'-0"	17'-0"	15'-4"	19'-8"	17'-2"	15'-8"	14'-0"
	230	20'-3"	18'-6"	17'-5"	16'-2"	20'-3"	18'-1"	16'-6"	14'-9"
11⅞"	110	22'-3"	19'-4"	17'-8"	15'-9" ⁽¹⁾	20'-5"	17'-8"	16'-1" ⁽¹⁾	14'-4" ⁽¹⁾
	210	23'-4"	21'-2"	19'-4"	17'-3" ⁽¹⁾	22'-4"	19'-4"	17'-8"	15'-9" ⁽¹⁾
	230	24'-0"	21'-11"	20'-5"	18'-3"	23'-7"	20'-5"	18'-7"	16'-7" ⁽¹⁾
	360	25'-4"	23'-2"	21'-10"	20'-4" ⁽¹⁾	25'-4"	23'-2"	21'-10"⁽¹⁾	17'-10" ⁽¹⁾
	560	28'-10"	26'-3"	24'-9"	23'-0"	28'-10"	26'-3"	24'-9"	20'-11" ⁽¹⁾
14"	110	24'-4"	21'-0"	19'-2"	17'-2" ⁽¹⁾	22'-2"	19'-2"	17'-6" ⁽¹⁾	15'-0" ⁽¹⁾
	210	26'-6"	23'-1"	21'-1"	18'-10" ⁽¹⁾	24'-4"	21'-1"	19'-2" ⁽¹⁾	16'-7" ⁽¹⁾
	230	27'-3"	24'-4"	22'-2"	19'-10" ⁽¹⁾	25'-8"	22'-2"	20'-3" ⁽¹⁾	17'-6" ⁽¹⁾
	360	28'-9"	26'-3"	24'-9" ⁽¹⁾	21'-5" ⁽¹⁾	28'-9"	26'-3"⁽¹⁾	22'-4" ⁽¹⁾	17'-10" ⁽¹⁾
	560	32'-8"	29'-9"	28'-0"	25'-2" ⁽¹⁾	32'-8"	29'-9"	26'-3"⁽¹⁾	20'-11" ⁽¹⁾
16"	110	26'-0"	22'-6"	20'-7" ⁽¹⁾	18'-1" ⁽¹⁾	23'-9"	20'-7" ⁽¹⁾	18'-9" ⁽¹⁾	15'-0" ⁽¹⁾
	210	28'-6"	24'-8"	22'-6" ⁽¹⁾	19'-11" ⁽¹⁾	26'-0"	22'-6" ⁽¹⁾	20'-7" ⁽¹⁾	16'-7" ⁽¹⁾
	230	30'-1"	26'-0"	23'-9"	21'-1" ⁽¹⁾	27'-5"	23'-9"	21'-8" ⁽¹⁾	17'-6" ⁽¹⁾
	360	31'-10"	29'-0"	26'-10" ⁽¹⁾	21'-5" ⁽¹⁾	31'-10"	26'-10"⁽¹⁾	22'-4" ⁽¹⁾	17'-10" ⁽¹⁾
	560	36'-1"	32'-11"	31'-0" ⁽¹⁾	25'-2" ⁽¹⁾	36'-1"	31'-6"⁽¹⁾	26'-3" ⁽¹⁾	20'-11" ⁽¹⁾

(1) Web stiffeners are required at intermediate supports of continuous-span joists when the intermediate bearing length is *less* than 5¼" and the span on either side of the intermediate bearing is greater than the following spans:

TJI®	40 PSF Live Load / 10 PSF Dead Load				40 PSF Live Load / 20 PSF Dead Load			
	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.	12" o.c.	16" o.c.	19.2" o.c.	24" o.c.
110	Not Req.	Not Req.	19'-2"	15'-4"	Not Req.	19'-2"	16'-0"	12'-9"
210			21'-4"	17'-0"		21'-4"	17'-9"	14'-2"
230			Not Req.	19'-2"		Not Req.	19'-11"	15'-11"
360			24'-5"	19'-6"		24'-5"	20'-4"	16'-3"
560			29'-10"	23'-10"		29'-10"	24'-10"	19'-10"

• Long-term deflection under dead load, which includes the effect of creep, has not been considered. Bold italic spans reflect initial dead load deflection exceeding 0.33".

How to Use These Tables

1. Determine the appropriate live load deflection criteria.
2. Identify the live and dead load condition.
3. Select on-center spacing.
4. Scan down the column until you meet or exceed the span of your application.
5. Select TJI® joist and depth.

General Notes

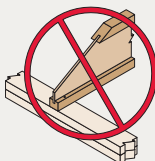
- Tables are based on:
 - Uniform loads.
 - More restrictive of simple or continuous span.
 - Clear distance between supports
 - Minimum bearing length of 1¾" end (no web stiffeners) and 3½" intermediate.
- Assumed composite action with a single layer of 24" on-center span-rated, glue-nailed floor panels for deflection only. **When subfloor adhesive is not applied, spans shall be reduced 6" for nails and 12" for proprietary fasteners.**
- For continuous spans, ratio of short span to long span should be 0.4 or greater to prevent uplift.
- Spans generated from Weyerhaeuser software may exceed the spans shown in these tables because software reflects actual design conditions.
- For multi-family applications and other loading conditions not shown, refer to Weyerhaeuser software or to the load table on page 8.

Live load deflection is not the only factor that affects how a floor will perform. To more accurately predict floor performance, use our TJ-Pro™ Ratings.

These Conditions Are NOT Permitted:



DO NOT use sawn lumber for rim board or blocking as it may shrink after installation. Use only engineered lumber



DO NOT bevel cut joist beyond inside face of wall.



DO NOT install hanger overhanging face of plate or beam. Flush bearing plate with inside face of wall or beam.

Project: BPLC Properties Mezz Framing Job No: 25-01

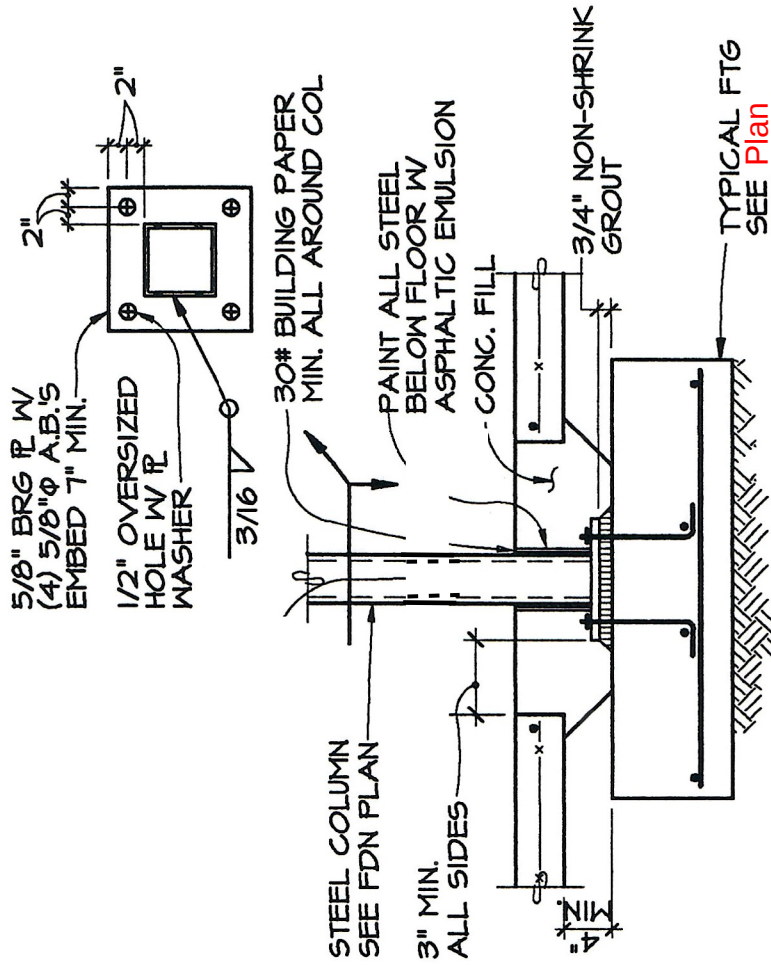
Subject: _____ Sheet _____ Name: DRS

Date: 01 March 2025

Footings

Area Required = $22,416\# / 1,500 \#/\text{ft}^2 = 15 \text{ sq. ft.} = \text{F4.0 footing at interior}$

Area Required = $11,208\# / 1,500 \#/\text{ft}^2 = 7.5 \text{ sq. ft.} = \text{F3.0 footings elsewhere.}$



TYP. STEEL COLUMN AT SPREAD FOOTING

SECTION

NO SCALE

SSK

02