Reid Middleton

CIVIL ENGINEERING
STRUCTURAL ENGINEERING
SURVEYING
PLANNING

4353 RENDEZVOUS CIRCLE STRUCTURAL CALCULATIONS

ANCHORAGE, ALASKA

RM Project #402024.121

Structural Calculations
February 16, 2024

REVIEWED FOR STRUCTURAL CODE COMPLIANCE

2/27/24

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Drifting per ASCE 7-16 Sect 7.7:

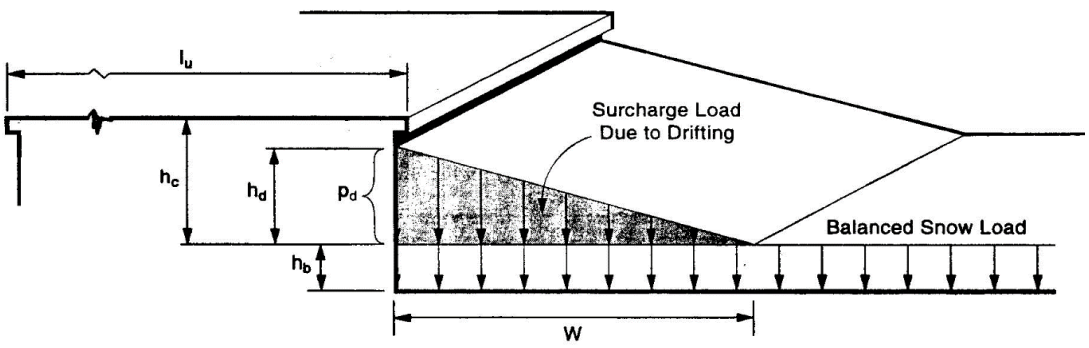
ReidMiddleton

Job Name:	4353 Rendezvous
RM Job Number:	40-23-121

Ground Snow Load, p_g = 50 psf
Basic Roof Snow Load, p_f = 40 psf
Importance Factor, I_s = 1.0

		Location:	low canopy		
Width of upper roof, 20' min	l_u		10.0 ft	10.0 ft	10.0 ft
Width of Lower Roof, 20' min in equation	l_l		30.0 ft	10.0 ft	10.0 ft
Difference in roof heights	h_r		5.0 ft	14.0 ft	14.0 ft
Is this a parapet or roof projection? (if no = no change, if yes = 3/4 of drift per Sect 7.8)			no	no	no
$h_c = h_r - h_b$	h_c		3.0 ft	12.0 ft	12.0 ft
Height of drift = $l_s^{1/2} * [(0.43 * l_x^{1/3} * (p_g+10)^{1/4}) - 1.5]$, (*limited to 60% of length of lower roof*)	h_d		1.7 ft	1.7 ft	1.7 ft
Governing direction (leeward or windward)			leeward	leeward	leeward
Width of drift = $4*h_d$, $4h_d^2/h_c$, $8h_c$ max	W		**7.0 ft**	**7.0 ft**	**7.0 ft**
Density of snow = $0.13p_g+14$, 30pcf max	γ		20.5 pcf	20.5 pcf	20.5 pcf
Depth of balance snow load = p_f/γ	h_b		2.0 ft	2.0 ft	2.0 ft
Consider drift? Is $h_c/h_b > 0.2$?			***YES***	***YES***	***YES***
Added Snow Drift at high point	**P_{max}=**		**36 psf**	**36 psf**	**36 psf**
Added Snow Drift at low point	**P_{min}=**		**0 psf**	**0 psf**	**0 psf**

		Location:			
Width of upper roof, 20' min	l_u				
Width of Lower Roof, 20' min in equation	l_l				
difference in roof heights	h_r				
Is this a parapet or roof projection? (if no = no change, if yes = 3/4 of drift per Sect 7.8)			no	no	no
$h_c = h_r - h_b$	h_c		-2.0 ft	-2.0 ft	-2.0 ft
Height of drift = sqrt(l_s) *$[(0.43 * l^{1/3} * (p_g+10)^{1/4}) - 1.5]$, (*limited to 60% of length of lower roof*)	h_d		0.0 ft	0.0 ft	0.0 ft
governing direction (leeward or windward)			leeward	leeward	leeward
Width of drift = $4*h_d$, $4h_d^2/h_c$, $8h_c$ max	W		**-15.6 ft**	**-15.6 ft**	**-15.6 ft**
Density of snow = $.13p_g+14$, 30 max	γ		20.5 pcf	20.5 pcf	20.5 pcf
Depth of balance snow load = p_f/γ	h_b		2.0 ft	2.0 ft	2.0 ft
Consider drift?			***NO***	***NO***	***NO***
Added Snow Drift at high point	**P_{max}=**		**0 psf**	**0 psf**	**0 psf**
Added Snow Drift at low point	**P_{min}=**		**0 psf**	**0 psf**	**0 psf**



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Project Title:
Engineer:
Project ID:
Project Descr:

Printed: 16 FEB 2024, 11:44AM

Wood Beam

Project File: 4353 Rendezvous.ec6

DESCRIPTION: NEW TRUSS TAIL FOR CONN DESIGN ONLY

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

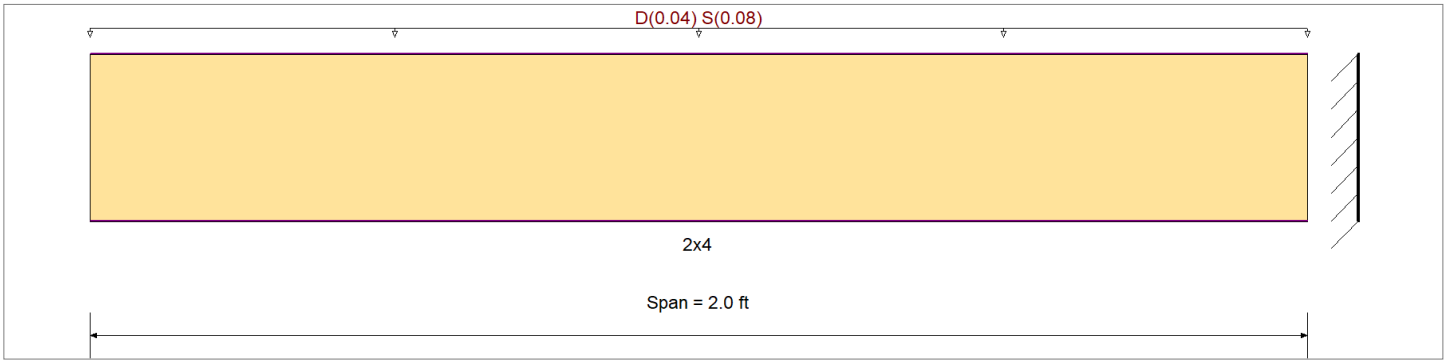
Wood Species : Hem-Fir
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1,100.0 ksi
Eminbend - xx	400.0 ksi
Density	26.840 pcf



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, S = 0.040 ksf, Tributary Width = 2.0 ft, (TYP ROOF LOAD)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.814 : 1	Maximum Shear Stress Ratio	=	0.368 : 1
Section used for this span		2x4	Section used for this span		2x4
fb: Actual	=	948.08 psi	fv: Actual	=	59.29 psi
F'b	=	1,164.38 psi	F'v	=	161.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	2.000 ft	Location of maximum on span	=	1.715 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.047 in	Ratio =	1020	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.071 in	Ratio =	674	>=180	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 2.0 ft	1	0.352	0.159	0.90	1.00	1.00	1.00	1.500	1.00	1.00	1.00	0.08	321.1	911.3	0.07	20.1	126.0
+D+S					1.00	1.00	1.00	1.500	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.0 ft	1	0.814	0.368	1.15	1.00	1.00	1.00	1.500	1.00	1.00	1.00	0.24	948.1	1,164.4	0.21	59.3	161.0
+D+0.750S					1.00	1.00	1.00	1.500	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.0 ft	1	0.680	0.307	1.15	1.00	1.00	1.00	1.500	1.00	1.00	1.00	0.20	791.3	1,164.4	0.17	49.5	161.0
+0.60D					1.00	1.00	1.00	1.500	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 2.0 ft	1	0.119	0.054	1.60	1.00	1.00	1.00	1.500	1.00	1.00	1.00	0.05	192.7	1,620.0	0.04	12.0	224.0

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Wood Beam

Project File: 4353 Rendezvous.ec6

DESCRIPTION: NEW TRUSS TAIL FOR CONN DESIGN ONLY

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0711	0.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions		0.242
Max Upward from Load Combinations		0.242
Max Upward from Load Cases		0.160
D Only		0.082
+D+S		0.242
+D+0.750S		0.202
+0.60D		0.049
S Only		0.160

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Wood Beam

Project File: 4353 Rendezvous.ec6

DESCRIPTION: canopy GLB

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

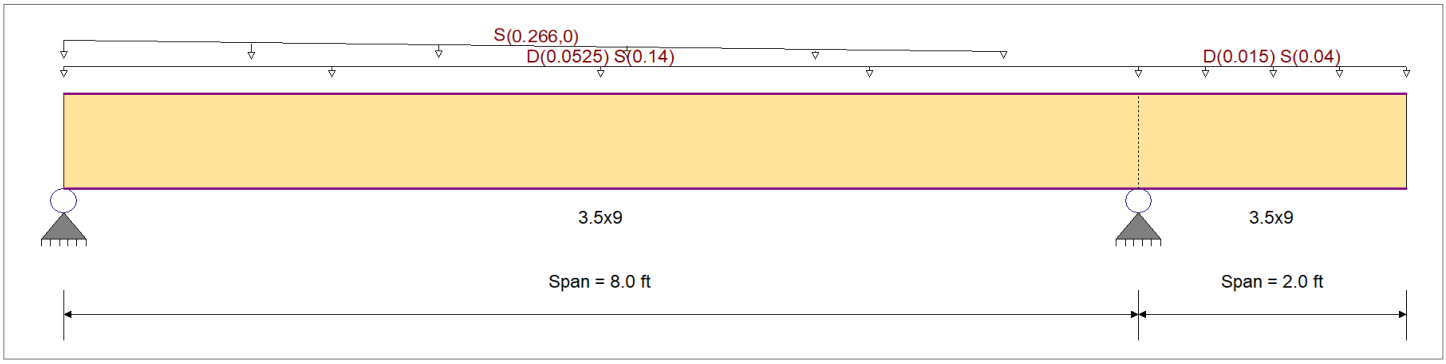
Wood Species : DF/DF
Wood Grade : 24F-V4

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

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

E : Modulus of Elasticity

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



Applied Loads

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

Beam self weight NOT internally calculated and added
Load for Span Number 1
Uniform Load : D = 0.0150, S = 0.040 ksf, Tributary Width = 3.50 ft, (typ roof load)
Varying Uniform Load : S= 0.0760->0.0 ksf, Extent = 0.0 -->> 7.0 ft, Trib Width = 3.50 ft

Load for Span Number 2
Uniform Load : D = 0.0150, S = 0.040 , Tributary Width = 1.0 ft, (typ load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.223 : 1	Maximum Shear Stress Ratio	=	0.172 : 1
Section used for this span		3.5x9	Section used for this span		3.5x9
fb: Actual	=	614.89 psi	fv: Actual	=	52.26 psi
F'b	=	2,760.00 psi	F'v	=	304.75 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	3.620 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	0.060 in	Ratio =	1588 >=240	Span: 1 : S Only
Max Upward Transient Deflection	-0.045 in	Ratio =	1070 >=240	Span: 2 : S Only
Max Downward Total Deflection	0.073 in	Ratio =	1321 >=180	Span: 1 : +D+S
Max Upward Total Deflection	-0.054 in	Ratio =	886 >=180	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.048	0.035	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.41	102.9	2,160.0	0.18	8.4	238.5
Length = 2.0 ft	2	0.005	0.035	0.90	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.03	7.6	1,665.0	0.02	8.4	238.5
+D+S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	1	0.223	0.172	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	2.42	614.9	2,760.0	1.10	52.3	304.8
Length = 2.0 ft	2	0.013	0.172	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.11	27.9	2,127.5	0.07	52.3	304.8

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Wood Beam

Project File: 4353 Rendezvous.ec6

DESCRIPTION: canopy GLB

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_V	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+D+0.750S					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	**1**	0.176	0.135	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	1.92	486.8	2,760.0	0.87	41.2	304.8
Length = 2.0 ft	**2**	0.011	0.135	1.15	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.09	22.9	2,127.5	0.06	41.2	304.8
+0.60D					1.00	1.00	1.00	1.000	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 8.0 ft	**1**	0.016	0.012	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.24	61.7	3,840.0	0.11	5.0	424.0
Length = 2.0 ft	**2**	0.002	0.012	1.60	1.00	1.00	1.00	1.000	1.00	1.00	1.00	0.02	4.6	2,960.0	0.01	5.0	424.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0726	3.933		0.0000	0.000
	2	0.0000	3.933	+D+S	-0.0541	2.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	1.416	1.165	
Max Upward from Load Combinations	1.416	1.165	
Max Upward from Load Cases	1.209	0.922	
D Only	0.206	0.244	
+D+S	1.416	1.165	
+D+0.750S	1.113	0.935	
+0.60D	0.124	0.146	
S Only	1.209	0.922	

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Wood Beam

Project File: 4353 Rendezvous.ec6

DESCRIPTION: 2x decking

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

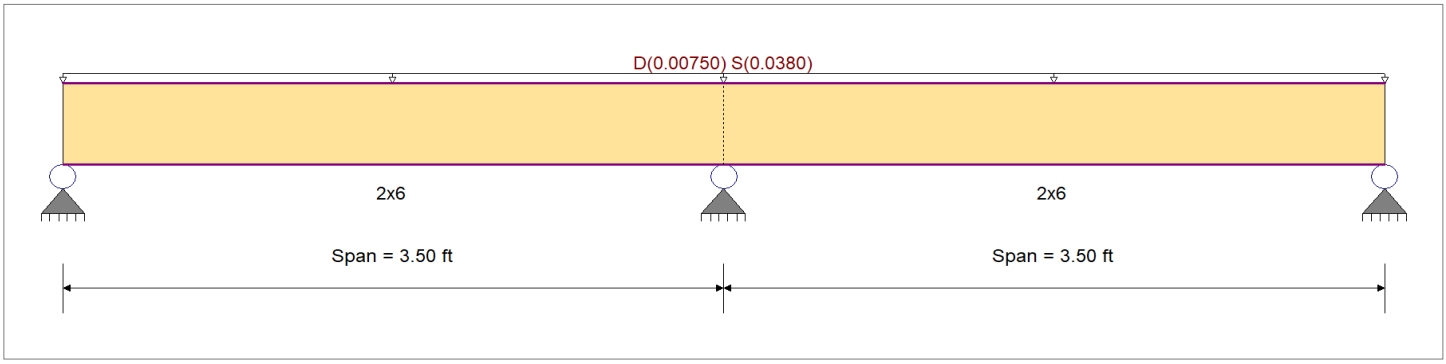
Wood Species : Hem-Fir
Wood Grade : No.2

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



Applied Loads

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

Beam self weight NOT internally calculated and added
Loads on all spans...
Uniform Load on ALL spans : D = 0.0150, S = 0.0760 ksf, Tributary Width = 0.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.319 : 1	Maximum Shear Stress Ratio	=	0.083 : 1
Section used for this span		2x6	Section used for this span		2x6
fb: Actual	=	405.36 psi	fv: Actual	=	14.38 psi
F'b	=	1,270.75 psi	F'v	=	172.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	3.500 ft	Location of maximum on span	=	3.500 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.027 in	Ratio =	1565 >=240	Span: 2 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0 <240	n/a
Max Downward Total Deflection	0.032 in	Ratio =	1307 >=180	Span: 2 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0 <180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 3.50 ft	1	0.067	0.018	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.01	66.8	994.5	0.01	2.4	135.0
Length = 3.50 ft	2	0.067	0.018	0.90	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.01	66.8	994.5	0.01	2.4	135.0
+D+S					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.50 ft	1	0.319	0.083	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.07	405.4	1,270.8	0.08	14.4	172.5
Length = 3.50 ft	2	0.319	0.083	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.07	405.4	1,270.8	0.08	14.4	172.5
+D+0.750S					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.50 ft	1	0.252	0.066	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.06	320.7	1,270.8	0.06	11.4	172.5
Length = 3.50 ft	2	0.252	0.066	1.15	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.06	320.7	1,270.8	0.06	11.4	172.5

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Wood Beam

Project File: 4353 Rendezvous.ec6

DESCRIPTION: 2x decking

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
+0.60D					1.00	1.00	1.00	1.300	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 3.50 ft	**1**	0.023	0.006	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.01	40.1	1,768.0	0.01	1.4	240.0
Length = 3.50 ft	**2**	0.023	0.006	1.60	1.00	1.00	1.00	1.300	1.00	1.00	1.00	0.01	40.1	1,768.0	0.01	1.4	240.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0321	1.486		0.0000	0.000
+D+S	2	0.0318	2.034		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.060	0.199	0.060
Max Upward from Load Combinations	0.060	0.199	0.060
Max Upward from Load Cases	0.050	0.166	0.050
D Only	0.010	0.033	0.010
+D+S	0.060	0.199	0.060
+D+0.750S	0.047	0.157	0.047
+0.60D	0.006	0.020	0.006
S Only	0.050	0.166	0.050

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Project Title:
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Wood Beam

Project File: 4353 Rendezvous.ec6

DESCRIPTION: entry deck joist

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

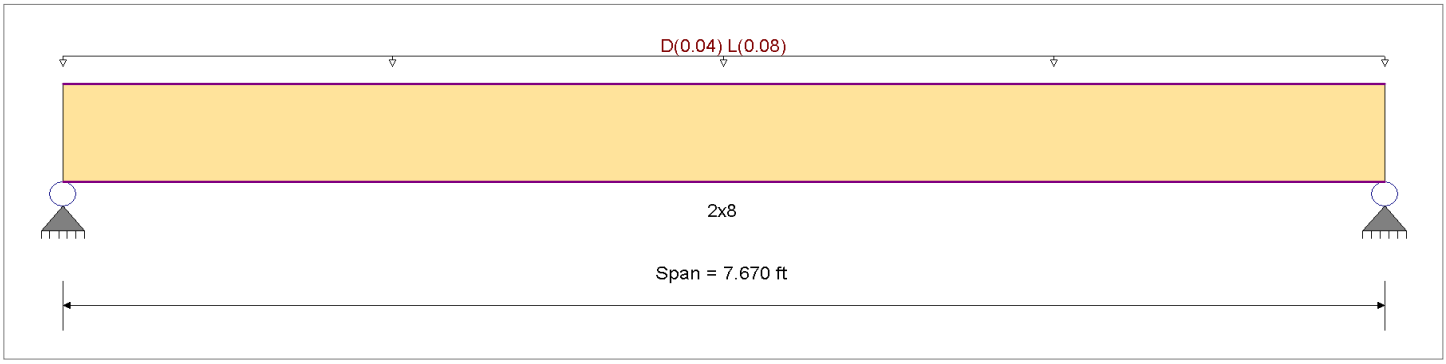
Wood Species : Douglas Fir-Larch (North)
Wood Grade : No. 1/No. 2

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

Fb +	850.0 psi
Fb -	850.0 psi
Fc - Prll	1,400.0 psi
Fc - Perp	625.0 psi
Fv	180.0 psi
Ft	500.0 psi

E : Modulus of Elasticity

Ebend- xx	1,600.0 ksi
Eminbend - xx	580.0 ksi
Density	30.590 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.020, L = 0.040 ksf, Tributary Width = 2.0 ft, (typ)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.790 : 1	Maximum Shear Stress Ratio	=	0.299 : 1
Section used for this span		2x8	Section used for this span		2x8
fb: Actual	=	805.84 psi	fv: Actual	=	53.75 psi
F'b	=	1,020.00 psi	F'v	=	180.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.835 ft	Location of maximum on span	=	7.082 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.082 in	Ratio =	1119	>=500	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<500	n/a
Max Downward Total Deflection	0.123 in	Ratio =	746	>=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 7.670 ft	1	0.293	0.111	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.29	268.6	918.0	0.13	17.9	162.0
+D+L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 7.670 ft	1	0.790	0.299	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.88	805.8	1,020.0	0.39	53.7	180.0
+D+0.750L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 7.670 ft	1	0.527	0.199	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.74	671.5	1,275.0	0.32	44.8	225.0
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 7.670 ft	1	0.099	0.037	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.18	161.2	1,632.0	0.08	10.7	288.0

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Wood Beam

Project File: 4353 Rendezvous.ec6

DESCRIPTION: entry deck joist

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1233	3.863		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.460	0.460
Max Upward from Load Combinations	0.460	0.460
Max Upward from Load Cases	0.307	0.307
D Only	0.153	0.153
+D+L	0.460	0.460
+D+0.750L	0.384	0.384
+0.60D	0.092	0.092
L Only	0.307	0.307

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Wood Beam

Project File: 4353 Rendezvous.ec6

DESCRIPTION: Entry Deck Girder

CODE REFERENCES

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Stress Design
Load Combination : IBC 2021

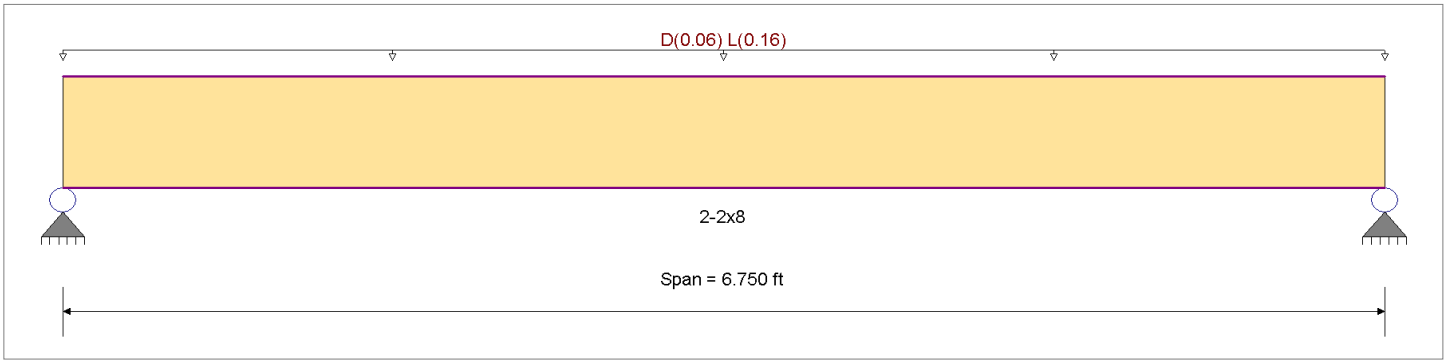
Wood Species : Hem-Fir
Wood Grade : No.2

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

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

E : Modulus of Elasticity

Ebend- xx	1100 ksi
Eminbend - xx	400 ksi
Density	26.84 pcf



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 4.0 ft, (typ floor load)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.706 : 1	Maximum Shear Stress Ratio	=	0.302 : 1
Section used for this span		2-2x8	Section used for this span		2-2x8
fb: Actual	=	572.10 psi	fv: Actual	=	42.24 psi
F'b	=	810.00 psi	F'v	=	140.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	3.375 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	0.072 in	Ratio =	1129	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.099 in	Ratio =	821	>=180	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<180	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	Moment Values M	fb	F'b	Shear Values V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 6.725 ft	1	0.214	0.091	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.34	156.0	729.0	0.17	11.5	126.0
Length = 0.02464 ft	1	0.003	0.091	0.90	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.00	2.3	729.0	0.17	11.5	126.0
+D+L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.725 ft	1	0.706	0.302	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.25	572.1	810.0	0.61	42.2	140.0
Length = 0.02464 ft	1	0.010	0.302	1.00	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.02	8.3	810.0	0.61	42.2	140.0
+D+0.750L					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.725 ft	1	0.462	0.197	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	1.03	468.1	1,012.5	0.50	34.6	175.0
Length = 0.02464 ft	1	0.007	0.197	1.25	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.01	6.8	1,012.5	0.50	34.6	175.0
+0.60D					1.00	1.00	1.00	1.200	1.00	1.00	1.00			0.0	0.00	0.0	0.0

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Wood Beam

Project File: 4353 Rendezvous.ec6

DESCRIPTION: Entry Deck Girder

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 6.725 ft	1	0.072	0.031	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.21	93.6	1,296.0	0.10	6.9	224.0
Length = 0.02464 ft	1	0.001	0.031	1.60	1.00	1.00	1.00	1.200	1.00	1.00	1.00	0.00	1.4	1,296.0	0.10	6.9	224.0

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0986	3.400		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.743	0.743
Max Upward from Load Combinations	0.743	0.743
Max Upward from Load Cases	0.540	0.540
D Only	0.203	0.203
+D+L	0.743	0.743
+D+0.750L	0.608	0.608
+0.60D	0.122	0.122
L Only	0.540	0.540

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Project No. 40-23-121

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Checked by ____
Date ____

TRUSS TAIL CONN

DESIGN AS A "FIXED" CONN

$M = 0.242 \frac{k}{}\cdot ft$ FROM ENERCALC, USE 200# PT LOAD

$M = 200 \times 2' = 400\ \#\cdot ft$

$\frac{M}{ot} = 2400\#$ ← EA LINE OF FASTENERS MUST TRANSFER THIS MUCH... SEE SS

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Checked:
Date:

~ COMBINED SHEAR AND TENSION CONNECTION PER NDS 2018, CHAPTER 12 ~

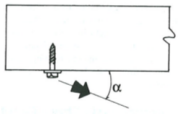
INPUT: Truss Tail Backspan Conn

Method: ASD

Forces:

Tension/Withdrawal:	R_t =	0.0 lbs
Shear:	R_s =	2400.0 lbs
Resultant Load:	R_R =	2400.0 lbs
Direction:	α =	0.0°

0° is Shear Only
90° is Tension Only



Fastener: Wood Screw

# of Fasteners, *n* =	13
Size:	#12
Length, *L* =	3.00 in
Nominal Diameter[B], *D* =	0.216 in
Head Diameter, D_H =	0.414 in

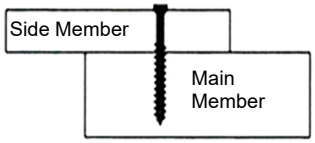
Wood:

Side Member Material[C]:	Wood
Main Member Material[C]:	Wood
Side Member Specific Gravity, G_s=	0.50
Main Member Specific Gravity, G_m=	0.50
Side Member Thickness, t_{ns}=	1.50 in
Main Member Thickness, t_m=	1.50 in
*Only used for toe-nailing:	2.00 in

Shear:

Main Member Shear Action Angle, θ_m=	90°	0° = // to grain
Side Member Shear Action Angle, θ_s=	90°	90° = ⊥ to grain

		NDS Ref.:
ASD	Tension Load Duration:	10 Min/Wind or EQ Load	11.3.2
ASD	Shear Load Duration:	10 Min/Wind or EQ Load	11.3.2
ASD & LRFD	Moisture Content[A]:	≤19% @ fab. & ≤19% in service	11.3.3
ASD & LRFD	Temperature:	In Service Dry & Temp.≤100°F	11.3.4
ASD & LRFD	Group Action:	Input C_g below	11.3.6
ASD & LRFD	Geometry:	Input C_Δ below	12.5.1
ASD & LRFD	End Grain:	NO End Grain	12.5.2
ASD & LRFD	Diaphragm:	NOT a Diaphragm	12.5.3
ASD & LRFD	Toe-nail:	NO Toe-Nailing	12.5.4
LRFD	Format Conversion:	2.16/Φ	11.3.7
LRFD	Φ Resistance:	0.65	11.3.8
LRFD	Time Effect:	λ approximated below, see Appendix N.3.3	11.3.9



Main Member Pen: 1.50 in *(6.9 D)*

Connection OK 78%

Adjustment Factors:	Tension/Withdrawal	Shear		NDS Pg #	NDS Ref.:
Load Duration Factor:	C_D = 1.60	C_D = 1.60	ASD only	pg. 11	11.3.2
Wet Service Factor:	C_M = 1.00	C_M[1] = 1.00	ASD & LRFD	pg. 61	10.3.3 & 11.5.4
Temperature Factor:	C_t = 1.00	C_t = 1.00	ASD & LRFD	pg. 66	11.3.4
Group Action Factor:	C_g = 1.00	C_g = 1.00	ASD & LRFD	pg. 68-72	11.3.6
Geometry Factor:	C_Δ = 1.00	C_Δ = 1.00	ASD & LRFD	pg. 89-91	12.5.1
End Grain Factor:	C_{eg} = 1.00	C_{eg} = 1.00	ASD & LRFD	pg. 91	12.5.2
Diaphragm Factor:	C_{di} = 1.00	C_{di} = 1.00	ASD & LRFD	pg. 91	12.5.3
Toe-nail Factor:	C_{tn} = 1.00	C_{tn} = 1.00	ASD & LRFD	pg. 91	12.5.4
Format Conversion Facto	K_F = 3.32	K_F = 3.32	LRFD only	pg. 187	11.3.7
Resistance Factor:	Φ_z = 0.65	Φ_z = 0.65	LRFD only	pg. 187	11.3.8
Time Effect Factor:	λ = 1.00	λ = 1.00	LRFD only	pg. 187	11.3.9

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Design by: GSB
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Date

~ COMBINED SHEAR AND TENSION CONNECTION PER NDS 2018, CHAPTER 12 ~

INPUT: Truss Tail Backspan Conn

Withdrawal Capacity:

Withdrawal Values, W		
Lag Screw	Wood Screw	Nail
N/A	154 lbs/in	N/A

NDS Ref.: Eq 12.2-1, 12.2-2, & 12.2-3

Length of Fastener Engaged/Thread Length, T			
Lag Screw		Wood Screw	Nail
T	E	T	T
N/A	N/A	2.00 in	N/A

NDS Ref.: Appendix L

W= 154 lbs/in/fastener

W' = Cd*Cm*Ct*Cg*CΔ*Ceg*Ctn*W*n= 3201 lbs/in

Unthreaded Shank Length: S = L-T= 1.00 in

Max Penetration allowed by Fastener: p_{max} = IF(Lag Screw, use T-E; else T)= 2.00 in

Penetration into Main Member: p = MIN(t_m, IF(t_{ns}<S, MIN(t_{sm}+t_m-S, p_{max}), S+p_{max}-t_{sm})= 1.50 in — 12.1.5.6

W' = W * p = 4802 lbs

Pull-Through Values, W_H		
Lag Screw	Wood Screw	Nail
NA	232 lbs	N/A

W_H = 232 lbs/fastener — 12.2.5

WH' = WH*Cd*Cm*Ct*n = 4830 lbs

Controlling W' = 4802 lbs

Shear Capacity:

p_m= 1.5 in — ℓ_s= 1.5 in — ℓ_m=

Lag Screw*	Wood Screw*	Nail
N/A	1.158 in	N/A

*screw tapered tip not included when P<10D

D_r= 0.171 in — F_{yb}= 80,000 psi

$F_{em\perp}$= 4,637 psi — $F_{em||}$= 4,637 psi

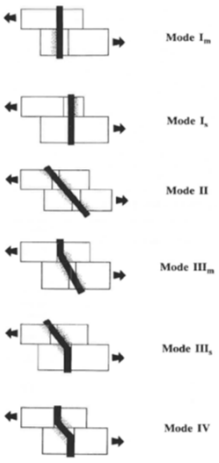
$F_{es\perp}$= 4,637 psi — $F_{es||}$= 4,637 psi

R_e= 1.000 — R_t= 0.772

$F_{em\theta}$= 4,637 psi — $F_{es\theta}$= 4,637 psi

12.3.2 — Tbl 12.3.2

Yield Mode — Tbl 12.3.1A



I_m	$Z = \frac{D\ell_m F_{em}}{R_d}$	R_d= 2.210	Z= 415 lbs/fastener	Mode I_m
I_s	$Z = \frac{D\ell_s F_{es}}{R_d}$	R_d= 2.210	Z= 538 lbs/fastener	Mode I_s
II	$Z = \frac{k_1 D\ell_s F_{es}}{R_d}$	k_1= 0.372 R_d= 2.210	Z= 200 lbs/fastener	Mode II
III_m	$Z = \frac{k_2 D\ell_m F_{em}}{(1+2R_e)R_d}$	k_2= 1.180 R_d= 2.210	Z= 163 lbs/fastener	Mode III_m
III_s	$Z = \frac{k_3 D\ell_s F_{em}}{(2+R_e)R_d}$	k_3= 1.109 R_d= 2.210	Z= 199 lbs/fastener	Mode III_s
IV	$Z = \frac{D^2}{R_d}\sqrt{\frac{2F_{em}F_{yb}}{3(1+R_e)}}$	R_d= 2.210	Z= 147 lbs/fastener	Mode IV

Controlling Z= 147 lbs/fastener — 12.3

Z' = Cd*Cm*Ct*Cg*CΔ*Ceg*Ctn*Z*n= 3060 lbs

Combined Capacity:

Z_{α}'Screws:	$Z'_{\alpha} = \frac{(W'p)Z'}{(W'p)\cos^2\alpha + Z'\sin^2\alpha}$	**3060 lbs**	12.4-1
Z_{α}'Nails:	$Z'_{\alpha} = \frac{(W'p)Z'}{(W'p)\cos\alpha + Z'\sin\alpha}$	N/A	12.4-2

A. If Moisture Content is >19% at time of fabrication and ≤19% in service, 0.4 is a conservative factor. For a more precise factor see NDS 11.3.3.

B. Diameter of lag screws are for "reduced body diameter" lag screws. (Similar to tables 11J & 11k in NDS)

C. The adujsted values for $F_{e\perp}$ and $F_{e||}$ are not supported by NDS for diameters of fasteners >1/4" in plywood or OSB & therefore not recommended. F_e is assumed for all fastener sizes herein.

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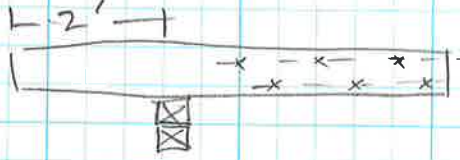
TRUSS TAIL CONN

DESIGN AS A "FIXED" CONN



$M = 0.242$ k·ft FROM ENERCALC, USE 200# PT LOAD

$M = 200 \times 2' = 400$ #-ft

$\frac{M}{d} = 2400$ # ← EA LINE OF FASTENERS MUST TRANSFER THIS MUCH... SEE SS

2x8 RAFTER, USE 4.5"

$\frac{M}{d} = \frac{400 \text{ \#-ft}}{0.375'} = 1067$ #

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~ COMBINED SHEAR AND TENSION CONNECTION PER NDS 2018, CHAPTER 12 ~

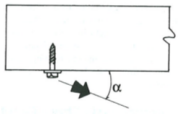
INPUT: Truss Tail Backspan Conn

Method: ASD

Forces:

Tension/Withdrawal:	R_t =	0.0 lbs
Shear:	R_s =	1067.0 lbs
Resultant Load:	R_R =	1067.0 lbs
Direction:	α =	0.0°

0° is Shear Only
90° is Tension Only



Fastener: Wood Screw

# of Fasteners, *n* =	8
Size:	#12
Length, *L* =	3.00 in
Nominal Diameter[B], *D* =	0.216 in
Head Diameter, D_H =	0.414 in

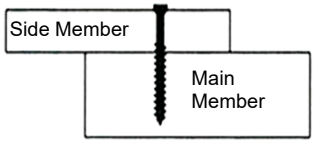
Wood:

Side Member Material[C]:	Wood
Main Member Material[C]:	Wood
Side Member Specific Gravity, G_s=	0.43
Main Member Specific Gravity, G_m=	0.43
Side Member Thickness, t_{ns}=	1.50 in
Main Member Thickness, t_m=	1.50 in
*Only used for toe-nailing:	2.00 in

Shear:

Main Member Shear Action Angle, θ_m=	90°	0° = // to grain
Side Member Shear Action Angle, θ_s=	90°	90° = ⊥ to grain

			NDS Ref.:
ASD	Tension Load Duration:	10 Min/Wind or EQ Load	11.3.2
ASD	Shear Load Duration:	10 Min/Wind or EQ Load	11.3.2
ASD & LRFD	Moisture Content[A]:	≤19% @ fab. & ≤19% in service	11.3.3
ASD & LRFD	Temperature:	In Service Dry & Temp.≤100°F	11.3.4
ASD & LRFD	Group Action:	Input C_g below	11.3.6
ASD & LRFD	Geometry:	Input C_Δ below	12.5.1
ASD & LRFD	End Grain:	NO End Grain	12.5.2
ASD & LRFD	Diaphragm:	NOT a Diaphragm	12.5.3
ASD & LRFD	Toe-nail:	NO Toe-Nailing	12.5.4
LRFD	Format Conversion:	2.16/Φ	11.3.7
LRFD	Φ Resistance:	0.65	11.3.8
LRFD	Time Effect:	λ approximated below, see Appendix N.3.3	11.3.9



Main Member Pen: 1.50 in *(6.9 D)*

Connection OK 65%

Adjustment Factors:	Tension/Withdrawal	Shear		NDS Pg #	NDS Ref.:
Load Duration Factor:	C_D = 1.60	C_D = 1.60	ASD only	pg. 11	11.3.2
Wet Service Factor:	C_M = 1.00	C_M[1] = 1.00	ASD & LRFD	pg. 61	10.3.3 & 11.5.4
Temperature Factor:	C_t = 1.00	C_t = 1.00	ASD & LRFD	pg. 66	11.3.4
Group Action Factor:	C_g = 1.00	C_g = 1.00	ASD & LRFD	pg. 68-72	11.3.6
Geometry Factor:	C_Δ = 1.00	C_Δ = 1.00	ASD & LRFD	pg. 89-91	12.5.1
End Grain Factor:	C_{eg} = 1.00	C_{eg} = 1.00	ASD & LRFD	pg. 91	12.5.2
Diaphragm Factor:	C_{di} = 1.00	C_{di} = 1.00	ASD & LRFD	pg. 91	12.5.3
Toe-nail Factor:	C_{tn} = 1.00	C_{tn} = 1.00	ASD & LRFD	pg. 91	12.5.4
Format Conversion Facto	K_F = 3.32	K_F = 3.32	LRFD only	pg. 187	11.3.7
Resistance Factor:	Φ_z = 0.65	Φ_z = 0.65	LRFD only	pg. 187	11.3.8
Time Effect Factor:	λ = 1.00	λ = 1.00	LRFD only	pg. 187	11.3.9

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Project No.:

Sheet ___ of ___
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Date: 2/16/2024
Checked
Date

~ COMBINED SHEAR AND TENSION CONNECTION PER NDS 2018, CHAPTER 12 ~

INPUT: Truss Tail Backspan Conn

Withdrawal Capacity:

Withdrawal Values, W		
Lag Screw	Wood Screw	Nail
N/A	114 lbs/in	N/A

NDS Ref.: Eq 12.2-1, 12.2-2, & 12.2-3

Length of Fastener Engaged/Thread Length, T			
Lag Screw		Wood Screw	Nail
T	E	T	T
N/A	N/A	2.00 in	N/A

NDS Ref.: Appendix L

W= 114 lbs/in/fastener

W' = Cd*Cm*Ct*Cg*CΔ*Ceg*Ctn*W*n= 1457 lbs/in

Unthreaded Shank Length: S = L-T= 1.00 in

Max Penetration allowed by Fastener: p_{max} = IF(Lag Screw, use T-E; else T)= 2.00 in

Penetration into Main Member: p = MIN(t_m, IF(t_{ns}<S, MIN(t_{sm}+t_m-S, p_{max}), S+p_{max}-t_{sm})= 1.50 in — 12.1.5.6

W' = W * p = 2185 lbs

Pull-Through Values, W_H		
Lag Screw	Wood Screw	Nail
NA	172 lbs	N/A

W_H = 172 lbs/fastener — 12.2.5

WH' = WH*Cd*Cm*Ct*n = 2198 lbs

Controlling W' = 2185 lbs

Shear Capacity:

p_m= 1.5 in — ℓ_s= 1.5 in — ℓ_m:

Lag Screw*	Wood Screw*	Nail
N/A	1.158 in	N/A

*screw tapered tip not included when P<10D

D_r= 0.171 in — F_{yb}= 80,000 psi

$F_{em\perp}$= 3,513 psi — $F_{em||}$= 3,513 psi — Tbl 12.3.2

$F_{es\perp}$= 3,513 psi — $F_{es||}$= 3,513 psi

R_e= 1.000 — R_t= 0.772

$F_{em\theta}$= 3,513 psi — $F_{es\theta}$= 3,513 psi

Yield Mode — Tbl 12.3.1A

I_m	$Z = \frac{D\ell_m F_{em}}{R_d}$	R_d= 2.210	Z= 315 lbs/fastener	Mode I_m
I_s	$Z = \frac{D\ell_s F_{es}}{R_d}$	R_d= 2.210	Z= 408 lbs/fastener	Mode I_s
II	$Z = \frac{k_1 D\ell_s F_{es}}{R_d}$	k_1= 0.372 R_d= 2.210	Z= 152 lbs/fastener	Mode II
III_m	$Z = \frac{k_2 D\ell_m F_{em}}{(1+2R_e)R_d}$	k_2= 1.235 R_d= 2.210	Z= 130 lbs/fastener	Mode III_m
III_s	$Z = \frac{k_3 D\ell_s F_{em}}{(2+R_e)R_d}$	k_3= 1.143 R_d= 2.210	Z= 155 lbs/fastener	Mode III_s
IV	$Z = \frac{D^2}{R_d}\sqrt{\frac{2F_{em}F_{yb}}{3(1+R_e)}}$	R_d= 2.210	Z= 128 lbs/fastener	Mode IV

Controlling Z= 128 lbs/fastener — 12.3

Z' = Cd*Cm*Ct*Cg*CΔ*Ceg*Ctn*Z*n= 1639 lbs

Combined Capacity:

Z_{α}'Screws:	$Z'_{\alpha} = \frac{(W'p)Z'}{(W'p)\cos^2\alpha + Z'\sin^2\alpha}$	**1639 lbs**	12.4-1
Z_{α}'Nails:	$Z'_{\alpha} = \frac{(W'p)Z'}{(W'p)\cos\alpha + Z'\sin\alpha}$	N/A	12.4-2

A. If Moisture Content is >19% at time of fabrication and ≤19% in service, 0.4 is a conservative factor. For a more precise factor see NDS 11.3.3.

B. Diameter of lag screws are for "reduced body diameter" lag screws. (Similar to tables 11J & 11k in NDS)

C. The adujsted values for $F_{e\perp}$ and $F_{e||}$ are not supported by NDS for diameters of fasteners >1/4" in plywood or OSB & therefore not recommended. F_e is assumed for all fastener sizes herein.