PITZER & ASSOCIATES, PLLC
Structural Engineers
7317 35th Street NE
Marysville, WA 98270
Office (425)308-8070
Email: tommyt42k@hotmail.com

STRUCTURAL CALCULATIONS FOR:

Architects NW

Plan M2595B3F-9

(2) Story SFR Lateral/Gravity Analysis

This Structural Analysis is approved for single use only

NOT VALID WITHOUT A WET SIGNATURE

THOMAS J. PITZER, PE

JOB # 21-140

Date	Eng	#	Desc.
12/2/2021	TJP	1	Original Contract

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Design Criteria

Project: Plan M2595B3F-9
Client ANW
P&A #: 21-140
Date: 12/2/21

ROOF

DL	15
Lr	19

FLOOR

DL	10
LL	40

DECK

DL	10
LL	60

SNOW

SL	25

WALLS

DL	10

CEILING JOISTS

DL	5
LL	10

BALCONY

DL	10
LL	60

Lr=20(R1/R2) where 12 < Lr < 20 EQ 16-24
R1=1 Ai<= 200 FT2 EQ 16-25 IBC
R2=1.2-.05F for 4 < F < 12 where F is rise in 12"

R1	1
R2	1.05
F	3

Use DL+SL for design

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Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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ASCE Seismic Base Shear

Lic. # : KW-06006556
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21-140

Risk Category

Calculations per ASCE 7-16

Risk Category of Building or Other Structure : "II" : All Buildings and other structures except those listed as Category I, III, and IV — *ASCE 7-16, Page 4, Table 1.5-1*

Seismic Importance Factor = 1 — *ASCE 7-16, Page 5, Table 1.5-2*

ASCE 7-16 11.4.2

Max. Ground Motions, 5% Damping :
S_S = 1.4721 g, 0.2 sec response
S_1 = 0.5664 g, 1.0 sec response

Latitude = 0.000 deg North
Longitude = 0.000 deg West
Location :

Site Class, Site Coeff. and Design Category

Site Classification "D" : Shear Wave Velocity 600 to 1,200 ft/sec = **D** — *ASCE 7-16 Table 20.3-1*

Site Coefficients Fa & Fv — *ASCE 7-16 Table 11.4-1 & 11.4-2*
(using straight-line interpolation from table values)
Fa = 1.00
Fv = 1.77

Maximum Considered Earthquake Acceleration
$S_{MS} = Fa * Ss$ = 1.472 — *ASCE 7-16 Eq. 11.4-1*
$S_{M1} = Fv * S1$ = 1.000 — *ASCE 7-16 Eq. 11.4-2*

Design Spectral Acceleration
$S_{DS} = S_{MS} * 2/3$ = 0.981 — *ASCE 7-16 Eq. 11.4-3*
$S_{D1} = S_{M1} * 2/3$ = 0.667 — *ASCE 7-16 Eq. 11.4-4*

Seismic Design Category = **D** — *ASCE 7-16 Table 11.6-1 & -2*

Resisting System

ASCE 7-16 Table 12.2-1

Basic Seismic Force Resisting System . . . **Bearing Wall Systems**
15.Light-frame (wood) walls sheathed w/wood structural panels rated for shear resistance.

Response Modification Coefficient " R " = 6.50
System Overstrength Factor " Wo " = 2.50
Deflection Amplification Factor " Cd " = 4.00

NOTE! See ASCE 7-16 for all applicable footnotes.

Building height Limits :
Category "A & B" Limit: No Limit
Category "C" Limit: No Limit
Category "D" Limit: Limit = 65
Category "E" Limit: Limit = 65
Category "F" Limit: Limit = 65

Lateral Force Procedure

ASCE 7-16 Section 12.8.2

Equivalent Lateral Force Procedure
The "Equivalent Lateral Force Procedure" is being used according to the provisions of ASCE 7-16 12.8

Determine Building Period

Use ASCE 12.8-7

Structure Type for Building Period Calculation : All Other Structural Systems
" Ct " value = 0.020
" x " value = 0.75
" hn " : Height from base to highest level = 26.0 ft
" Ta " Approximate fundemental period using Eq. 12.8-7 : Ta = Ct * (hn ^ x) = 0.230 sec
"TL" : Long-period transition period per ASCE 7-16 Maps 22-14 -> 22-17 4.000 sec

Building Period " Ta " Calculated from Approximate Method selected = 0.230 sec

" Cs " Response Coefficient

ASCE 7-16 Section 12.8.1.1

S_{DS}: Short Period Design Spectral Response	=	0.981	From Eq. 12.8-2, Preliminary Cs	=	0.151
" R " : Response Modification Factor	=	6.50	From Eq. 12.8-3 & 12.8-4 , Cs need not exceed	=	0.446
" I " : Seismic Importance Factor	=	1	From Eq. 12.8-5 & 12.8-6, Cs not be less than	=	0.043
			Cs : Seismic Response Coefficient =	=	**0.1510**

Seismic Base Shear

ASCE 7-16 Section 12.8.1

Cs = 0.1510 from 12.8.1.1

W (see Sum Wi below) = 0.00 k
Seismic Base Shear V = Cs * W = 0.00 k

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Vertical Distribution of Seismic Forces

ASCE 7-16 Section 12.8.3

" k " : hx exponent based on Ta = 1.00

Table of building Weights by Floor Level...

Level #	Wi : Weight	Hi : Height	(Wi * Hi^k)	Cvx	Fx=Cvx * V	Sum Story Shear	Sum Story Moment
Sum Wi =	0.00 k	Sum Wi * Hi =	0.00 k-ft		Total Base Shear =	0.00 k	
						Base Moment =	0.0 k-ft

Diaphragm Forces : Seismic Design Category "B" to "F"

ASCE 7-16 12.10.1.1

Level #	Wi	Fi	Sum Fi	Sum Wi	Fpx : Calcd	Fpx : Min	Fpx : Max	Fpx	Dsgn. Force

Wpx ..... Weight at level of diaphragm and other structure elements attached to it.

Fi ..... Design Lateral Force applied at the level.

Sum Fi ..... Sum of "Lat. Force" of current level plus all levels above

MIN Req'd Force @ Level ..... $0.20 * S_{DS}^{*} I * Wpx$

MAX Req'd Force @ Level ..... $0.40 * S_{DS}^{*} I * Wpx$

Fpx : Design Force @ Level ..... Wpx * SUM(x->n) Fi / SUM(x->n) wi, x = Current level, n = Top Level

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: M03

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 : Hem Fir
Wood Grade : No.2

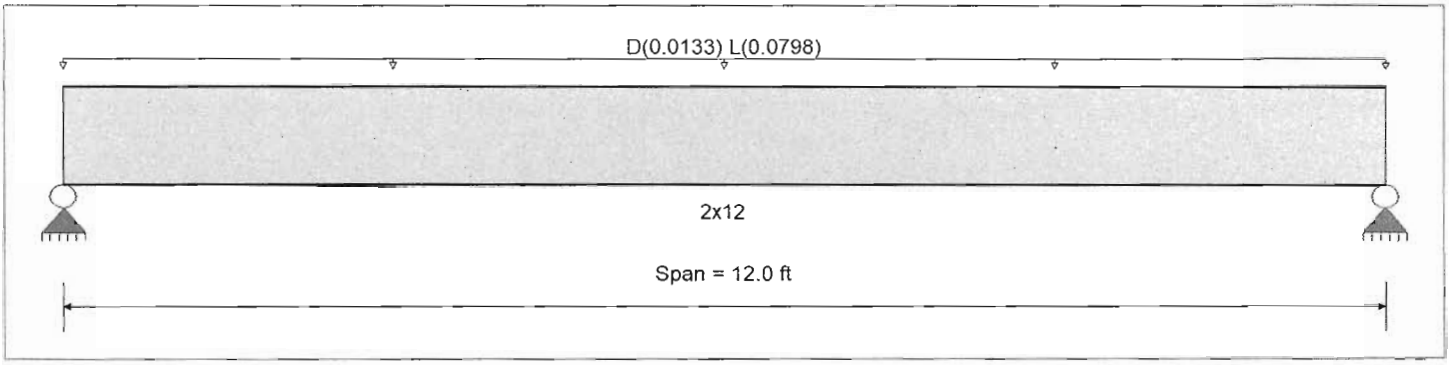
Fb +	850 psi
Fb -	850 psi
Fc - Prll	1300 psi
Fc - Perp	405 psi
Fv	150 psi
Ft	525 psi

E : Modulus of Elasticity

Ebend- xx	1300 ksi
Eminbend - xx	470 ksi
Density	26.84 pcf

Repetitive Member Stress Increase

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.060 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.840 : 1	Maximum Shear Stress Ratio	=	0.362 : 1
Section used for this span		2x12	Section used for this span		2x12
	=	657.03 psi		=	43.43 psi
	=	782.00 psi		=	120.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	5.980 ft	Location of maximum on span	=	11.077 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.170 in	Ratio =	845 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.205 in	Ratio =	701 >=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_{FV}	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.160	0.069	0.90	1.000	0.80	1.15	1.00	1.00	1.00	0.30	112.27	703.80	0.08	7.42	108.00
+D+L					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.840	0.362	1.00	1.000	0.80	1.15	1.00	1.00	1.00	1.73	657.03	782.00	0.49	43.43	120.00
+D+0.750L					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.533	0.230	1.25	1.000	0.80	1.15	1.00	1.00	1.00	1.37	520.84	977.50	0.39	34.43	150.00
+0.60D					1.000	0.80	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.054	0.023	1.60	1.000	0.80	1.15	1.00	1.00	1.00	0.18	67.36	1251.20	0.05	4.45	192.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2054	6.020		0.0000	0.000

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: M03

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.577	0.577
Overall MINimum	0.479	0.479
D Only	0.099	0.099
+D+L	0.577	0.577
+D+0.750L	0.458	0.458
+0.60D	0.059	0.059
L Only	0.479	0.479

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Wood Beam

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PITZER & ASSOCIATES

DESCRIPTION: M02

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 : Hem Fir
Wood Grade : No.2

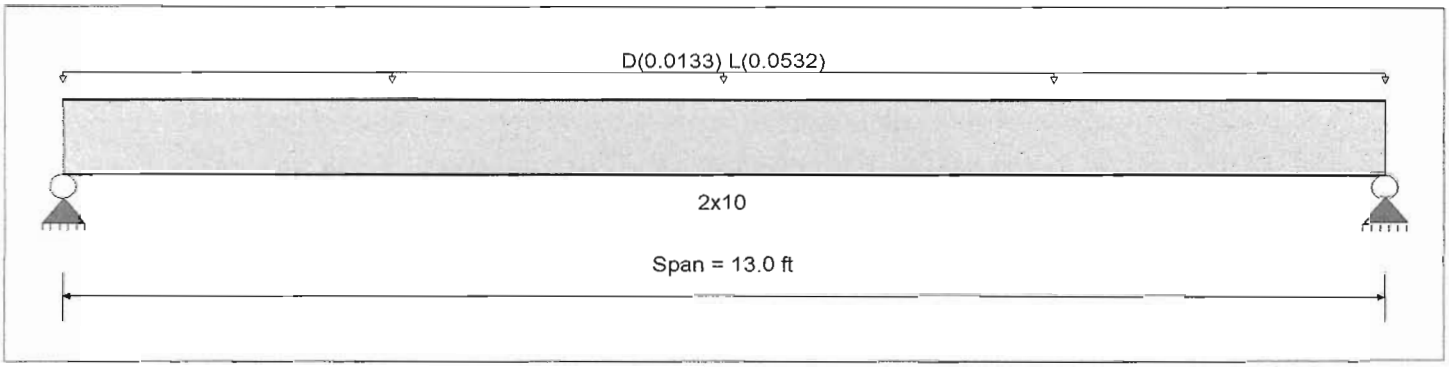
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb +	850.0 psi
Fb -	850.0 psi
Fc - Prll	1,300.0 psi
Fc - Perp	405.0 psi
Fv	150.0 psi
Ft	525.0 psi

E : Modulus of Elasticity

Ebend- xx	1,300.0 ksi
Eminbend - xx	470.0 ksi
Density	26.840 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
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.761 : 1	Maximum Shear Stress Ratio	=	0.287 : 1
Section used for this span		2x10	Section used for this span		2x10
	=	818.73 psi		=	43.03 psi
	=	1,075.25 psi		=	150.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.478 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	0.267 in	Ratio =	583 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.347 in	Ratio =	449 >=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 Only													0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.195	0.073	0.90	1.100	1.00	1.15	1.00	1.00	1.00	0.34	188.26	967.73	0.09	9.89	135.00
+D+L					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.761	0.287	1.00	1.100	1.00	1.15	1.00	1.00	1.00	1.46	818.73	1075.25	0.40	43.03	150.00
+D+0.750L					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.492	0.185	1.25	1.100	1.00	1.15	1.00	1.00	1.00	1.18	661.11	1344.06	0.32	34.74	187.50
+0.60D					1.100	1.00	1.15	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.0 ft	1	0.066	0.025	1.60	1.100	1.00	1.15	1.00	1.00	1.00	0.20	112.96	1720.40	0.05	5.94	240.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3470	6.522		0.0000	0.000

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PITZER & ASSOCIATES

DESCRIPTION: M02

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.449	0.449
Overall MINimum	0.346	0.346
D Only	0.103	0.103
+D+L	0.449	0.449
+D+0.750L	0.363	0.363
+0.60D	0.062	0.062
L Only	0.346	0.346

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Wood Beam

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PITZER & ASSOCIATES

DESCRIPTION: M01

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

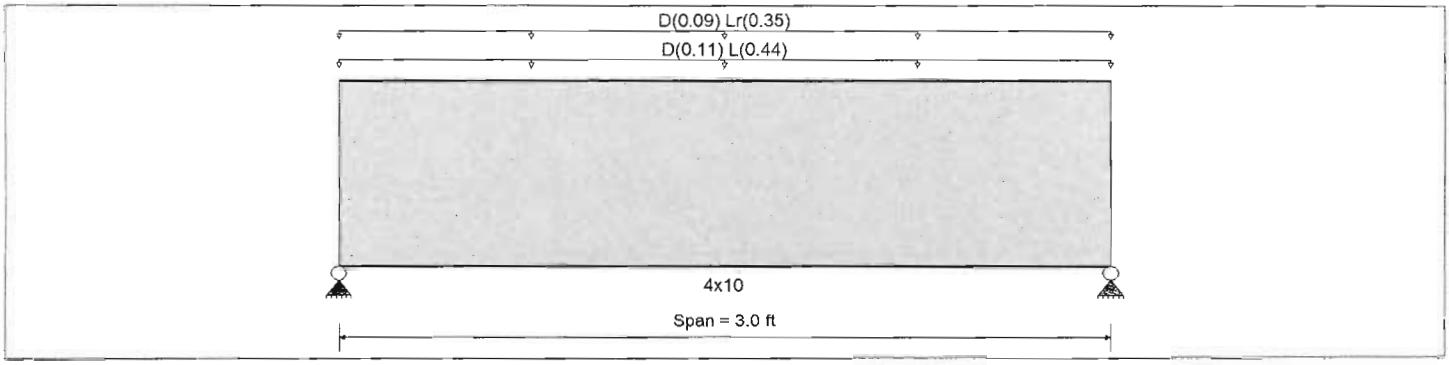
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 11.0 ft
Uniform Load : D = 0.090, Lr = 0.350 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.162** : 1	Maximum Shear Stress Ratio	=	**0.123** : 1
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	175.06 psi		=	22.11 psi
	=	1,080.00 psi		=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	1.505 ft	Location of maximum on span	=	2.237 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.002 in	Ratio =	16492 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.004 in	Ratio =	9073 >=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 Only					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.058	0.044	0.90							0.23	56.05	972.00	0.15	7.08	162.00
+D+L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.162	0.123	1.00							0.73	175.06	1080.00	0.48	22.11	180.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.112	0.085	1.25							0.63	150.72	1350.00	0.41	19.04	225.00
+D+0.750Lr+0.750L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.160	0.121	1.25							0.90	216.31	1350.00	0.59	27.33	225.00
+D+0.750L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.117	0.089	1.15							0.60	145.31	1242.00	0.40	18.36	207.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 3.0 ft	1	0.019	0.015	1.60							0.14	33.63	1728.00	0.09	4.25	288.00

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Wood Beam

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PITZER & ASSOCIATES

DESCRIPTION: M01

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.0040	1.505		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.200	1.200
Overall MINimum	0.660	0.660
D Only	0.311	0.311
+D+L	0.971	0.971
+D+Lr	0.836	0.836
+D+0.750Lr+0.750L	1.200	1.200
+D+0.750L	0.806	0.806
+0.60D	0.187	0.187
Lr Only	0.525	0.525
L Only	0.660	0.660

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Wood Beam

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PITZER & ASSOCIATES

DESCRIPTION: U12 - SEISMIC

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

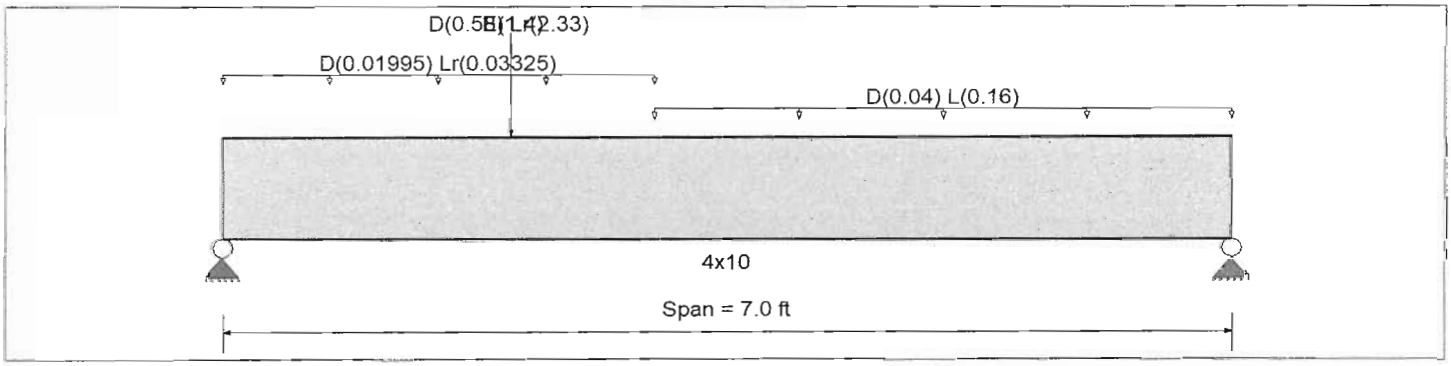
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf

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



Applied Loads

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

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.010, L = 0.040 ksf, Extent = 3.0 –>> 7.0 ft, Tributary Width = 4.0 ft
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 0.0 –>> 3.0 ft, Tributary Width = 1.330 ft
Point Load : D = 0.580, Lr = 2.330 k @ 2.0 ft, (R/U09)
Point Load : E = 1.40 k @ 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.644** : 1	Maximum Shear Stress Ratio	=	**0.375** : 1
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	1,113.65 psi		=	107.91 psi
	=	1,728.00 psi		=	288.00 psi
Load Combination		+1.131D+1.750E	Load Combination		+1.131D+1.750E
Location of maximum on span	=	2.013 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	0.063 in	Ratio =	1341 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.083 in	Ratio =	1007 >=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
+1.131D+1.750E													0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.644	0.375	1.60	1.200	1.00	1.00	1.00	1.00	1.00	4.63	1,113.65	1728.00	2.33	107.91	288.00
+1.098D+0.750L+1.313E					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.557	0.324	1.60	1.200	1.00	1.00	1.00	1.00	1.00	4.00	962.27	1728.00	2.01	93.22	288.00
+0.4688D+1.750E					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.551	0.320	1.60	1.200	1.00	1.00	1.00	1.00	1.00	3.96	952.97	1728.00	1.99	92.20	288.00

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Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

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PITZER & ASSOCIATES

DESCRIPTION: U12 - SEISMIC

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0834	3.161		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.275	1.176
Overall MINimum	1.000	0.400
D Only	0.532	0.318
+D+L	0.715	0.775
+D+Lr	2.275	1.005
+D+0.750Lr+0.750L	1.977	1.176
+D+0.750L	0.670	0.661
+D+0.70E	1.232	0.598
+D+0.750L+0.5250E	1.195	0.871
+0.60D	0.319	0.191
+0.60D+0.70E	1.019	0.471
Lr Only	1.743	0.687
L Only	0.183	0.457
E Only	1.000	0.400

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U10 - SEISMIC

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

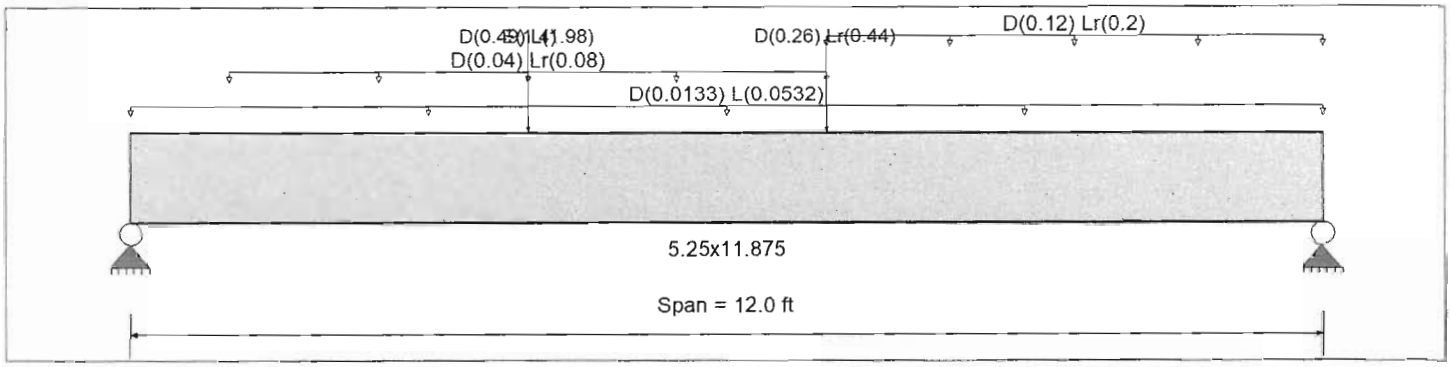
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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	45.070 pcf

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft
Uniform Load : D = 0.040, Lr = 0.080 k/ft, Extent = 1.0 -->> 7.0 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.120, Lr = 0.20 k/ft, Extent = 7.0 -->> 12.0 ft, Tributary Width = 1.0 ft
Point Load : D = 0.490, L = 1.980 k @ 4.0 ft, (L/U09)
Point Load : D = 0.260, Lr = 0.440 k @ 7.0 ft, (0.70K)
Point Load : E = 1.40 k @ 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.273** : 1	Maximum Shear Stress Ratio	=	**0.176** : 1
Section used for this span		**5.25x11.875**	Section used for this span		**5.25x11.875**
	=	1,267.17 psi		=	81.52 psi
	=	4,640.00 psi		=	464.00 psi
Load Combination		+1.098D+0.750L+1.313E	Load Combination		+1.098D+0.750L+1.313E
Location of maximum on span	=	4.013 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	0.090 in	Ratio =	1606 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.171 in	Ratio =	842 >=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
+1.131D+1.750E													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.213	0.137	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.17	989.37	4640.00	2.63	63.39	464.00
+1.098D+0.750L+1.313E					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	0.273	0.176	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.03	1,267.17	4640.00	3.39	81.52	464.00
+0.4688D+1.750E					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	0.168	0.106	1.60	1.000	1.00	1.00	1.00	1.00	1.00	8.04	781.48	4640.00	2.05	49.28	464.00

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

Lic. # : KW-06006556
PITZER & ASSOCIATES

DESCRIPTION: U10 - SEISMIC

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.1709	5.900		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.680	2.708
Overall MINimum	0.933	0.467
D Only	0.917	1.067
+D+L	2.556	2.046
+D+Lr	1.629	2.275
+D+0.750Lr+0.750L	2.680	2.708
+D+0.750L	2.146	1.801
+D+0.70E	1.570	1.394
+D+0.750L+0.5250E	2.636	2.046
+0.60D	0.550	0.640
+0.60D+0.70E	1.203	0.967
Lr Only	0.712	1.208
L Only	1.639	0.979
E Only	0.933	0.467

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Wood Beam

Lic. # : KW-06006556
PITZER & ASSOCIATES

DESCRIPTION: U09 - SEISMIC

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

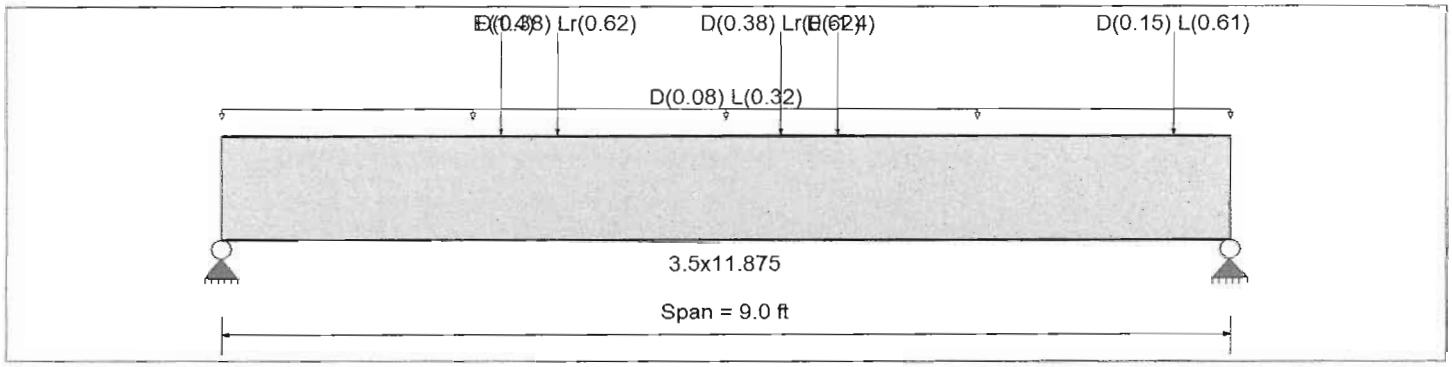
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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	45.070 pcf

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 8.0 ft
Point Load : D = 0.150, L = 0.610 k @ 8.50 ft, (L/U07)
Point Load : D = 0.380, Lr = 0.620 k @ 3.0 ft, (1.0K)
Point Load : D = 0.380, Lr = 0.620 k @ 5.0 ft, (1.0K)
Point Load : E = 1.40 k @ 2.50 ft
Point Load : E = -1.40 k @ 5.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.175 : 1	Maximum Shear Stress Ratio	=	0.181 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
	=	810.48 psi		=	83.76 psi
	=	4,640.00 psi		=	464.00 psi
Load Combination		+1.098D+0.750L+1.313E	Load Combination		+1.098D+0.750L+1.313E
Location of maximum on span	=	2.528 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 =	2103 >=360
Max Upward Transient Deflection	-0.009 in	Ratio =	11970 >=360
Max Downward Total Deflection	0.095 in	Ratio =	1134 >=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
+1.131D+1.750E													0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.129	0.164	1.60	1.000	1.00	1.00	1.00	1.00	1.00	4.11	599.79	4640.00	2.11	76.11	464.00
+1.098D+0.750L+1.313E					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	0.175	0.181	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.56	810.48	4640.00	2.32	83.76	464.00
+0.4688D+1.750E					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	0.091	0.142	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.90	422.87	4640.00	1.83	66.06	464.00

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Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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PITZER & ASSOCIATES

DESCRIPTION: U09 - SEISMIC

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.0952	4.485		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.471	2.914
Overall MINimum	0.467	-0.467
D Only	0.849	0.898
+D+L	2.323	2.914
+D+Lr	1.538	1.449
+D+0.750Lr+0.750L	2.471	2.823
+D+0.750L	1.955	2.410
+D+0.70E	1.176	0.571
+D+0.750L+0.5250E	2.200	2.165
+0.60D	0.509	0.539
+0.60D+0.70E	0.836	0.212
Lr Only	0.689	0.551
L Only	1.474	2.016
E Only	0.467	-0.467

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Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

Lic. # : KW-06006556
PITZER & ASSOCIATES

DESCRIPTION: U03 - SEISMIC

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

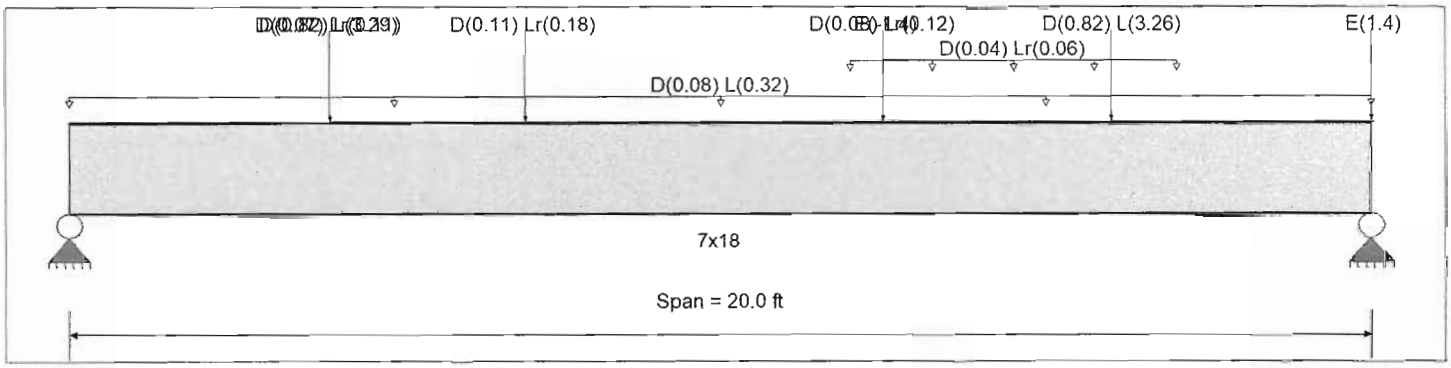
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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	45.070 pcf

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 8.0 ft
Uniform Load : D = 0.040, Lr = 0.060 k/ft, Extent = 12.0 –>> 17.0 ft, Tributary Width = 1.0 ft
Point Load : D = 0.820, L = 3.290 k @ 4.0 ft, (L/U01)
Point Load : D = 0.820, L = 3.260 k @ 16.0 ft, (L/U02)
Point Load : D = 0.070, Lr = 0.110 k @ 4.0 ft, (0.18K)
Point Load : D = 0.110, Lr = 0.180 k @ 7.0 ft, (0.29K)
Point Load : D = 0.080, Lr = 0.120 k @ 12.50 ft, (0.20)
Point Load : E = -1.40 k @ 12.50 ft
Point Load : E = 1.40 k @ 20.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.195** : 1	Maximum Shear Stress Ratio	=	**0.156** : 1
Section used for this span		**7x18**	Section used for this span		**7x18**
	=	863.16 psi		=	72.31 psi
	=	4,435.80 psi		=	464.00 psi
Load Combination		+1.098D+0.750L+1.313E	Load Combination		+1.098D+0.750L+1.313E
Location of maximum on span	=	8.227 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	0.329 in	Ratio =	730 >=360
Max Upward Transient Deflection	-0.055 in	Ratio =	4382 >=360
Max Downward Total Deflection	0.447 in	Ratio =	537 >=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
+1.131D+1.750E													0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.038	0.036	1.60	0.956	1.00	1.00	1.00	1.00	1.00	5.33	169.22	4435.80	1.40	16.68	464.00
+1.098D+0.750L+1.313E					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.195	0.156	1.60	0.956	1.00	1.00	1.00	1.00	1.00	27.19	863.16	4435.80	6.07	72.31	464.00

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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PITZER & ASSOCIATES

DESCRIPTION: U03 - SEISMIC

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
+0.4688D+1.750E					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.047	0.035	1.60	0.956	1.00	1.00	1.00	1.00	1.00	6.63	210.48	4435.80	1.36	16.18	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.4469	10.033		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	8.711	8.728
Overall MINimum	-0.525	0.525
D Only	2.227	2.262
+D+L	8.711	8.728
+D+Lr	2.559	2.639
+D+0.750Lr+0.750L	7.339	7.394
+D+0.750L	7.090	7.111
+D+0.70E	1.859	2.629
+D+0.750L+0.5250E	6.814	7.387
+0.60D	1.336	1.357
+0.60D+0.70E	0.969	1.725
Lr Only	0.333	0.378
L Only	6.484	6.466
E Only	-0.525	0.525

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Wood Beam

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Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U16

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

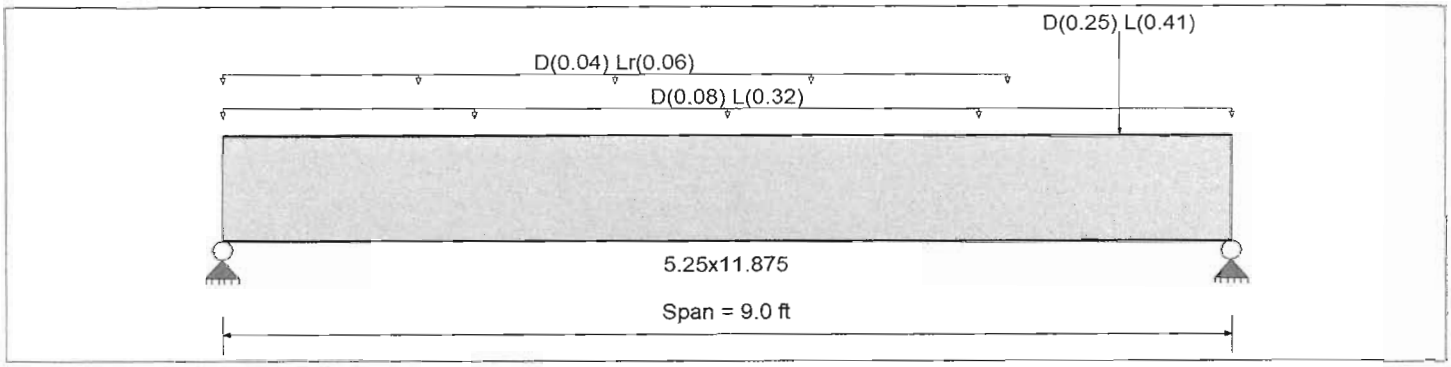
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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	45.07 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 8.0 ft
Uniform Load : D = 0.040, Lr = 0.060 k/ft, Extent = 0.0 –>> 7.0 ft, Tributary Width = 1.0 ft
Point Load : D = 0.250, L = 0.410 k @ 8.0 ft, (R/U05)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.166** : 1	Maximum Shear Stress Ratio	=	**0.181** : 1
Section used for this span		**5.25x11.875**	Section used for this span		**5.25x11.875**
	=	481.12 psi		=	52.43 psi
	=	2,900.00 psi		=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.635 ft	Location of maximum on span	=	8.037 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.035 in	Ratio =	3100 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.050 in	Ratio =	2160 >=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 Only													0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.056	0.063	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.50	145.77	2610.00	0.68	16.43	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.166	0.181	1.00	1.000	1.00	1.00	1.00	1.00	1.00	4.95	481.12	2900.00	2.18	52.43	290.00
+D+Lr					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	0.055	0.056	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.05	198.90	3625.00	0.85	20.36	362.50
+D+0.750Lr+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.121	0.128	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.49	437.07	3625.00	1.93	46.38	362.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.119	0.130	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.09	397.28	3335.00	1.81	43.43	333.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

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Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U16

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	0.019	0.021	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.90	87.46	4640.00	0.41	9.86	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0500	4.545		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.132	2.583
Overall MINimum	1.486	1.804
D Only	0.647	0.779
+D+L	2.132	2.583
+D+Lr	0.903	0.942
+D+0.750Lr+0.750L	1.953	2.255
+D+0.750L	1.761	2.132
+0.60D	0.388	0.467
Lr Only	0.257	0.163
L Only	1.486	1.804

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U15

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2018

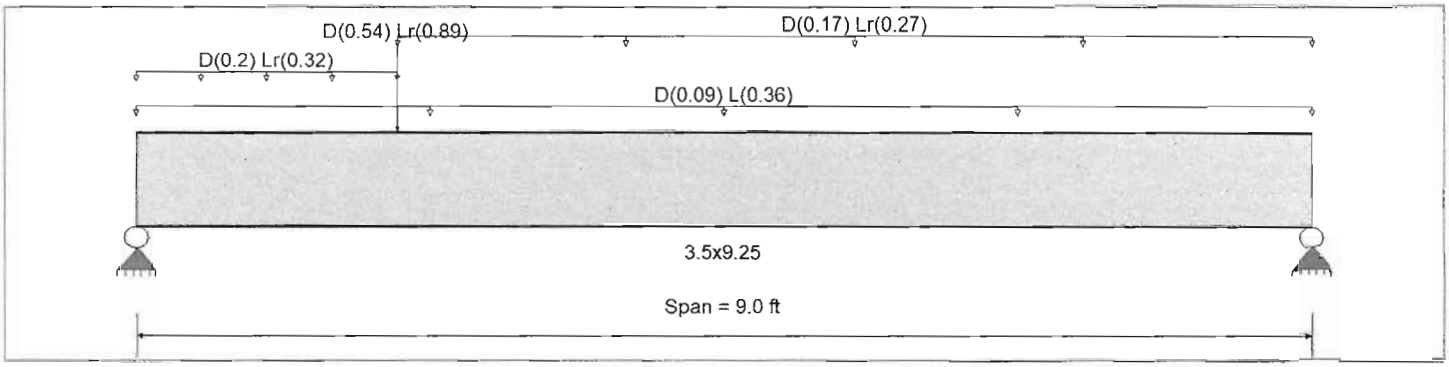
Wood Species : DF/DF
Wood Grade : 24F - V4

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

E : Modulus of Elasticity

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

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 9.0 ft
Uniform Load : D = 0.20, Lr = 0.320 k/ft, Extent = 0.0 -->> 2.0 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.170, Lr = 0.270 k/ft, Extent = 2.0 -->> 9.0 ft, Tributary Width = 1.0 ft
Point Load : D = 0.540, Lr = 0.890 k @ 2.0 ft, (1.43K)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.707** : 1	Maximum Shear Stress Ratio	=	**0.529** : 1
Section used for this span		**3.5x9.25**	Section used for this span		**3.5x9.25**
	=	2,119.80 psi		=	175.12 psi
	=	3,000.00 psi		=	331.25 psi
Load Combination		+D+0.750Lr+0.750L	Load Combination		+D+0.750Lr+0.750L
Location of maximum on span	=	4.124 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	0.134 in	Ratio =	806 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.315 in	Ratio =	343 >=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 Only					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	0.368	0.282	0.90							3.30	794.27	2160.00	1.45	67.25	238.50
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.694	0.490	1.00							6.93	1,666.47	2400.00	2.80	129.75	265.00
+D+Lr					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	0.565	0.449	1.25							7.05	1,695.51	3000.00	3.21	148.57	331.25
+D+0.750Lr+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.707	0.529	1.25							8.82	2,119.80	3000.00	3.78	175.12	331.25
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.525	0.374	1.15							6.02	1,447.89	2760.00	2.46	114.13	304.75

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File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U15

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
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.124	0.095	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.98	476.56	3840.00	0.87	40.35	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.3149	4.425		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.387	3.611
Overall MINimum	1.620	1.620
D Only	1.675	1.328
+D+L	3.295	2.948
+D+Lr	3.671	2.752
+D+0.750Lr+0.750L	4.387	3.611
+D+0.750L	2.890	2.543
+0.60D	1.005	0.797
Lr Only	1.996	1.424
L Only	1.620	1.620

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File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U14

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

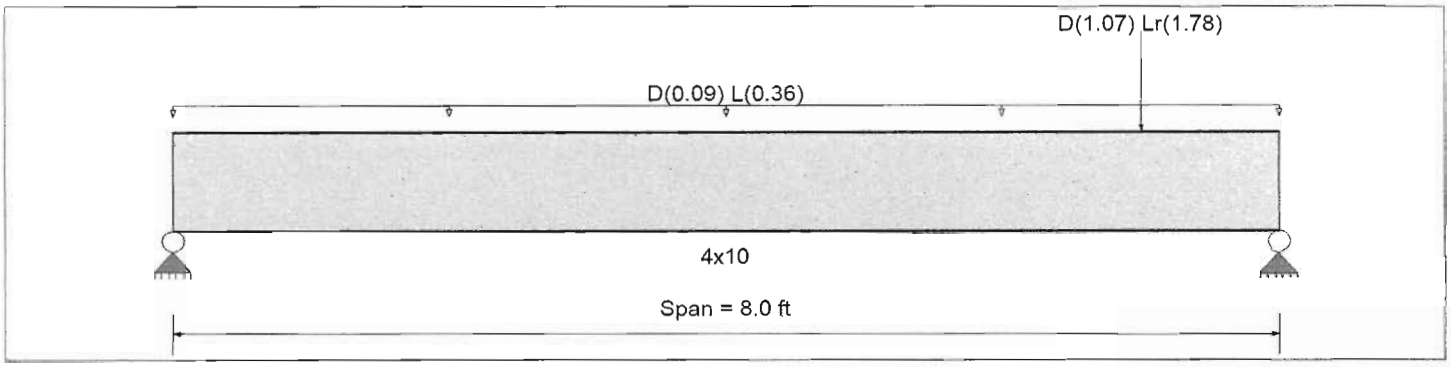
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 9.0 ft
Point Load : D = 1.070, Lr = 1.780 k @ 7.0 ft, (2.85K)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.938 : 1	Maximum Shear Stress Ratio	=	0.679 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	1,012.78 psi		=	152.81 psi
	=	1,080.00 psi		=	225.00 psi
Load Combination		+D+L	Load Combination		+D+0.750Lr+0.750L
Location of maximum on span	=	4.281 ft	Location of maximum on span	=	7.251 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.090 in	Ratio =	1063 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.137 in	Ratio =	702 >=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 Only					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.348	0.358	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.40	337.78	972.00	1.25	58.02	162.00
+D+L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.938	0.624	1.00	1.200	1.00	1.00	1.00	1.00	1.00	4.21	1,012.78	1080.00	2.42	112.25	180.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.505	0.579	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.83	681.13	1350.00	2.81	130.19	225.00
+D+0.750Lr+0.750L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.759	0.679	1.25	1.200	1.00	1.00	1.00	1.00	1.00	4.26	1,025.05	1350.00	3.30	152.81	225.00
+D+0.750L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.677	0.477	1.15	1.200	1.00	1.00	1.00	1.00	1.00	3.50	840.84	1242.00	2.13	98.69	207.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.117	0.121	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.84	202.67	1728.00	0.75	34.81	288.00

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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PITZER & ASSOCIATES

DESCRIPTION: U14

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.1367	4.201		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.963	3.573
Overall MINimum	1.440	1.440
D Only	0.523	1.325
+D+L	1.963	2.765
+D+Lr	0.745	2.883
+D+0.750Lr+0.750L	1.770	3.573
+D+0.750L	1.603	2.405
+0.60D	0.314	0.795
Lr Only	0.223	1.558
L Only	1.440	1.440

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Wood Beam

Lic. # : KW-06006556
PITZER & ASSOCIATES

DESCRIPTION: U13

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

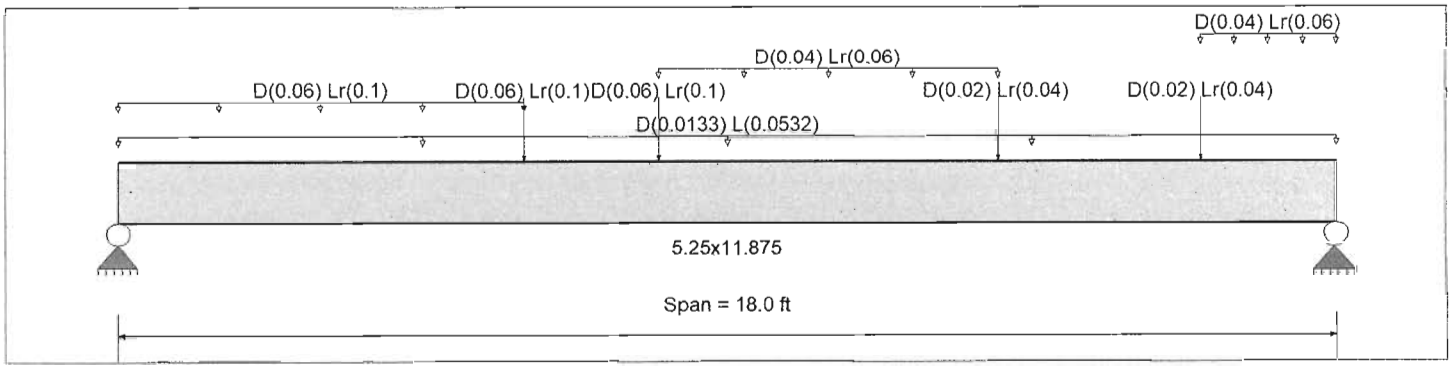
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Fb +	900 psi
Fb -	900 psi
Fc - Prll	1350 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	575 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 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.

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft
Uniform Load : D = 0.060, Lr = 0.10 k/ft, Extent = 0.0 -->> 6.0 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.040, Lr = 0.060 k/ft, Extent = 8.0 -->> 13.0 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.040, Lr = 0.060 k/ft, Extent = 16.0 -->> 18.0 ft, Tributary Width = 1.0 ft
Point Load : D = 0.060, Lr = 0.10 k @ 6.0 ft, (0.16)
Point Load : D = 0.060, Lr = 0.10 k @ 8.0 ft, (0.16)
Point Load : D = 0.020, Lr = 0.040 k @ 13.0 ft
Point Load : D = 0.020, Lr = 0.040 k @ 16.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.581** : 1	Maximum Shear Stress Ratio	=	**0.155** : 1
Section used for this span		**5.25x11.875**	Section used for this span		**5.25x11.875**
	=	653.52 psi		=	34.94 psi
	=	1,125.00 psi		=	225.00 psi
Load Combination		+D+0.750Lr+0.750L	Load Combination		+D+0.750Lr+0.750L
Location of maximum on span	=	8.187 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 =	1492 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.333 in	Ratio =	648 >=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 Only													0.00	0.00	0.00	0.00
Length = 18.0 ft	1	0.349	0.093	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.91	282.56	810.00	0.63	15.08	162.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.0 ft	1	0.546	0.141	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.05	491.26	900.00	1.05	25.36	180.00
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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PITZER & ASSOCIATES

DESCRIPTION: U13

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 = 18.0 ft	1	0.507	0.139	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.86	569.81	1125.00	1.30	31.27	225.00
+D+0.750Lr+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.0 ft	1	0.581	0.155	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.72	653.52	1125.00	1.45	34.94	225.00
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.0 ft	1	0.424	0.110	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.51	439.01	1035.00	0.95	22.79	207.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.0 ft	1	0.118	0.031	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.74	169.54	1440.00	0.38	9.05	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.3332	8.849		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.646	1.329
Overall MINimum	0.479	0.479
D Only	0.710	0.572
+D+L	1.189	1.051
+D+Lr	1.480	1.103
+D+0.750Lr+0.750L	1.646	1.329
+D+0.750L	1.069	0.932
+0.60D	0.426	0.343
Lr Only	0.769	0.531
L Only	0.479	0.479

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U12

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

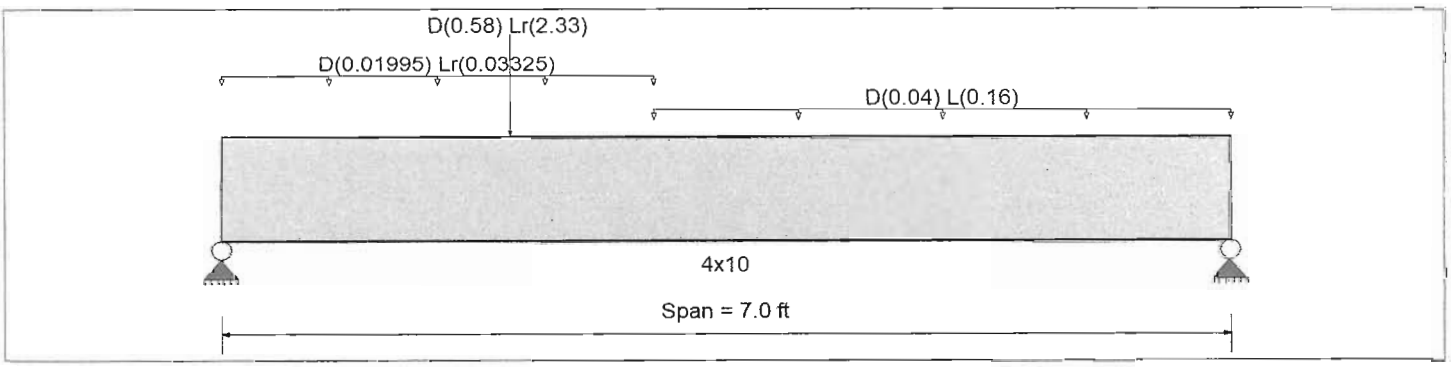
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf

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



Applied Loads

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

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.010, L = 0.040 ksf, Extent = 3.0 –>> 7.0 ft, Tributary Width = 4.0 ft
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 0.0 –>> 3.0 ft, Tributary Width = 1.330 ft
Point Load : D = 0.580, Lr = 2.330 k @ 2.0 ft, (R/U09)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.787 : 1	Maximum Shear Stress Ratio	=	0.459 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	1,062.46 psi		=	103.31 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	2.013 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	0.063 in	Ratio =	1341 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.083 in	Ratio =	1007 >=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 Only					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.250	0.146	0.90							1.01	242.59	972.00	0.51	23.72	162.00
+D+L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.323	0.179	1.00							1.45	348.68	1080.00	0.69	32.19	180.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.787	0.459	1.25							4.42	1,062.46	1350.00	2.23	103.31	225.00
+D+0.750Lr+0.750L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.684	0.399	1.25							3.84	923.88	1350.00	1.94	89.77	225.00
+D+0.750L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.253	0.145	1.15							1.31	314.08	1242.00	0.65	30.08	207.00

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7317 35th Street NE
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Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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PITZER & ASSOCIATES

DESCRIPTION: U12

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
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 7.0 ft	1	0.084	0.049	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.61	145.55	1728.00	0.31	14.23	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0834	3.161		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.275	1.176
Overall MINimum	0.183	0.457
D Only	0.532	0.318
+D+L	0.715	0.775
+D+Lr	2.275	1.005
+D+0.750Lr+0.750L	1.977	1.176
+D+0.750L	0.670	0.661
+0.60D	0.319	0.191
Lr Only	1.743	0.687
L Only	0.183	0.457

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U11

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

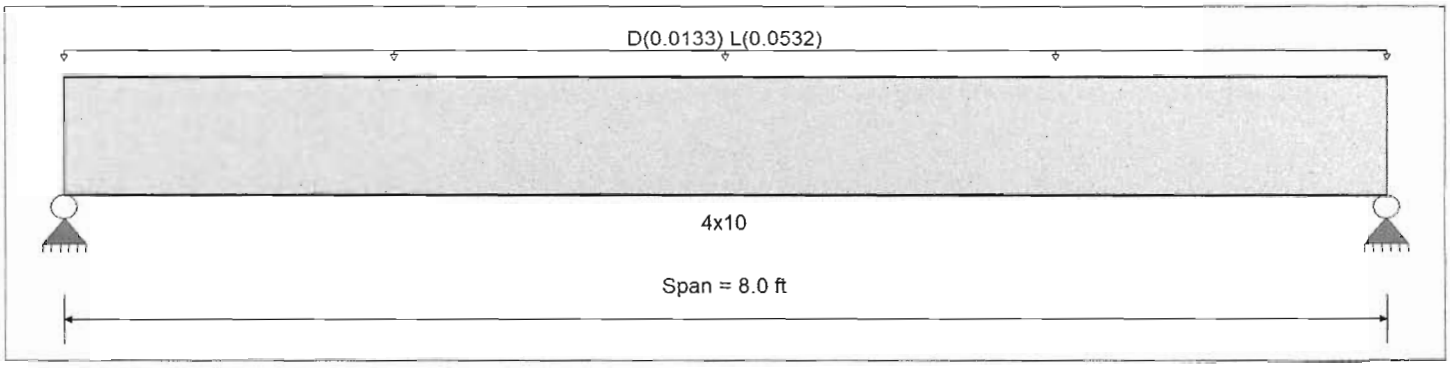
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

Fb +	900 psi
Fb -	900 psi
Fc - Prll	1350 psi
Fc - Perp	625 psi
Fv	180 psi
Ft	575 psi

E : Modulus of Elasticity

Ebend- xx	1600 ksi
Eminbend - xx	580 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.

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.131**: 1	Maximum Shear Stress Ratio	=	**0.062** : 1
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	141.40 psi		=	11.07 psi
	=	1,080.00 psi		=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.987 ft	Location of maximum on span	=	7.251 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.013 in	Ratio =	7193 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.018 in	Ratio =	5205 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.040	0.019	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.16	39.08	972.00	0.07	3.06	162.00
+D+L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.131	0.062	1.00	1.200	1.00	1.00	1.00	1.00	1.00	0.59	141.40	1080.00	0.24	11.07	180.00
+D+0.750L					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.086	0.040	1.25	1.200	1.00	1.00	1.00	1.00	1.00	0.48	115.82	1350.00	0.20	9.07	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.014	0.006	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.10	23.45	1728.00	0.04	1.84	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0184	4.013		0.0000	0.000

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U11

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.294	0.294
Overall MINimum	0.213	0.213
D Only	0.081	0.081
+D+L	0.294	0.294
+D+0.750L	0.241	0.241
+0.60D	0.049	0.049
L Only	0.213	0.213

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U10

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

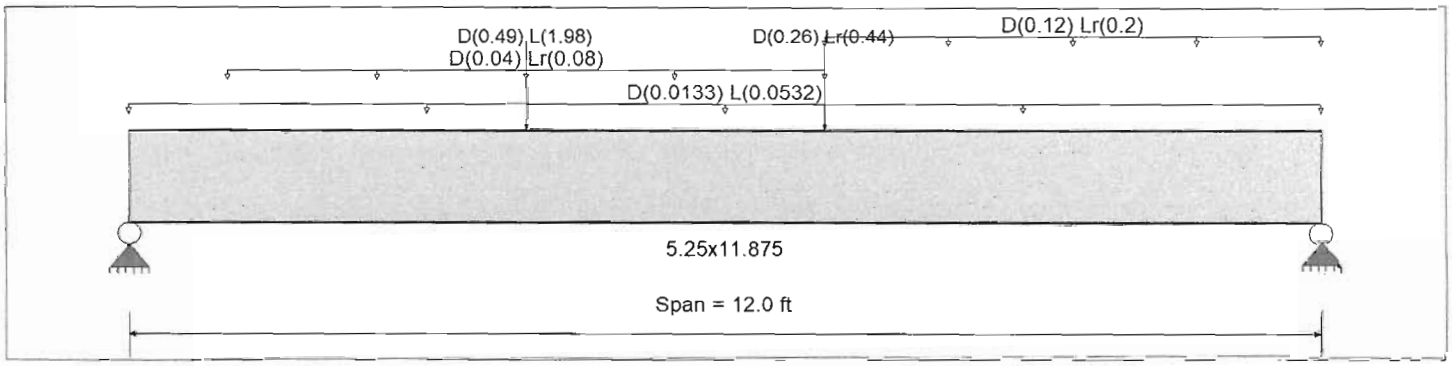
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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	45.07 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft
Uniform Load : D = 0.040, Lr = 0.080 k/ft, Extent = 1.0 -->> 7.0 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.120, Lr = 0.20 k/ft, Extent = 7.0 -->> 12.0 ft, Tributary Width = 1.0 ft
Point Load : D = 0.490, L = 1.980 k @ 4.0 ft, (L/U09)
Point Load : D = 0.260, Lr = 0.440 k @ 7.0 ft, (0.70K)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.314 : 1	Maximum Shear Stress Ratio	=	0.205 : 1
Section used for this span		5.25x11.875	Section used for this span		5.25x11.875
	=	909.43 psi		=	59.51 psi
	=	2,900.00 psi		=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.013 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	0.090 in	Ratio =	1606 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.171 in	Ratio =	842 >=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 Only													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.128	0.085	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.44	334.24	2610.00	0.92	22.13	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.314	0.205	1.00	1.000	1.00	1.00	1.00	1.00	1.00	9.35	909.43	2900.00	2.47	59.51	290.00
+D+Lr					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	0.187	0.128	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.96	677.15	3625.00	1.94	46.57	362.50
+D+0.750Lr+0.750L					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	0.173	1.25	1.000	1.00	1.00	1.00	1.00	1.00	9.73	945.90	3625.00	2.61	62.80	362.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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Engineer: tjp
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PITZER & ASSOCIATES

DESCRIPTION: U10

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 = 12.0 ft	1	0.228	0.150	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.82	760.54	3335.00	2.08	49.95	333.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.043	0.029	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.06	200.55	4640.00	0.55	13.28	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.1709	5.900		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.680	2.708
Overall MINimum	1.639	0.979
D Only	0.917	1.067
+D+L	2.556	2.046
+D+Lr	1.629	2.275
+D+0.750Lr+0.750L	2.680	2.708
+D+0.750L	2.146	1.801
+0.60D	0.550	0.640
Lr Only	0.712	1.208
L Only	1.639	0.979

PITZER & ASSOCIATES, PLLC
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7117 35th Street NE
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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U09

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

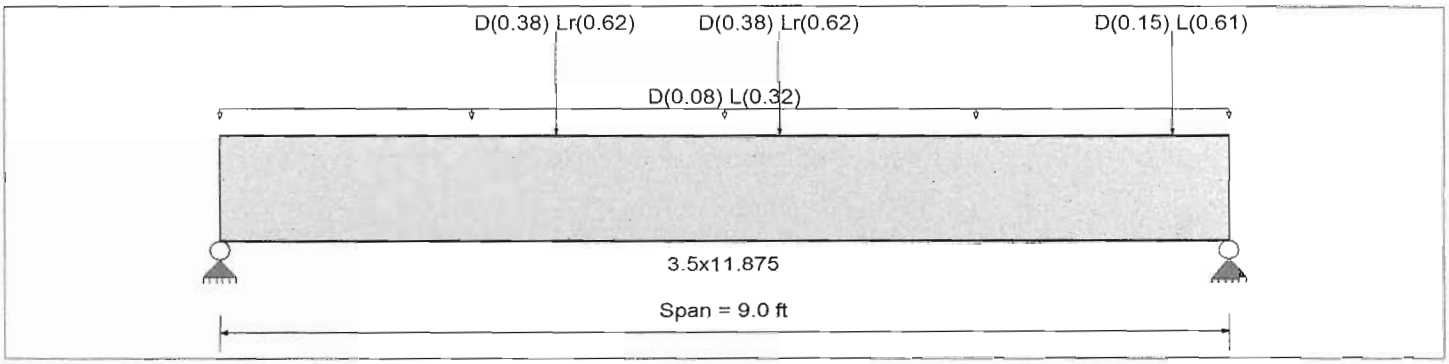
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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.

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 8.0 ft
Point Load : D = 0.150, L = 0.610 k @ 8.50 ft, (L/U07)
Point Load : D = 0.380, Lr = 0.620 k @ 3.0 ft, (1.0K)
Point Load : D = 0.380, Lr = 0.620 k @ 5.0 ft, (1.0K)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.287 : 1	Maximum Shear Stress Ratio	=	0.240 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
	=	833.03 psi		=	69.48 psi
	=	2,900.00 psi		=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.696 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 =	2103 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.095 in	Ratio =	1134 >=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 Only					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	0.130	0.105	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.32	338.86	2610.00	0.76	27.41	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.287	0.240	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.71	833.03	2900.00	1.93	69.48	290.00
+D+Lr					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	0.182	0.144	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.53	660.41	3625.00	1.45	52.27	362.50
+D+0.750Lr+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.262	0.214	1.25	1.000	1.00	1.00	1.00	1.00	1.00	6.51	949.03	3625.00	2.15	77.61	362.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.213	0.177	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.86	709.31	3335.00	1.63	58.96	333.50

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PITZER & ASSOCIATES

DESCRIPTION: U09

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
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 9.0 ft	1	0.044	0.035	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.39	203.31	4640.00	0.46	16.45	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750Lr+0.750L	1	0.0952	4.485		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.471	2.914
Overall MINimum	1.474	2.016
D Only	0.849	0.898
+D+L	2.323	2.914
+D+Lr	1.538	1.449
+D+0.750Lr+0.750L	2.471	2.823
+D+0.750L	1.955	2.410
+0.60D	0.509	0.539
Lr Only	0.689	0.551
L Only	1.474	2.016

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U08

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

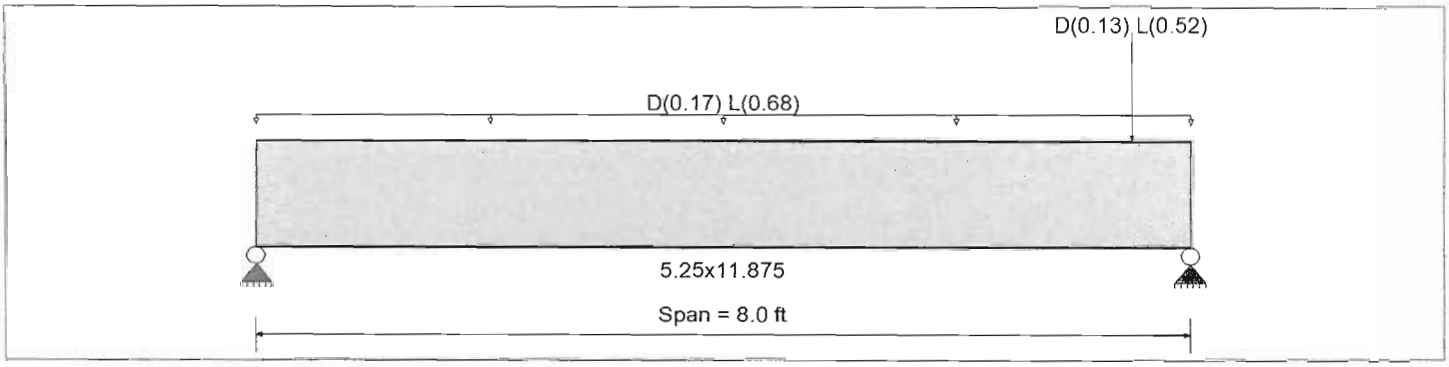
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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.

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 17.0 ft
Point Load : D = 0.130, L = 0.520 k @ 7.50 ft, (R/U07)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.239 : 1	Maximum Shear Stress Ratio	=	0.222 : 1
Section used for this span		5.25x11.875	Section used for this span		5.25x11.875
	=	692.40 psi		=	64.51 psi
	=	2,900.00 psi		=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.040 ft	Location of maximum on span	=	0.000 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.044 in	Ratio =	2170 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.057 in	Ratio =	1698 >=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 Only													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.058	0.054	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.55	150.62	2610.00	0.58	14.04	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.239	0.222	1.00	1.000	1.00	1.00	1.00	1.00	1.00	7.12	692.40	2900.00	2.68	64.51	290.00
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.154	0.143	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.73	556.96	3625.00	2.16	51.89	362.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.019	0.018	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.93	90.37	4640.00	0.35	8.43	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0565	4.040		0.0000	0.000

PITZER & ASSOCIATES, PLLC
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7317 35th Street NE
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Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U08

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.519	4.087
Overall MINimum	2.753	3.208
D Only	0.766	0.880
+D+L	3.519	4.087
+D+0.750L	2.831	3.286
+0.60D	0.460	0.528
L Only	2.753	3.208

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U07

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

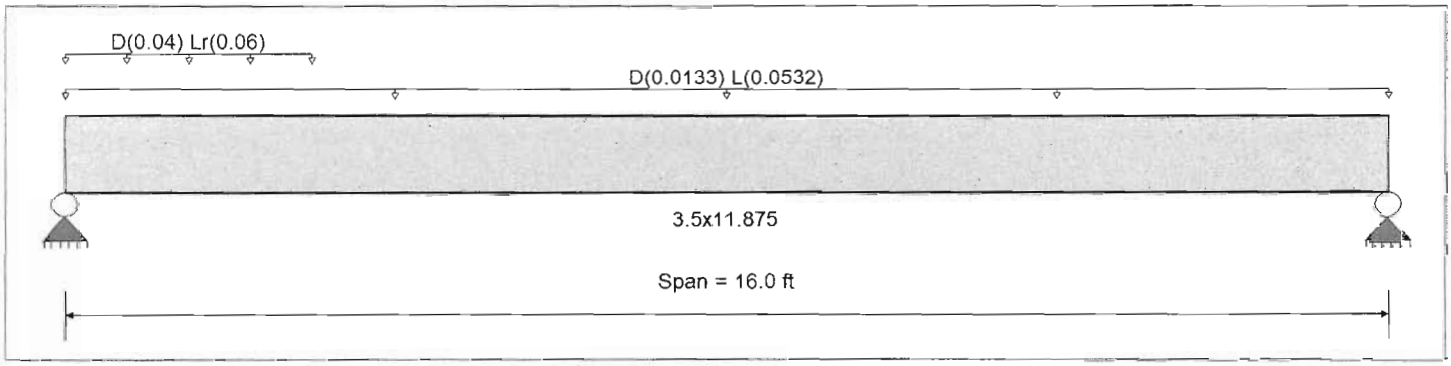
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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.

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft
Uniform Load : D = 0.040, Lr = 0.060 k/ft, Extent = 0.0 –>> 3.0 ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.133 : 1	Maximum Shear Stress Ratio	=	0.078 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
	=	384.40 psi		=	22.73 psi
	=	2,900.00 psi		=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	7.866 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	0.081 in	Ratio =	2378 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.126 in	Ratio =	1527 >=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 Only													0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.052	0.035	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.93	136.29	2610.00	0.26	9.22	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.133	0.078	1.00	1.000	1.00	1.00	1.00	1.00	1.00	2.64	384.40	2900.00	0.63	22.73	290.00
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.044	0.036	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.08	157.83	3625.00	0.36	13.02	362.50
+D+0.750Lr+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.093	0.061	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.31	337.60	3625.00	0.62	22.20	362.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.097	0.058	1.15	1.000	1.00	1.00	1.00	1.00	1.00	2.21	322.34	3335.00	0.54	19.35	333.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.018	0.012	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.56	81.77	4640.00	0.15	5.53	464.00

PITZER & ASSOCIATES, PLLC
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Project Descr: 2 Story SFR

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PITZER & ASSOCIATES

DESCRIPTION: U07

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1257	7.973		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.761	0.647
Overall MINimum	0.426	0.426
D Only	0.319	0.222
+D+L	0.745	0.647
+D+Lr	0.482	0.239
+D+0.750Lr+0.750L	0.761	0.554
+D+0.750L	0.638	0.541
+0.60D	0.192	0.133
Lr Only	0.163	0.017
L Only	0.426	0.426

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File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U06

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

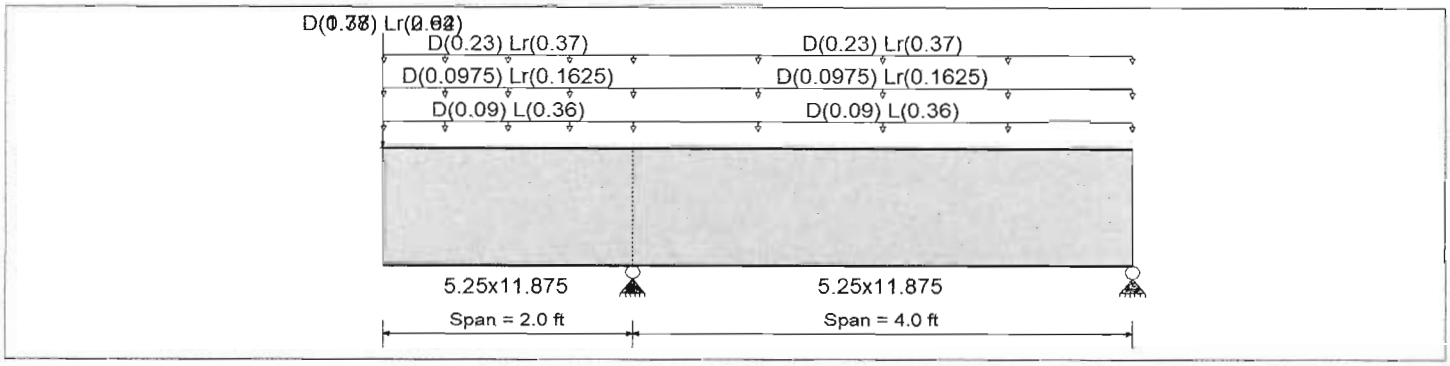
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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	45.070 pcf



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 = 0.010, L = 0.040 ksf, Tributary Width = 9.0 ft
- Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 6.50 ft
- Uniform Load : D = 0.230, Lr = 0.370 , Tributary Width = 1.0 ft
- Point Load : D = 0.380, Lr = 0.620 k @ 0.0 ft, (L/R07)
- Point Load : D = 1.770, Lr = 2.940 k @ 0.0 ft, (4.71K)

Load for Span Number 2
- Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 9.0 ft
- Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 6.50 ft
- Uniform Load : D = 0.230, Lr = 0.370 , Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.358 : 1	Maximum Shear Stress Ratio	=	0.444 : 1
Section used for this span		5.25x11.875	Section used for this span		5.25x11.875
	=	1,299.21 psi		=	161.10 psi
	=	3,625.00 psi		=	362.50 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	2.000 ft	Location of maximum on span	=	1.017 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.035 in	Ratio =	1374 >=360
Max Upward Transient Deflection	-0.008 in	Ratio =	5987 >=360
Max Downward Total Deflection	0.056 in	Ratio =	852 >=180
Max Upward Total Deflection	-0.013 in	Ratio =	3778 >=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 Only													0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.193	0.239	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.17	503.19	2610.00	2.59	62.42	261.00
Length = 4.0 ft	2	0.193	0.239	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.17	503.19	2610.00	1.74	62.42	261.00

PITZER & ASSOCIATES, PLLC
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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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PITZER & ASSOCIATES

DESCRIPTION: U06

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					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.198	0.246	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.89	573.22	2900.00	2.96	71.23	290.00
Length = 4.0 ft	2	0.198	0.246	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.89	573.22	2900.00	2.28	71.23	290.00
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.358	0.444	1.25	1.000	1.00	1.00	1.00	1.00	1.00	13.36	1,299.21	3625.00	6.70	161.10	362.50
Length = 4.0 ft	2	0.358	0.444	1.25	1.000	1.00	1.00	1.00	1.00	1.00	13.36	1,299.21	3625.00	4.33	161.10	362.50
+D+0.750Lr+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.318	0.395	1.25	1.000	1.00	1.00	1.00	1.00	1.00	11.85	1,152.73	3625.00	5.94	143.04	362.50
Length = 4.0 ft	2	0.318	0.395	1.25	1.000	1.00	1.00	1.00	1.00	1.00	11.85	1,152.73	3625.00	4.09	143.04	362.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.167	0.207	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.71	555.71	3335.00	2.87	69.03	333.50
Length = 4.0 ft	2	0.167	0.207	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.71	555.71	3335.00	2.15	69.03	333.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.065	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.10	301.92	4640.00	1.56	37.45	464.00
Length = 4.0 ft	2	0.065	0.081	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.10	301.92	4640.00	1.04	37.45	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0562	0.000		0.0000	0.000
	2	0.0000	0.000	+D+Lr	-0.0127	1.609

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum		12.928	-1.401
Overall MINimum		1.620	0.540
D Only		5.192	-0.419
+D+L		6.812	0.121
+D+Lr		12.928	-1.401
+D+0.750Lr+0.750L		12.209	-0.750
+D+0.750L		6.407	-0.014
+0.60D		3.115	-0.252
Lr Only		7.736	-0.981
L Only		1.620	0.540

PITZER & ASSOCIATES, PLLC
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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U05

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

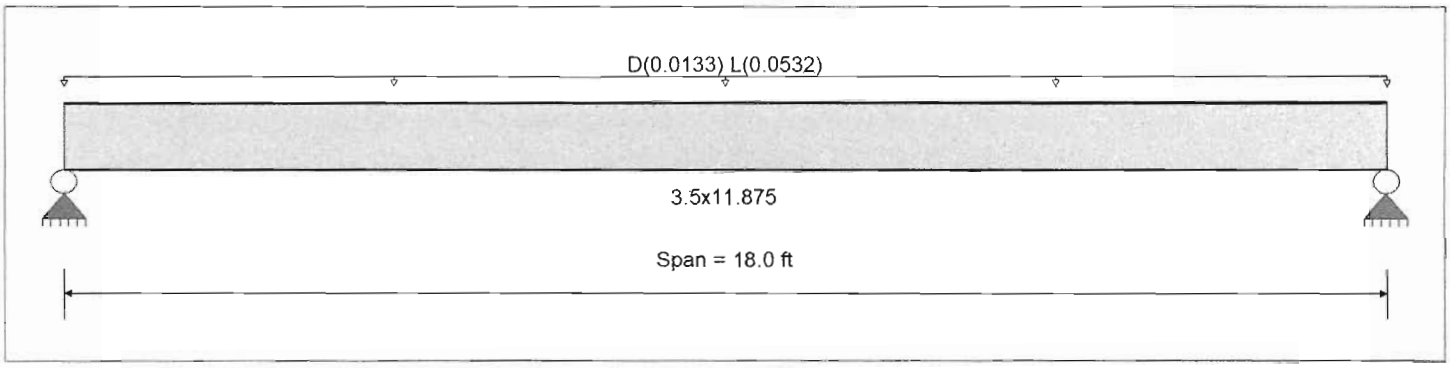
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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	45.070 pcf

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.162 : 1	Maximum Shear Stress Ratio	=	0.080 : 1
Section used for this span		3.5x11.875	Section used for this span		3.5x11.875
	=	469.73 psi		=	23.23 psi
	=	2,900.00 psi		=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	8.950 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	0.130 in	Ratio =	1664 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.194 in	Ratio =	1113 >=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 Only					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.0 ft	1	0.060	0.029	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.07	155.43	2610.00	0.21	7.69	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.0 ft	1	0.162	0.080	1.00	1.000	1.00	1.00	1.00	1.00	1.00	3.22	469.73	2900.00	0.64	23.23	290.00
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.0 ft	1	0.108	0.053	1.25	1.000	1.00	1.00	1.00	1.00	1.00	2.68	391.16	3625.00	0.54	19.34	362.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 18.0 ft	1	0.020	0.010	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.64	93.26	4640.00	0.13	4.61	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1940	9.050		0.0000	0.000

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Engineer: tjp
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Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U05

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.716	0.716
Overall MINimum	0.479	0.479
D Only	0.237	0.237
+D+L	0.716	0.716
+D+0.750L	0.596	0.596
+0.60D	0.142	0.142
L Only	0.479	0.479

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U04

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 : 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.

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft
Uniform Load : D = 0.060, Lr = 0.10 k/ft, Extent = 12.0 –>> 20.0 ft, Tributary Width = 1.0 ft
Point Load : D = 1.760, L = 6.970 k @ 4.0 ft, (L/U03)
Point Load : D = 0.070, Lr = 0.110 k @ 8.0 ft, (0.18K)
Point Load : D = 0.030, Lr = 0.060 k @ 11.0 ft, (0.09K)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.365 : 1	Maximum Shear Stress Ratio	=	0.330 : 1
Section used for this span		7x18	Section used for this span		7x18
	=	1,013.03 psi		=	95.73 psi
	=	2,772.37 psi		=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	4.022 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	0.201 in	Ratio =	1195 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.287 in	Ratio =	837 >=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 Only													0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.102	0.092	0.90	0.956	1.00	1.00	1.00	1.00	1.00	8.05	255.65	2495.14	2.01	23.93	261.00
+D+L					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.365	0.330	1.00	0.956	1.00	1.00	1.00	1.00	1.00	31.91	1,013.03	2772.37	8.04	95.73	290.00
+D+Lr					0.956	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	0.074	1.25	0.956	1.00	1.00	1.00	1.00	1.00	9.99	317.15	3465.47	2.26	26.94	362.50
+D+0.750Lr+0.750L					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.244	0.221	1.25	0.956	1.00	1.00	1.00	1.00	1.00	26.68	846.93	3465.47	6.72	80.04	362.50
+D+0.750L					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

PITZER & ASSOCIATES, PLLC
STRUCTURAL ENGINEERS
7317 35th Street NE
Marysville, WA 98270
Office: (425)308-8070

Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U04

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 = 20.0 ft	1	0.258	0.233	1.15	0.956	1.00	1.00	1.00	1.00	1.00	25.91	822.70	3188.23	6.53	77.78	333.50
+0.60D					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.035	0.031	1.60	0.956	1.00	1.00	1.00	1.00	1.00	4.83	153.39	4435.80	1.21	14.36	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.2867	9.162		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	8.195	3.290
Overall MINimum	6.108	1.926
D Only	2.087	1.308
+D+L	8.195	3.234
+D+Lr	2.340	2.025
+D+0.750Lr+0.750L	6.858	3.290
+D+0.750L	6.668	2.752
+0.60D	1.252	0.785
Lr Only	0.253	0.717
L Only	6.108	1.926

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U03

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

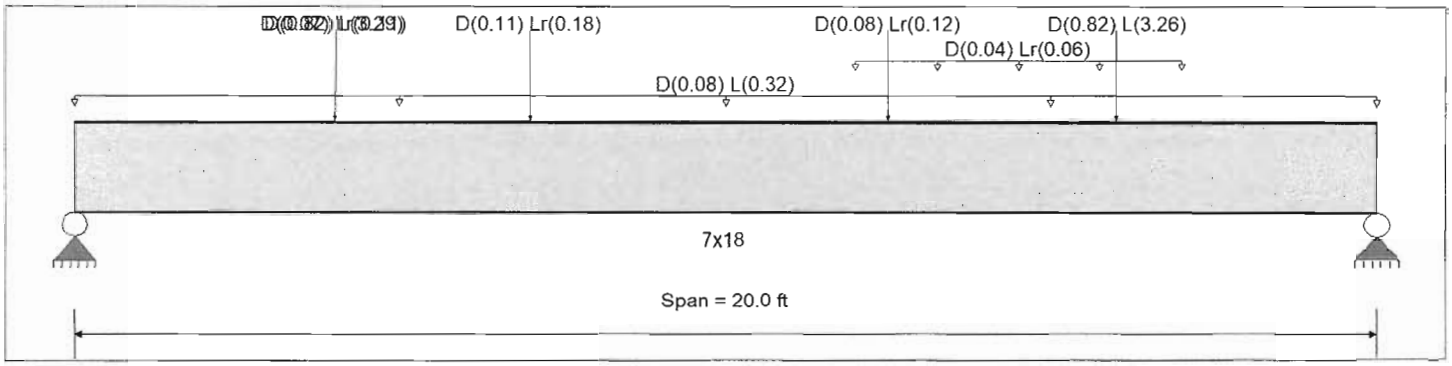
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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	45.07 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 8.0 ft
Uniform Load : D = 0.040, Lr = 0.060 k/ft, Extent = 12.0 –>> 17.0 ft, Tributary Width = 1.0 ft
Point Load : D = 0.820, L = 3.290 k @ 4.0 ft, (L/U01)
Point Load : D = 0.820, L = 3.260 k @ 16.0 ft, (L/U02)
Point Load : D = 0.070, Lr = 0.110 k @ 4.0 ft, (0.18K)
Point Load : D = 0.110, Lr = 0.180 k @ 7.0 ft, (0.29K)
Point Load : D = 0.080, Lr = 0.120 k @ 12.50 ft, (0.20)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.455 : 1	Maximum Shear Stress Ratio	=	0.332 : 1
Section used for this span		7x18	Section used for this span		7x18
	=	1,261.19 psi		=	96.30 psi
	=	2,772.37 psi		=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	10.056 ft	Location of maximum on span	=	18.547 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.330 in	Ratio =	727 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.449 in	Ratio =	535 >=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 Only													0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.135	0.095	0.90	0.956	1.00	1.00	1.00	1.00	1.00	10.63	337.50	2495.14	2.09	24.86	261.00
+D+L					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.455	0.332	1.00	0.956	1.00	1.00	1.00	1.00	1.00	39.73	1,261.19	2772.37	8.09	96.30	290.00
+D+Lr					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.117	0.081	1.25	0.956	1.00	1.00	1.00	1.00	1.00	12.78	405.57	3465.47	2.47	29.36	362.50

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U03

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+0.750Lr+0.750L					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.312	0.226	1.25	0.956	1.00	1.00	1.00	1.00	1.00	34.05	1,080.97	3465.47	6.87	81.81	362.50
+D+0.750L					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.323	0.235	1.15	0.956	1.00	1.00	1.00	1.00	1.00	32.45	1,030.25	3188.23	6.59	78.44	333.50
+0.60D					0.956	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.046	0.032	1.60	0.956	1.00	1.00	1.00	1.00	1.00	6.38	202.50	4435.80	1.25	14.92	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.4485	10.056		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	8.711	8.728
Overall MINimum	6.484	6.466
D Only	2.227	2.262
+D+L	8.711	8.728
+D+Lr	2.559	2.639
+D+0.750Lr+0.750L	7.339	7.394
+D+0.750L	7.090	7.111
+0.60D	1.336	1.357
Lr Only	0.333	0.378
L Only	6.484	6.466

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Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U02

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

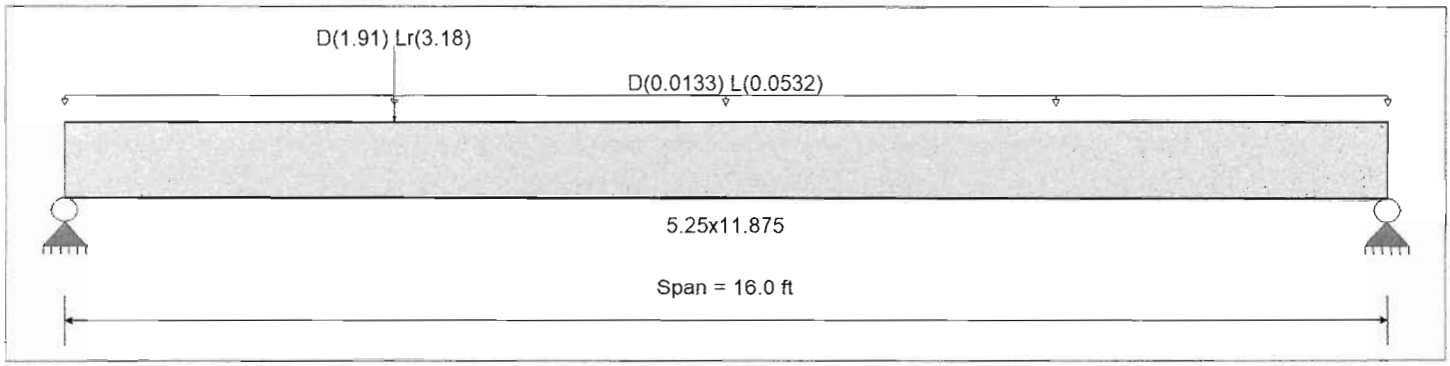
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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.

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft
Point Load : D = 1.910, Lr = 3.180 k @ 4.0 ft, (5.08k)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.430 : 1	Maximum Shear Stress Ratio	=	0.269 : 1
Section used for this span		5.25x11.875	Section used for this span		5.25x11.875
	=	1,559.17 psi		=	97.39 psi
	=	3,625.00 psi		=	362.50 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	4.022 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	0.226 in	Ratio =	849 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.395 in	Ratio =	486 >=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 Only													0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.243	0.153	0.90	1.000	1.00	1.00	1.00	1.00	1.00	6.51	633.10	2610.00	1.66	40.01	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.261	0.169	1.00	1.000	1.00	1.00	1.00	1.00	1.00	7.79	757.73	2900.00	2.04	48.99	290.00
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.430	0.269	1.25	1.000	1.00	1.00	1.00	1.00	1.00	16.03	1,559.17	3625.00	4.05	97.39	362.50
+D+0.750Lr+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.392	0.248	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.61	1,421.13	3625.00	3.73	89.78	362.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.218	0.140	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.47	726.57	3335.00	1.94	46.74	333.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.082	0.052	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.91	379.86	4640.00	1.00	24.00	464.00

PITZER & ASSOCIATES, PLLC
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7317 35th Street NE
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Office: (425)308-8070

Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U02

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.3945	7.151		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.080	1.655
Overall MINimum	0.426	0.426
D Only	1.695	0.740
+D+L	2.121	1.166
+D+Lr	4.080	1.535
+D+0.750Lr+0.750L	3.803	1.655
+D+0.750L	2.014	1.059
+0.60D	1.017	0.444
Lr Only	2.385	0.795
L Only	0.426	0.426

PITZER & ASSOCIATES, PLLC
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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U01

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

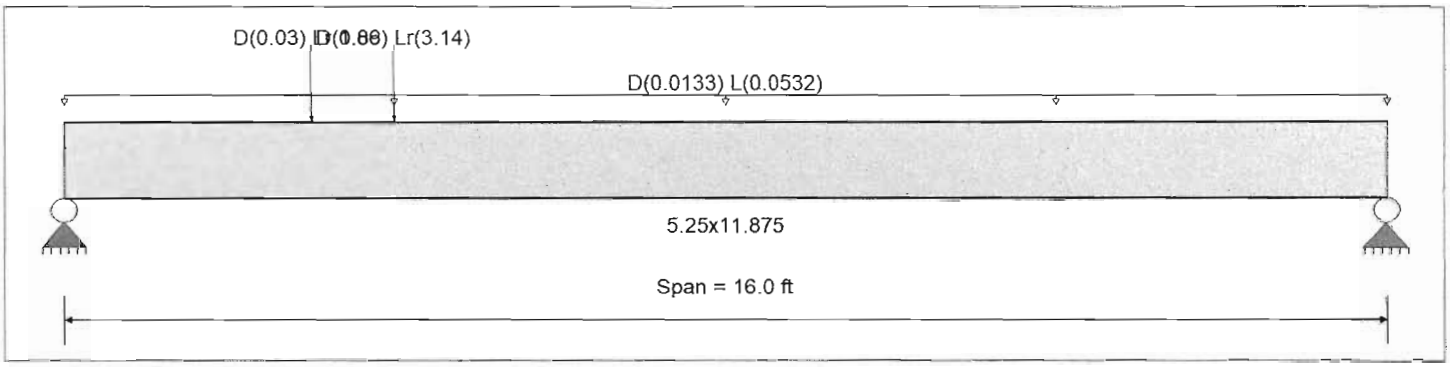
Wood Species : Trus Joist
Wood Grade : Parallam PSL 2.0E

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.

Beam self weight calculated and added to loads
Uniform Load : D = 0.010, L = 0.040 ksf, Tributary Width = 1.330 ft
Point Load : D = 0.030, Lr = 0.060 k @ 3.0 ft, (.09k)
Point Load : D = 1.890, Lr = 3.140 k @ 4.0 ft, (5.03k)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.431 : 1	Maximum Shear Stress Ratio	=	0.271 : 1
Section used for this span		5.25x11.875	Section used for this span		5.25x11.875
	=	1,561.35 psi		=	98.07 psi
	=	3,625.00 psi		=	362.50 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	4.022 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	0.226 in	Ratio =	847 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.395 in	Ratio =	485 >=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 Only					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.243	0.154	0.90	1.000	1.00	1.00	1.00	1.00	1.00	6.52	633.83	2610.00	1.67	40.23	261.00
+D+L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.262	0.170	1.00	1.000	1.00	1.00	1.00	1.00	1.00	7.80	758.46	2900.00	2.05	49.21	290.00
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.431	0.271	1.25	1.000	1.00	1.00	1.00	1.00	1.00	16.05	1,561.35	3625.00	4.08	98.07	362.50
+D+0.750Lr+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.393	0.249	1.25	1.000	1.00	1.00	1.00	1.00	1.00	14.63	1,422.95	3625.00	3.75	90.34	362.50
+D+0.750L					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.218	0.141	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.48	727.30	3335.00	1.95	46.97	333.50
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00

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Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: U01

Load Combination		Max Stress Ratios									Moment Values			Shear Values		
Segment Length	Span #	M	V	C_d	$C_{F/V}$	C_i	C_r	C_m	C_t	C_L	M	fb	F'b	V	fv	F'v
Length = 16.0 ft	1	0.082	0.052	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.91	380.30	4640.00	1.00	24.14	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.3953	7.151		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.108	1.657
Overall MINimum	0.426	0.426
D Only	1.704	0.741
+D+L	2.130	1.166
+D+Lr	4.108	1.537
+D+0.750Lr+0.750L	3.826	1.657
+D+0.750L	2.024	1.060
+0.60D	1.023	0.444
Lr Only	2.404	0.796
L Only	0.426	0.426

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7317 35th Street NE
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Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R20

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

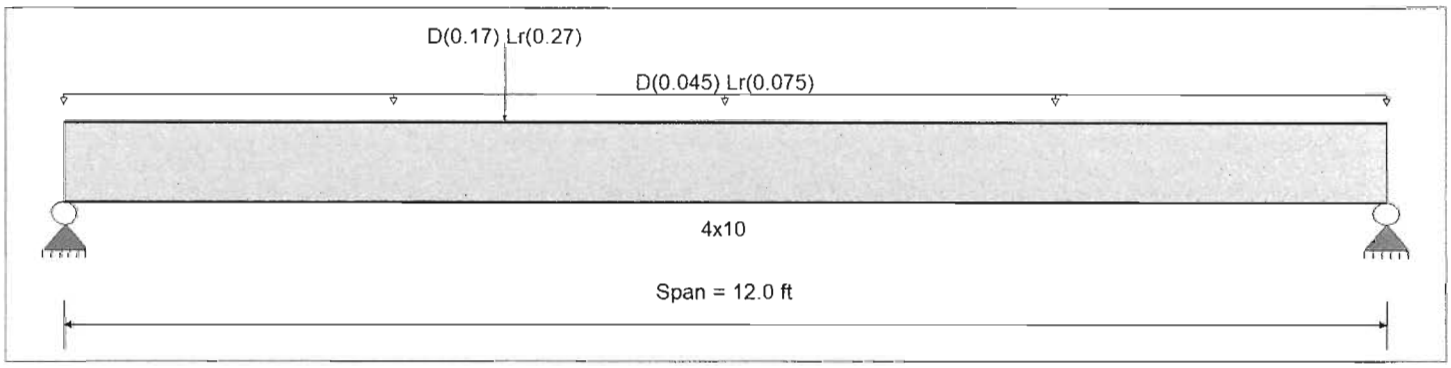
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 3.0 ft
Point Load : D = 0.170, Lr = 0.270 k @ 4.0 ft, (0.44)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.580 : 1	Maximum Shear Stress Ratio	=	0.198 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	782.55 psi		=	44.62 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	4.827 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	0.135 in	Ratio =	1068 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.226 in	Ratio =	636 >=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 Only													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.324	0.111	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.31	315.22	972.00	0.39	17.99	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.580	0.198	1.25	1.200	1.00	1.00	1.00	1.00	1.00	3.25	782.55	1350.00	0.96	44.62	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.493	0.169	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.77	665.70	1350.00	0.82	37.96	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.109	0.037	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.79	189.13	1728.00	0.23	10.79	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.2261	5.899		0.0000	0.000

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R20

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.057	0.910
Overall MINimum	0.630	0.540
D Only	0.427	0.370
+D+Lr	1.057	0.910
+D+0.750Lr	0.899	0.775
+0.60D	0.256	0.222
Lr Only	0.630	0.540

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7517 35th Street NE
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Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R19

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

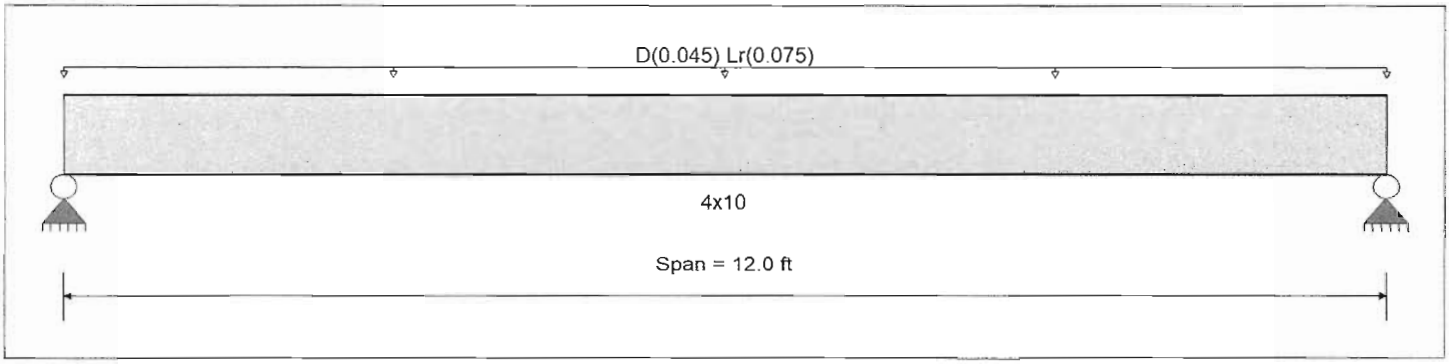
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 3.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.408 : 1	Maximum Shear Stress Ratio	=	0.138 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	550.64 psi		=	31.02 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	5.966 ft	Location of maximum on span	=	11.263 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.096 in	Ratio =	1506 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.162 in	Ratio =	887 >=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 Only													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.233	0.079	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.94	226.08	972.00	0.27	12.74	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.408	0.138	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.29	550.64	1350.00	0.67	31.02	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.348	0.118	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.95	469.50	1350.00	0.57	26.45	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.078	0.027	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.56	135.65	1728.00	0.16	7.64	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.1622	6.034		0.0000	0.000

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Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R19

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.763	0.763
Overall MINimum	0.450	0.450
D Only	0.313	0.313
+D+Lr	0.763	0.763
+D+0.750Lr	0.651	0.651
+0.60D	0.188	0.188
Lr Only	0.450	0.450

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R18

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

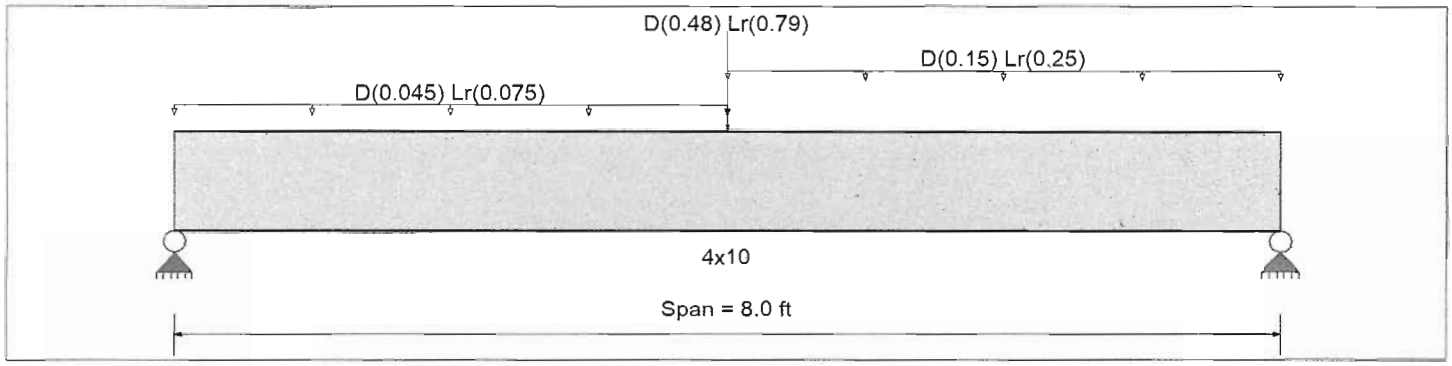
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf

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



Applied Loads

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

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 0.0 –>> 4.0 ft, Tributary Width = 3.0 ft
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 4.0 –>> 8.0 ft, Tributary Width = 10.0 ft
Point Load : D = 0.480, Lr = 0.790 k @ 4.0 ft, (I/r01)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.832** : 1	Maximum Shear Stress Ratio	=	**0.345** : 1
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	1,122.76 psi		=	77.59 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	4.022 ft	Location of maximum on span	=	7.240 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.081 in	Ratio =	1189 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.131 in	Ratio =	731 >=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 Only					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.444	0.184	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.79	431.53	972.00	0.64	29.86	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.832	0.345	1.25	1.200	1.00	1.00	1.00	1.00	1.00	4.67	1,122.76	1350.00	1.67	77.59	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.704	0.292	1.25	1.200	1.00	1.00	1.00	1.00	1.00	3.95	949.96	1350.00	1.42	65.65	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.150	0.062	1.60	1.200	1.00	1.00	1.00	1.00	1.00	1.08	258.92	1728.00	0.39	17.92	288.00

PITZER & ASSOCIATES, PLLC
STRUCTURAL ENGINEERS
7317 35th Street NE
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Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R18

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.1312	4.112		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.424	1.984
Overall MINimum	0.870	1.220
D Only	0.554	0.764
+D+Lr	1.424	1.984
+D+0.750Lr	1.206	1.679
+0.60D	0.332	0.458
Lr Only	0.870	1.220

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R17

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

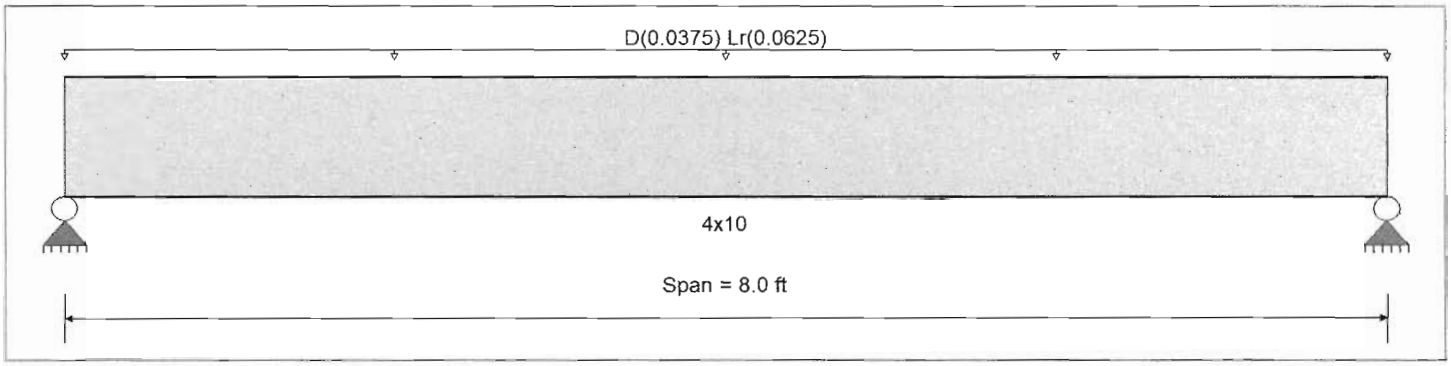
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 2.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.153 : 1	Maximum Shear Stress Ratio	=	0.072 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	206.26 psi		=	16.10 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	3.978 ft	Location of maximum on span	=	7.240 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.016 in	Ratio =	6100 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.027 in	Ratio =	3555 >=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 Only													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.089	0.041	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.36	86.05	972.00	0.14	6.72	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.153	0.072	1.25	1.200	1.00	1.00	1.00	1.00	1.00	0.86	206.26	1350.00	0.35	16.10	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.131	0.061	1.25	1.200	1.00	1.00	1.00	1.00	1.00	0.73	176.21	1350.00	0.30	13.75	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.030	0.014	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.21	51.63	1728.00	0.09	4.03	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0270	4.022		0.0000	0.000

PITZER & ASSOCIATES, PLLC
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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R17

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.429	0.429
Overall MINimum	0.250	0.250
D Only	0.179	0.179
+D+Lr	0.429	0.429
+D+0.750Lr	0.366	0.366
+0.60D	0.107	0.107
Lr Only	0.250	0.250

PITZER & ASSOCIATES, PLLC
STRUCTURAL ENGINEERS
7317 32th Street NE
Marysville, WA 98270
Office: (425)308-8070

Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

Printed: 15 DEC 2021, 9:50PM

Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R16

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

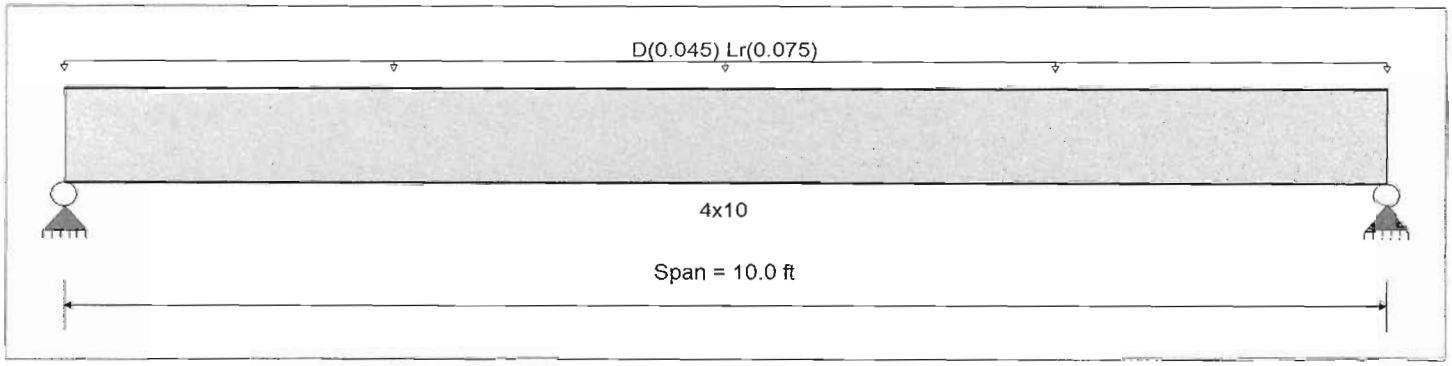
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 3.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.283** 1	Maximum Shear Stress Ratio	=	**0.112** : 1
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	382.39 psi		=	25.20 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	4.972 ft	Location of maximum on span	=	9.274 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.046 in	Ratio =	2603 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.078 in	Ratio =	1534 >=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 Only					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.162	0.064	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.65	157.00	972.00	0.22	10.34	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.283	0.112	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.59	382.39	1350.00	0.54	25.20	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.242	0.095	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.36	326.04	1350.00	0.46	21.48	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.055	0.022	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.39	94.20	1728.00	0.13	6.21	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0782	5.028		0.0000	0.000

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Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

Lic. # : KW-06006556

DESCRIPTION: R16

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.636	0.636
Overall MINimum	0.375	0.375
D Only	0.261	0.261
+D+Lr	0.636	0.636
+D+0.750Lr	0.542	0.542
+0.60D	0.157	0.157
Lr Only	0.375	0.375

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Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R15

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

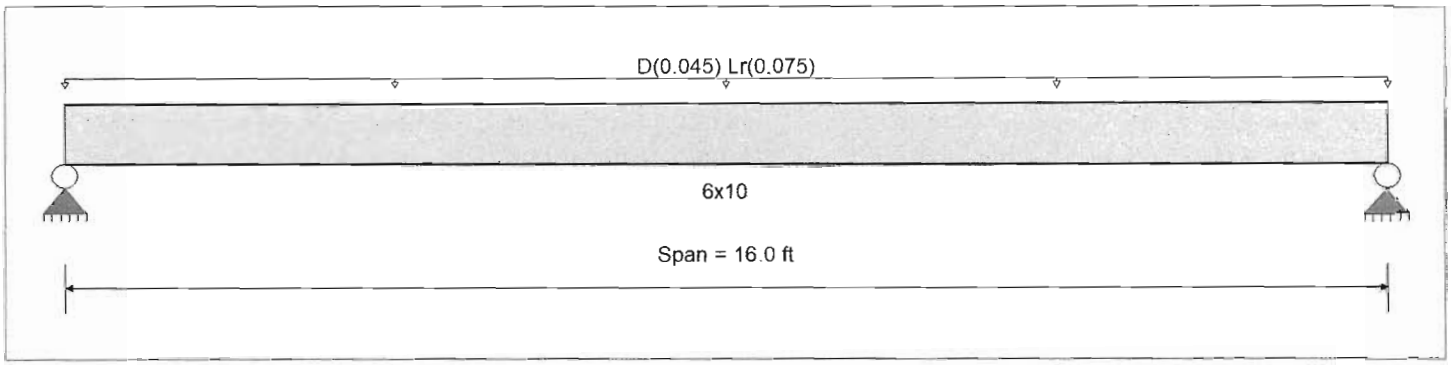
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 3.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.543 : 1	Maximum Shear Stress Ratio	=	0.122 : 1
Section used for this span		6x10	Section used for this span		6x10
	=	611.23 psi		=	27.54 psi
	=	1,125.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	7.955 ft	Location of maximum on span	=	15.285 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.177 in	Ratio =	1081 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.312 in	Ratio =	616 >=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 Only													0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.325	0.073	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.81	263.11	810.00	0.41	11.86	162.00
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.543	0.122	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.21	611.23	1125.00	0.96	27.54	225.00
+D+0.750Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.466	0.105	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.61	524.20	1125.00	0.82	23.62	225.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.110	0.025	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.09	157.87	1440.00	0.25	7.11	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.3116	8.045		0.0000	0.000

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Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R15

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.053	1.053
Overall MINimum	0.600	0.600
D Only	0.453	0.453
+D+Lr	1.053	1.053
+D+0.750Lr	0.903	0.903
+0.60D	0.272	0.272
Lr Only	0.600	0.600

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R14

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

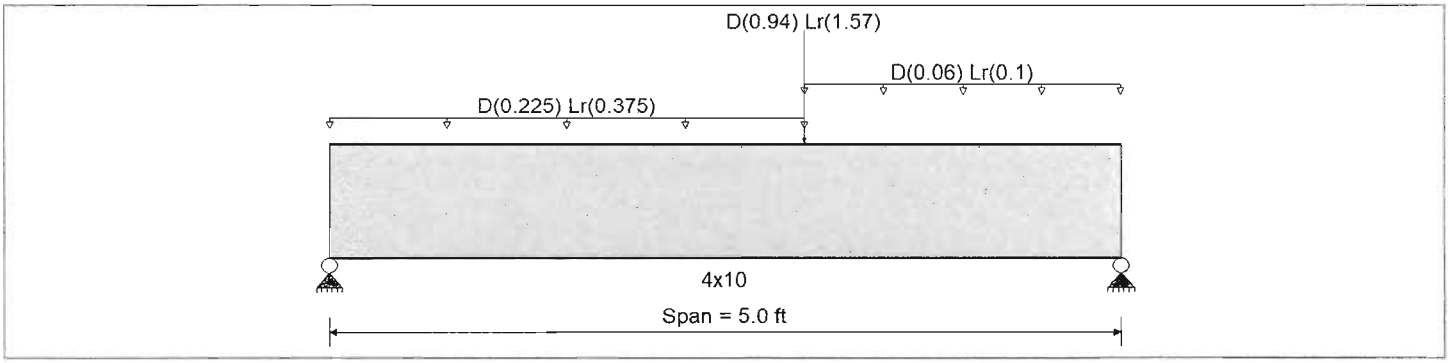
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



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 = 0.0150, Lr = 0.0250 ksf, Extent = 0.0 -->> 3.0 ft, Tributary Width = 15.0 ft
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 3.0 -->> 5.0 ft, Tributary Width = 4.0 ft
Point Load : D = 0.940, Lr = 1.570 k @ 3.0 ft, (L/R04)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.766** : 1	Maximum Shear Stress Ratio	=	**0.452** : 1
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	1,033.79 psi		=	101.65 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	2.989 ft	Location of maximum on span	=	4.246 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.029 in	Ratio =	2068 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.047 in	Ratio =	1285 >=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 Only					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1	0.402	0.237	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.62	390.58	972.00	0.83	38.45	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1	0.766	0.452	1.25	1.200	1.00	1.00	1.00	1.00	1.00	4.30	1,033.79	1350.00	2.19	101.65	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1	0.647	0.382	1.25	1.200	1.00	1.00	1.00	1.00	1.00	3.63	872.99	1350.00	1.85	85.85	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 5.0 ft	1	0.136	0.080	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.97	234.35	1728.00	0.50	23.07	288.00

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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PITZER & ASSOCIATES

DESCRIPTION: R14

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0467	2.570		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.346	2.320
Overall MINimum	1.456	1.440
D Only	0.891	0.881
+D+Lr	2.346	2.320
+D+0.750Lr	1.982	1.960
+0.60D	0.534	0.528
Lr Only	1.456	1.440

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PITZER & ASSOCIATES

DESCRIPTION: R13

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2018

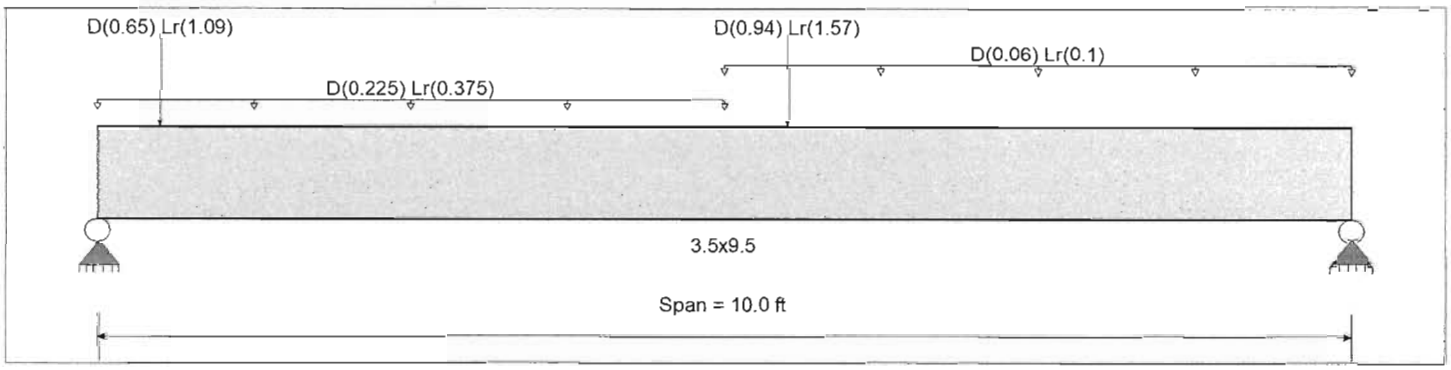
Wood Species : DF/DF
Wood Grade : 24F - V4

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

E : Modulus of Elasticity

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

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



Applied Loads

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

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 0.0 -->> 5.0 ft, Tributary Width = 15.0 ft
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 5.0 -->> 10.0 ft, Tributary Width = 4.0 ft
Point Load : D = 0.650, Lr = 1.090 k @ 0.50 ft, (R/RE11)
Point Load : D = 0.940, Lr = 1.570 k @ 5.50 ft, (R/R04)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.846** : 1	Maximum Shear Stress Ratio	=	**0.416** : 1
Section used for this span		**3.5x9.5**	Section used for this span		**3.5x9.5**
	=	2,538.68 psi		=	137.76 psi
	=	3,000.00 psi		=	331.25 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	5.475 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	0.258 in	Ratio =	465 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.416 in	Ratio =	288 >=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 Only													0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.446	0.220	0.90	1.000	1.00	1.00	1.00	1.00	1.00	4.23	963.89	2160.00	1.16	52.50	238.50
+D+Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.846	0.416	1.25	1.000	1.00	1.00	1.00	1.00	1.00	11.14	2,538.68	3000.00	3.05	137.76	331.25
+D+0.750Lr					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.715	0.352	1.25	1.000	1.00	1.00	1.00	1.00	1.00	9.41	2,144.99	3000.00	2.58	116.44	331.25
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.151	0.074	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.54	578.34	3840.00	0.70	31.50	424.00

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PITZER & ASSOCIATES

DESCRIPTION: R13

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.4160	4.972		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.269	2.854
Overall MINimum	3.273	1.762
D Only	1.995	1.092
+D+Lr	5.269	2.854
+D+0.750Lr	4.450	2.413
+0.60D	1.197	0.655
Lr Only	3.273	1.762

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PITZER & ASSOCIATES

DESCRIPTION: R12

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

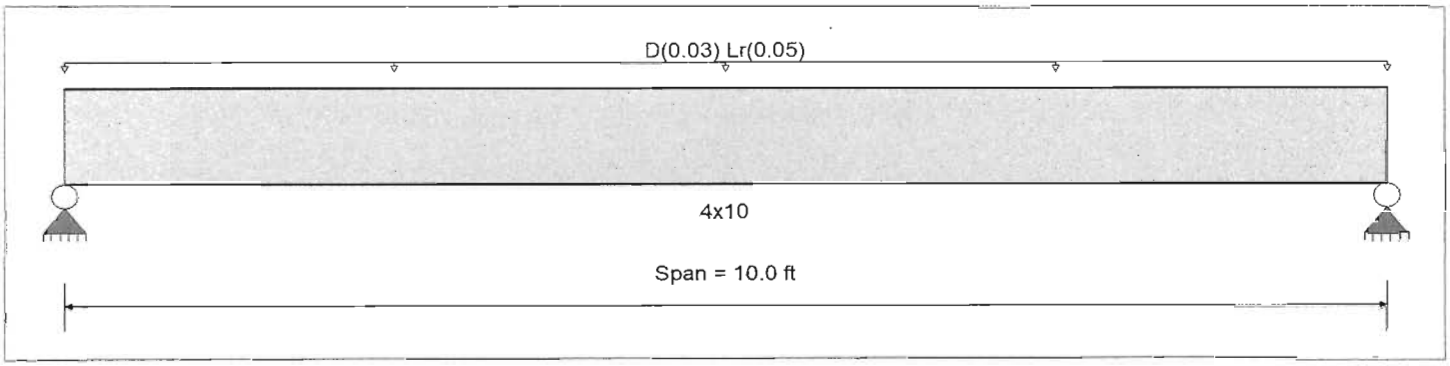
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.194 : 1	Maximum Shear Stress Ratio	=	0.077 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	262.18 psi		=	17.27 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	4.972 ft	Location of maximum on span	=	9.274 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.031 in	Ratio =	3904 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.054 in	Ratio =	2237 >=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 Only					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.115	0.046	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.47	111.92	972.00	0.16	7.37	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.194	0.077	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.09	262.18	1350.00	0.37	17.27	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.166	0.066	1.25	1.200	1.00	1.00	1.00	1.00	1.00	0.93	224.62	1350.00	0.32	14.80	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 10.0 ft	1	0.039	0.015	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.28	67.15	1728.00	0.10	4.42	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0536	5.028		0.0000	0.000

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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PITZER & ASSOCIATES

DESCRIPTION: R12

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.436	0.436
Overall MINimum	0.250	0.250
D Only	0.186	0.186
+D+Lr	0.436	0.436
+D+0.750Lr	0.374	0.374
+0.60D	0.112	0.112
Lr Only	0.250	0.250

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Wood Beam

File: 21-140.ec6

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PITZER & ASSOCIATES

DESCRIPTION: R11

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

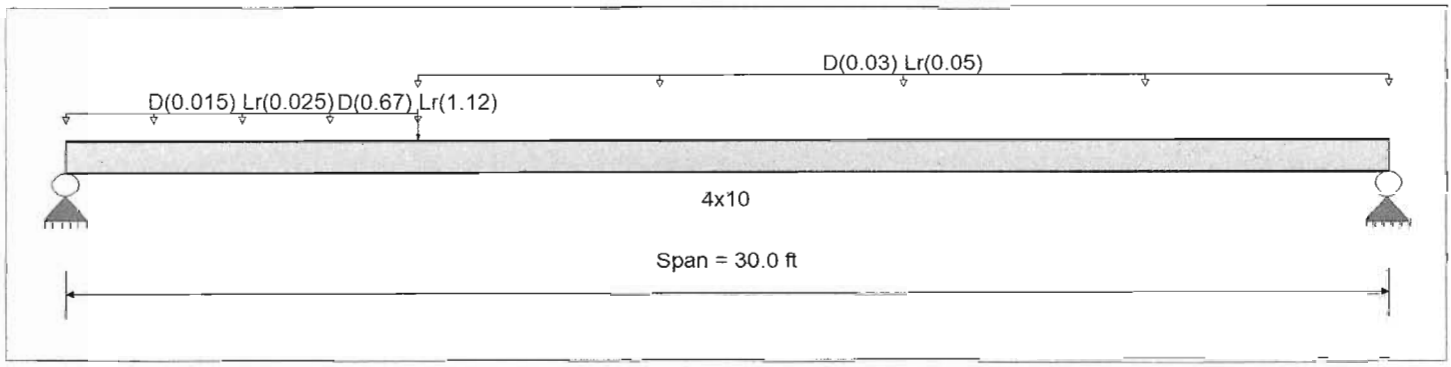
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



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 = 0.0150, Lr = 0.0250 ksf, Extent = 0.0 –>> 8.0 ft, Tributary Width = 1.0 ft
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 8.0 –>> 30.0 ft, Tributary Width = 2.0 ft
Point Load : D = 0.670, Lr = 1.120 k @ 8.0 ft, (R/R03)

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	**3.102** 1	Maximum Shear Stress Ratio	=	**0.476** : 1
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	4,187.60 psi		=	107.13 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	10.056 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	4.455 in	Ratio =	80 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	7.485 in	Ratio =	48 <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 Only					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 30.0 ft	1	1.728	0.266	0.90	1.200	1.00	1.00	1.00	1.00	1.00	6.98	1,679.34	972.00	0.93	43.14	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 30.0 ft	1	3.102	0.476	1.25	1.200	1.00	1.00	1.00	1.00	1.00	17.42	4,187.60	1350.00	2.31	107.13	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 30.0 ft	1	2.637	0.405	1.25	1.200	1.00	1.00	1.00	1.00	1.00	14.81	3,560.17	1350.00	1.97	91.13	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 30.0 ft	1	0.583	0.090	1.60	1.200	1.00	1.00	1.00	1.00	1.00	4.19	1,007.60	1728.00	0.56	25.88	288.00

PITZER & ASSOCIATES, PLLC
STRUCTURAL ENGINEERS
7117 35th Street NE
Marysville, WA 98270
Office: (425)308-8070

Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R11

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	7.4845	14.413		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.344	1.743
Overall MINimum	1.398	1.022
D Only	0.946	0.721
+D+Lr	2.344	1.743
+D+0.750Lr	1.994	1.488
+0.60D	0.568	0.433
Lr Only	1.398	1.022

PITZER & ASSOCIATES, PLLC
STRUCTURAL ENGINEERS
7317 35th Street NE
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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R10

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

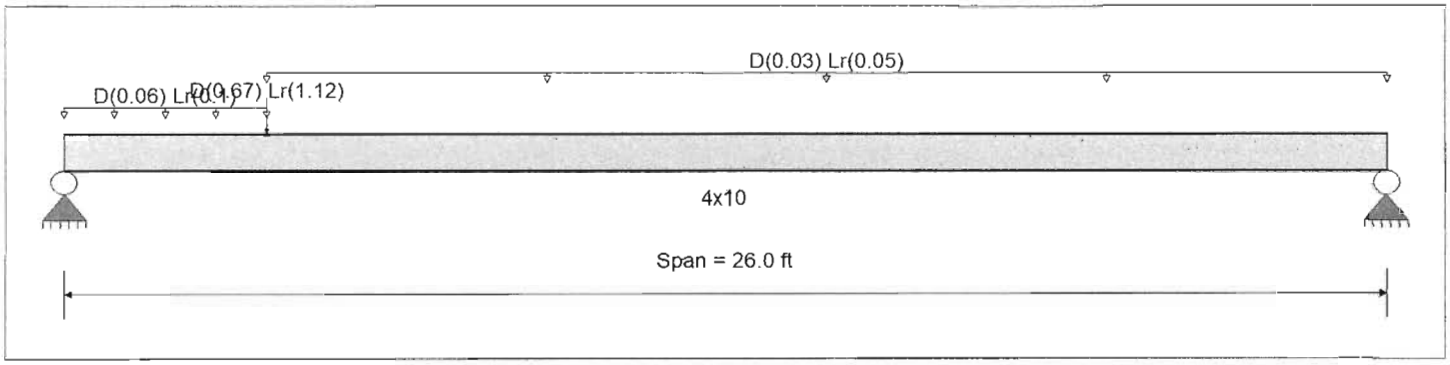
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



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 = 0.0150, Lr = 0.0250 ksf, Extent = 0.0 –>> 4.0 ft, Tributary Width = 4.0 ft
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 4.0 –>> 26.0 ft, Tributary Width = 2.0 ft
Point Load : D = 0.670, Lr = 1.120 k @ 4.0 ft, (L/R03)

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	**2.099** : 1	Maximum Shear Stress Ratio	=	**0.581** : 1
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	2,834.07 psi		=	130.78 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	9.587 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	2.359 in	Ratio =	132 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	3.976 in	Ratio =	78 <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 Only					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	1.181	0.318	0.90	1.200	1.00	1.00	1.00	1.00	1.00	4.78	1,148.33	972.00	1.11	51.57	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	2.099	0.581	1.25	1.200	1.00	1.00	1.00	1.00	1.00	11.79	2,834.07	1350.00	2.82	130.78	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	1.787	0.493	1.25	1.200	1.00	1.00	1.00	1.00	1.00	10.03	2,412.46	1350.00	2.40	110.98	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 26.0 ft	1	0.399	0.107	1.60	1.200	1.00	1.00	1.00	1.00	1.00	2.87	689.00	1728.00	0.67	30.94	288.00

PITZER & ASSOCIATES, PLLC
STRUCTURAL ENGINEERS
7317 35th Street NE
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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

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PITZER & ASSOCIATES

DESCRIPTION: R10

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	3.9760	12.346		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.944	1.434
Overall MINimum	1.782	0.838
D Only	1.162	0.596
+D+Lr	2.944	1.434
+D+0.750Lr	2.499	1.225
+0.60D	0.697	0.358
Lr Only	1.782	0.838

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Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R09

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

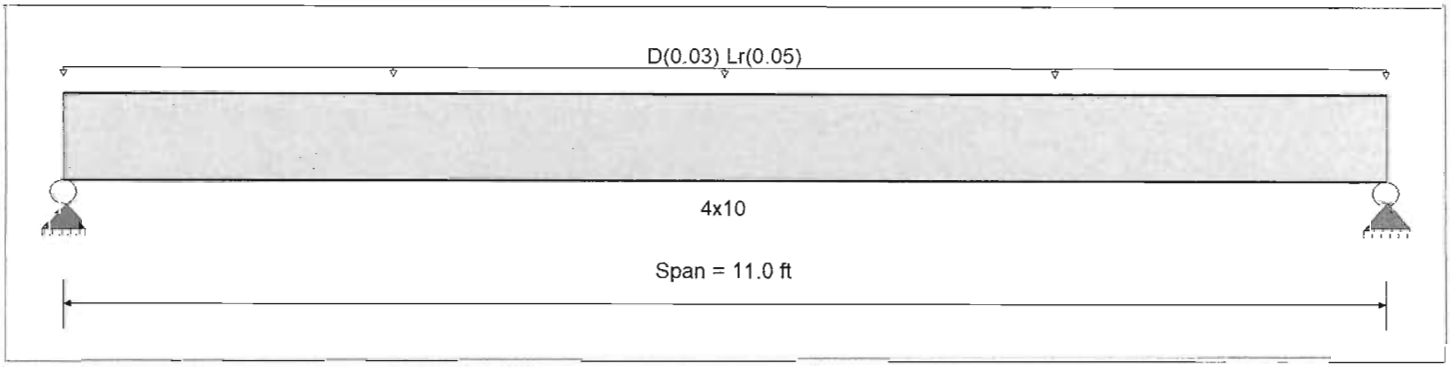
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.235 : 1	Maximum Shear Stress Ratio	=	0.086 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	317.24 psi		=	19.25 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	5.469 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	0.045 in	Ratio =	2933 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.079 in	Ratio =	1681 >=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 Only													0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.139	0.051	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.56	135.42	972.00	0.18	8.22	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.235	0.086	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.32	317.24	1350.00	0.42	19.25	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.201	0.073	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.13	271.79	1350.00	0.36	16.49	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 11.0 ft	1	0.047	0.017	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.34	81.25	1728.00	0.11	4.93	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.0785	5.531		0.0000	0.000

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R09

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.480	0.480
Overall MINimum	0.275	0.275
D Only	0.205	0.205
+D+Lr	0.480	0.480
+D+0.750Lr	0.411	0.411
+0.60D	0.123	0.123
Lr Only	0.275	0.275

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R08

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

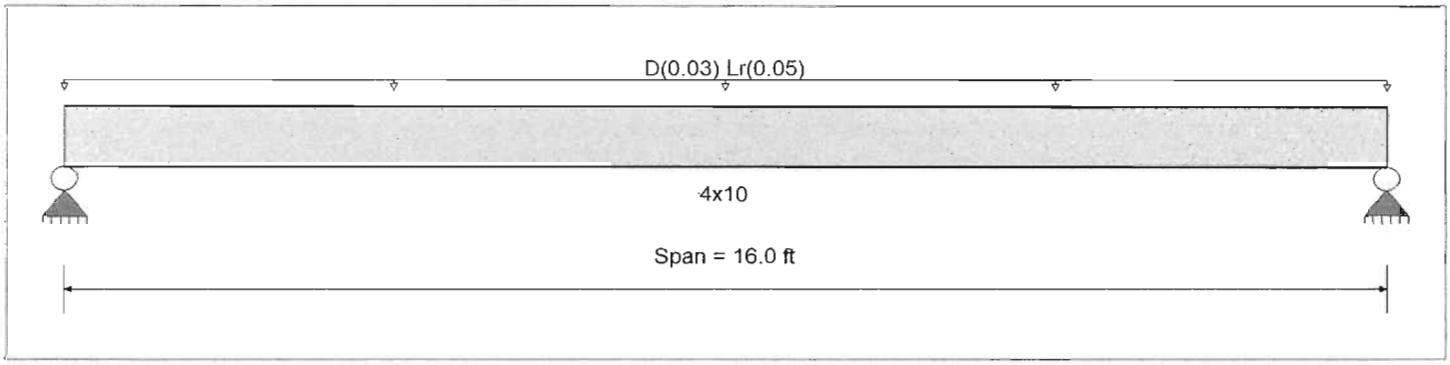
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.497 : 1	Maximum Shear Stress Ratio	=	0.131 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	671.18 psi		=	29.45 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	7.955 ft	Location of maximum on span	=	15.285 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.201 in	Ratio =	953 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.351 in	Ratio =	546 >=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_{FN}	C_i	C_r	C_m	C_t	C_L	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only													0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.295	0.078	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.19	286.51	972.00	0.27	12.57	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.497	0.131	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.79	671.18	1350.00	0.64	29.45	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.426	0.112	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.39	575.02	1350.00	0.54	25.23	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.099	0.026	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.72	171.91	1728.00	0.16	7.54	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.3514	8.045		0.0000	0.000

PITZER & ASSOCIATES, PLLC
STRUCTURAL ENGINEERS
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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R08

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.698	0.698
Overall MINimum	0.400	0.400
D Only	0.298	0.298
+D+Lr	0.698	0.698
+D+0.750Lr	0.598	0.598
+0.60D	0.179	0.179
Lr Only	0.400	0.400

PITZER & ASSOCIATES, PLLC
STRUCTURAL ENGINEERS
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File: 21-140.ec6

Wood Beam

Lic. # : KW-06006556
PITZER & ASSOCIATES

DESCRIPTION: R07

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

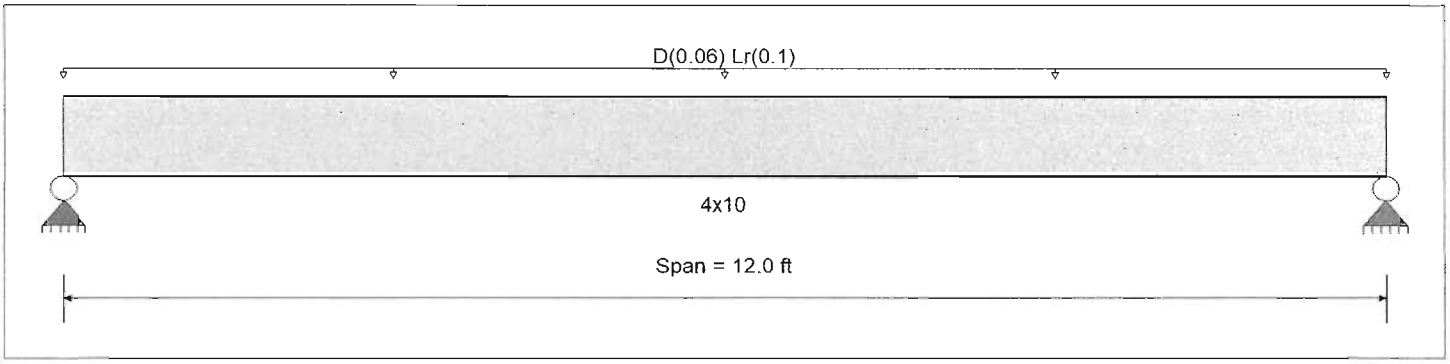
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.536 : 1	Maximum Shear Stress Ratio	=	0.181 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	723.74 psi		=	40.78 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	5.966 ft	Location of maximum on span	=	11.263 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.127 in	Ratio =	1129 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.213 in	Ratio =	675 >=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 Only													0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.299	0.101	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.21	290.99	972.00	0.35	16.40	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.536	0.181	1.25	1.200	1.00	1.00	1.00	1.00	1.00	3.01	723.74	1350.00	0.88	40.78	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.456	0.154	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.56	615.55	1350.00	0.75	34.68	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.101	0.034	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.73	174.59	1728.00	0.21	9.84	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.2132	6.034		0.0000	0.000

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Project Title: Plan M2595B3F-9
Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R07

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.003	1.003
Overall MINimum	0.600	0.600
D Only	0.403	0.403
+D+Lr	1.003	1.003
+D+0.750Lr	0.853	0.853
+0.60D	0.242	0.242
Lr Only	0.600	0.600

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R06

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2018

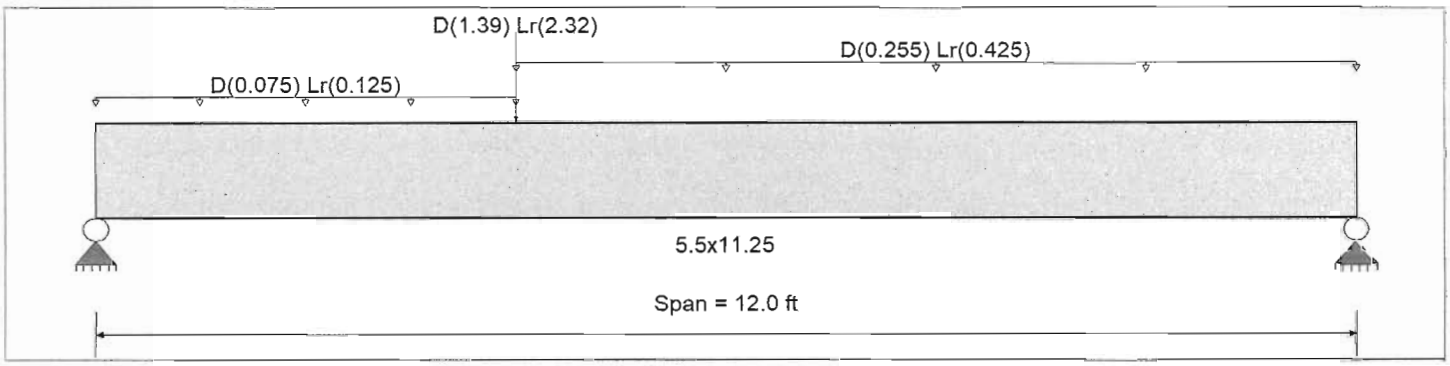
Wood Species : DF/DF
Wood Grade : 24F - V4

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

E : Modulus of Elasticity

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

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



Applied Loads

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

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 0.0 -->> 4.0 ft, Tributary Width = 5.0 ft
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Extent = 4.0 -->> 12.0 ft, Tributary Width = 17.0 ft
Point Load : D = 1.390, Lr = 2.320 k @ 4.0 ft, (L/R02)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.641 : 1	Maximum Shear Stress Ratio	=	0.355 : 1
Section used for this span		5.5x11.25	Section used for this span		5.5x11.25
	=	1,922.56 psi		=	117.52 psi
	=	3,000.00 psi		=	331.25 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	4.693 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	0.246 in	Ratio =	584 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.400 in	Ratio =	360 >=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 Only					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	0.341	0.189	0.90							7.11	735.51	2160.00	1.86	45.09	238.50
+D+Lr					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	0.641	0.355	1.25							18.59	1,922.56	3000.00	4.85	117.52	331.25
+D+0.750Lr					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	0.542	0.300	1.25							15.72	1,625.79	3000.00	4.10	99.42	331.25
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 12.0 ft	1	0.115	0.064	1.60							4.27	441.30	3840.00	1.12	27.06	424.00

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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PITZER & ASSOCIATES

DESCRIPTION: R06

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.3996	5.899		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	5.034	5.077
Overall MINimum	3.097	3.123
D Only	1.937	1.954
+D+Lr	5.034	5.077
+D+0.750Lr	4.260	4.296
+0.60D	1.162	1.172
Lr Only	3.097	3.123

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Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R05

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

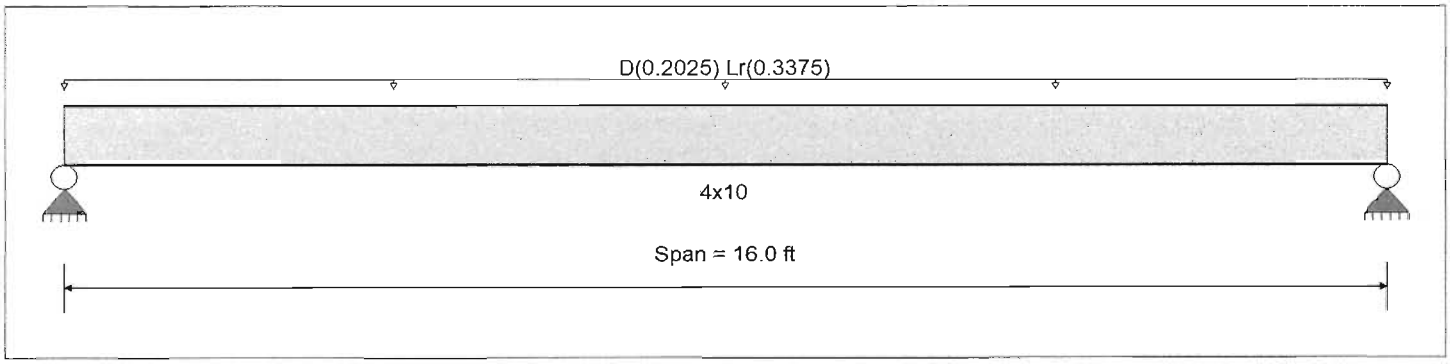
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf

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



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 13.50 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	3.119 : 1	Maximum Shear Stress Ratio	=	0.821 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	4,210.14 psi		=	184.71 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	7.955 ft	Location of maximum on span	=	15.285 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	1.360 in	Ratio =	141 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	2.204 in	Ratio =	87 <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 Only													0.00	0.00	0.00	0.00
Length = 16.0 ft	1	1.660	0.437	0.90	1.200	1.00	1.00	1.00	1.00	1.00	6.71	1,613.62	972.00	1.53	70.79	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	3.119	0.821	1.25	1.200	1.00	1.00	1.00	1.00	1.00	17.51	4,210.14	1350.00	3.99	184.71	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	2.638	0.694	1.25	1.200	1.00	1.00	1.00	1.00	1.00	14.81	3,561.01	1350.00	3.37	156.23	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 16.0 ft	1	0.560	0.147	1.60	1.200	1.00	1.00	1.00	1.00	1.00	4.03	968.17	1728.00	0.92	42.48	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	2.2044	8.045		0.0000	0.000

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

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PITZER & ASSOCIATES

DESCRIPTION: R05

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.378	4.378
Overall MINimum	2.700	2.700
D Only	1.678	1.678
+D+Lr	4.378	4.378
+D+0.750Lr	3.703	3.703
+0.60D	1.007	1.007
Lr Only	2.700	2.700

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R04

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

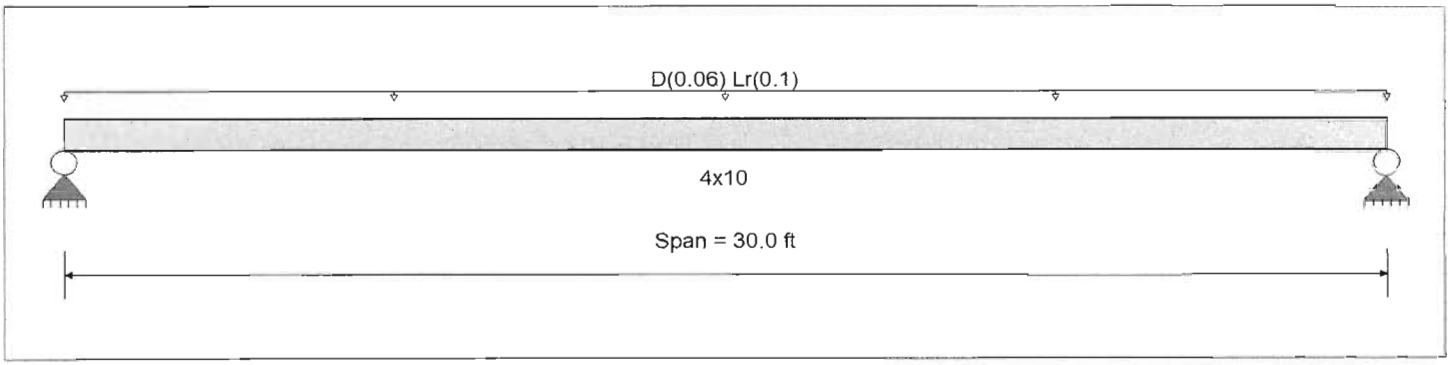
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 4.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	**3.351**: 1	Maximum Shear Stress Ratio	=	**0.493** : 1
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	4,523.39 psi		=	111.04 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	14.916 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	4.979 in	Ratio =	72 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	8.326 in	Ratio =	43 <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 Only													0.00	0.00	0.00	0.00
Length = 30.0 ft	1	1.871	0.276	0.90	1.200	1.00	1.00	1.00	1.00	1.00	7.56	1,818.69	972.00	0.96	44.64	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 30.0 ft	1	3.351	0.493	1.25	1.200	1.00	1.00	1.00	1.00	1.00	18.81	4,523.39	1350.00	2.40	111.04	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 30.0 ft	1	2.850	0.420	1.25	1.200	1.00	1.00	1.00	1.00	1.00	16.00	3,847.22	1350.00	2.04	94.44	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 30.0 ft	1	0.631	0.093	1.60	1.200	1.00	1.00	1.00	1.00	1.00	4.54	1,091.21	1728.00	0.58	26.79	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	8.3265	15.084		0.0000	0.000

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Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

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PITZER & ASSOCIATES

DESCRIPTION: R04

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.509	2.509
Overall MINimum	1.500	1.500
D Only	1.009	1.009
+D+Lr	2.509	2.509
+D+0.750Lr	2.134	2.134
+0.60D	0.605	0.605
Lr Only	1.500	1.500

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Project ID: 21-140
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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R03

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

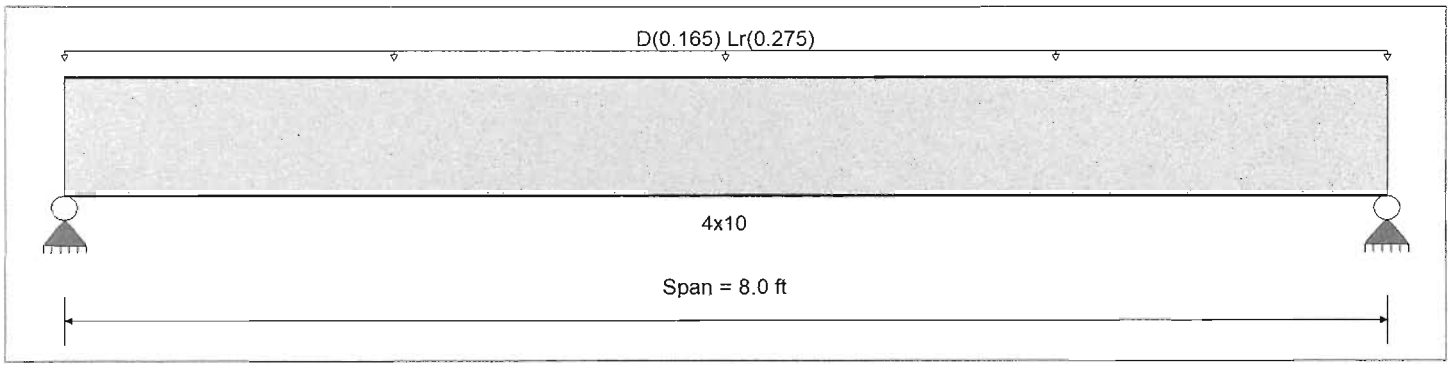
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 11.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.637 : 1**	Maximum Shear Stress Ratio	=	**0.298 : 1**
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	860.20 psi		=	67.14 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	3.978 ft	Location of maximum on span	=	7.240 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.069 in	Ratio =	1386 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.113 in	Ratio =	852 >=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 Only													0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.341	0.160	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.38	331.28	972.00	0.56	25.86	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.637	0.298	1.25	1.200	1.00	1.00	1.00	1.00	1.00	3.58	860.20	1350.00	1.45	67.14	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.539	0.253	1.25	1.200	1.00	1.00	1.00	1.00	1.00	3.03	727.97	1350.00	1.23	56.82	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 8.0 ft	1	0.115	0.054	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.83	198.77	1728.00	0.33	15.51	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	0.1126	4.022		0.0000	0.000

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

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PITZER & ASSOCIATES

DESCRIPTION: R03

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.789	1.789
Overall MINimum	1.100	1.100
D Only	0.689	0.689
+D+Lr	1.789	1.789
+D+0.750Lr	1.514	1.514
+0.60D	0.413	0.413
Lr Only	1.100	1.100

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R02

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

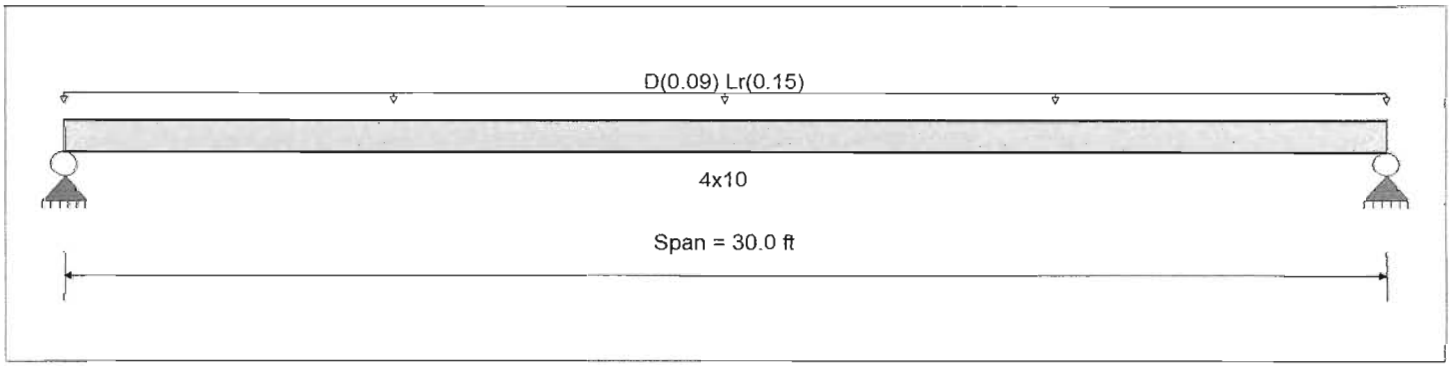
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 6.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	**4.953 : 1**	Maximum Shear Stress Ratio	=	**0.730 : 1**
Section used for this span		**4x10**	Section used for this span		**4x10**
	=	6,687.16 psi		=	164.15 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	15.084 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	7.468 in	Ratio =	48 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	12.309 in	Ratio =	29 <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 Only													0.00	0.00	0.00	0.00
Length = 30.0 ft	1	2.706	0.399	0.90	1.200	1.00	1.00	1.00	1.00	1.00	10.94	2,630.10	972.00	1.39	64.56	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 30.0 ft	1	4.953	0.730	1.25	1.200	1.00	1.00	1.00	1.00	1.00	27.81	6,687.16	1350.00	3.54	164.15	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 30.0 ft	1	4.202	0.619	1.25	1.200	1.00	1.00	1.00	1.00	1.00	23.60	5,672.89	1350.00	3.01	139.25	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 30.0 ft	1	0.913	0.135	1.60	1.200	1.00	1.00	1.00	1.00	1.00	6.56	1,578.06	1728.00	0.84	38.74	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	12.3094	15.084		0.0000	0.000

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Engineer: tjp
Project ID: 21-140
Project Descr: 2 Story SFR

Printed: 15 DEC 2021, 9:51PM

Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R02

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.709	3.709
Overall MINimum	2.250	2.250
D Only	1.459	1.459
+D+Lr	3.709	3.709
+D+0.750Lr	3.146	3.146
+0.60D	0.875	0.875
Lr Only	2.250	2.250

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R01

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

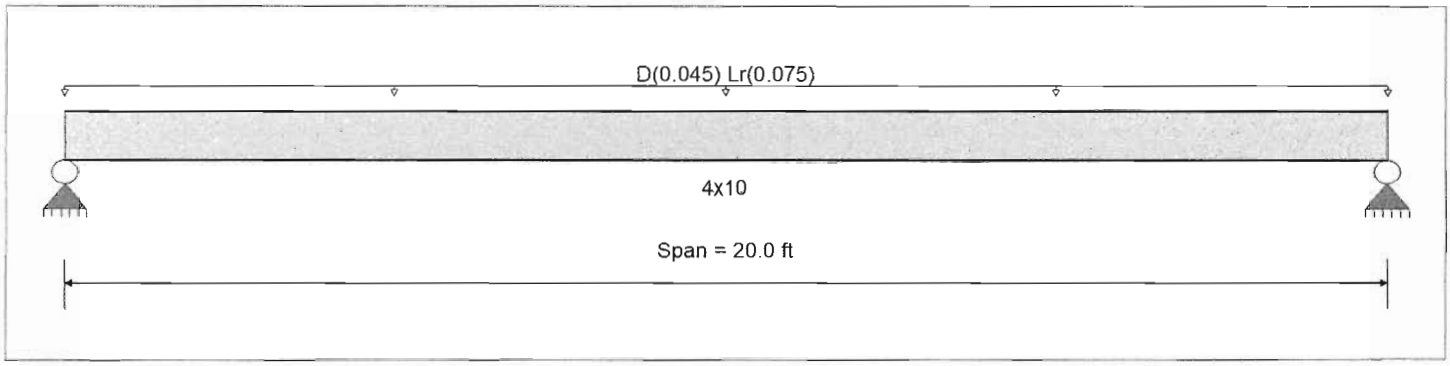
Wood Species : Douglas Fir - Larch
Wood Grade : No.2

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	32.210 pcf



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0150, Lr = 0.0250 ksf, Tributary Width = 3.0 ft

DESIGN SUMMARY

Design N.G.

Maximum Bending Stress Ratio	=	1.133 : 1	Maximum Shear Stress Ratio	=	0.244 : 1
Section used for this span		4x10	Section used for this span		4x10
	=	1,529.56 psi		=	55.00 psi
	=	1,350.00 psi		=	225.00 psi
Load Combination		+D+Lr	Load Combination		+D+Lr
Location of maximum on span	=	10.056 ft	Location of maximum on span	=	19.330 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.738 in	Ratio =	325 <360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	1.251 in	Ratio =	191 >=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 Only													0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.646	0.139	0.90	1.200	1.00	1.00	1.00	1.00	1.00	2.61	627.99	972.00	0.49	22.58	162.00
+D+Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	1.133	0.244	1.25	1.200	1.00	1.00	1.00	1.00	1.00	6.36	1,529.56	1350.00	1.19	55.00	225.00
+D+0.750Lr					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.966	0.208	1.25	1.200	1.00	1.00	1.00	1.00	1.00	5.42	1,304.17	1350.00	1.01	46.90	225.00
+0.60D					1.200	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 20.0 ft	1	0.218	0.047	1.60	1.200	1.00	1.00	1.00	1.00	1.00	1.57	376.80	1728.00	0.29	13.55	288.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr	1	1.2514	10.056		0.0000	0.000

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Project Descr: 2 Story SFR

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Wood Beam

File: 21-140.ec6

Lic. # : KW-06006556

PITZER & ASSOCIATES

DESCRIPTION: R01

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.272	1.272
Overall MINimum	0.750	0.750
D Only	0.522	0.522
+D+Lr	1.272	1.272
+D+0.750Lr	1.085	1.085
+0.60D	0.313	0.313
Lr Only	0.750	0.750

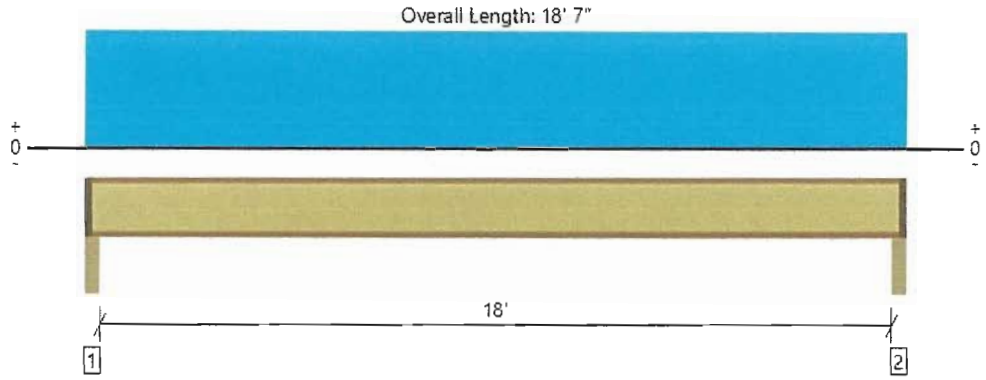
FORTE WEB

MEMBER REPORT

PASSED

Level, FJ1

1 piece(s) 11 7/8" TJI® 360 @ 16" OC



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	634 @ 2 1/2"	1080 (1.75")	Passed (59%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	624 @ 3 1/2"	1705	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2860 @ 9' 3 1/2"	6180	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.303 @ 9' 3 1/2"	0.454	Passed (L/720)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.393 @ 9' 3 1/2"	0.908	Passed (L/554)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	42	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Beam - DF	3.50"	1.75"	1.75"	149	496	645	1 3/4" Rim Board
2 - Beam - DF	3.50"	1.75"	1.75"	149	496	645	1 3/4" Rim Board

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 7" o/c	
Bottom Edge (Lu)	18' 4" o/c	

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

Vertical Load	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 18' 7"	16"	12.0	40.0	Residential - Living Areas

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

ForteWEB Software Operator	Job Notes
THOMAS PITZER Pitzer & Associates, PLLC (425) 308-8070 TOMMYT42K@HOTMAIL.COM	

Weyerhaeuser

12/9/2021 7:17:13 PM UTC
ForteWEB v3.2, Engine: V8.2.0.17, Data: V8.1.0.16
File Name: 21-140

Foundation Design Pressure

Project: Plan M2595B3F-9
Client: ANW
P&A #: 21-140
Date: 12/2/2021

Location	Tributary	Total
W_{tRoof}	13	520
W_{tWall}	8	80
W_{tFloor}	9	450
W_{tWall}	9.5	95
W_{tFloor}	13	650
W_{tConc}	1	267
ΣW_t		2062

Design Criteria

Roof

DL	15	psf
LL	25	psf

Floor

DL	10	psf
LL	40	psf

Walls

DL	10	psf

Footing Dimensions

thickness	8	in
width	16	in

Stemwall Dimensions

Thickness	8	in
Depth	16	in

Strip Footing Dimensions

thickness	10	in
width	24	in

Wt of Conc	150	pcf
Soil Brg	2000	spf

Try 1608 Footing
Total Pressure

Calculated		Allowed
2062	Less Than	2667

Use 1608 Footing

Unfiorm Loads

F/B	0
L/R	0
Back of Garage	0

Foundation Design Pressure

Project: Plan M2595B3F-9
Client: ANW
P&A #: 21-140
Date: 12/2/2021

Point Loads (2000 psf Soil Bearing Pressure)

Kips	FT^2	Square Ftg	Round Ftg
12.93	6.47	2.54	2.87
2.58	1.29	1.14	1.28
8.2	4.10	2.02	2.28
8.73	4.37	2.09	2.36
8.88	4.44	2.11	2.38
1.82	0.91	0.95	1.08
7.54	3.77	1.94	2.19

POINT LOAD ON A CONTINUOUS STEMWALL
(P/2*ds)+w = SBP*wf

P>=((SBP*wf)-w)*2*ds exceeds soil bearing pressure
F/B
10.67 Kips
L/R
10.67 Kips

POINT LOAD ON A STRIP FOOTING
(P/2*df) = SBP*wf

P>=(SBP*wf)*2*df

6.67 Kips

Lateral Analysis by: 12/8/2021

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Client: Architects NW
Project: Plan M2595B3F-9
P&A#: 21-140
Calculated By: Tom Pitzer, PE

1.0 General Wind & Seismic Design Criteria

Governing Code

2018 INTERNATIONAL BUILDING CODE (IBC). References in the right margin are: [Axx] ASCE 7-16, [Ixx] IBC 2018, [Nxx] NDS-2018, SDPWS 2015

Scope of Project

A lateral analysis and design of a two story Single Family Residence in the City of Mercer Island, WA. 98040

Design Criteria

	Roof	Floors	Snow	Walls
Dead Load	$R_{DL} := 15 \cdot psf$	$F_{DL} := 10 \cdot psf$	$R_{SL} := 25 \cdot psf$	$W_{DL} := 10 \cdot psf$
Live Load	$R_{LL} := 25 \cdot psf$	$F_{LL} := 40 \cdot psf$		

Snow Load Reduction: $S_{red} := 0$ *ASCE 7 12.7.2.4 [A100]*

▶ Snow Load Reduction

Wind Design Criteria

Ultimate Wind Speed		110 MPH	1609.3	[I375]
Wind Exposure Category		B	1609.4	[I378]
Design Method Used		Enclosed Simple Diaphragm - Low Rise	12.8	[A101]
Wind Speed Up Factor	Kzt	1.30	26.8.1	[A266]

Seismic Design Criteria

Seismic Importance Factor	I_E	1.00	T 11.5.1	[A85]
Seismic Design Category		"D"	11.6	[A85]
Short Period Acceleration	S_S	1.406	F 22(1)	[A210]
1-Second Acceleration	S_1	0.489	F 22(2)	[A212]
Seismic Force Resisting System		Bearing Wall	T 12.2-1	[A91]
Response Modification Factor	R	6.5	T 12.2-1	[A91]
Deflection Amplification Factor	C_d	4.0	T 12.2-1	[A91]
Method Used	Equivalent Lateral Force Procedure		12.8	[A101]
System Overstrength Factor	Ω_o	2.5	12.19.8	[A116]

2.0 Table of Contents

3.0 Wind Analysis - ASCE Enclosed Simple Diaphragm - Low Rise Method

Basic Wind Speed (MPH), BWS := 110 *(1609.3)[I378]*

Wind Exposure Category (WEC), WEC := 1 *(1609.4)[I378]*

Wind Exposure, enter: (1)- exposure "B", (2)- exposure "C", (3)- exposure "D"

Mean Roof Height (MRH), MRH := 26

Design Wind Loads,

$p_S = \lambda K_{zt} p_{S30}$ *(Equation 28.5-1)[A315]*

Roof Pitch

3:12

Simplified Wind Design Pressures (Main Wind Force Resisting System)
ps30 (Exposure B at h = 30 feet)(psf)

Roof Rise enter: (1)- Flat, (2)- 2, (3)- 3, (4), 4, (5) 6, (6), 7 to 12 $\Phi_2 := 3$

▶ ASCE 7 Simple Wind Pressures

ZoneA = 24.1·psf ZoneB = 0·psf ZoneC = 16.00·psf ZoneD = 0·psf ZoneEOH = −32.3·psf

ZoneE = −23.1 ZoneF = −15.1·psf ZoneG = −16·psf ZoneH = −11.5·psf ZoneGOH = −25.3·psf

Height & Exposure Adjustment Coefficient, λ *ASCE 7 Figure 28.5-1 [A316]*

▶ Adjustment Factor $\lambda = 1.00$ *ASCE 7 Fig 28.5-1[A316]*

Topographic Factor, Kzt *ASCE 7 Section 28.6-1 [A267]*

Topographic Factor: Kzt := 1.30

Design Wind Pressures *ASCE 7 Fig 28.5-1[A318]*

Simplified Wind Design Pressures - combined windward & leeward pressures over projected area:

$P_A := \lambda \cdot Kzt \cdot ZoneA$ $P_E := \lambda \cdot Kzt \cdot ZoneE$

$P_B := \lambda \cdot Kzt \cdot ZoneB$ $P_F := \lambda \cdot Kzt \cdot ZoneF$

$P_C := \lambda \cdot Kzt \cdot ZoneC$ $P_G := \lambda \cdot Kzt \cdot ZoneG$

$P_D := \lambda \cdot Kzt \cdot ZoneD$ $P_H := \lambda \cdot Kzt \cdot ZoneH$

Least Horizontal Dimension, (LHD) *ASCE 7 Figure 28.5-1[A316]*

LHD := 47·ft h := 21·ft

The smaller of:
10% of least horizontal dimension
0.4h
But not less than:
4% of least horizontal dimension
3 feet

a1 := .1·LHD a1 = 4.7 ft Controls
a2 := .4·h a2 = 8.4 ft
a3 := .04·LH a3 = 2 ft
a4 := 3·ft
2·a1 = 9 ft

Wind Design Pressures

$P_A = 31.3\,ft^{-2}\cdot lb$ $P_E = -30\,ft^{-2}\cdot lb$

$P_B = 0\,ft^{-2}\cdot lb$ $P_F = -19.6\,ft^{-2}\cdot lb$

$P_C = 20.8\,ft^{-2}\cdot lb$ $P_G = -20.8\,ft^{-2}\cdot lb$

$P_D = 0\,ft^{-2}\cdot lb$ $P_H = -14.9\,ft^{-2}\cdot lb$

3.0 Wind Analysis (cont.)

Controlling Load Combination for Wind Loads

0.6*W *Equation 16-12 [1366]*

Diaphragm Sail Areas

Roof Diaphragm:

Front/Rear Direction
(Longitudinal)

Horizontal | Vertical

$Afr := 30 \cdot ft^2$ $Efr := 180 \cdot ft^2$

$Bfr := 15 \cdot ft^2$ $Ffr := 180 \cdot ft^2$

$Cfr := 147 \cdot ft^2$ $Gfr := 900 \cdot ft^2$

$Dfr := 205 \cdot ft^2$ $Hfr := 900 \cdot ft^2$

Side/Side Direction
(Transverse)

Horizontal | Vertical

$Asr := 50 \cdot ft^2$ $Esr := 300 \cdot ft^2$

$Bsr := 18 \cdot ft^2$ $Fsr := 300 \cdot ft^2$

$Csr := 93 \cdot ft^2$ $Gsr := 780 \cdot ft^2$

$Dsr := 110 \cdot ft^2$ $Hsr := 780 \cdot ft^2$

2nd Floor Diaphragm:

Front/Rear Direction

Horizontal

$Af1 := 100 \cdot ft^2$

$Bf1 := 0 \cdot ft^2$

$Cf1 := 536 \cdot ft^2$

$Df1 := 24 \cdot ft^2$

Side/Side Direction

Horizontal

$As1 := 100 \cdot ft^2$

$Bs1 := 0 \cdot ft^2$

$Cs1 := 362 \cdot ft^2$

$Ds1 := 21 \cdot ft^2$

▶ Shear Calculations

4.0 Wind Shear Forces and Uplift

WIND SHEAR CALCULATIONS

Shear Forces:

Shear Forces Front/Back Direction

Roof Diaphragm $V_{r.fr} = 2755 \cdot lb$

2nd Floor Diaphragm $V_{lf.fr} = 8569 \cdot lb$

Total Base Shear $V_{T.fr} = 11324 \cdot lb$

Shear Forces Side/Side Direction

Roof Diaphragm $V_{r.ss} = 2101 \cdot lb$

2nd Floor Diaphragm $V_{lf.ss} = 6398 \cdot lb$

Total Base Shear $V_{T.ss} = 8498 \cdot lb$

Uplift Forces:

Total Uplift $U_{r.fr1} = -41114\ lb$

Opposing Dead Load $U_{DLL} = 21600\ lb$

Total Uplift $U_{r.ss1} = -42783\ lb$

Opposing Dead Load $U_{DLT} = 20400\ lb$

5.0 General Seismic Design Criteria

Mapped Maximum Considered Earthquake Spectral Acceleration

SS := 1.406 *Figure 22-1[A210]*

S1 := 0.489 *Figure 22-2[A212]*

Site Class D, (Assumed)

Fa := 1.00 *Table 11.4-1[A84]*

Fv := 1.811 *Table 11.4-2 [A84]*

$S_{MS} = F_a * S_S$ *Equation 11.4-1 [A84]*

SMS := Fa·SS SMS = 1.41

$S_{M1} = F_v * S_1$ *Equation 11.4-2 [A84]*

SM1 := Fv·S1 SM1 = 0.89

Design Spectral Response Acceleration Parameters

$S_{DS} = 2/3 * S_{MS}$ *Equation 11.4-3 [A84]*

$S_{DS} := \left(\frac{2}{3}\right) \cdot SMS$ $S_{DS} = 0.937$

$S_{D1} = 2/3 * S_{M1}$ *Equation 11.4-4[A84]*

$S_{D1} := \left(\frac{2}{3}\right) \cdot SM1$ $S_{D1} = 0.590$

Approximate Fundamental Period, Ta

Ct := 0.02 *Table 12.8-2 [A102]*

x := .75 *Table 12.8-2[A102]*

hn := 26 height in ft from the base to the highest point of the structure

$Ta := Ct \cdot hn^{x}$ *Equation 12.8-7 [A102]*

Ta = 0.230

6.0 Seismic Analysis - Equivalent Lateral Force Procedure

Building Properties:

$A_r := 2192 \cdot ft^2$ Area of the Roof in Square Feet

$A_{lf} := 1890 \cdot ft^2$ Area of the Upper Floor in Square Feet

$A_{rll} := 942 \cdot ft^2$ Area of Low Roof into Lower Floor Diaphragm in Square Feet

$A_b := 2791 \cdot ft^2$ Ground Floor area in Square Feet

$H_{RJ} := 1.0 \cdot ft$ Height of Rim Joist and/or pony wall

$H_2 := 8.0 \cdot ft$ Height of Second Story Walls

$H_1 := 9.5 \cdot ft$ Height of First Story Walls average

$L_{2b} := 114 \cdot ft$ Length of Wall on the Second Floor

$L_{1b} := 132 \cdot ft$ Length of Wall on the First Floor

Calculate Building Masses:

Mass of High Roof and Tributary Walls $M_r := A_r \cdot R_D + H_2 \cdot 0.5 \cdot L_{2b} \cdot W_{DL}$ $M_r = 37440 \cdot lb$

Mass of 2nd Floor,Roof into Diaphragm, Walls $M_{lf} := A_{lf} \cdot F_{DL} + A_{rll} \cdot R_D + H_2 \cdot 0.5 \cdot L_{2b} \cdot W_{DL} + H_1 \cdot 0.5 \cdot L_{1b} \cdot W_{DL}$ $M_{lf} = 43860 \cdot lb$

Mass of Entire Building $M_t := M_r + M_{lf}$ $M_t = 81300 \cdot lb$

Lateral Force Parameters:

$k := 1.0$ *ASCE-7 12.8.3 [A102]*

$R := 6.5$ *ASCE 7 Table 12.2-1 [A90*

$S_{DS} = 0.94$ *ASCE 7 EQ 11.4-3 [A84]*

$Ie := 1.00$ *ASCE 7 T1.5-2 [A5]*

$TL := 6.0$ *ASCE 7 11.4.6 [A83]*

$Ta = 0.230$ *Equation 12.8-7 [A102]*

Cs shall not be less than

$Csmin := 0.044 \cdot S_{DS} \cdot Ie$ *ASCE-7 12.8-5 [A101]*

$Csmin = 0.041$

Seismic Base Shear, V

$C := \frac{S_{DS}}{R}$ $C = 0.1442$ *ASCE-7 Equation 12.8-2[A101]*

$V_B := C \cdot M_t$ *ASCE-7 Equation 12.8-1[A101]*

$V_B = 11724 \cdot lb$

Cs need not be more than

$Csmax1 := \frac{S_{D1}}{Ta \cdot \left(\frac{R}{Ie}\right)}$ For Ta LE TL *ASCE-7 12.8-3 [A101]*

$Csmax1 = 0.394$

$Csmax2 := \frac{S_{D1} \cdot TL}{Ta \cdot \left(\frac{R}{Ie}\right)}$ For Ta QT TL *ASCE-7 12.8-4 [A101]*

$Csmax2 = 2.367$

TOTAL BUILDING MASS

$TBM := \left(BH_2^{\,k} \cdot M_r\right) + \left(BH_1^{\,k} \cdot M_{lf}\right)$ *ASCE-7 Equation 12.8-12[A102]*

$TBM = 1153170\ lb$

Vertical Distribution of Seismic Shear Forces: *ASCE-7 12.8-3 [A102]*

Check following calculations; if ΣCi is equal to 1; then OK

ASCE-7 EQ. 12.8-12[A102] *ASCE-7 EQ. 12.8-11[A102]*

Roof Diaphragm $C_{vr} := \frac{BH_2^{k} \cdot M_r}{TBM}$ $C_{vr} = 0.601$ $F_r := C_{vr} \cdot V_B$ $F_r = 7042\,lb$

Second Floor Diaphragm $C_{vlf} := \frac{BH_1^{k} \cdot M_{lf}}{TBM}$ $C_{vlf} = 0.399$ $F_{lf} := C_{vlf} \cdot V_B$ $F_{lf} = 4682\,lb$

Check Shear Distribution $C_t := C_{vr} + C_{vlf}$ $C_t = 1.000$

7.0 Controlling Load Combination for Seismic Loads

0.7*E *Equation 16-12 [I366]*

Seismic Load, E *Section 12.4 [A98]*

E=ρQe *Equation 12.4-3 [A99]*

ASCE 7 12.3.4.2[A98] *Table 12.2-1[A90]*

$\rho := 1.3$ $\Omega o := 2.5$

$Er := \frac{\rho \cdot F_r}{1.4}$ $Er = 6539\,lb$

$Elf := \frac{\rho \cdot F_{lf}}{1.4}$ $Elf = 4348\,lb$

$E_T := Er + Elf$ $E_T = 10886\,lb$

Special Seismic Load, E_m *Equation 12.4-7[A99]*

$E_{mr} := \Omega o \cdot F_r$ $E_{mr} = 17605\,lb$

$E_{mlf} := \Omega o \cdot F_{lf}$ *Equation 12.4-7[A99]* $E_{mlf} = 11705\,lb$

Summary of Lateral Shear Wall Forces

Seismic (Either Direction)	Wind (Front/Rear)	Wind (Side/Side)
$Er = 6539 \cdot lb$	$V_{r.fr} = 2755 \cdot lb$	$V_{r.ss} = 2101 \cdot lb$
$Elf = 4348 \cdot lb$	$V_{lf.fr} = 8569 \cdot lb$	$V_{lf.ss} = 6398 \cdot lb$
$E_T = 10886 \cdot lb$	$V_{T.fr} = 11324 \cdot lb$	$V_{T.ss} = 8498 \cdot lb$

8.0 Diaphragm Seismic Forces

ASCE 7 12.10 [A106]

$$\frac{\sum_{i=x}^{n} Fi}{\sum_{i=x}^{n} Wi} \cdot Wpx$$ *Equation ASCE 7 12.10-1 [A106]*

PER ASCE 7-16 SEC 12.3.3.4 INCREASE FORCES BY 25%

7042 x 1.25 = 8803 lb ←

8222 x 1.25 = 10 277 lb ←

Roof Diaphragm

$$Wpr := \frac{M_r}{M_r} \cdot F_r$$

Wpr = 7042 lb **Controls**

Second Floor Diaphragm

$$Wp2 := \frac{M_{lf}}{M_r + M_{lf}} \cdot \left(F_r + F_{lf}\right)$$

Wp2 = 6325 lb

Shall not be less than:

$Fpx := 0.2 \cdot S_{DS} \cdot Ie \cdot Wpx$ *ASCE-7 Equation 12.10-2[A106]*

Roof Diaphragm

$Fprmin := 0.2 \cdot S_{DS} \cdot Ie \cdot M_r$

Fprmin = 7019 lb

Second Floor Diaphragm

$Fp2min := 0.2 \cdot S_{DS} \cdot Ie \cdot M_{lf}$

Fp2min = 8222 lb **Controls**

Need not exceed:

$Fpx := 0.4 \cdot S_{DS} \cdot Ie \cdot Wpx$ *ASCE-7 Equation 12.10-3[A106]*

Roof Diaphragm

$Fprmax := 0.4 \cdot S_{DS} \cdot Ie \cdot M_r$

Fprmax = 14038 lb

Second Floor Diaphragm

$Fp2max := 0.4 \cdot S_{DS} \cdot Ie \cdot M_{lf}$

Fp2max = 16445 lb

9.0 Shear Wall Design

Equation 12.8-13 [A102]

	Wall Line - **(1.2)**	Wall Line - **(2.2)**	Wall Line - **(3.2)**	Wall Line - **(4.2)**
	$L_{1.2} := 0 \cdot ft$	$L_{2.2} := 20 \cdot ft$	$L_{3.2} := 0 \cdot ft$	$L_{4.2} := 20 \cdot ft$
Earthquake distr.:	$TW_{1.2e} := 0$	$TW_{2.2e} := .500$	$TW_{3.2e} := 0$	$TW_{4.2e} := .500$
Wind distribution:	$TW_{1.2w} := 0$	$TW_{2.2w} := .500$	$TW_{3.2w} := 0$	$TW_{4.2w} := .500$
Calculate Lateral Forces for earthquake:	$V_{1.2e} := Er \cdot TW_{1.2e}$	$V_{2.2e} := Er \cdot TW_{2.2e}$	$V_{3.2e} := Er \cdot TW_{3.2e}$	$V_{4.2e} := Er \cdot TW_{4.2e}$
	$V_{1.2e} = 0 \cdot lb$	$V_{2.2e} = 3269 \cdot lb$	$V_{3.2e} = 0 \cdot lb$	$V_{4.2e} = 3269 \cdot lb$
Calculate Lateral Forces for wind:	$V_{1.2w} := V_{r.fr} \cdot TW_{1.2w}$	$V_{2.2w} := V_{r.fr} \cdot TW_{2.2w}$	$V_{3.2w} := V_{r.fr} \cdot TW_{3.2w}$	$V_{4.2w} := V_{r.fr} \cdot TW_{4.2w}$
	$V_{1.2w} = 0 \cdot lb$	$V_{2.2w} = 1378 \cdot lb$	$V_{3.2w} = 0 \cdot lb$	$V_{4.2w} = 1378 \cdot lb$
	$Controls_{1.2} = \text{"Wind"}$	$Controls_{2.2} = \text{"Seismic"}$	$Controls_{3.2} = \text{"Wind"}$	$Controls_{4.2} = \text{"Seismic"}$
	$VT_{1.2} = 0$	$VT_{2.2} = 3269\,lb$	$VT_{3.2} = 0$	$VT_{4.2} = 3269\,lb$
Shear per linear foot:	$\nu_{1.2} := \frac{VT_{1.2}}{L_{1.2}}$	$\nu_{2.2} := \frac{VT_{2.2}}{L_{2.2}}$	$\nu_{3.2} := \frac{VT_{3.2}}{L_{3.2}}$	$\nu_{4.2} := \frac{VT_{4.2}}{L_{4.2}}$
	$\nu_{1.2} = 0 \cdot \frac{lb}{ft}$	$\nu_{2.2} = 163 \cdot \frac{lb}{ft}$	$\nu_{3.2} = 0 \cdot \frac{lb}{ft}$	$\nu_{4.2} = 163 \cdot \frac{lb}{ft}$

	Wall Line - **(1.1)**	Wall Line - **(2.1)**	Wall Line - **(3.1)**	Wall Line - **(4.1)**
	$L_{1.1} := 20 \cdot ft$	$L_{2.1} := 17 \cdot ft$	$L_{3.1} := 45 \cdot ft$	$L_{4.1} := 21 \cdot ft$
Earthquake distr.:	$TW_{1.1e} := .079$	$TW_{2.1e} := .221$	$TW_{3.1e} := .421$	$TW_{4.1e} := .279$
Wind distribution:	$TW_{1.1w} := .079$	$TW_{2.1w} := .221$	$TW_{3.1w} := .421$	$TW_{4.1w} := .279$
Calculate Lateral Forces for earthquake:	$V_{1.1e} := Elf \cdot TW_{1.1e}$	$V_{2.1e} := Elf \cdot TW_{2.1e}$	$V_{3.1e} := Elf \cdot TW_{3.1e}$	$V_{4.1e} := Elf \cdot TW_{4.1e}$
	$V_{1.1e} = 343 \cdot lb$	$V_{2.1e} = 961 \cdot lb$	$V_{3.1e} = 1830 \cdot lb$	$V_{4.1e} = 1213 \cdot lb$
Calculate Lateral Forces for wind:	$V_{1.1w} := V_{lf.fr} \cdot TW_{1.1w}$	$V_{2.1w} := V_{lf.fr} \cdot TW_{2.1w}$	$V_{3.1w} := V_{lf.fr} \cdot TW_{3.1w}$	$V_{4.1w} := V_{lf.fr} \cdot TW_{4.1w}$
	$V_{1.1w} = 677 \cdot lb$	$V_{2.1w} = 1894 \cdot lb$	$V_{3.1w} = 3608 \cdot lb$	$V_{4.1w} = 2391 \cdot lb$
	$Controls_{1.1} = \text{"Wind"}$	$Controls_{2.1} = \text{"Seismic"}$	$Controls_{3.1} = \text{"Wind"}$	$Controls_{4.1} = \text{"Seismic"}$
	$VT_{1.1} = 677\,lb$	$VT_{2.1} = 4230\,lb$	$VT_{3.1} = 3608\,lb$	$VT_{4.1} = 4482\,lb$
Shear per linear foot:	$\nu_{1.1} := \frac{VT_{1.1}}{L_{1.1}}$	$\nu_{2.1} := \frac{VT_{2.1}}{L_{2.1}}$	$\nu_{3.1} := \frac{VT_{3.1}}{L_{3.1}}$	$\nu_{4.1} := \frac{VT_{4.1}}{L_{4.1}}$
	$\nu_{1.1} = 34 \cdot \frac{lb}{ft}$	$\nu_{2.1} = 249 \cdot \frac{lb}{ft}$	$\nu_{3.1} = 80 \cdot \frac{lb}{ft}$	$\nu_{4.1} = 213 \cdot \frac{lb}{ft}$

9.0 Shear Wall Design (cont)

	Wall Line - **(A.2)**	Wall Line - **(B.2)**	Wall Line - **(C.2)**	Wall Line - **(D.2)**
	$L_{A.2} := 0 \cdot ft$	$L_{B.2} := 28.5 \cdot ft$	$L_{C.2} := 0 \cdot ft$	$L_{D.2} := 13 \cdot ft$
Earthquake distr.:	$TW_{A.2e} := 0$	$TW_{B.2e} := .500$	$TW_{C.2e} := 0$	$TW_{D.2e} := .500$
Wind distribution:	$TW_{A.2w} := 0$	$TW_{B.2w} := .500$	$TW_{C.2w} := 0$	$TW_{D.2w} := .500$
Calculate Lateral Forces for earthquake:	$V_{A.2e} := Er \cdot TW_{A.2e}$	$V_{B.2e} := Er \cdot TW_{B.2e}$	$V_{C.2e} := Er \cdot TW_{C.2e}$	$V_{D.2e} := Er \cdot TW_{D.2e}$
	$V_{A.2e} = 0 \cdot lb$	$V_{B.2e} = 3269 \cdot lb$	$V_{C.2e} = 0 \cdot lb$	$V_{D.2e} = 3269 \cdot lb$
Calculate Lateral Forces for wind:	$V_{A.2w} := V_{r.ss} \cdot TW_{A.2w}$	$V_{B.2w} := V_{r.ss} \cdot TW_{B.2w}$	$V_{C.2w} := V_{r.ss} \cdot TW_{C.2w}$	$V_{D.2w} := V_{r.ss} \cdot TW_{D.2w}$
	$V_{A.2w} = 0 \cdot lb$	$V_{B.2w} = 1050 \cdot lb$	$V_{C.2w} = 0 \cdot lb$	$V_{D.2w} = 1050 \cdot lb$
	$Controls_{A.2} = \text{"Wind"}$	$Controls_{B.2} = \text{"Seismic"}$	$Controls_{C.2} = \text{"Wind"}$	$Controls_{D.2} = \text{"Seismic"}$
	$VT_{A.2} = 0$	$VT_{B.2} = 3269\,lb$	$VT_{C.2} = 0$	$VT_{D.2} = 3269\,lb$
Shear per linear foot:	$v_{A.2} := \frac{VT_{A.2}}{L_{A.2}}$	$v_{B.2} := \frac{VT_{B.2}}{L_{B.2}}$	$v_{C.2} := \frac{VT_{C.2}}{L_{C.2}}$	$v_{D.2} := \frac{VT_{D.2}}{L_{D.2}}$
	$v_{A.2} = 0 \cdot \frac{lb}{ft}$	$v_{B.2} = 115 \cdot \frac{lb}{ft}$	$v_{C.2} = 0 \cdot \frac{lb}{ft}$	$v_{D.2} = 251 \cdot \frac{lb}{ft}$

	Wall Line - **(A.1)**	Wall Line - **(B.1)**	Wall Line - **(C.1)**	Wall Line - **(D.1)**
	$L_{A.1} := 14 \cdot ft$	$L_{B.1} := 26 \cdot ft$	$L_{C.1} := 32 \cdot ft$	$L_{D.1} := 13.5 \cdot ft$
Earthquake distr.:	$TW_{A.1e} := .117$	$TW_{B.1e} := .290$	$TW_{C.1e} := .383$	$TW_{D.1e} := .210$
Wind distribution:	$TW_{A.1w} := .117$	$TW_{B.1w} := .290$	$TW_{C.1w} := .383$	$TW_{D.1w} := .210$
Calculate Lateral Forces for earthquake:	$V_{A.1e} := Elf \cdot TW_{A.1e}$	$V_{B.1e} := Elf \cdot TW_{B.1e}$	$V_{C.1e} := Elf \cdot TW_{C.1e}$	$V_{D.1e} := Elf \cdot TW_{D.1e}$
	$V_{A.1e} = 509 \cdot lb$	$V_{B.1e} = 1261 \cdot lb$	$V_{C.1e} = 1665 \cdot lb$	$V_{D.1e} = 913 \cdot lb$
Calculate Lateral Forces for wind:	$V_{A.1w} := V_{lf.ss} \cdot TW_{A.1w}$	$V_{B.1w} := V_{lf.ss} \cdot TW_{B.1w}$	$V_{C.1w} := V_{lf.ss} \cdot TW_{C.1w}$	$V_{D.1w} := V_{lf.ss} \cdot TW_{D.1w}$
	$V_{A.1w} = 749 \cdot lb$	$V_{B.1w} = 1855 \cdot lb$	$V_{C.1w} = 2450 \cdot lb$	$V_{D.1w} = 1343 \cdot lb$
	$Controls_{A.1} = \text{"Wind"}$	$Controls_{B.1} = \text{"Seismic"}$	$Controls_{C.1} = \text{"Wind"}$	$Controls_{D.1} = \text{"Seismic"}$
	$VT_{A.1} = 749\,lb$	$VT_{B.1} = 4530\,lb$	$VT_{C.1} = 2450\,lb$	$VT_{D.1} = 4182\,lb$
Shear per linear foot:	$v_{A.1} := \frac{VT_{A.1}}{L_{A.1}}$	$v_{B.1} := \frac{VT_{B.1}}{L_{B.1}}$	$v_{C.1} := \frac{VT_{C.1}}{L_{C.1}}$	$v_{D.1} := \frac{VT_{D.1}}{L_{D.1}}$
	$v_{A.1} = 53 \cdot \frac{lb}{ft}$	$v_{B.1} = 174 \cdot \frac{lb}{ft}$	$v_{C.1} = 77 \cdot \frac{lb}{ft}$	$v_{D.1} = 310 \cdot \frac{lb}{ft}$

10.0 Overturning Forces

Section 12.14.8.4 [A119]

Tributary Area of:

Line	Width	Length	Wall Ht	Roof	RoofAdj	Floor	FloorAdj	Uplift Force
1.2	$w_{1.2} := 0 \cdot ft$	$L_{1.2} = 0$	$H_{mot} := H_2$	$T_r := 0 \cdot ft$	$T_{r2} := 0 \cdot ft$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	
	Overturning Calculations							
2.2	$w_{2.2} := 4 \cdot ft$	$L_{2.2} = 20\,ft$	$H_{mot} := H_2$	$T_r := 4 \cdot ft$	$T_{r2} := 3 \cdot ft$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	$T_{1.2} = 0$
	Overturning Calculations							
3.2	$w_{3.2} := 0 \cdot ft$	$L_{3.2} = 0$	$H_{mot} := H_2$	$T_r := 0 \cdot ft$	$T_{r2} := 0 \cdot ft$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	$T_{2.2} = 640\,lb$
	Overturning Calculations							
4.2	$w_{4.2} := 5 \cdot ft$	$L_{4.2} = 20\,ft$	$H_{mot} := H_2$	$T_r := 4 \cdot ft$	$T_{r2} := 3 \cdot ft$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	$T_{3.2} = 0$
	Overturning Calculations							
1.1	$w_{1.1} := 20 \cdot ft$	$L_{1.1} = 20\,ft$	$H_{mot} := H_1$	$T_r := 3.5 \cdot ft$	$T_{r2} := 3 \cdot ft$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	$T_{4.2} = 598\,lb$
	Overturning Calculations							
2.1	$w_{2.1} := 3 \cdot ft$	$L_{2.1} = 17\,ft$	$H_{mot} := H_1$	$T_r := 0 \cdot ft$	$T_{r2} := 0 \cdot ft$	$T_f := 3 \cdot ft$	$T_{f2} := 8 \cdot ft$	$T_{1.1} = -717\,lb$
	Overturning Calculations							
3.1	$w_{3.1} := 12 \cdot ft$	$L_{3.1} = 45\,ft$	$H_{mot} := H_1$	$T_r := 3 \cdot ft$	$T_{r2} := 6.5 \cdot f$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	$T_{2.1} = 2060\,lb$
	Overturning Calculations							
4.1	$w_{4.1} := 3 \cdot ft$	$L_{4.1} = 21\,ft$	$H_{mot} := H_1$	$T_r := 0 \cdot ft$	$T_{r2} := 0 \cdot ft$	$T_f := 30 \cdot ft$	$T_{f2} := 6 \cdot ft$	$T_{3.1} = -189\,lb$
	Overturning Calculations							
A.2	$w_{A.2} := 0 \cdot ft$	$L_{A.2} = 0$	$H_{mot} := H_2$	$T_r := 0 \cdot ft$	$T_{r2} := 0 \cdot ft$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	$T_{4.1} = 1534\,lb$
	Overturning Calculations							
B.2	$w_{B.2} := 3.5 \cdot ft$	$L_{B.2} = 28.5\,ft$	$H_{mot} := H_2$	$T_r := 3 \cdot ft$	$T_{r2} := 3 \cdot ft$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	$T_{A.2} = 0$
	Overturning Calculations							
C.2	$w_{C.2} := 0 \cdot ft$	$L_{C.2} = 0$	$H_{mot} := H_2$	$T_r := 0 \cdot ft$	$T_{r2} := 0 \cdot ft$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	$T_{B.2} = 286\,lb$
	Overturning Calculations							
D.2	$w_{D.2} := 3 \cdot ft$	$L_{D.2} = 13\,ft$	$H_{mot} := H_2$	$T_r := 3 \cdot ft$	$T_{r2} := 3 \cdot ft$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	$T_{C.2} = 0$
	Overturning Calculations							
A.1	$w_{A.1} := 7 \cdot ft$	$L_{A.1} = 14\,ft$	$H_{mot} := H_1$	$T_r := 3 \cdot ft$	$T_{r2} := 3 \cdot ft$	$T_f := 0 \cdot ft$	$T_{f2} := 0 \cdot ft$	$T_{D.2} = 1399\,lb$
	Overturning Calculations							
B.1	$w_{B.1} := 4 \cdot ft$	$L_{B.1} = 26\,ft$	$H_{mot} := H_1$	$T_r := 0 \cdot ft$	$T_{r2} := 0 \cdot ft$	$T_f := 9 \cdot ft$	$T_{f2} := 3 \cdot ft$	$T_{A.1} = -135\,lb$
	Overturning Calculations							
C.1	$w_{C.1} := 5 \cdot ft$	$L_{C.1} = 32\,ft$	$H_{mot} := H_1$	$T_r := 0 \cdot ft$	$T_{r2} := 0 \cdot ft$	$T_f := 17 \cdot ft$	$T_{f2} := 3 \cdot ft$	$T_{B.1} = 1126\,lb$
	Overturning Calculations							
D.1	$w_{D.1} := 3.5 \cdot ft$	$L_{D.1} = 13.5\,ft$	$H_{mot} := H_1$	$T_r := 0 \cdot ft$	$T_{r2} := 0 \cdot ft$	$T_f := 3.5 \cdot ft$	$T_{f2} := 3 \cdot ft$	$T_{C.1} = 63\,lb$
	Overturning Calculations							
								$T_{D.1} = 3612\,lb$

11.0 Shear Wall Load Summary

Line	Total Shear	Length	Shear per foot	Call-Out		Uplift Force	Call-Out
(1.2)	$VT_{1.2} = 0 \cdot lb$	$L_{1.2} = 0$	$v_{1.2} = 0 \cdot plf$		$Ro_{1.2}$ = "W"	$T_{1.2} = 0$	
(2.2)	$VT_{2.2} = 3269 \cdot lb$	$L_{2.2} = 20\,ft$	$v_{2.2} = 163 \cdot plf$	**SW-1**	$Ro_{2.2}$ = "S"	$T_{2.2} = 640\,lb$	**N/A; T < 1000#**
(3.2)	$VT_{3.2} = 0 \cdot lb$	$L_{3.2} = 0$	$v_{3.2} = 0 \cdot plf$		$Ro_{3.2}$ = "W"	$T_{3.2} = 0$	
(4.2)	$VT_{4.2} = 3269 \cdot lb$	$L_{4.2} = 20\,ft$	$v_{4.2} = 163 \cdot plf$	**SW-1**	$Ro_{4.2}$ = "S"	$T_{4.2} = 598\,lb$	**N/A; T < 1000#**
(1.1)	$VT_{1.1} = 677 \cdot lb$	$L_{1.1} = 20\,ft$	$v_{1.1} = 34 \cdot plf$	**SW-1**	$Ro_{1.1}$ = "W"	$T_{1.1} = -717\,lb$	**N/A; T < 1000#**
(2.1)	$VT_{2.1} = 4230 \cdot lb$	$L_{2.1} = 17\,ft$	$v_{2.1} = 249 \cdot plf$	**SW-3**	$Ro_{2.1}$ = "S"	$T_{2.1} = 2060\,lb$	**T - 2**
(3.1)	$VT_{3.1} = 3608 \cdot lb$	$L_{3.1} = 45\,ft$	$v_{3.1} = 80 \cdot plf$	**SW-1**	$Ro_{3.1}$ = "W"	$T_{3.1} = -189\,lb$	**N/A; T < 1000#**
(4.1)	$VT_{4.1} = 4482 \cdot lb$	$L_{4.1} = 21\,ft$	$v_{4.1} = 213 \cdot plf$	**SW-2**	$Ro_{4.1}$ = "S"	$T_{4.1} = 1534\,lb$	**T - 2**
(A.2)	$VT_{A.2} = 0 \cdot lb$	$L_{A.2} = 0$	$v_{A.2} = 0 \cdot plf$		$Ro_{A.2}$ = "W"	$T_{A.2} = 0$	
(B.2)	$VT_{B.2} = 3269 \cdot lb$	$L_{B.2} = 28.5\,ft$	$v_{B.2} = 115 \cdot plf$	**SW-1**	$Ro_{B.2}$ = "S"	$T_{B.2} = 286\,lb$	**N/A; T < 1000#**
(C.2)	$VT_{C.2} = 0 \cdot lb$	$L_{C.2} = 0$	$v_{C.2} = 0 \cdot plf$		$Ro_{C.2}$ = "W"	$T_{C.2} = 0$	
(D.2)	$VT_{D.2} = 3269 \cdot lb$	$L_{D.2} = 13\,ft$	$v_{D.2} = 251 \cdot plf$	**SW-2**	$Ro_{D.2}$ = "S"	$T_{D.2} = 1399\,lb$	**T - 1**
(A.1)	$VT_{A.1} = 749 \cdot lb$	$L_{A.1} = 14\,ft$	$v_{A.1} = 53 \cdot plf$	**SW-1**	$Ro_{A.1}$ = "W"	$T_{A.1} = -135\,lb$	**N/A; T < 1000#**
(B.1)	$VT_{B.1} = 4530\,lb$	$L_{B.1} = 26\,ft$	$v_{B.1} = 174 \cdot plf$	**SW-1**	$Ro_{B.1}$ = "S"	$T_{B.1} = 1126\,lb$	**T - 2**
(C.1)	$VT_{C.1} = 2450\,lb$	$L_{C.1} = 32\,ft$	$v_{C.1} = 77 \cdot plf$	**SW-1**	$Ro_{C.1}$ = "W"	$T_{C.1} = 63\,lb$	**N/A; T < 1000#**
(D.1)	$VT_{D.1} = 4182\,lb$	$L_{D.1} = 13.5\,ft$	$v_{D.1} = 310 \cdot plf$	**SW-3**	$Ro_{D.1}$ = "S"	$T_{D.1} = 3612\,lb$	**T - 3**

12.0 Shear Wall & Hold Down Schedules

Shear Wall Requirements - Hem Fir values

SW - 1	SW - 2	SW - 3	SW - 4	SW - 5	SW - 6	SW - 7
Use 7/16" CDX w/ 8d @ 6" Edge 8d @ 12" Field Capacity: S-(242 plf) W-(339 plf)	**Use 7/16" CDX w/** 8d @ 4" Edge 8d @ 12" Field Capacity: S-(349 plf) W- (489 plf)	**Use 15/32" CDX w/** 10d @ 4" Edge 10d @ 12" Field Capacity: S-(428 plf) W-(599 plf)	**Use 15/32" CDX w/** 10d @ 3" Edge 10d @ 12" Field Capacity: S-(558 plf) W-(781 plf)	Use 15/32" CDX w/ 10d @ 2" Edge 10d @ 12" Field Capacity: S-(716 plf) W-(1003 plf)	**Use 15/32" CDX Both Sides w/** 10d @ 4" Edge 10d @ 12" Field Capacity S-(856 plf) W-(1198 plf)	**Use 15/32" CDX Both Sides w/** 10d @ 3" Edge 10d @ 12" Field Capacity: S-(1116 plf) W-(1562 plf)

Holddown Requirements

T - 1	T - 2	T - 3
MSTC40 w/ (28)- 16d sinkers Capacity = 2650#	STHD14/STHD14RJ w/ (38)- 16d sinkers 8" stem wall Capacity: Midwall: 3815# Corner: 3815# Endwall: 3500#	HDU8-SDS3 w/ (20)- SDS 1/4"x 2.5" screws SSTB28 w/ 25" min embed Capacity: 2-2X : 4305# 4X : 5020# 3-2X: 5665#

Shear Flow Connectors	Capacity (Hem-Fir)
Simpson L50	$Z_1 := 385 \cdot lb$
Simpson LS50	$Z_2 := 630 \cdot lb$
Simpson A35 Clip	$Z_3 := 575 \cdot lb$
Simpson H1 Truss Connector	$Z_4 := 415 \cdot lb$
Simpson DTC Clip	$Z_5 := 210 \cdot lb$
1/2" Diameter Anchor Bolts (2x)	$Z_6 := 758 \cdot lb$
5/8" Diameter Anchor Bolts (2x)	$Z_7 := 1106 \cdot lb$
5/8" Diameter Anchor Bolts (3x)	$Z_8 := 1386 \cdot lb$

Shear Wall Capacity

$SW_1 := 242 \cdot plf$

$SW_2 := 349 \cdot plf$

$SW_3 := 428 \cdot plf$

$SW_4 := 558 \cdot plf$

$SW_5 := 716 \cdot plf$

$SW_6 := 856 \cdot plf$

$SW_7 := 1116 \cdot plf$

Connector Spacing:

Shear Walls 1 2 3 4 5 6 7

$$Z = \begin{pmatrix} 19 & 13 & 11 & 8 & 6 & 5 & 4 \\ 31 & 22 & 18 & 14 & 11 & 9 & 7 \\ 29 & 20 & 16 & 12 & 10 & 8 & 6 \\ 21 & 14 & 12 & 9 & 7 & 6 & 4 \\ 10 & 7 & 6 & 5 & 4 & 3 & 2 \\ 38 & 26 & 21 & 16 & 13 & 11 & 8 \\ 55 & 38 & 31 & 24 & 19 & 16 & 12 \\ 69 & 48 & 39 & 30 & 23 & 19 & 15 \end{pmatrix} \cdot in$$

Simpson L50
Simpson LS50
A35 Clips
H1 Clips
DTC Clips
1/2" Anchor Bolts (2x)
5/8" Anchor Bolts (2x)
5/8" Anchor Bolts (3x)

13.0 Seismic Check

Seismic Shear per linear ft

$v_{1.2e} = 0 \cdot plf$ $v_{2.2e} = 163 \cdot plf$ $v_{3.2e} = 0 \cdot plf$ $v_{4.2e} = 163 \cdot pl$ $v_{A.2e} = 0 \cdot plf$ $v_{B.2e} = 115 \cdot plf$ $v_{C.2e} = 0 \cdot plf$ $v_{D.2e} = 251 \cdot plf$

$v_{1.1e} = 17 \cdot plf$ $v_{2.1e} = 249 \cdot plf$ $v_{3.1e} = 41 \cdot plf$ $v_{4.1e} = 213 \cdot pl$ $v_{A.1e} = 36 \cdot plf$ $v_{B.1e} = 174 \cdot plf$ $v_{C.1e} = 52 \cdot plf$ $v_{D.1e} = 310 \cdot plf$

14.0 Height to Width Aspect Ratio

$H_{2AR} := H_2$ Height of Second Story Walls $\frac{H_{2AR}}{2} = 4\,ft$ $\frac{H_{2AR}}{3.5} = 2.3\,ft$ *AF&PA SDPWS 2015 [22]*

$H_{1AR} := H_1$ Height of First Story Walls $\frac{H_{1AR}}{2} = 4.8\,ft$ $\frac{H_{1AR}}{3.5} = 2.7\,ft$

h/w less than 2 is OK; Greater than 3.5 is unacceptable

Grid Line	w	h/w		2w/h	Vreqd	SW
1.2	$w_{1.2} := w_{1.2}$	$\frac{H_{2AR}}{w_{1.2}} =$ ∎	$MV := \frac{2 \cdot w_{1.2}}{H_{2AR}}$	MV = 0.000	$\frac{v_{1.2e}}{MV} = 0$	
2.2	$w_{2.2} := w_{2.2}$	$\frac{H_{2AR}}{w_{2.2}} = 2$	$MV := \frac{2 \cdot w_{2.2}}{H_{2AR}}$	MV = 1.000	$\frac{v_{2.2e}}{MV} = 163\,\frac{lb}{ft}$	
3.2	$w_{3.2} := w_{3.2}$	$\frac{H_{2AR}}{w_{3.2}} =$ ∎	$MV := \frac{2 \cdot w_{3.2}}{H_{2AR}}$	MV = 0.000	$\frac{v_{3.2e}}{MV} = 0$	
4.2	$w_{4.2} := w_{4.2}$	$\frac{H_{2AR}}{w_{4.2}} = 1.6$	$MV := \frac{2 \cdot w_{4.2}}{H_{2AR}}$	MV = 1.250	$\frac{v_{4.2e}}{MV} = 131\,\frac{lb}{ft}$	
1.1	$w_{1.1} := w_{1.1}$	$\frac{H_{1AR}}{w_{1.1}} = 0.5$	$MV := \frac{2 \cdot w_{1.1}}{H_{1AR}}$	MV = 4.211	$\frac{v_{1.1e}}{MV} = 4\,\frac{lb}{ft}$	
2.1	$w_{2.1} := w_{2.1}$	$\frac{H_{1AR}}{w_{2.1}} = 3.2$	$MV := \frac{2 \cdot w_{2.1}}{H_{1AR}}$	MV = 0.632	$\frac{v_{2.1e}}{MV} = 394\,\frac{lb}{ft}$	SW-3
3.1	$w_{3.1} := w_{3.1}$	$\frac{H_{1AR}}{w_{3.1}} = 0.8$	$MV := \frac{2 \cdot w_{3.1}}{H_{1AR}}$	MV = 2.526	$\frac{v_{3.1e}}{MV} = 16\,\frac{lb}{ft}$	
4.1	$w_{4.1} := w_{4.1}$	$\frac{H_{1AR}}{w_{4.1}} = 3.2$	$MV := \frac{2 \cdot w_{4.1}}{H_{1AR}}$	MV = 0.632	$\frac{v_{4.1e}}{MV} = 338\,\frac{lb}{ft}$	SW-2
A.2	$w_{A.2} := w_{A.2}$	$\frac{H_{2AR}}{w_{A.2}} =$ ∎	$MV := \frac{2 \cdot w_{A.2}}{H_{2AR}}$	MV = 0.000	$\frac{v_{A.2e}}{MV} = 0$	
B.2	$w_{B.2} := w_{B.2}$	$\frac{H_{2AR}}{w_{B.2}} = 2.3$	$MV := \frac{2 \cdot w_{B.2}}{H_{2AR}}$	MV = 0.875	$\frac{v_{B.2e}}{MV} = 131\,\frac{lb}{ft}$	SW-1
C.2	$w_{C.2} := w_{C.2}$	$\frac{H_{2AR}}{w_{C.2}} =$ ∎	$MV := \frac{2 \cdot w_{C.2}}{H_{2AR}}$	MV = 0.000	$\frac{v_{C.2e}}{MV} = 0$	
D.2	$w_{D.2} := w_{D.2}$	$\frac{H_{2AR}}{w_{D.2}} = 2.7$	$MV := \frac{2 \cdot w_{D.2}}{H_{2AR}}$	MV = 0.750	$\frac{v_{D.2e}}{MV} = 335\,\frac{lb}{ft}$	SW-2
A.1	$w_{A.1} := w_{A.1}$	$\frac{H_{1AR}}{w_{A.1}} = 1.4$	$MV := \frac{2 \cdot w_{A.1}}{H_{1AR}}$	MV = 1.474	$\frac{v_{A.1e}}{MV} = 25\,\frac{lb}{ft}$	
B.1	$w_{B.1} := w_{B.1}$	$\frac{H_{1AR}}{w_{B.1}} = 2.4$	$MV := \frac{2 \cdot w_{B.1}}{H_{1AR}}$	MV = 0.842	$\frac{v_{B.1e}}{MV} = 207\,\frac{lb}{ft}$	SW-1
C.1	$w_{C.1} := w_{C.1}$	$\frac{H_{1AR}}{w_{C.1}} = 1.9$	$MV := \frac{2 \cdot w_{C.1}}{H_{1AR}}$	MV = 1.053	$\frac{v_{C.1e}}{MV} = 49\,\frac{lb}{ft}$	
D.1	$w_{D.1} := w_{D.1}$	$\frac{H_{1AR}}{w_{D.1}} = 2.7$	$MV := \frac{2 \cdot w_{D.1}}{H_{1AR}}$	MV = 0.737	$\frac{v_{D.1e}}{MV} = 420\,\frac{lb}{ft}$	SW-3

Diaphragm Design

Project: Plan M2595B3F-9
Client: ANW
P&A No.: 21-140

Root Diaphragm

Front/Back

V= 8803 lb
L= 34 ft
b= 60 ft

DIAPHRAGM NAILING PATTERN

Use 19/32" CDX w/
10d @ 6" OC (Panel Edge)
10d @ 12" OC (Panel Field)

Capacity: 265 plf

UNIT SHEAR

ω = Unit Shear= 259 plf

REACTIONS

Ra=Rb= wl/2 Ra=Rb= 4402 LB

MOMENT

$M = wl^2/8$ M= 37413 FT*LB

TENSION

T=C= M/b T=C= 624 LB

CHORD

Try 2x6 HF#2 A= 8.25 in2
ft= 525 psi
Tallow= 4331 GT 624 OK

TOP PLATE SPLICE NAILING

10d (0.131) NAIL-GUN NAILS 84 LB
Number of nails ea side of each splice 7.4
Use 2-2x6 HF#2 Chord W/24-10d nails on each side of each splice

Left/Right

V= 8803 lb
L= 60 ft
b= 34 ft

DIAPHRAGM NAILING PATTERN

Use 19/32" CDX w/
10d @ 6" OC (Panel Edge)
10d @ 12" OC (Panel Field)

Capacity: 265 plf

UNIT SHEAR

ω = Unit Shear= 147 plf

REACTIONS

Ra=Rb= wl/2 Ra=Rb= 4402 LB

MOMENT

$M = wl^2/8$ M= 66023 FT*LB

TENSION

T=C= M/b T=C= 1942 LB

CHORD

Try 2x6 HF#2 A= 8.25 in2
ft= 525 psi
Tallow= 4331 GT 1942 OK

TOP PLATE SPLICE NAILING

10d (0.131) NAIL-GUN NAILS 84 LB
Number of nails ea side of each splice 23.1
Use 2-2x6 HF#2 Chord W/24-10d nails on each side of each splice

Second FLoor Diaphragm

Project: Plan M2595B3F-9
Client: ANW
P&A No.: 21-140

Front/Back

V= 10277 lb
L= 34 ft
b= 56 ft

DIAPHRAGM NAILING PATTERN

Use 3/4" Sturd-I-Floor w/
10d @ 6" OC (Panel Edge)
10d @ 12" OC (Panel Field)

Capacity: 320 plf

UNIT SHEAR

ω = Unit Shear= 302 plf

REACTIONS

Ra=Rb= wl/2 Ra=Rb= 5139 LB

MOMENT

$M = wl^2/8$ M= 43677 FT*LB

TENSION

T=C= M/b T=C= 780 LB

CHORD

Try 2x6 HF#2 A= 8.25 in2
ft= 525 psi
Tallow= 4331 GT 780 OK

TOP PLATE SPLICE NAILING

10d (0.131) NAIL-GUN NAILS 84 LB
Number of nails ea side of each splice 9.3

Use 2-2x6 HF#2 Chord W/25-10d nails on each side of each splice

Left/Right

V= 10277 lb
L= 56 ft
b= 34 ft

DIAPHRAGM NAILING PATTERN

Use 3/4" Sturd-I-Floor w/
10d @ 6" OC (Panel Edge)
10d @ 12" OC (Panel Field)

Capacity: 320 plf

UNIT SHEAR

ω = Unit Shear= 184 plf

REACTIONS

Ra=Rb= wl/2 Ra=Rb= 5139 LB

MOMENT

$M = wl^2/8$ M= 71939 FT*LB

TENSION

T=C= M/b T=C= 2116 LB

CHORD

Try 2x6 HF#2 A= 8.25 in2
ft= 525 psi
Tallow= 4331 GT 2116 OK

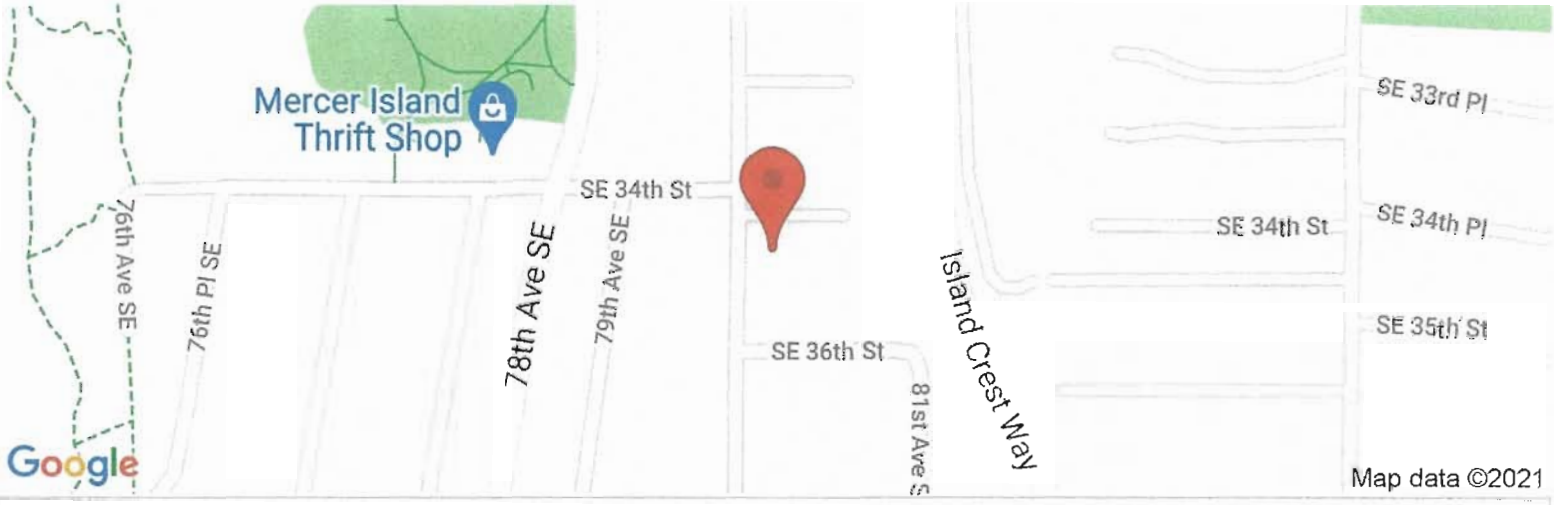
TOP PLATE SPLICE NAILING

10d (0.131) NAIL-GUN NAILS 84 LB
Number of nails ea side of each splice 25.2

Use 2-2x6 HF#2 Chord W/25-10d nails on each side of each splice

8005 SE 34th Pl, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.579581, -122.2320127



Date	12/8/2021, 12:15:11 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

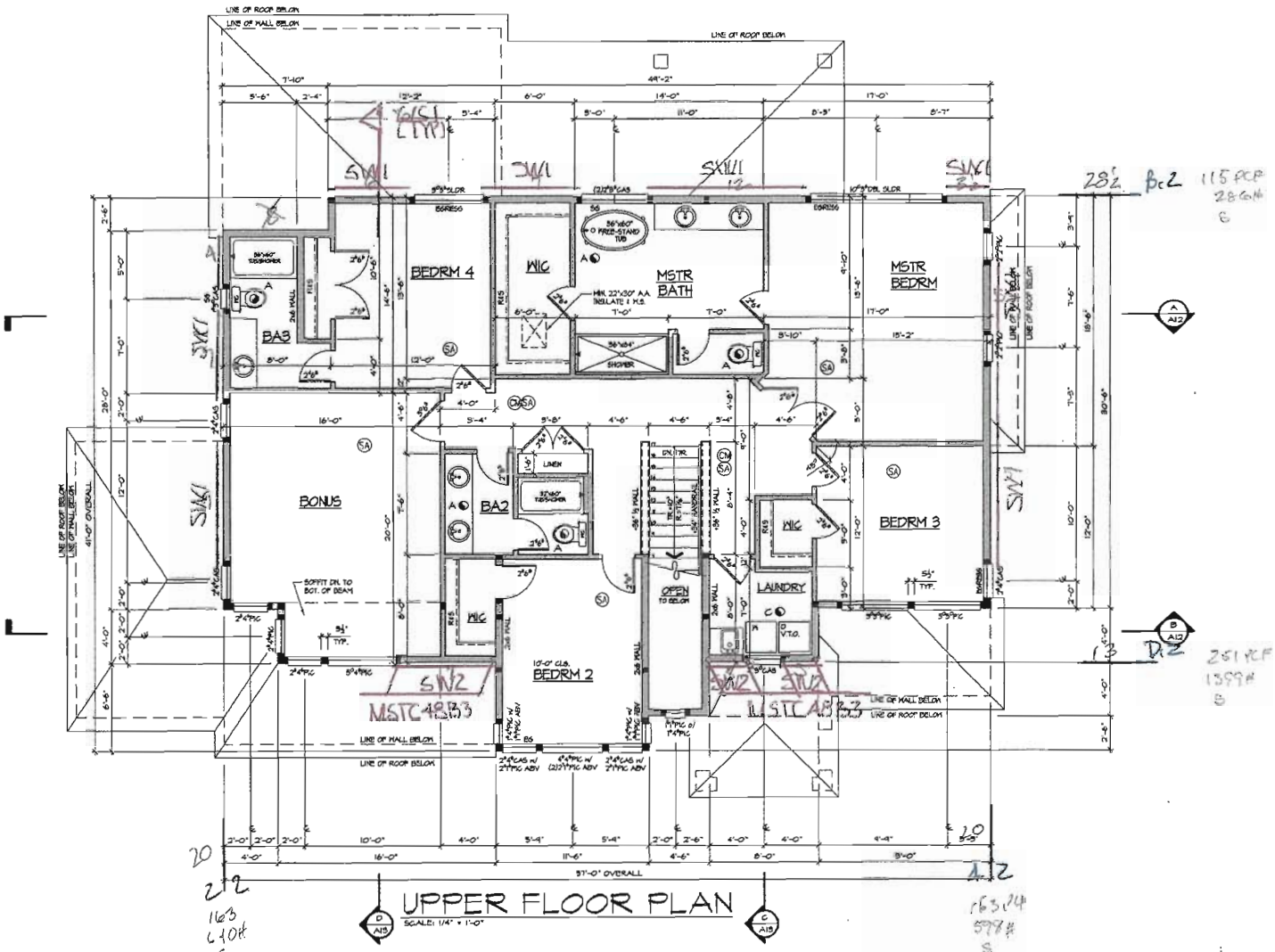
Type	Value	Description	
S_S	1.406	MCE_R ground motion. (for 0.2 second period)	1.4711
S_1	0.489	MCE_R ground motion. (for 1.0s period)	0.5664
S_{MS}	1.406	Site-modified spectral acceleration value	1.00
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value	1.77
S_{DS}	0.937	Numeric seismic design value at 0.2 second SA	
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA	

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.602	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.662	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	1.406	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.558	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	3.441	Factored deterministic acceleration value. (0.2 second)
S1RT	0.489	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.545	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.389	Factored deterministic acceleration value. (1.0 second)
PGAd	1.18	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.902	Mapped value of the risk coefficient at short periods
C_{R1}	0.897	Mapped value of the risk coefficient at a period of 1 s

Resisting System
R = 6.50
Ω_0 = 2.50
C_d = 4.00
ρ = 1.3
T_e =
0.1510

N Mercer Way
90th Pl SE
I-90 West Bound
I-90 East Bound
I-90 Express Lane
Fortuna Dr
Shorewood Dr
W Concord
E Shorewood
SE 36th St
SE 36th Pl
Gallagher Hill Rd
86th Ave SE
SE 33rd Pl
SE 34th Pl
SE 35th Pl
SE 37th St
SE 39th St
SE 30th St
SE 30th Pl
SE 32nd St
SE 35th St
SE 36th St
SE 28th Pl
81st Pl SE
81st Ave SE
Island Crest Way
80th Ave SE
77th Ave SE
77th Pl SE
76th Ave SE
76th Pl SE
74th Pl SE

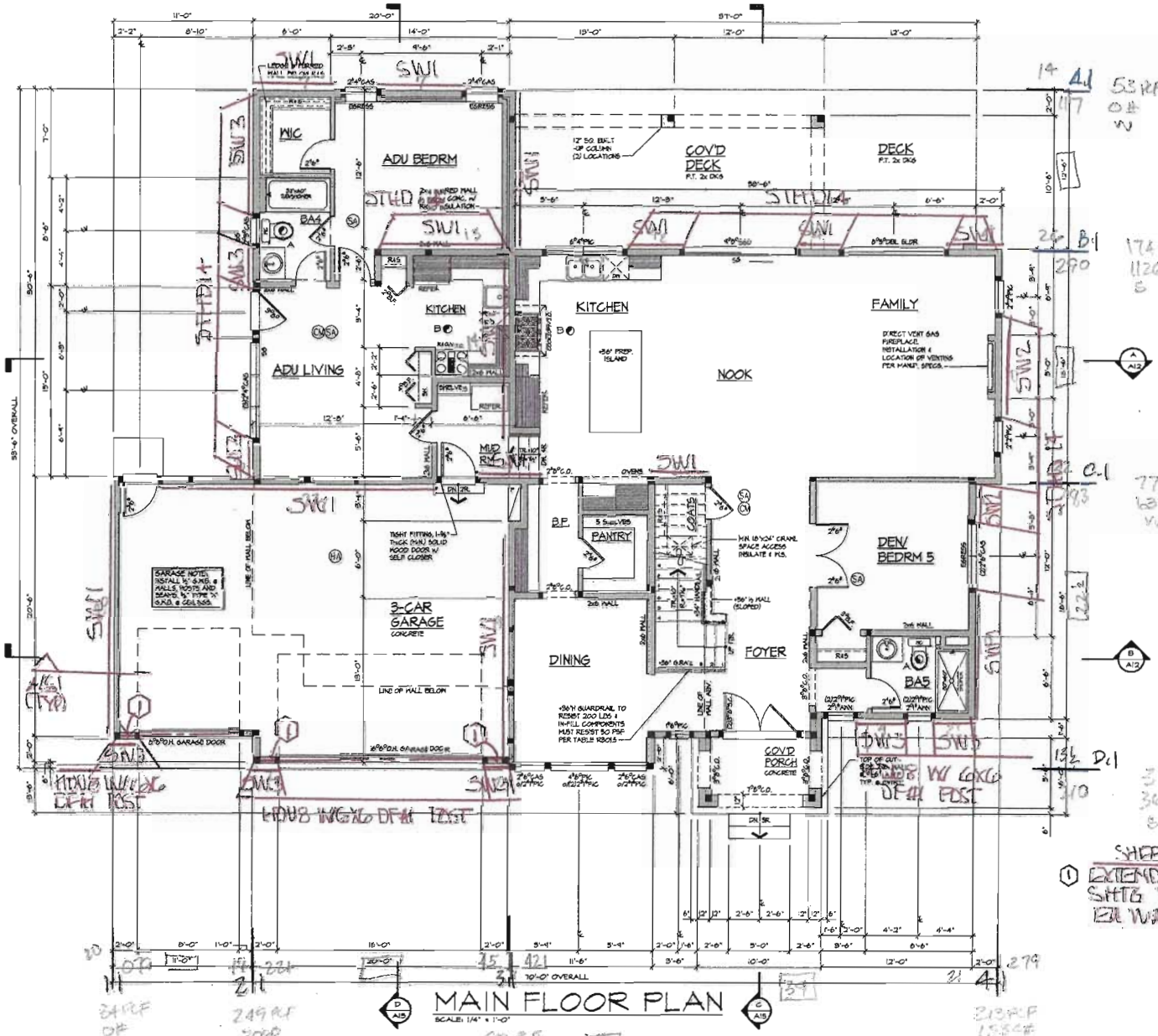
21-140



UPPER FLOOR PLAN

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

21-140


ADU BEDRM
WIC
BAS
ADU LIVING
KITCHEN
KITCHEN
NOOK
FAMILY
COV'D DECK
DECK
DEN/ BEDRM 5
PANTRY
B.P.
COATS
FOYER
DINING
3-CAR GARAGE
CONCRETE
COV'D PORCH
CONCRETE
MAIN FLOOR PLAN
SCALE: 1/4" = 1'-0"
SHEET NOTES
1 EXTEND HDR OVER SW. NAIL SHTG TO HDR W/10d @ 4"oc EA WAY.

21-140