

L2 ENGINEERS, LLC

17848 NE 198th Place
Woodinville, WA 98072



STRUCTURAL CALCULATIONS

Chen Residence

5024 Mercer Way
Mercer Island, WA 98040

Harvey Chen
Project # 20-084
February 22, 2021



02/22/2021

L2 ENGINEERS, LLC

17848 NE 198th Place
Woodinville, WA 98072



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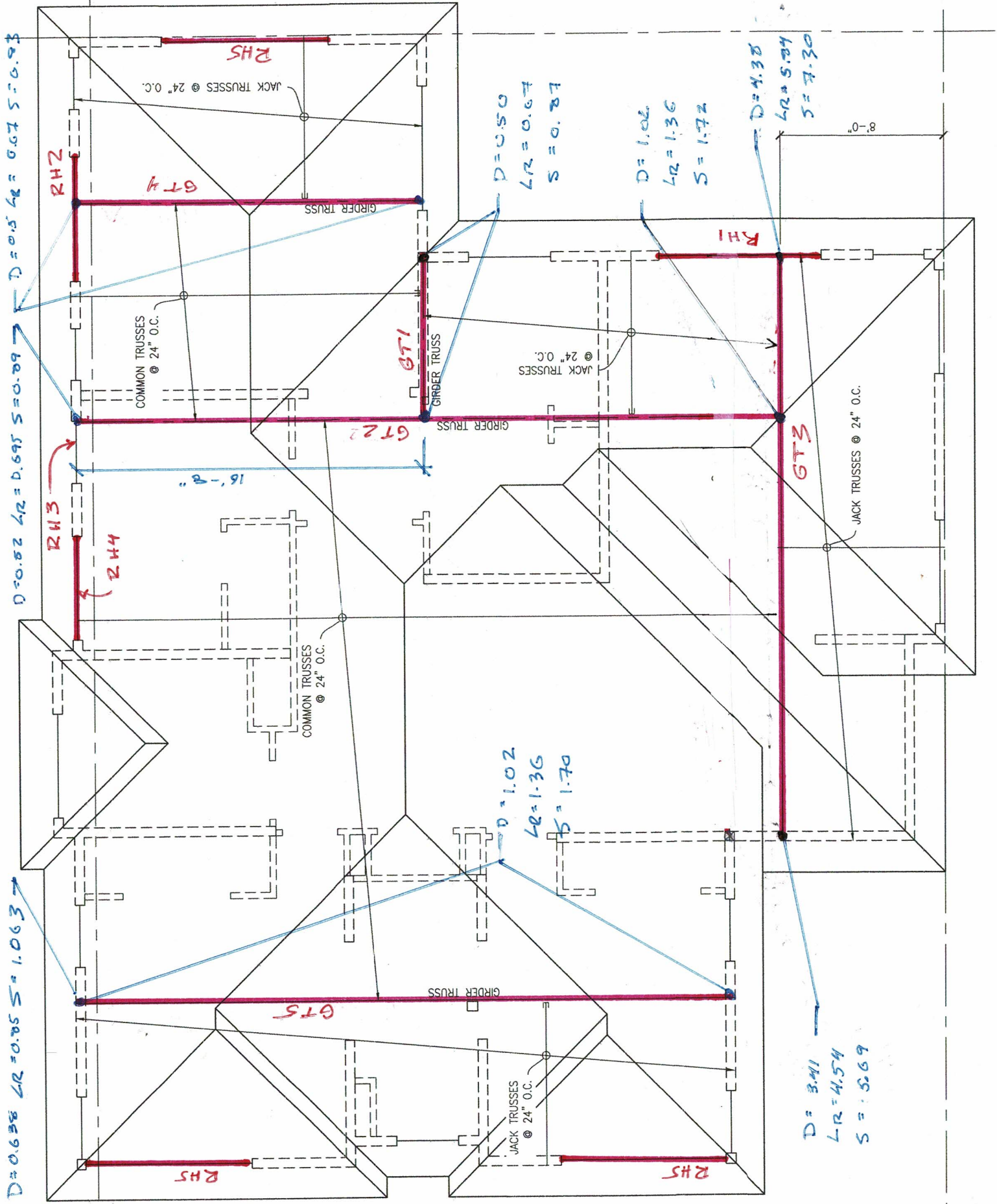
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Gravity Analysis

Roof Framing Key Plan



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Beam Analysis

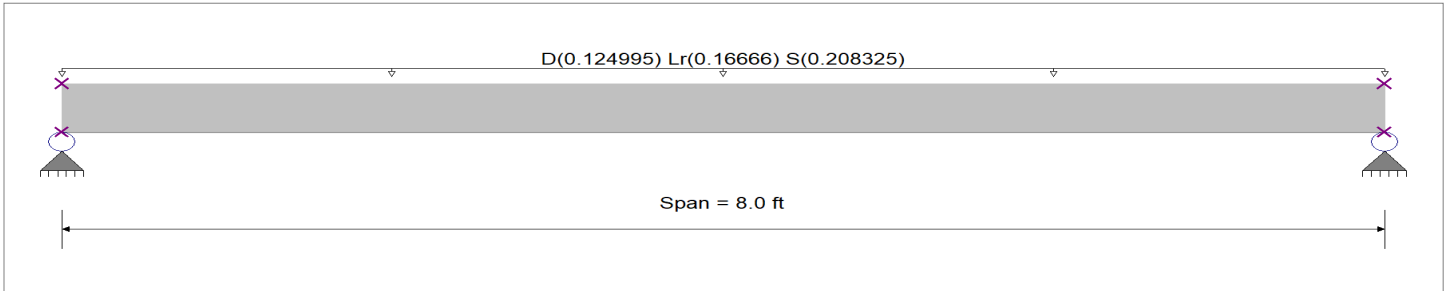
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Lic. #: KW-06011909

DESCRIPTION: GT1

General Beam Properties

Elastic Modulus = 29,000.0 ksi
 Span #1 = Span Length = 8.0 ft
 Area = 10.0 in²
 Moment of Inertia = 100.0 in⁴



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 8.333 ft, (COMMON TRUSSES)

DESIGN SUMMARY

Maximum Bending =	2.667 k-ft	Maximum Shear =	1.333 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	4.000 ft	Location of maximum on span	0.000 ft
Maximum Deflection			
Max Downward Transient Deflection	0.007 in	14385	
Max Upward Transient Deflection	0.000 in	0	
Max Downward Total Deflection	0.011 in	8990	
Max Upward Total Deflection	0.000 in	2517461	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values (k-ft)						Shear Values (k)				
			M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega	
Overall MAXimum Envelope	Dsgn. L = 8.00 ft	1			2.67		2.67						1.33		
D Only	Dsgn. L = 8.00 ft	1			1.00		1.00						0.50		
+D+Lr	Dsgn. L = 8.00 ft	1			2.33		2.33						1.17		
+D+S	Dsgn. L = 8.00 ft	1			2.67		2.67						1.33		
+D+0.750Lr	Dsgn. L = 8.00 ft	1			2.00		2.00						1.00		
+D+0.750S	Dsgn. L = 8.00 ft	1			2.25		2.25						1.12		
+0.60D	Dsgn. L = 8.00 ft	1			0.60		0.60						0.30		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0107	4.040		0.0000	0.000

Vertical Reactions

Load Combination	Support notation : Far left is #1		Values in KIPS
	Support 1	Support 2	
Overall MAXimum	1.333	1.333	
Overall MINimum			
D Only	0.500	0.500	
+D+Lr	1.167	1.167	
+D+S	1.333	1.333	
+D+0.750Lr	1.000	1.000	
+D+0.750S	1.125	1.125	
+0.60D	0.300	0.300	
Lr Only	0.667	0.667	
S Only	0.833	0.833	

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Beam Analysis

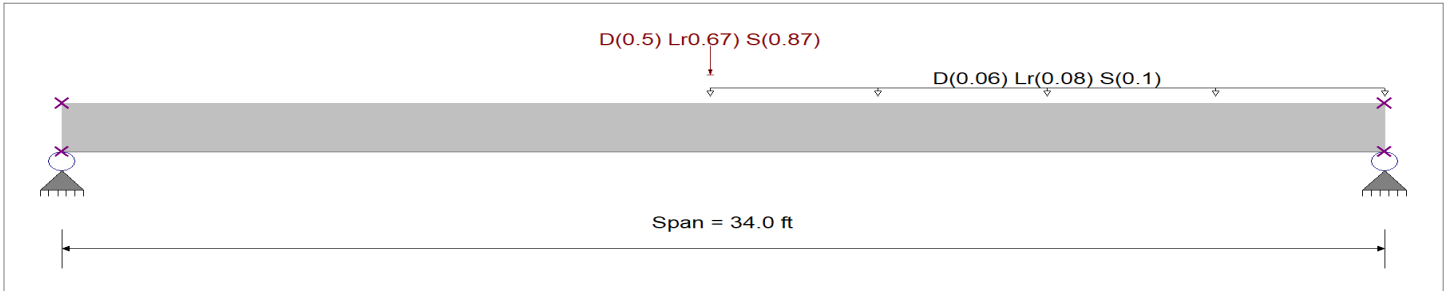
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DESCRIPTION: GT2

General Beam Properties

Elastic Modulus = 29,000.0 ksi
 Span #1 Span Length = 34.0 ft Area = 10.0 in² Moment of Inertia = 100.0 in⁴



Applied Loads

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

Load(s) for Span Number 1

Point Load : D = 0.50, Lr = 0.670, S = 0.870 k @ 16.666 ft, (GT1)

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Extent = 16.666 -->> 34.0 ft, Tributary Width = 4.0 ft, (JACK TRUSS)

DESIGN SUMMARY

Maximum Bending =	23.427 k-ft	Maximum Shear =	2.738 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	16.830 ft	Location of maximum on span	34.000 ft
Maximum Deflection			
Max Downward Transient Deflection	0.968 in	421	
Max Upward Transient Deflection	0.011 in	37307	
Max Downward Total Deflection	1.538 in	265	
Max Upward Total Deflection	0.005 in	83092	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values (k-ft)						Shear Values (k)				
			M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega	
Overall MAXimum Envelope															
D Only	Dsgn. L = 34.00 ft	1			23.43		23.43						2.74		
+D+Lr	Dsgn. L = 34.00 ft	1			8.67		8.67						1.02		
+D+S	Dsgn. L = 34.00 ft	1			20.26		20.26						2.38		
+D+0.750Lr	Dsgn. L = 34.00 ft	1			23.43		23.43						2.74		
+D+0.750S	Dsgn. L = 34.00 ft	1			17.36		17.36						2.04		
+0.60D	Dsgn. L = 34.00 ft	1			19.74		19.74						2.31		
	Dsgn. L = 34.00 ft	1			5.20		5.20						0.61		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	1.5375	17.680		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.405	2.738
Overall MINimum		
D Only	0.520	1.020
+D+Lr	1.215	2.382
+D+S	1.405	2.738
+D+0.750Lr	1.041	2.041
+D+0.750S	1.184	2.309

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Beam Analysis

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L2 Engineers

DESCRIPTION: GT2

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+0.60D	0.312	0.612
Lr Only	0.695	1.362
S Only	0.885	1.718

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Beam Analysis

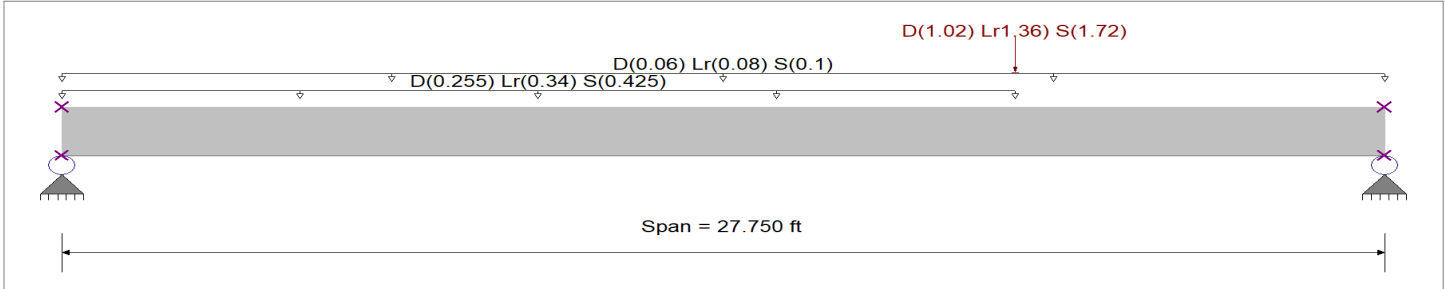
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 L2 Engineers

Lic. #: KW-06011909

DESCRIPTION: GT3

General Beam Properties

Elastic Modulus = 29,000.0 ksi
 Span #1 Span Length = 27.750 ft Area = 10.0 in² Moment of Inertia = 100.0 in⁴



Applied Loads

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

Load(s) for Span Number 1

Point Load : D = 1.020, Lr = 1.360, S = 1.720 k @ 20.0 ft, (GT2)

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Extent = 0.0 -->> 20.0 ft, Tributary Width = 17.0 ft, (COMMON TRUSS)

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 4.0 ft, (JACK TRUSS)

DESIGN SUMMARY

Maximum Bending =	81.263 k-ft	Maximum Shear =	11.684 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	13.875 ft	Location of maximum on span	0.000 ft
Maximum Deflection			
Max Downward Transient Deflection	2.430 in	137	
Max Upward Transient Deflection	0.031 in	10861	
Max Downward Total Deflection	3.886 in	85	
Max Upward Total Deflection	0.014 in	24135	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values (k-ft)						Shear Values (k)				
			M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx	Vnx/Omega		
Overall MAXimum Envelope	Dsgn. L = 27.75 ft	1			81.26		81.26						11.68		
D Only	Dsgn. L = 27.75 ft	1			30.44		30.44						4.38		
+D+Lr	Dsgn. L = 27.75 ft	1			71.04		71.04						10.22		
+D+S	Dsgn. L = 27.75 ft	1			81.26		81.26						11.68		
+D+0.750Lr	Dsgn. L = 27.75 ft	1			60.89		60.89						8.76		
+D+0.750S	Dsgn. L = 27.75 ft	1			68.56		68.56						9.86		
+0.60D	Dsgn. L = 27.75 ft	1			18.27		18.27						2.63		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	3.8862	13.875		0.0000	0.000

Vertical Reactions

Load Combination	Support notation : Far left is #1		Values in KIPS	
	Support 1	Support 2		
Overall MAXimum	11.684	9.096		
Overall MINimum				
D Only	4.380	3.405		
+D+Lr	10.219	7.946		
+D+S	11.684	9.096		

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L2 Engineers

DESCRIPTION: GT3

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr	8.759	6.811
+D+0.750S	9.858	7.673
+0.60D	2.628	2.043
Lr Only	5.839	4.541
S Only	7.305	5.690

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Beam Analysis

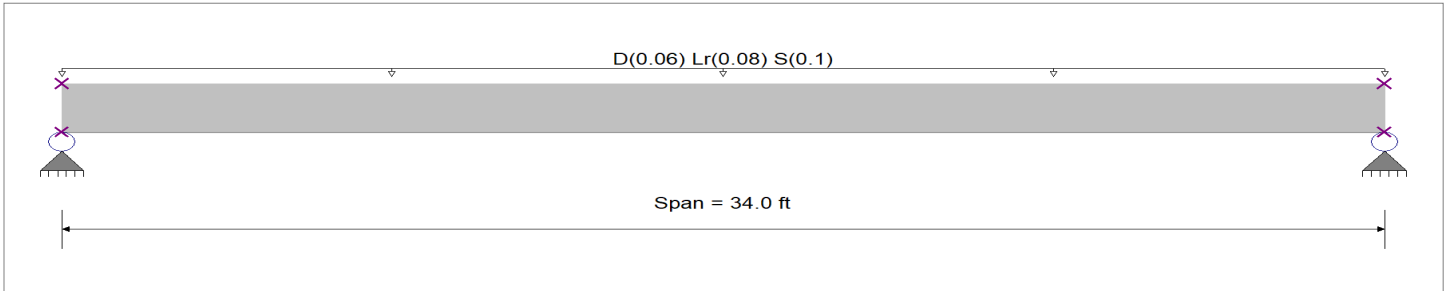
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DESCRIPTION: GT4

General Beam Properties

Elastic Modulus = 29,000.0 ksi
 Span #1 = Span Length = 34.0 ft
 Area = 10.0 in²
 Moment of Inertia = 100.0 in⁴



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 4.0 ft, (JACK TRUSSES)

DESIGN SUMMARY

Maximum Bending =	23.120 k-ft	Maximum Shear =	2.720 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	17.000 ft	Location of maximum on span	0.000 ft
Maximum Deflection			
Max Downward Transient Deflection	1.045 in	390	
Max Upward Transient Deflection	0.013 in	30743	
Max Downward Total Deflection	1.672 in	243	
Max Upward Total Deflection	0.006 in	68318	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values (k-ft)					Shear Values (k)				
			M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx	Vnx/Omega	
Overall MAXimum Envelope	Dsgn. L = 34.00 ft	1			23.12		23.12					2.72		
D Only	Dsgn. L = 34.00 ft	1			8.67		8.67					1.02		
+D+Lr	Dsgn. L = 34.00 ft	1			20.23		20.23					2.38		
+D+S	Dsgn. L = 34.00 ft	1			23.12		23.12					2.72		
+D+0.750Lr	Dsgn. L = 34.00 ft	1			17.34		17.34					2.04		
+D+0.750S	Dsgn. L = 34.00 ft	1			19.51		19.51					2.30		
+0.60D	Dsgn. L = 34.00 ft	1			5.20		5.20					0.61		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	1.6722	17.170		0.0000	0.000

Vertical Reactions

Load Combination	Support notation : Far left is #1		Values in KIPS	
	Support 1	Support 2		
Overall MAXimum	2.720	2.720		
Overall MINimum				
D Only	1.020	1.020		
+D+Lr	2.380	2.380		
+D+S	2.720	2.720		
+D+0.750Lr	2.040	2.040		
+D+0.750S	2.295	2.295		
+0.60D	0.612	0.612		
Lr Only	1.360	1.360		
S Only	1.700	1.700		

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Beam Analysis

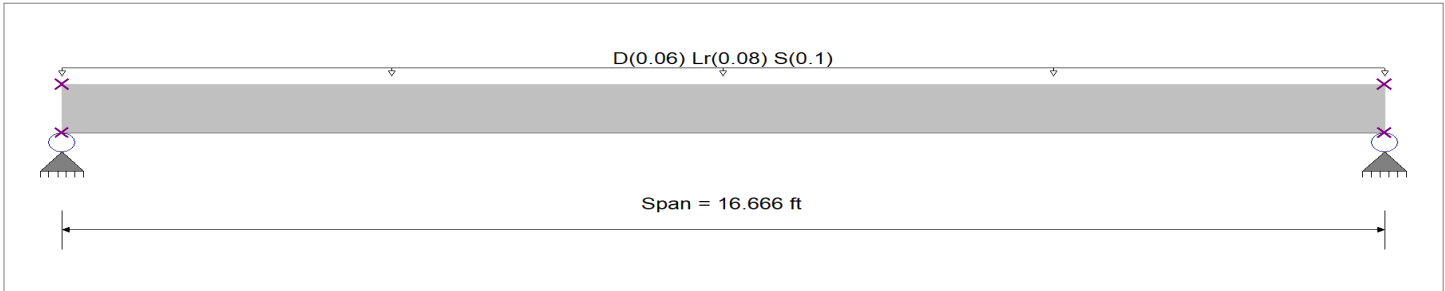
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DESCRIPTION: GT5

General Beam Properties

Elastic Modulus = 29,000.0 ksi
 Span #1 = 16.666 ft
 Area = 10.0 in²
 Moment of Inertia = 100.0 in⁴



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 4.0 ft, (JACK TRUSSES)

DESIGN SUMMARY

Maximum Bending =	5.555 k-ft	Maximum Shear =	1.333 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Location of maximum on span	8.333 ft	Location of maximum on span	0.000 ft
Maximum Deflection			
Max Downward Transient Deflection	0.060 in	3314	
Max Upward Transient Deflection	0.000 in	0	
Max Downward Total Deflection	0.097 in	2071	
Max Upward Total Deflection	0.000 in	580069	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values (k-ft)					Shear Values (k)				
			M	V	Mmax +	Mmax -	Ma - Max	Mnx	Mnx/Omega Cb	Rm	Va Max	Vnx	Vnx/Omega	
Overall MAXimum Envelope	Dsgn. L = 16.67 ft	1			5.56		5.56					1.33		
D Only	Dsgn. L = 16.67 ft	1			2.08		2.08					0.50		
+D+Lr	Dsgn. L = 16.67 ft	1			4.86		4.86					1.17		
+D+S	Dsgn. L = 16.67 ft	1			5.56		5.56					1.33		
+D+0.750Lr	Dsgn. L = 16.67 ft	1			4.17		4.17					1.00		
+D+0.750S	Dsgn. L = 16.67 ft	1			4.69		4.69					1.12		
+0.60D	Dsgn. L = 16.67 ft	1			1.25		1.25					0.30		

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0965	8.416		0.0000	0.000

Vertical Reactions

Load Combination	Support notation : Far left is #1		Values in KIPS
	Support 1	Support 2	
Overall MAXimum	1.333	1.333	
Overall MINimum			
D Only	0.500	0.500	
+D+Lr	1.167	1.167	
+D+S	1.333	1.333	
+D+0.750Lr	1.000	1.000	
+D+0.750S	1.125	1.125	
+0.60D	0.300	0.300	
Lr Only	0.667	0.667	
S Only	0.833	0.833	

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Wood Beam

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DESCRIPTION: RH1

CODE REFERENCES

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

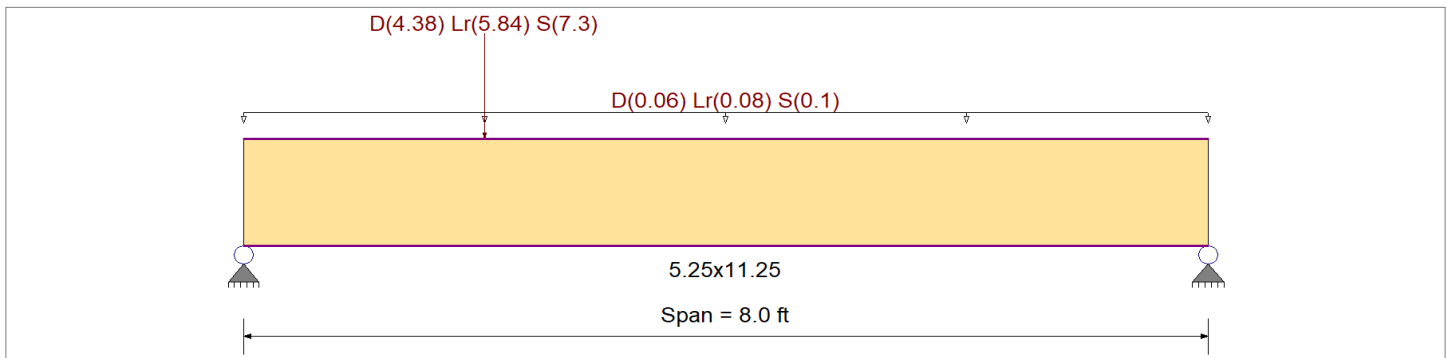
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

Wood Species : iLevel Truss Joist
 Wood Grade : Parallam PSL 2.2E

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

Fb + 2,900.0 psi E : Modulus of Elasticity
 Fb - 2,900.0 psi Ebend- xx 2,200.0ksi
 Fc - Prll 2,900.0 psi Eminbend - xx 1,118.19ksi
 Fc - Perp 750.0 psi
 Fv 290.0 psi
 Ft 2,025.0 psi Density 45.070pcf



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 4.0 ft
 Point Load : D = 4.380, Lr = 5.840, S = 7.30 k @ 2.0 ft, (GT3)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.599 : 1	Maximum Shear Stress Ratio	=	0.704 : 1
Section used for this span	=	5.25x11.25	Section used for this span	=	5.25x11.25
fb: Actual	=	1,998.37 psi	fv: Actual	=	234.93 psi
Fb: Allowable	=	3,335.00 psi	Fv: Allowable	=	333.50 psi
Load Combination	=	+D+S	Load Combination	=	+D+S
Location of maximum on span	=	2.015ft	Location of maximum on span	=	0.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.076 in	Ratio =		1267 >=360
Max Upward Transient Deflection		0.000 in	Ratio =		0 <360
Max Downward Total Deflection		0.121 in	Ratio =		792 >=240
Max Upward Total Deflection		0.000 in	Ratio =		0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values					
		M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v				
D Only Length = 8.0 ft	1	0.287	0.338	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.00	6.92	749.39	2610.00	0.00	0.00	0.00	3.47	88.10	261.00
+D+Lr Length = 8.0 ft	1	0.482	0.567	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	16.14	1,748.58	3625.00	0.00	0.00	0.00	0.00	0.00	0.00
+D+S Length = 8.0 ft	1	0.599	0.704	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	18.44	1,998.37	3335.00	0.00	0.00	0.00	9.25	234.93	333.50
+D+0.750Lr Length = 8.0 ft	1	0.413	0.486	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	13.83	1,498.78	3625.00	0.00	0.00	0.00	0.00	0.00	0.00
+D+0.750S Length = 8.0 ft	1	0.506	0.594	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	15.56	1,686.13	3335.00	0.00	0.00	0.00	7.81	198.23	333.50
+0.60D Length = 8.0 ft	1	0.097	0.114	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	4.15	449.63	4640.00	0.00	0.00	0.00	2.08	52.86	464.00

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DESCRIPTION: RH1

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1212	3.591		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	9.400	3.560
Overall MINimum	5.875	2.225
D Only	3.525	1.335
+D+Lr	8.225	3.115
+D+S	9.400	3.560
+D+0.750Lr	7.050	2.670
+D+0.750S	7.931	3.004
+0.60D	2.115	0.801
Lr Only	4.700	1.780
S Only	5.875	2.225

Title Block Line 1
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Wood Beam

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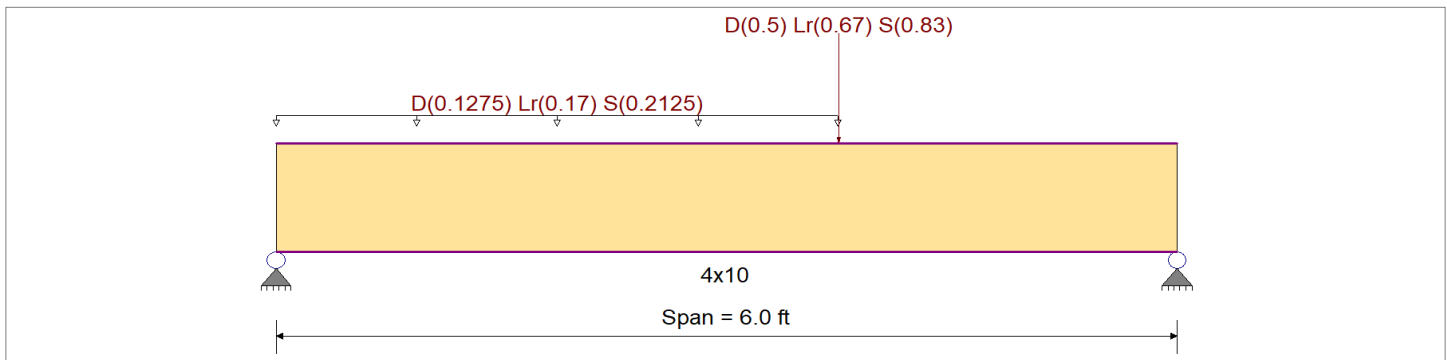
DESCRIPTION: RH2

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	850 psi	E : Modulus of Elasticity	
Load Combination ASCE 7-16	Fb -	850 psi	Ebend- xx	1300ksi
	Fc - Prll	1300 psi	Eminbend - xx	470ksi
Wood Species : Hem-Fir	Fc - Perp	405 psi		
Wood Grade : No.2	Fv	150 psi		
	Ft	525 psi	Density	26.84pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Load for Span Number 1

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Extent = 0.0 --> 3.750 ft, Tributary Width = 8.50 ft, (COMMON TRUSS)

Point Load : D = 0.50, Lr = 0.670, S = 0.830 k @ 3.750 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.567 : 1	Maximum Shear Stress Ratio	=	0.330 : 1
Section used for this span		4x10	Section used for this span		4x10
fb: Actual	=	665.08psi	fv: Actual	=	56.97 psi
Fb: Allowable	=	1,173.00psi	Fv: Allowable	=	172.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	3.745ft	Location of maximum on span	=	3.766 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.034 in	Ratio =		2105 >=360
Max Upward Transient Deflection		0.000 in	Ratio =		0 <360
Max Downward Total Deflection		0.055 in	Ratio =		1314 >=240
Max Upward Total Deflection		0.000 in	Ratio =		0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values						
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v			
D Only	Length = 6.0 ft	1	0.272	0.159	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.04	249.83	918.00	0.00	0.00	0.00	0.00	21.40	135.00
+D+Lr	Length = 6.0 ft	1	0.458	0.267	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.43	584.05	1275.00	0.00	0.00	0.00	0.00	50.03	187.50
+D+S	Length = 6.0 ft	1	0.567	0.330	1.15	1.200	1.00	1.00	1.00	1.00	1.00	2.77	665.08	1173.00	0.00	0.00	0.00	0.00	56.97	172.50
+D+0.750Lr	Length = 6.0 ft	1	0.393	0.229	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.08	500.50	1275.00	0.00	0.00	0.00	0.00	42.88	187.50
+D+0.750S	Length = 6.0 ft	1	0.478	0.279	1.15	1.200	1.00	1.00	1.00	1.00	1.00	2.33	561.26	1173.00	0.00	0.00	0.00	0.00	48.08	172.50
+0.60D	Length = 6.0 ft	1	0.092	0.054	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.62	149.90	1632.00	0.00	0.00	0.00	0.00	12.84	240.00

Title Block Line 1
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DESCRIPTION: RH2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0548	3.088		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.375	1.230
Overall MINimum	0.859	0.768
D Only	0.516	0.462
+D+Lr	1.206	1.080
+D+S	1.375	1.230
+D+0.750Lr	1.033	0.925
+D+0.750S	1.161	1.038
+0.60D	0.310	0.277
Lr Only	0.690	0.618
S Only	0.859	0.768

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DESCRIPTION: RH3

CODE REFERENCES

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

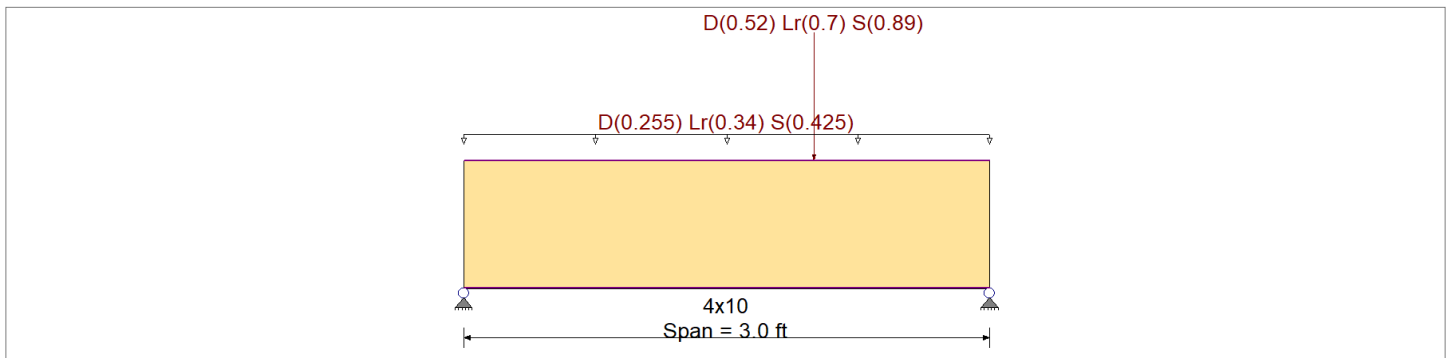
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

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 26.840pcf



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 17.0 ft, (COMMON TRUSS)

Point Load : D = 0.520, Lr = 0.70, S = 0.890 k @ 2.0 ft, (GT3)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.332	1	Maximum Shear Stress Ratio	=	0.386	: 1
Section used for this span		4x10		Section used for this span		4x10	
fb: Actual	=	389.26	psi	fv: Actual	=	66.66	psi
Fb: Allowable	=	1,173.00	psi	Fv: Allowable	=	172.50	psi
Load Combination		+D+S		Load Combination		+D+S	
Location of maximum on span	=	1.993	ft	Location of maximum on span	=	2.234	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.005	in	Ratio =		7092	>=360
Max Upward Transient Deflection		0.000	in	Ratio =		0	<360
Max Downward Total Deflection		0.008	in	Ratio =		4453	>=240
Max Upward Total Deflection		0.000	in	Ratio =		0	<240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values						
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v				
D Only	Length = 3.0 ft	1	0.157	0.183	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.00	0.60	144.57	918.00	0.00	0.00	0.00	0.53	24.73	135.00
+D+Lr	Length = 3.0 ft	1	0.265	0.309	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.00	1.41	338.40	1275.00	0.00	0.00	0.00	1.25	57.91	187.50
+D+S	Length = 3.0 ft	1	0.332	0.386	1.15	1.200	1.00	1.00	1.00	1.00	1.00	1.00	1.62	389.26	1173.00	0.00	0.00	0.00	1.44	66.66	172.50
+D+0.750Lr	Length = 3.0 ft	1	0.227	0.265	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.00	1.21	289.95	1275.00	0.00	0.00	0.00	1.07	49.61	187.50
+D+0.750S	Length = 3.0 ft	1	0.280	0.326	1.15	1.200	1.00	1.00	1.00	1.00	1.00	1.00	1.36	328.09	1173.00	0.00	0.00	0.00	1.21	56.18	172.50
+0.60D	Length = 3.0 ft	1	0.053	0.062	1.60	1.200	1.00	1.00	1.00	1.00	1.00	1.00	0.36	86.74	1632.00	0.00	0.00	0.00	0.32	14.84	240.00

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DESCRIPTION: RH3

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0081	1.577		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.490	1.960
Overall MINimum	0.934	1.231
D Only	0.556	0.729
+D+Lr	1.299	1.706
+D+S	1.490	1.960
+D+0.750Lr	1.113	1.462
+D+0.750S	1.256	1.652
+0.60D	0.334	0.438
Lr Only	0.743	0.977
S Only	0.934	1.231

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DESCRIPTION: RH4

CODE REFERENCES

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

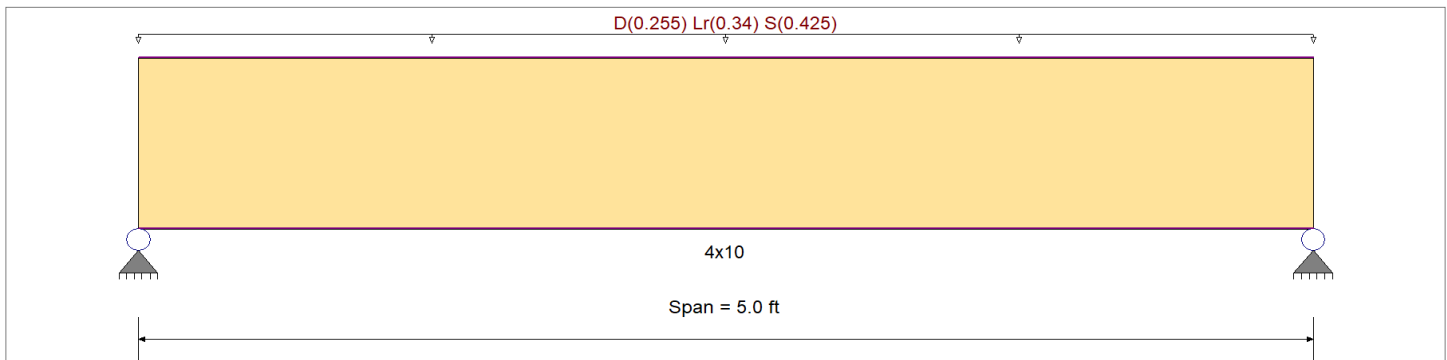
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

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

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

Fb + 850.0 psi E : Modulus of Elasticity
 Fb - 850.0 psi Ebend- xx 1,300.0ksi
 Fc - Prll 1,300.0 psi Eminbend - xx 470.0ksi
 Fc - Perp 405.0 psi
 Fv 150.0 psi
 Ft 525.0 psi Density 26.840pcf



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 17.0 ft, (COMMON TRUSS)

DESIGN SUMMARY

Design OK

<p>Maximum Bending Stress Ratio = 0.436 < 1 Section used for this span 4x10 fb: Actual = 510.90psi Fb: Allowable = 1,173.00psi Load Combination = +D+S Location of maximum on span = 2.500ft Span # where maximum occurs = Span # 1</p> <p>Maximum Deflection Max Downward Transient Deflection 0.020 in Ratio = 2995 >=360 Max Upward Transient Deflection 0.000 in Ratio = 0 <360 Max Downward Total Deflection 0.032 in Ratio = 1871 >=240 Max Upward Total Deflection 0.000 in Ratio = 0 <240</p>	<p>Maximum Shear Stress Ratio = 0.317 < 1 Section used for this span 4x10 fv: Actual = 54.62 psi Fv: Allowable = 172.50 psi Load Combination = +D+S Location of maximum on span = 0.000 ft Span # where maximum occurs = Span # 1</p>
--	---

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
		M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v		
D Only Length = 5.0 ft	1	0.209	0.152	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.80	191.59	918.00	0.00	0.00	0.00	0.00	135.00
+D+Lr Length = 5.0 ft	1	0.351	0.255	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.86	447.04	1275.00	0.00	0.00	0.00	0.00	0.00
+D+S Length = 5.0 ft	1	0.436	0.317	1.15	1.200	1.00	1.00	1.00	1.00	1.00	2.13	510.90	1173.00	0.00	0.00	0.00	0.00	0.00
+D+0.750Lr Length = 5.0 ft	1	0.301	0.218	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.59	383.18	1275.00	0.00	0.00	0.00	0.00	0.00
+D+0.750S Length = 5.0 ft	1	0.367	0.267	1.15	1.200	1.00	1.00	1.00	1.00	1.00	1.79	431.08	1173.00	0.00	0.00	0.00	0.00	0.00
+0.60D Length = 5.0 ft	1	0.070	0.051	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.48	114.95	1632.00	0.00	0.00	0.00	0.00	0.00

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DESCRIPTION: RH4

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0321	2.518		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.700	1.700
Overall MINimum	1.063	1.063
D Only	0.638	0.638
+D+Lr	1.488	1.488
+D+S	1.700	1.700
+D+0.750Lr	1.275	1.275
+D+0.750S	1.434	1.434
+0.60D	0.383	0.383
Lr Only	0.850	0.850
S Only	1.063	1.063

Title Block Line 1
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 Title Block" selection.
 Title Block Line 6

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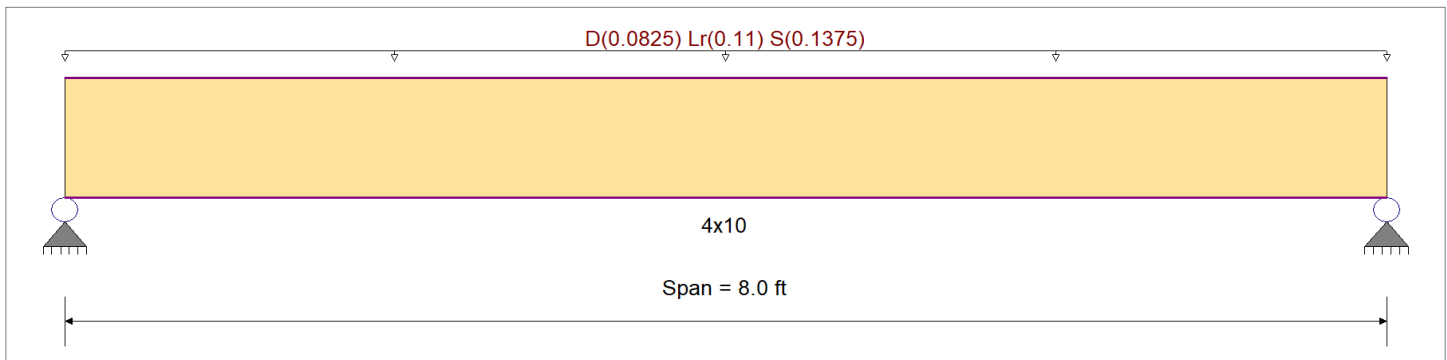
DESCRIPTION: RH5

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	850.0 psi	E : Modulus of Elasticity
Load Combination ASCE 7-16	Fb -	850.0 psi	Ebend- xx
	Fc - Prll	1,300.0 psi	Eminbend - xx
Wood Species : Hem-Fir	Fc - Perp	405.0 psi	
Wood Grade : No.2	Fv	150.0 psi	
	Ft	525.0 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			26.840pcf



Applied Loads

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

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 5.50 ft, (COMMON TRUSS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.361 : 1	Maximum Shear Stress Ratio	=	0.192 : 1
Section used for this span		4x10	Section used for this span		4x10
fb: Actual	=	423.15 psi	fv: Actual	=	33.03 psi
Fb: Allowable	=	1,173.00 psi	Fv: Allowable	=	172.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	4.000ft	Location of maximum on span	=	7.241 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.042 in	Ratio =		2260 >=360
Max Upward Transient Deflection		0.000 in	Ratio =		0 <360
Max Downward Total Deflection		0.068 in	Ratio =		1412 >=240
Max Upward Total Deflection		0.000 in	Ratio =		0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
		M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only Length = 8.0 ft	1	0.173	0.092	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.66	158.68	918.00	0.27	12.39	135.00
+D+Lr Length = 8.0 ft	1	0.290	0.154	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.54	370.26	1275.00	0.62	28.91	187.50
+D+S Length = 8.0 ft	1	0.361	0.192	1.15	1.200	1.00	1.00	1.00	1.00	1.00	1.76	423.15	1173.00	0.71	33.03	172.50
+D+0.750Lr Length = 8.0 ft	1	0.249	0.132	1.25	1.200	1.00	1.00	1.00	1.00	1.00	1.32	317.36	1275.00	0.53	24.78	187.50
+D+0.750S Length = 8.0 ft	1	0.304	0.162	1.15	1.200	1.00	1.00	1.00	1.00	1.00	1.49	357.03	1173.00	0.60	27.87	172.50
+0.60D Length = 8.0 ft	1	0.058	0.031	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.40	95.21	1632.00	0.16	7.43	240.00

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DESCRIPTION: RH5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0680	4.029		0.0000	0.000

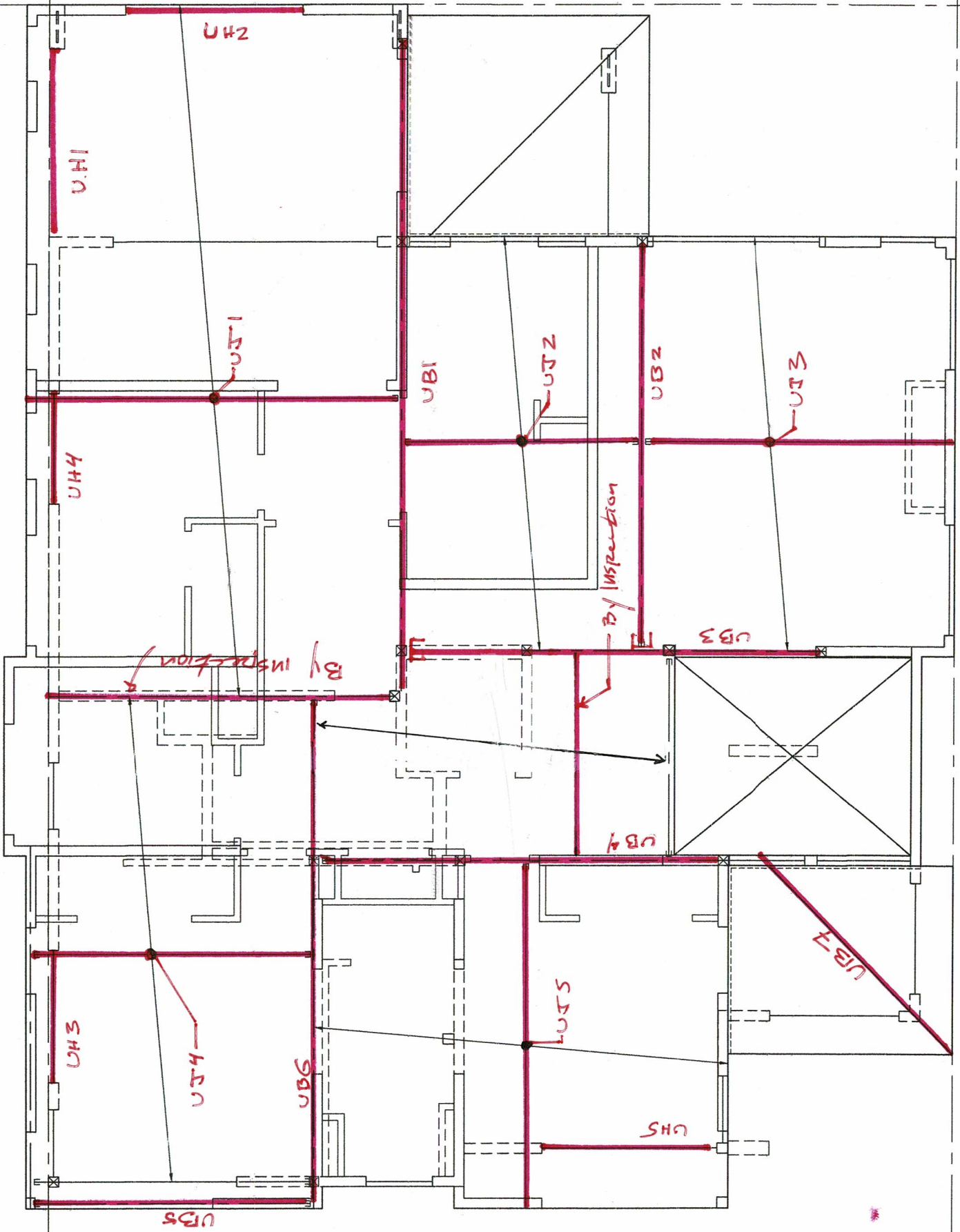
Vertical Reactions

Support notation : Far left is #1

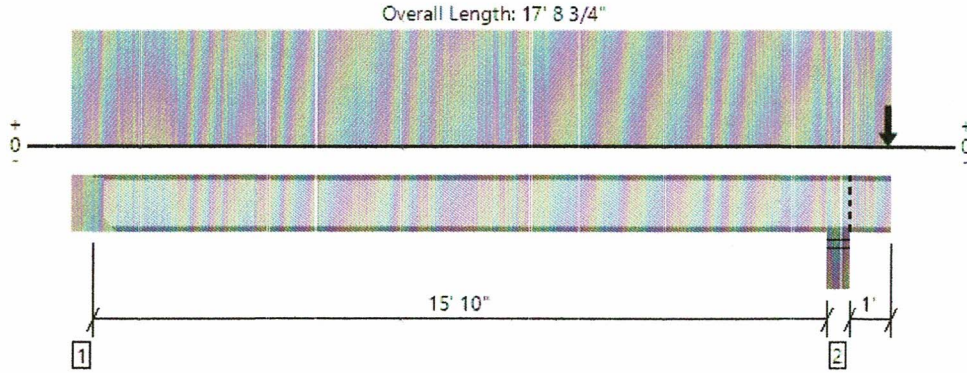
Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.880	0.880
Overall MINimum	0.550	0.550
D Only	0.330	0.330
+D+Lr	0.770	0.770
+D+S	0.880	0.880
+D+0.750Lr	0.660	0.660
+D+0.750S	0.743	0.743
+0.60D	0.198	0.198
Lr Only	0.440	0.440
S Only	0.550	0.550

UPPR FLR Framing Key Plan



Upper, UJ1
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)	560 @ 5 1/4"	1080 (1.75")	Passed (52%)	1.00	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	1012 @ 16' 8 3/4"	1961	Passed (52%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2135 @ 8' 13/16"	6180	Passed (35%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.192 @ 8' 5 5/8"	0.402	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.237 @ 8' 3 7/8"	0.803	Passed (L/813)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	46	45	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/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	Roof Live	Snow	Total	
1 - Hanger on 11 7/8" PSL beam	5.25"	Hanger ¹	1.75" / - ²	140	452	-38	-47	592/-85	See note ¹
2 - Stud wall - HF	5.50"	5.50"	3.50"	587	496	534	667	2284	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.
- ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 6" o/c	
Bottom Edge (Lu)	8' 8" o/c	

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

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS2.37/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

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

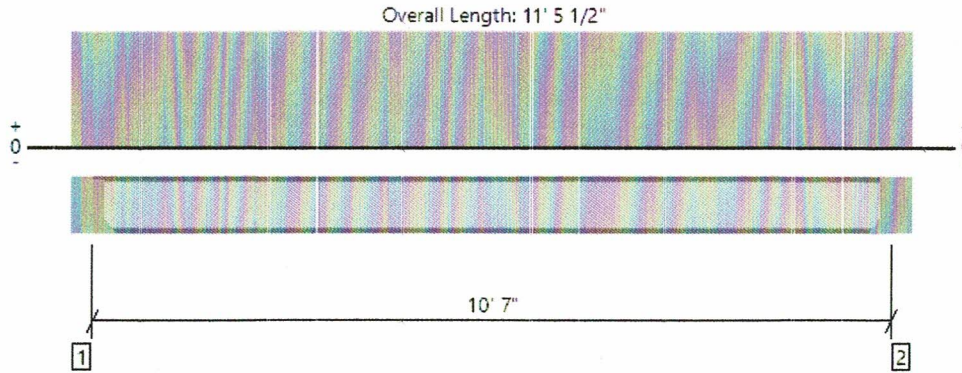
Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 17' 8 3/4"	16"	15.0	40.0	-	-	Default Load
2 - Point (PLF)	17' 7 15/16"	16"	-	-	-	-	
3 - Point (PLF)	17' 7 15/16"	16"	279.0	-	372.0	465.0	

ForteWEB Software Operator	Job Notes
Brian L2 Engineers, LLC (206) 251-2346 brian@l2engineers.com	



Upper, UJ2

1 piece(s) 11 7/8" TJI@ 110 @ 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)	291 @ 5 1/4"	910 (1.75")	Passed (32%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	291 @ 5 1/4"	1560	Passed (19%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	770 @ 5' 8 3/4"	3160	Passed (24%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.044 @ 5' 8 3/4"	0.265	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.060 @ 5' 8 3/4"	0.529	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	58	45	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" 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 - Hanger on 11 7/8" PSL beam	5.25"	Hanger ¹	1.75" / - ²	86	229	315	See note ¹
2 - Hanger on 11 7/8" PSL beam	5.25"	Hanger ¹	1.75" / - ²	86	229	315	See note ¹

• At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger

• ¹ See Connector grid below for additional information and/or requirements.

• ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 7" o/c	
Bottom Edge (Lu)	10' 7" o/c	

• TJI joists are only analyzed using Maximum Allowable bracing solutions.

• Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip		
2 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip		

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PLF)	0 to 11' 5 1/2"	N/A	15.0	40.0	

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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
Brian L2 Engineers, LLC (206) 251-2346 brian@l2engineers.com	



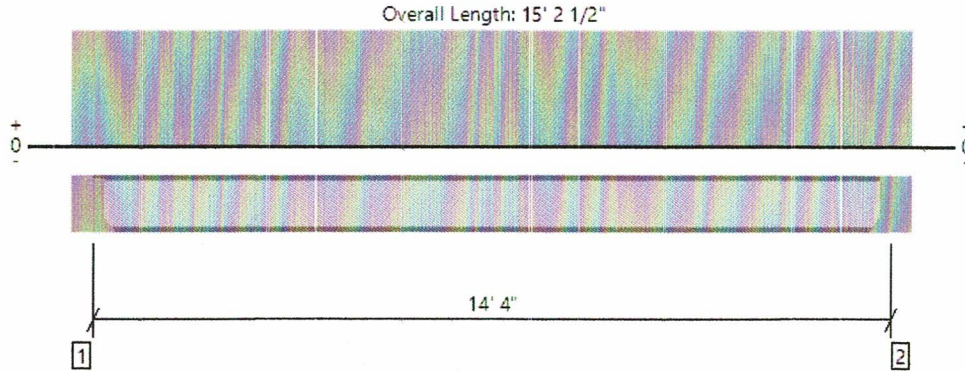
1/22/2021 4:58:01 PM UTC

ForteWEB v3.1, Engine: V8.1.5.1, Data: V8.0.1.0

File Name: Chen

Upper, UJ3

1 piece(s) 11 7/8" TJI@ 110 @ 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)	394 @ 5 1/4"	910 (1.75")	Passed (43%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	394 @ 5 1/4"	1560	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1412 @ 7' 7 1/4"	3160	Passed (45%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.132 @ 7' 7 1/4"	0.358	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.181 @ 7' 7 1/4"	0.717	Passed (L/951)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	45	45	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" 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 - Hanger on 11 7/8" PSL beam	5.25"	Hanger ¹	1.75" / - ²	114	304	418	See note ¹
2 - Hanger on 11 7/8" PSL beam	5.25"	Hanger ¹	1.75" / - ²	114	304	418	See note ¹

• At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger

• ¹ See Connector grid below for additional information and/or requirements.

• ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 9" o/c	
Bottom Edge (Lu)	14' 4" o/c	

• TJI joists are only analyzed using Maximum Allowable bracing solutions.

• Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip		
2 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip		

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

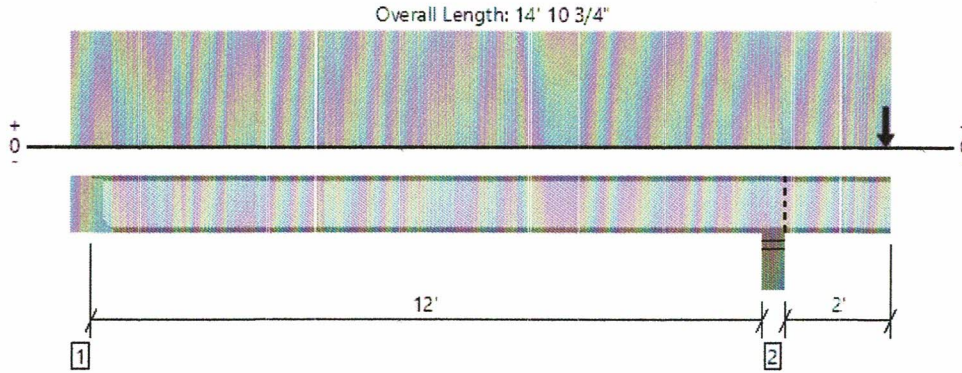
Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PLF)	0 to 15' 2 1/2"	N/A	15.0	40.0	

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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
Brian L2 Engineers, LLC (206) 251-2346 brian@l2engineers.com	



Upper, UJ4
1 piece(s) 11 7/8" TJI@ 110 @ 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)	1496 @ 12' 8"	2703 (5.25")	Passed (55%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1032 @ 12' 10 3/4"	1794	Passed (58%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-2166 @ 12' 8"	3634	Passed (60%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.097 @ 14' 10 3/4"	0.200	Passed (2L/554)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.141 @ 14' 10 3/4"	0.223	Passed (2L/380)	--	1.0 D + 1.0 S (All Spans)
TJ-Pro™ Rating	53	45	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/0.2") and TL (2L/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	Roof Live	Snow	Total	
1 - Hanger on 11 7/8" PSL beam	5.25"	Hanger ¹	1.75" / - ²	62	349	-87	-108	411/-195	See note ¹
2 - Stud wall - HF	5.50"	5.50"	3.50"	608	456	583	728	2375	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.
- ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 9" o/c	
Bottom Edge (Lu)	3' 10" o/c	

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

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip		

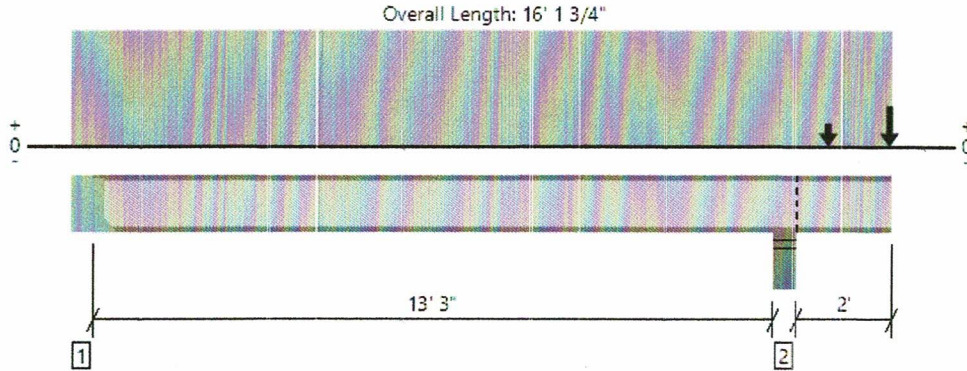
- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 14' 10 3/4"	16"	15.0	40.0	-	-	Default Load
2 - Point (PLF)	14' 9 5/8"	16"	-	-	-	-	
3 - Point (PLF)	14' 9 5/8"	16"	279.0	-	372.0	465.0	

ForterWEB Software Operator	Job Notes
Brian L2 Engineers, LLC (206) 251-2346 brian@l2engineers.com	



Upper, UJ5
1 piece(s) 11 7/8" TJI@ 110 @ 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)	465 @ 5 1/4"	910 (1.75")	Passed (51%)	1.00	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	465 @ 5 1/4"	1560	Passed (30%)	1.00	1.0 D + 1.0 L (Alt Spans)
Moment (Ft-lbs)	1476 @ 6' 9 3/8"	3160	Passed (47%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.140 @ 7' 2 1/8"	0.337	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.169 @ 7' 5/16"	0.674	Passed (L/955)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	47	45	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/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	Roof Live	Snow	Total	
1 - Hanger on 11 7/8" PSL beam	5.25"	Hanger ¹	1.75" / - ²	115	383	-24	-30	498/-54	See note ¹
2 - Stud wall - HF	5.50"	5.50"	3.50"	426	488	171	214	1299	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.
- ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 8" o/c	
Bottom Edge (Lu)	6' 5" o/c	

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

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS1.81/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

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

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 16' 1 3/4"	16"	15.0	40.0	-	-	Default Load
2 - Point (PLF)	14' 9 5/8"	16"	80.0	-	-	-	
3 - Point (PLF)	16' 1 3/16"	16"	83.0	-	110.0	138.0	

ForteWEB Software Operator	Job Notes
Brian L2 Engineers, LLC (206) 251-2346 brian@l2engineers.com	



Title Block Line 1
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 Title Block" selection.
 Title Block Line 6

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Printed: 22 FEB 2021, 1:06AM

Wood Beam

Lic. #: KW-06011909

File: Chen.ec6
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 L2 Engineers

DESCRIPTION: UB1

CODE REFERENCES

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

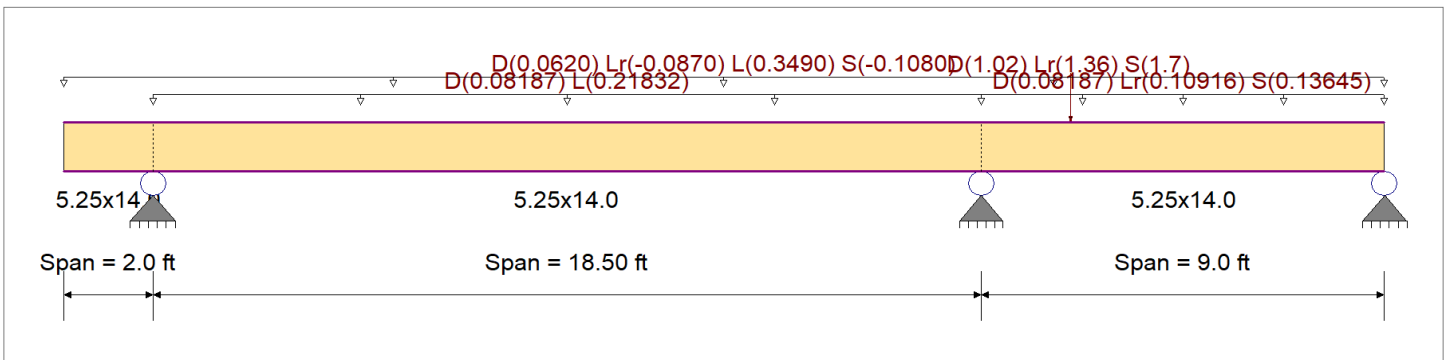
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

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

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

Fb + 2,900.0 psi E : Modulus of Elasticity
 Fb - 2,900.0 psi Ebend- xx 2,000.0ksi
 Fc - Prll 2,900.0 psi Eminbend - xx 1,016.54ksi
 Fc - Perp 750.0 psi
 Fv 290.0 psi
 Ft 2,025.0 psi Density 45.070pcf



Applied Loads

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

Loads on all spans...

Uniform Load on ALL spans : D = 0.0620, Lr = -0.0870, L = 0.3490, S = -0.1080 k/ft

Load for Span Number 2

Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 5.458 ft

Load for Span Number 3

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 5.458 ft

Point Load : D = 1.020, Lr = 1.360, S = 1.70 k @ 2.0 ft, (GT4)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.547 : 1	Maximum Shear Stress Ratio	=	0.490 : 1
Section used for this span		5.25x14.0	Section used for this span		5.25x14.0
fb: Actual	=	1,559.40psi	fv: Actual	=	142.14 psi
Fb: Allowable	=	2,850.80psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	18.500ft	Location of maximum on span	=	17.412 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 2
Maximum Deflection					
Max Downward Transient Deflection		0.355 in	Ratio =		624 >=360
Max Upward Transient Deflection		-0.132 in	Ratio =		362 >=360
Max Downward Total Deflection		0.436 in	Ratio =		508 >=240
Max Upward Total Deflection		-0.163 in	Ratio =		294 >=240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values				
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v	
D Only																		
	Length = 2.0 ft	1	0.003	0.071	0.90	0.983	1.00	1.00	1.00	1.00	1.00	0.12	8.68	2565.72	0.91	18.54	261.00	
	Length = 18.50 ft	2	0.137	0.144	0.90	0.983	1.00	1.00	1.00	1.00	1.00	5.04	352.46	2565.72	1.84	37.49	261.00	
	Length = 9.0 ft	3	0.137	0.144	0.90	0.983	1.00	1.00	1.00	1.00	1.00	5.04	352.46	2565.72	1.84	37.49	261.00	
+D+L																		
	Length = 2.0 ft	1	0.020	0.327	1.00	0.983	1.00	1.00	1.00	1.00	1.00	0.82	57.52	2850.80	0.00	0.00	0.00	
	Length = 18.50 ft	2	0.547	0.490	1.00	0.983	1.00	1.00	1.00	1.00	1.00	22.29	1,559.40	2850.80	6.96	142.14	290.00	
	Length = 9.0 ft	3	0.547	0.490	1.00	0.983	1.00	1.00	1.00	1.00	1.00	22.29	1,559.40	2850.80	4.93	142.14	290.00	

Title Block Line 1
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 Title Block" selection.
 Title Block Line 6

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Printed: 22 FEB 2021, 1:06AM

Wood Beam

File: Chen.ec6
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 L2 Engineers

Lic. #: KW-06011909

DESCRIPTION: UB1

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
		M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
+D+Lr						0.983	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.001	0.016	1.25	0.983	1.00	1.00	1.00	1.00	1.00	0.05	3.50	3563.50	0.28	5.80	362.50
Length = 18.50 ft	2	0.064	0.156	1.25	0.983	1.00	1.00	1.00	1.00	1.00	3.28	229.55	3563.50	2.77	56.62	362.50
Length = 9.0 ft	3	0.064	0.156	1.25	0.983	1.00	1.00	1.00	1.00	1.00	3.28	229.55	3563.50	2.77	56.62	362.50
+D+S					0.983	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.002	0.008	1.15	0.983	1.00	1.00	1.00	1.00	1.00	0.09	6.44	3278.42	0.13	2.71	333.50
Length = 18.50 ft	2	0.061	0.184	1.15	0.983	1.00	1.00	1.00	1.00	1.00	2.87	200.48	3278.42	3.01	61.51	333.50
Length = 9.0 ft	3	0.070	0.184	1.15	0.983	1.00	1.00	1.00	1.00	1.00	3.27	228.77	3278.42	3.01	61.51	333.50
+D+0.750Lr+0.750L					0.983	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.010	0.183	1.25	0.983	1.00	1.00	1.00	1.00	1.00	0.52	36.17	3563.50	3.24	66.16	362.50
Length = 18.50 ft	2	0.327	0.281	1.25	0.983	1.00	1.00	1.00	1.00	1.00	16.66	1,165.49	3563.50	4.99	101.77	362.50
Length = 9.0 ft	3	0.327	0.281	1.25	0.983	1.00	1.00	1.00	1.00	1.00	16.66	1,165.49	3563.50	4.86	101.77	362.50
+D+0.750L+0.750S					0.983	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.010	0.191	1.15	0.983	1.00	1.00	1.00	1.00	1.00	0.49	33.97	3278.42	3.13	63.85	333.50
Length = 18.50 ft	2	0.349	0.308	1.15	0.983	1.00	1.00	1.00	1.00	1.00	16.35	1,143.68	3278.42	5.04	102.82	333.50
Length = 9.0 ft	3	0.349	0.308	1.15	0.983	1.00	1.00	1.00	1.00	1.00	16.35	1,143.68	3278.42	5.04	102.82	333.50
+0.60D					0.983	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 2.0 ft	1	0.001	0.024	1.60	0.983	1.00	1.00	1.00	1.00	1.00	0.07	5.21	4561.28	0.55	11.13	464.00
Length = 18.50 ft	2	0.046	0.048	1.60	0.983	1.00	1.00	1.00	1.00	1.00	3.02	211.47	4561.28	1.10	22.50	464.00
Length = 9.0 ft	3	0.046	0.048	1.60	0.983	1.00	1.00	1.00	1.00	1.00	3.02	211.47	4561.28	1.10	22.50	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0000	0.000	+D+L	-0.1633	0.000
	2	0.4364	8.395		0.0000	0.000
	3	0.0000	8.395	+D+L	-0.0488	3.328

Vertical Reactions

Load Combination	Support notation : Far left is #1				Values in KIPS
	Support 1	Support 2	Support 3	Support 4	
Overall MAXimum		6.240	13.226	1.062	
Overall MINimum		-1.109	0.104	0.747	
D Only		1.189	3.597	0.314	
+D+L		6.240	13.226	-0.032	
+D+Lr		0.296	3.669	0.911	
+D+S		0.080	3.701	1.062	
+D+0.750Lr+0.750L		4.308	10.873	0.503	
+D+0.750L+0.750S		4.146	10.897	0.615	
+0.60D		0.714	2.158	0.189	
Lr Only		-0.893	0.072	0.597	
L Only		5.051	9.629	-0.346	
S Only		-1.109	0.104	0.747	

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 L2 Engineers

DESCRIPTION: UB2

CODE REFERENCES

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

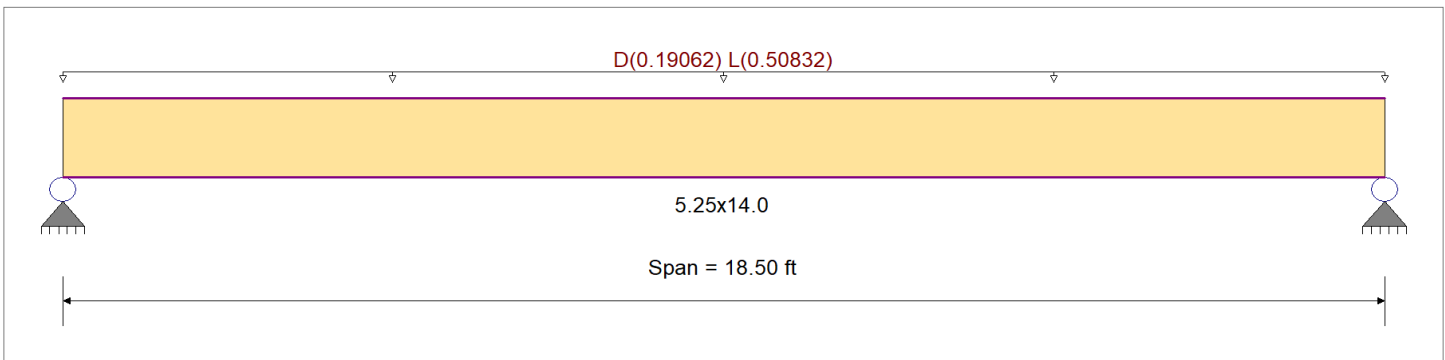
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

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

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

Fb + 2,900.0 psi E : Modulus of Elasticity
 Fb - 2,900.0 psi Ebend- xx 2,000.0ksi
 Fc - Prll 2,900.0 psi Eminbend - xx 1,016.54ksi
 Fc - Perp 750.0 psi
 Fv 290.0 psi
 Ft 2,025.0 psi Density 45.070pcf



Applied Loads

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

Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 12.708 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.734 : 1	Maximum Shear Stress Ratio	=	0.399 : 1
Section used for this span		5.25x14.0	Section used for this span		5.25x14.0
fb: Actual	=	2,092.24psi	fv: Actual	=	115.57 psi
Fb: Allowable	=	2,850.80psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	9.250ft	Location of maximum on span	=	17.352 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.561 in	Ratio =		395 >=360
Max Upward Transient Deflection		0.000 in	Ratio =		0 <360
Max Downward Total Deflection		0.772 in	Ratio =		287 >=240
Max Upward Total Deflection		0.000 in	Ratio =		0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
D Only	Length = 18.50 ft	1	0.222	0.121	0.90	0.983	1.00	1.00	1.00	1.00	1.00	8.15	570.61	2565.72	1.54	31.52	261.00
+D+L	Length = 18.50 ft	1	0.734	0.399	1.00	0.983	1.00	1.00	1.00	1.00	1.00	29.90	2,092.24	2850.80	5.66	115.57	290.00
+D+Lr	Length = 18.50 ft	1	0.160	0.087	1.25	0.983	1.00	1.00	1.00	1.00	1.00	8.15	570.61	3563.50	1.54	31.52	362.50
+D+S	Length = 18.50 ft	1	0.174	0.095	1.15	0.983	1.00	1.00	1.00	1.00	1.00	8.15	570.61	3278.42	1.54	31.52	333.50
+D+0.750Lr+0.750L	Length = 18.50 ft	1	0.480	0.261	1.25	0.983	1.00	1.00	1.00	1.00	1.00	24.46	1,711.83	3563.50	4.63	94.56	362.50
+D+0.750L+0.750S	Length = 18.50 ft	1	0.522	0.284	1.15	0.983	1.00	1.00	1.00	1.00	1.00	24.46	1,711.83	3278.42	4.63	94.56	333.50
+0.60D	Length = 18.50 ft	1	0.075	0.041	1.60	0.983	1.00	1.00	1.00	1.00	1.00	4.89	342.37	4561.28	0.93	18.91	464.00

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Lic. # : KW-06011909

DESCRIPTION: UB2

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.7717	9.318		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	6.465	6.465
Overall MINimum	4.702	4.702
D Only	1.763	1.763
+D+L	6.465	6.465
+D+Lr	1.763	1.763
+D+S	1.763	1.763
+D+0.750Lr+0.750L	5.290	5.290
+D+0.750L+0.750S	5.290	5.290
+0.60D	1.058	1.058
L Only	4.702	4.702
S Only		

Title Block Line 1
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Wood Beam

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 L2 Engineers

DESCRIPTION: UB3

CODE REFERENCES

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

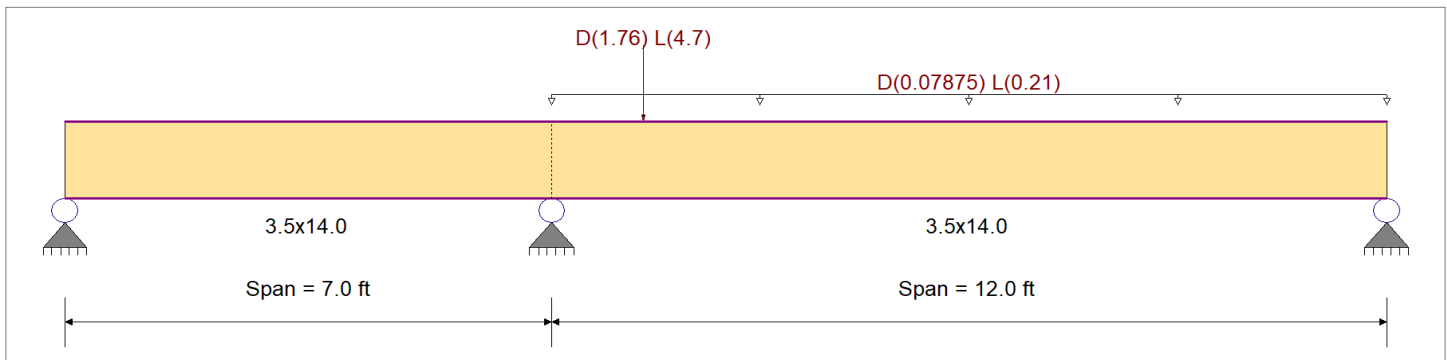
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

Wood Species : iLevel Truss Joist
 Wood Grade : Parallam PSL 2.2E

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

Fb + 2,900.0 psi E : Modulus of Elasticity
 Fb - 2,900.0 psi Ebend- xx 2,200.0ksi
 Fc - Prll 2,900.0 psi Eminbend - xx 1,118.19ksi
 Fc - Perp 750.0 psi
 Fv 290.0 psi
 Ft 2,025.0 psi Density 45.070pcf



Applied Loads

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

Load for Span Number 2

Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 5.250 ft
 Point Load : D = 1.760, L = 4.70 k @ 1.333 ft, (UB2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.289 : 1	Maximum Shear Stress Ratio	=	0.823 : 1
Section used for this span		3.5x14.0	Section used for this span		3.5x14.0
fb: Actual	=	823.76psi	fv: Actual	=	238.77 psi
Fb: Allowable	=	2,850.80psi	Fv: Allowable	=	290.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	7.000ft	Location of maximum on span	=	7.000ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.060 in	Ratio =		2396 >=360
Max Upward Transient Deflection		-0.018 in	Ratio =		4734 >=360
Max Downward Total Deflection		0.083 in	Ratio =		1743 >=240
Max Upward Total Deflection		-0.024 in	Ratio =		3444 >=240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values					
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v		
D Only																			
Length = 7.0 ft	1	0.088	0.249	0.90	0.983	1.00	1.00	1.00	1.00	1.00	2.14	224.53	2565.72	0.00	0.00	0.00	2.13	65.07	261.00
Length = 12.0 ft	2	0.088	0.249	0.90	0.983	1.00	1.00	1.00	1.00	1.00	2.14	224.53	2565.72	0.00	0.00	0.00	2.13	65.07	261.00
+D+L																			
Length = 7.0 ft	1	0.289	0.823	1.00	0.983	1.00	1.00	1.00	1.00	1.00	7.85	823.76	2850.80	0.00	0.00	0.00	7.80	238.77	290.00
Length = 12.0 ft	2	0.289	0.823	1.00	0.983	1.00	1.00	1.00	1.00	1.00	7.85	823.76	2850.80	0.00	0.00	0.00	7.80	238.77	290.00
+D+0.750L																			
Length = 7.0 ft	1	0.189	0.539	1.25	0.983	1.00	1.00	1.00	1.00	1.00	6.42	673.95	3563.50	0.00	0.00	0.00	6.38	195.35	362.50
Length = 12.0 ft	2	0.189	0.539	1.25	0.983	1.00	1.00	1.00	1.00	1.00	6.42	673.95	3563.50	0.00	0.00	0.00	6.38	195.35	362.50
+0.60D																			
Length = 7.0 ft	1	0.030	0.084	1.60	0.983	1.00	1.00	1.00	1.00	1.00	1.28	134.72	4561.28	0.00	0.00	0.00	1.28	39.04	464.00
Length = 12.0 ft	2	0.030	0.084	1.60	0.983	1.00	1.00	1.00	1.00	1.00	1.28	134.72	4561.28	0.00	0.00	0.00	1.28	39.04	464.00

Title Block Line 1
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DESCRIPTION: UB3

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000			
+D+L	2	0.0826	6.034	+D+L	-0.0244	4.067
					0.0000	4.067

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-1.121	9.250	1.796
Overall MINimum	-0.306	6.729	1.306
D Only	-0.306	2.521	0.490
+D+L	-1.121	9.250	1.796
+D+0.750L	-0.917	7.568	1.469
+0.60D	-0.183	1.513	0.294
L Only	-0.816	6.729	1.306

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DESCRIPTION: UB4

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
	Length = 4.167 ft	1	0.206	0.509	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.68	747.29	3625.00	7.66	184.37	362.50
	Length = 11.750 ft	2	0.095	0.509	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.54	344.20	3625.00	1.14	184.37	362.50
	Length = 6.250 ft	3	0.034	0.509	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.28	124.44	3625.00	0.53	184.37	362.50
+D+S						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 4.167 ft	1	0.257	0.636	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.82	858.00	3335.00	8.81	211.95	333.50
	Length = 11.750 ft	2	0.108	0.636	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.72	361.46	3335.00	1.14	211.95	333.50
	Length = 6.250 ft	3	0.033	0.636	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.14	111.24	3335.00	0.50	211.95	333.50
+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 = 4.167 ft	1	0.201	0.393	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.50	729.47	3625.00	5.92	142.49	362.50
	Length = 11.750 ft	2	0.201	0.393	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.50	729.47	3625.00	3.23	142.49	362.50
	Length = 6.250 ft	3	0.145	0.393	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.40	524.83	3625.00	1.94	142.49	362.50
+D+0.750L+0.750S						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
	Length = 4.167 ft	1	0.223	0.489	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.63	742.41	3335.00	6.78	163.17	333.50
	Length = 11.750 ft	2	0.223	0.489	1.15	1.000	1.00	1.00	1.00	1.00	1.00	7.63	742.41	3335.00	3.23	163.17	333.50
	Length = 6.250 ft	3	0.154	0.489	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.29	514.93	3335.00	1.91	163.17	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 = 4.167 ft	1	0.040	0.096	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.89	183.73	4640.00	1.86	44.70	464.00
	Length = 11.750 ft	2	0.036	0.096	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.70	165.30	4640.00	0.69	44.70	464.00
	Length = 6.250 ft	3	0.023	0.096	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.09	106.27	4640.00	0.40	44.70	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0113	1.716	L Only	-0.0023	3.782
+D+L	2	0.0655	6.023		0.0000	3.782
	3	0.0000	6.023	+D+L	-0.0076	1.943

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	8.927	9.624	7.737	0.612
Overall MINimum	5.683	2.153	-0.511	0.015
D Only	3.244	3.696	2.073	0.201
+D+L	2.820	9.447	7.737	0.612
+D+Lr	7.787	5.417	1.664	0.213
+D+S	8.927	5.849	1.562	0.216
+D+0.750Lr+0.750L	6.333	9.300	6.014	0.518
+D+0.750L+0.750S	7.188	9.624	5.937	0.520
+0.60D	1.946	2.217	1.244	0.121
Lr Only	4.543	1.721	-0.409	0.012
L Only	-0.424	5.751	5.664	0.411
S Only	5.683	2.153	-0.511	0.015

Title Block Line 1
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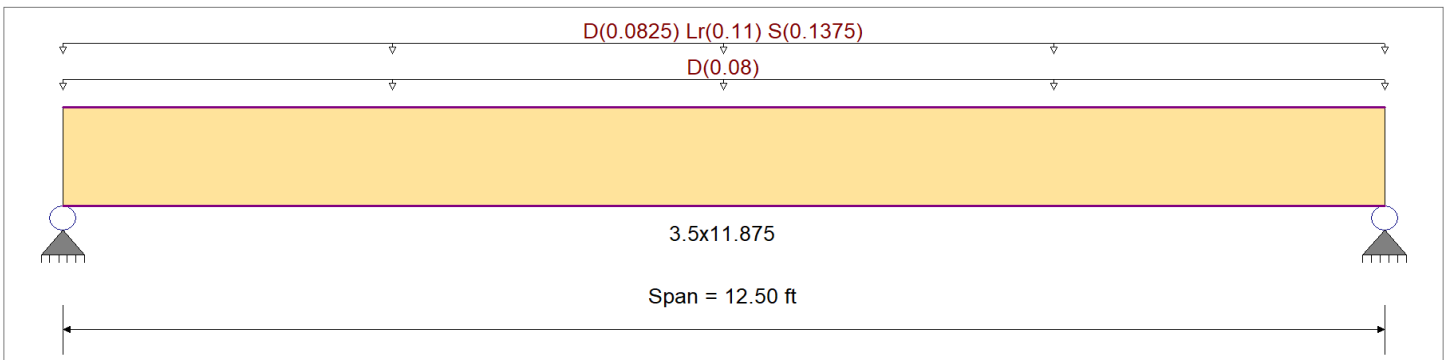
DESCRIPTION: UB5

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	2900 psi	E : Modulus of Elasticity
Load Combination ASCE 7-16	Fb -	2900 psi	Ebend- xx
	Fc - Prll	2900 psi	Eminbend - xx
Wood Species : iLevel Truss Joist	Fc - Perp	750 psi	
Wood Grade : Parallam PSL 2.2E	Fv	290 psi	
	Ft	2025 psi	Density
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling			45.07 pcf



Applied Loads

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

Uniform Load : D = 0.080 , Tributary Width = 1.0 ft, (Wall)
 Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 5.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.256 < 1	Maximum Shear Stress Ratio =	0.172 < 1
Section used for this span	3.5x11.875	Section used for this span	3.5x11.875
fb: Actual =	854.77 psi	fv: Actual =	57.30 psi
Fb: Allowable =	3,335.00 psi	Fv: Allowable =	333.50 psi
Load Combination =	+D+S	Load Combination =	+D+S
Location of maximum on span =	6.250ft	Location of maximum on span =	11.542 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.071 in	Ratio =	2121 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.154 in	Ratio =	972 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values									
			M	V	C _d	C _{F/N}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v							
D Only	Length = 12.50 ft	1	0.177	0.119	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.17	463.00	2610.00	0.00	0.00	0.00	0.86	31.04	261.00	
+D+Lr	Length = 12.50 ft	1	0.214	0.144	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.32	776.41	3625.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
+D+S	Length = 12.50 ft	1	0.256	0.172	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.86	854.77	3335.00	0.00	0.00	0.00	1.59	57.30	333.50	
+D+0.750Lr	Length = 12.50 ft	1	0.193	0.129	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	4.79	698.06	3625.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
+D+0.750S	Length = 12.50 ft	1	0.227	0.152	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	5.19	756.83	3335.00	0.00	0.00	0.00	1.41	50.73	333.50	
+0.60D	Length = 12.50 ft	1	0.060	0.040	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.90	277.80	4640.00	0.00	0.00	0.00	0.52	18.62	464.00	

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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Wood Beam

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DESCRIPTION: UB5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1543	6.296		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.875	1.875
Overall MINimum	0.859	0.859
D Only	1.016	1.016
+D+Lr	1.703	1.703
+D+S	1.875	1.875
+D+0.750Lr	1.531	1.531
+D+0.750S	1.660	1.660
+0.60D	0.609	0.609
Lr Only	0.688	0.688
S Only	0.859	0.859

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

Project Title:
 Engineer:
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DESCRIPTION: UB6

CODE REFERENCES

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

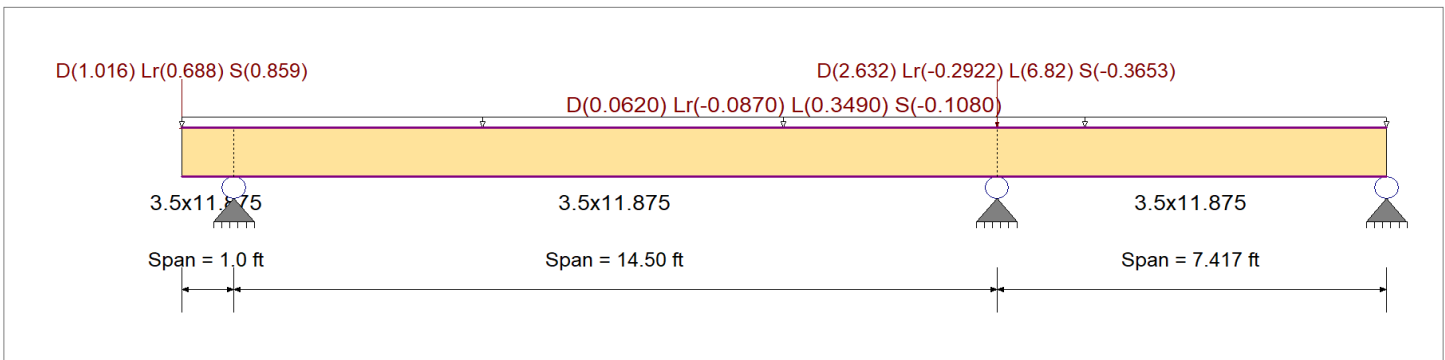
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

Wood Species : iLevel Truss Joist
 Wood Grade : Parallam PSL 2.2E

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

Fb + : 2,900.0 psi
 Fb - : 2,900.0 psi
 Fc - Prll : 2,900.0 psi
 Fc - Perp : 750.0 psi
 Fv : 290.0 psi
 Ft : 2,025.0 psi
 E : Modulus of Elasticity
 Ebend- xx : 2,200.0 ksi
 Eminbend - xx : 1,118.19 ksi
 Density : 45.070 pcf



Applied Loads

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

Loads on all spans...

Uniform Load on ALL spans : D = 0.0620, Lr = -0.0870, L = 0.3490, S = -0.1080 k/ft

Load for Span Number 1

Point Load : D = 1.016, Lr = 0.6880, S = 0.8590 k @ 0.0 ft, (UB5)

Load for Span Number 2

Point Load : D = 2.632, Lr = -0.2922, L = 6.820, S = -0.3653 k @ 14.50 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.387 : 1	Maximum Shear Stress Ratio	=	0.377 : 1
Section used for this span	=	3.5x11.875	Section used for this span	=	3.5x11.875
fb: Actual	=	1,123.07 psi	fv: Actual	=	109.20 psi
Fb: Allowable	=	2,900.00 psi	Fv: Allowable	=	290.00 psi
Load Combination	=	+D+L	Load Combination	=	+D+L
Location of maximum on span	=	14.500ft	Location of maximum on span	=	13.525 ft
Span # where maximum occurs	=	Span # 2	Span # where maximum occurs	=	Span # 2
Maximum Deflection					
Max Downward Transient Deflection	=	0.180 in	Ratio =	=	966 >=360
Max Upward Transient Deflection	=	-0.043 in	Ratio =	=	552 >=360
Max Downward Total Deflection	=	0.197 in	Ratio =	=	885 >=240
Max Upward Total Deflection	=	-0.044 in	Ratio =	=	546 >=240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values					
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v		
D Only																			
Length = 1.0 ft	1		0.059	0.149	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.05	152.74	2610.00	0.00	1.08	38.89	261.00	
Length = 14.50 ft	2		0.059	0.149	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.05	152.74	2610.00	0.40	0.40	38.89	261.00	
Length = 7.417 ft	3		0.049	0.149	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.88	127.78	2610.00	0.29	0.29	38.89	261.00	
+D+L																			
Length = 1.0 ft	1		0.061	0.265	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.22	178.19	2900.00	0.00	0.00	0.00	0.00	
Length = 14.50 ft	2		0.387	0.377	1.00	1.000	1.00	1.00	1.00	1.00	1.00	7.70	1,123.07	2900.00	3.03	3.03	109.20	290.00	
Length = 7.417 ft	3		0.387	0.377	1.00	1.000	1.00	1.00	1.00	1.00	1.00	7.70	1,123.07	2900.00	2.18	2.18	109.20	290.00	
+D+Lr																			
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	0.00	

Title Block Line 1
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DESCRIPTION: UB6

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values		
		M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
Length = 1.0 ft	1	0.068	0.170	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.69	246.76	3625.00	1.70	61.50	362.50
Length = 14.50 ft	2	0.068	0.170	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.69	246.76	3625.00	0.35	61.50	362.50
Length = 7.417 ft	3	0.042	0.170	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.05	153.52	3625.00	0.21	61.50	362.50
+D+S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1	0.081	0.203	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.85	270.17	3335.00	1.88	67.67	333.50
Length = 14.50 ft	2	0.086	0.203	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.96	286.34	3335.00	0.52	67.67	333.50
Length = 7.417 ft	3	0.066	0.203	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.52	221.66	3335.00	0.33	67.67	333.50
+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 = 1.0 ft	1	0.067	0.178	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.66	242.34	3625.00	1.79	64.54	362.50
Length = 14.50 ft	2	0.183	0.181	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.55	663.27	3625.00	1.82	65.73	362.50
Length = 7.417 ft	3	0.183	0.181	1.25	1.000	1.00	1.00	1.00	1.00	1.00	4.55	663.27	3625.00	1.33	65.73	362.50
+D+0.750L+0.750S					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 1.0 ft	1	0.078	0.206	1.15	1.000	1.00	1.00	1.00	1.00	1.00	1.78	259.90	3335.00	1.90	68.61	333.50
Length = 14.50 ft	2	0.184	0.206	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.20	612.16	3335.00	1.69	68.61	333.50
Length = 7.417 ft	3	0.184	0.206	1.15	1.000	1.00	1.00	1.00	1.00	1.00	4.20	612.16	3335.00	1.24	68.61	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 = 1.0 ft	1	0.020	0.050	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.63	91.64	4640.00	0.65	23.33	464.00
Length = 14.50 ft	2	0.020	0.050	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.63	91.64	4640.00	0.24	23.33	464.00
Length = 7.417 ft	3	0.017	0.050	1.60	1.000	1.00	1.00	1.00	1.00	1.00	0.53	76.67	4640.00	0.17	23.33	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+L	-0.0439	0.000
+D+L	2	0.1966	6.702		0.0000	0.000
	3	0.0000	6.702	+D+L	-0.0200	2.431

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum		3.960	15.441	0.486
Overall MINimum		0.189	-2.093	-0.078
D Only		1.539	3.418	0.112
+D+L		3.960	15.441	0.486
+D+Lr		1.687	1.735	0.049
+D+S		1.728	1.325	0.034
+D+0.750Lr+0.750L		3.466	11.173	0.346
+D+0.750L+0.750S		3.496	10.866	0.334
+0.60D		0.924	2.051	0.067
Lr Only		0.148	-1.683	-0.063
L Only		2.421	12.023	0.374
S Only		0.189	-2.093	-0.078

Title Block Line 1
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 Title Block Line 6

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 Engineer:
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Wood Beam

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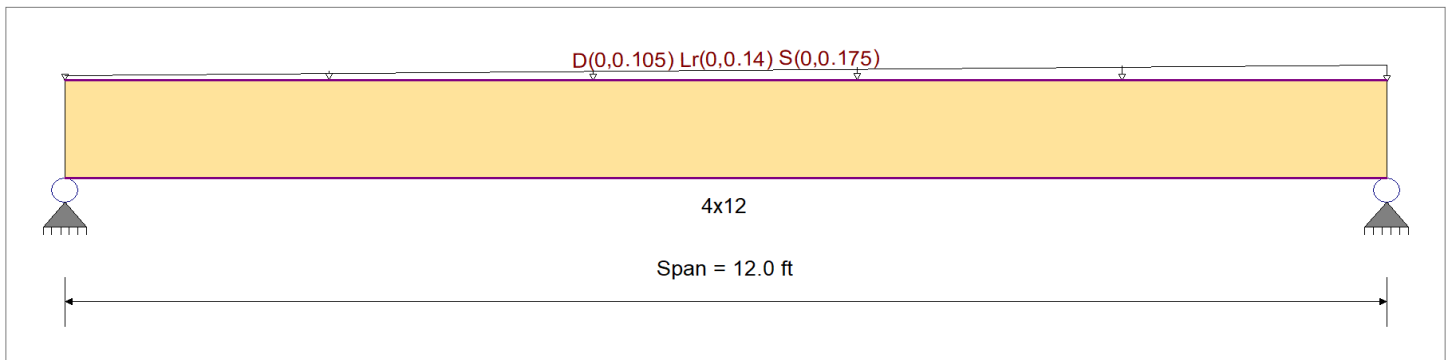
DESCRIPTION: UB7

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	850 psi	E : Modulus of Elasticity	
Load Combination ASCE 7-16	Fb -	850 psi	Ebend- xx	1300ksi
	Fc - Prll	1300 psi	Eminbend - xx	470ksi
Wood Species : Hem-Fir	Fc - Perp	405 psi		
Wood Grade : No.2	Fv	150 psi		
	Ft	525 psi	Density	26.84pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Load for Span Number 1

Varying Uniform Load : D= 0.0->0.0150, Lr= 0.0->0.020, S= 0.0->0.0250 ksf, Extent = 0.0 --> 12.0 ft, Trib Width = 7.0 ft, (Rafters)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.391 : 1	Maximum Shear Stress Ratio	=	0.193 : 1
Section used for this span		4x12	Section used for this span		4x12
fb: Actual	=	420.41 psi	fv: Actual	=	33.23 psi
Fb: Allowable	=	1,075.25 psi	Fv: Allowable	=	172.50 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	6.920ft	Location of maximum on span	=	11.080 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.076 in	Ratio =		1890 >=360
Max Upward Transient Deflection		0.000 in	Ratio =		0 <360
Max Downward Total Deflection		0.122 in	Ratio =		1181 >=240
Max Upward Total Deflection		0.000 in	Ratio =		0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios										Moment Values			Shear Values					
		M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v				
D Only Length = 12.0 ft	1	0.187	0.092	0.90	1.100	1.00	1.00	1.00	1.00	1.00	1.00	0.97	157.65	841.50	0.00	0.00	0.00	0.33	12.46	135.00
+D+Lr Length = 12.0 ft	1	0.315	0.155	1.25	1.100	1.00	1.00	1.00	1.00	1.00	1.00	2.26	367.86	1168.75	0.00	0.00	0.00	0.00	0.00	0.00
+D+S Length = 12.0 ft	1	0.391	0.193	1.15	1.100	1.00	1.00	1.00	1.00	1.00	1.00	2.59	420.41	1075.25	0.00	0.00	0.00	0.87	33.23	172.50
+D+0.750Lr Length = 12.0 ft	1	0.270	0.133	1.25	1.100	1.00	1.00	1.00	1.00	1.00	1.00	1.94	315.31	1168.75	0.00	0.00	0.00	0.65	24.92	187.50
+D+0.750S Length = 12.0 ft	1	0.330	0.163	1.15	1.100	1.00	1.00	1.00	1.00	1.00	1.00	2.18	354.72	1075.25	0.00	0.00	0.00	0.74	28.04	172.50
+0.60D Length = 12.0 ft	1	0.063	0.031	1.60	1.100	1.00	1.00	1.00	1.00	1.00	1.00	0.58	94.59	1496.00	0.00	0.00	0.00	0.20	7.48	240.00

Title Block Line 1
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 Title Block Line 6

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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DESCRIPTION: UB7

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.1219	6.263		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.560	1.120
Overall MINimum	0.350	0.700
D Only	0.210	0.420
+D+Lr	0.490	0.980
+D+S	0.560	1.120
+D+0.750Lr	0.420	0.840
+D+0.750S	0.473	0.945
+0.60D	0.126	0.252
Lr Only	0.280	0.560
S Only	0.350	0.700

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

Project Title:
 Engineer:
 Project ID:
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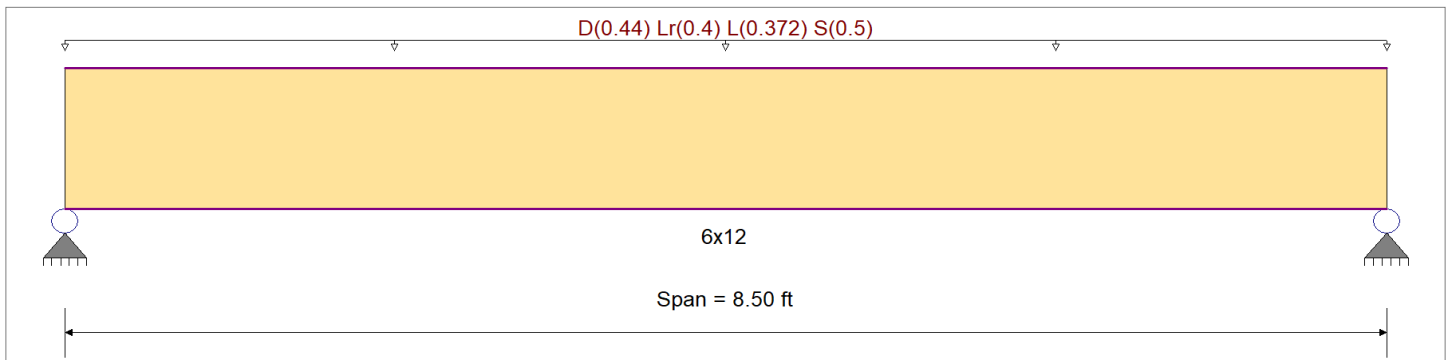
DESCRIPTION: UH1

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	1,300.0 psi	E : Modulus of Elasticity	
Load Combination : ASCE 7-16	Fb -	1,300.0 psi	Ebend- xx	1,200.0ksi
	Fc - Prll	850.0 psi	Eminbend - xx	440.0ksi
Wood Species : Douglas Fir-South	Fc - Perp	520.0 psi		
Wood Grade : No.1	Fv	165.0 psi		
	Ft	625.0 psi	Density	28.720pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Uniform Load : D = 0.440, Lr = 0.40, L = 0.3720, S = 0.50, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.654 : 1	Maximum Shear Stress Ratio =	0.454 : 1
Section used for this span	6x12	Section used for this span	6x12
fb: Actual =	978.00psi	fv: Actual =	86.12 psi
Fb: Allowable =	1,495.00psi	Fv: Allowable =	189.75 psi
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
Location of maximum on span =	4.250ft	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	0.071 in	Ratio =	1444 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.155 in	Ratio =	660 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
		M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v		
D Only Length = 8.50 ft	1	0.336	0.233	0.90	1.000	1.00	1.00	1.00	1.00	1.00	3.97	393.35	1170.00	0.00	0.00	0.00	0.00	148.50
+D+L Length = 8.50 ft	1	0.558	0.387	1.00	1.000	1.00	1.00	1.00	1.00	1.00	7.33	725.90	1300.00	0.00	0.00	0.00	0.00	165.00
+D+Lr Length = 8.50 ft	1	0.462	0.321	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.59	750.93	1625.00	0.00	0.00	0.00	0.00	206.25
+D+S Length = 8.50 ft	1	0.562	0.390	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.49	840.33	1495.00	0.00	0.00	0.00	0.00	189.75
+D+0.750Lr+0.750L Length = 8.50 ft	1	0.561	0.389	1.25	1.000	1.00	1.00	1.00	1.00	1.00	9.20	910.95	1625.00	0.00	0.00	0.00	0.00	206.25
+D+0.750L+0.750S Length = 8.50 ft	1	0.654	0.454	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.88	978.00	1495.00	0.00	0.00	0.00	0.00	189.75
+0.60D Length = 8.50 ft	1	0.113	0.079	1.60	1.000	1.00	1.00	1.00	1.00	1.00	2.38	236.01	2080.00	0.00	0.00	0.00	0.00	264.00

Title Block Line 1
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 Title Block Line 6

Project Title:
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 Project Descr:

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DESCRIPTION: UH1

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1545	4.281		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	4.650	4.650
Overall MINimum	2.125	2.125
D Only	1.870	1.870
+D+L	3.451	3.451
+D+Lr	3.570	3.570
+D+S	3.995	3.995
+D+0.750Lr+0.750L	4.331	4.331
+D+0.750L+0.750S	4.650	4.650
+0.60D	1.122	1.122
Lr Only	1.700	1.700
L Only	1.581	1.581
S Only	2.125	2.125

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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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Wood Beam

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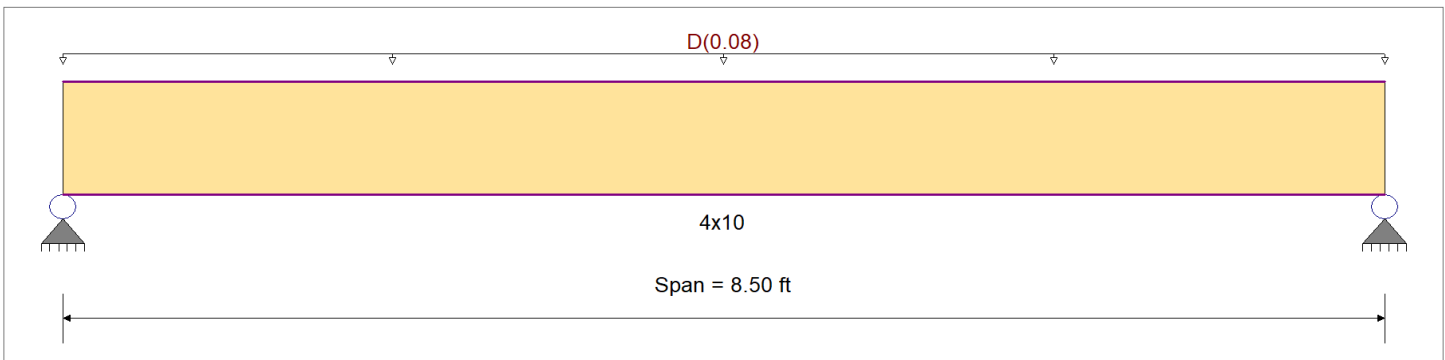
DESCRIPTION: UH2

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	675.0 psi	E : Modulus of Elasticity	
Load Combination : ASCE 7-16	Fb -	675.0 psi	Ebend- xx	1,100.0ksi
	Fc - Prll	500.0 psi	Eminbend - xx	400.0ksi
Wood Species : Hem-Fir	Fc - Perp	405.0 psi		
Wood Grade : No.2	Fv	140.0 psi		
	Ft	350.0 psi	Density	26.840pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Uniform Load : D = 0.010 ksf, Tributary Width = 8.0 ft, (Wall)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.238 : 1	Maximum Shear Stress Ratio =	0.103 : 1
Section used for this span	4x10	Section used for this span	4x10
fb: Actual =	173.71 psi	fv: Actual =	12.99 psi
Fb: Allowable =	729.00psi	Fv: Allowable =	126.00 psi
Load Combination =	D Only	Load Combination =	D Only
Location of maximum on span =	4.250ft	Location of maximum on span =	0.000 ft
Span # where maximum occurs =	Span # 1	Span # where maximum occurs =	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.000 in	Ratio =	0 < 360
Max Upward Transient Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.037 in	Ratio =	2740 >= 240
Max Upward Total Deflection	0.000 in	Ratio =	0 < 240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values				
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v	
D Only	Length = 8.50 ft	1	0.238	0.103	0.90	1.200	1.00	1.00	1.00	1.00	1.00	0.72	173.71	729.00	0.00	0.00	0.00	0.00
+0.60D	Length = 8.50 ft	1	0.080	0.035	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.43	104.22	1296.00	0.00	0.00	0.00	0.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.0372	4.281		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.340	0.340
Overall MINimum	0.204	0.204
D Only	0.340	0.340

Title Block Line 1
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Title Block Line 6

Project Title:
Engineer:
Project ID:
Project Descr:

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Wood Beam

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DESCRIPTION: UH2

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+0.60D	0.204	0.204

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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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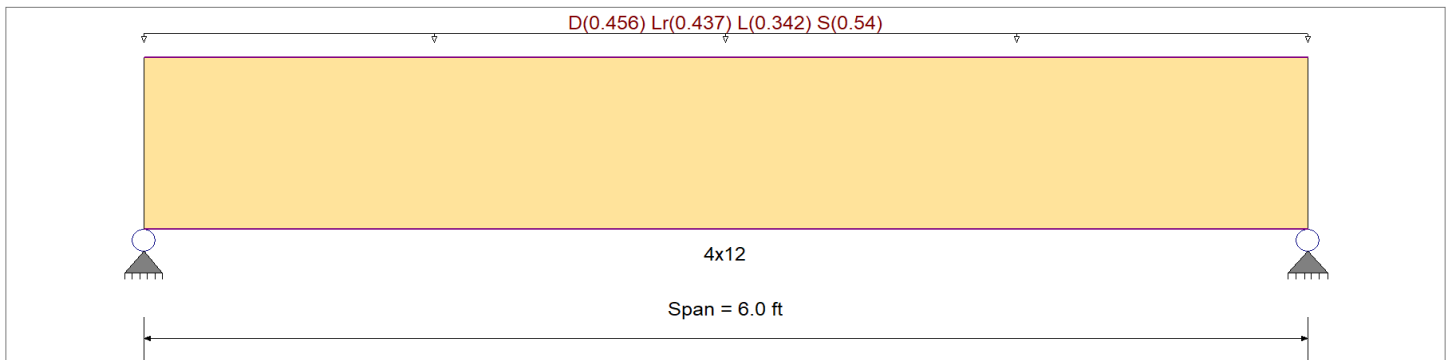
DESCRIPTION: UH3

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	850 psi	E : Modulus of Elasticity	
Load Combination ASCE 7-16	Fb -	850 psi	Ebend- xx	1300ksi
	Fc - Prll	1300 psi	Eminbend - xx	470ksi
Wood Species : Hem-Fir	Fc - Perp	405 psi		
Wood Grade : No.2	Fv	150 psi		
	Ft	525 psi	Density	26.84pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Uniform Load : D = 0.4560, Lr = 0.4370, L = 0.3420, S = 0.540, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.760 : 1	Maximum Shear Stress Ratio =	0.513 : 1
Section used for this span	4x12	Section used for this span	4x12
fb: Actual =	817.37 psi	fv: Actual =	88.56 psi
Fb: Allowable =	1,075.25 psi	Fv: Allowable =	172.50 psi
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
Location of maximum on span =	3.000ft	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	0.029 in	Ratio =	2454 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.061 in	Ratio =	1185 >=240
Max Upward Total Deflection	0.000 in	Ratio =	0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
		M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v	
D Only Length = 6.0 ft	1	0.396	0.268	0.90	1.100	1.00	1.00	1.00	1.00	1.00	2.05	333.53	841.50	0.00	0.00	0.00	0.00
+D+L Length = 6.0 ft	1	0.624	0.422	1.00	1.100	1.00	1.00	1.00	1.00	1.00	3.59	583.68	935.00	0.00	0.00	0.00	0.00
+D+Lr Length = 6.0 ft	1	0.559	0.377	1.25	1.100	1.00	1.00	1.00	1.00	1.00	4.02	653.17	1168.75	0.00	0.00	0.00	0.00
+D+S Length = 6.0 ft	1	0.678	0.458	1.15	1.100	1.00	1.00	1.00	1.00	1.00	4.48	728.50	1075.25	0.00	0.00	0.00	0.00
+D+0.750Lr+0.750L Length = 6.0 ft	1	0.651	0.440	1.25	1.100	1.00	1.00	1.00	1.00	1.00	4.68	760.87	1168.75	0.00	2.16	82.44	187.50
+D+0.750L+0.750S Length = 6.0 ft	1	0.760	0.513	1.15	1.100	1.00	1.00	1.00	1.00	1.00	5.03	817.37	1075.25	0.00	0.00	0.00	0.00
+0.60D Length = 6.0 ft	1	0.134	0.090	1.60	1.100	1.00	1.00	1.00	1.00	1.00	1.23	200.12	1496.00	0.00	0.00	0.00	0.00

Title Block Line 1
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 Engineer:
 Project ID:
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DESCRIPTION: UH3

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.0607	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	3.353	3.353
Overall MINimum	1.620	1.620
D Only	1.368	1.368
+D+L	2.394	2.394
+D+Lr	2.679	2.679
+D+S	2.988	2.988
+D+0.750Lr+0.750L	3.121	3.121
+D+0.750L+0.750S	3.353	3.353
+0.60D	0.821	0.821
Lr Only	1.311	1.311
L Only	1.026	1.026
S Only	1.620	1.620

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

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 Engineer:
 Project ID:
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 L2 Engineers

DESCRIPTION: UH4

CODE REFERENCES

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

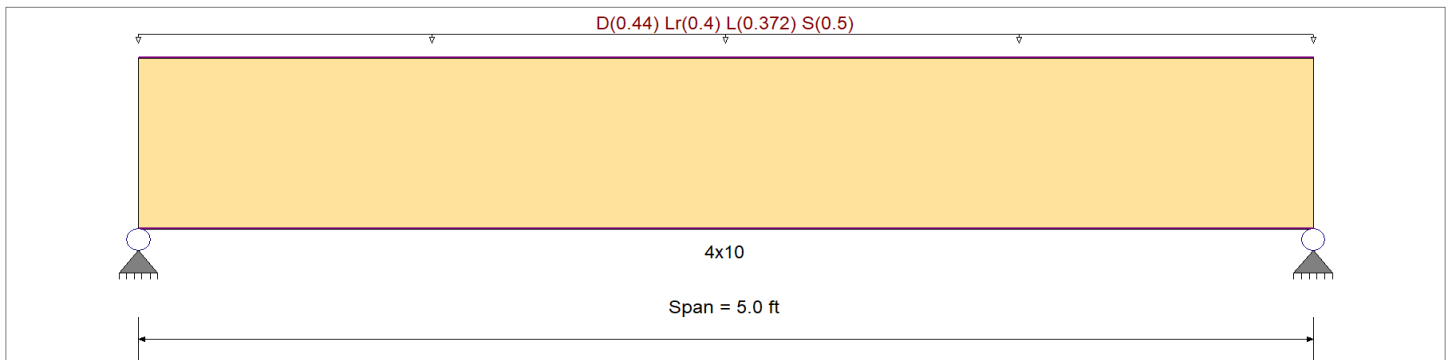
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

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

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

Fb + 850.0 psi E : Modulus of Elasticity
 Fb - 850.0 psi Ebend- xx 1,300.0ksi
 Fc - Prll 1,300.0 psi Eminbend - xx 470.0ksi
 Fc - Perp 405.0 psi
 Fv 150.0 psi
 Ft 525.0 psi Density 26.840pcf



Applied Loads

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

Uniform Load : D = 0.440, Lr = 0.40, L = 0.3720, S = 0.50, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.701 : 1	Maximum Shear Stress Ratio	=	0.509 : 1
Section used for this span		4x10	Section used for this span		4x10
fb: Actual	=	821.96psi	fv: Actual	=	87.87 psi
Fb: Allowable	=	1,173.00psi	Fv: Allowable	=	172.50 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	2.500ft	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		0.024 in	Ratio =		2545 >=360
Max Upward Transient Deflection		0.000 in	Ratio =		0 <360
Max Downward Total Deflection		0.052 in	Ratio =		1163 >=240
Max Upward Total Deflection		0.000 in	Ratio =		0 <240

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values					
		M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v			
D Only Length = 5.0 ft	1	0.360	0.262	0.90	1.200	1.00	1.00	1.00	1.00	1.00	1.38	330.59	918.00	0.00	0.00	0.00	0.76	35.34	135.00
+D+L Length = 5.0 ft	1	0.598	0.435	1.00	1.200	1.00	1.00	1.00	1.00	1.00	2.54	610.08	1020.00	0.00	0.00	0.00	1.41	65.22	150.00
+D+Lr Length = 5.0 ft	1	0.495	0.360	1.25	1.200	1.00	1.00	1.00	1.00	1.00	2.63	631.12	1275.00	0.00	0.00	0.00	1.46	67.47	187.50
+D+S Length = 5.0 ft	1	0.602	0.438	1.15	1.200	1.00	1.00	1.00	1.00	1.00	2.94	706.25	1173.00	0.00	0.00	0.00	1.63	75.50	172.50
+D+0.750Lr+0.750L Length = 5.0 ft	1	0.600	0.437	1.25	1.200	1.00	1.00	1.00	1.00	1.00	3.18	765.61	1275.00	0.00	0.00	0.00	1.77	81.85	187.50
+D+0.750L+0.750S Length = 5.0 ft	1	0.701	0.509	1.15	1.200	1.00	1.00	1.00	1.00	1.00	3.42	821.96	1173.00	0.00	0.00	0.00	1.90	87.87	172.50
+0.60D Length = 5.0 ft	1	0.122	0.088	1.60	1.200	1.00	1.00	1.00	1.00	1.00	0.83	198.35	1632.00	0.00	0.00	0.00	0.46	21.20	240.00

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DESCRIPTION: UH4

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.0516	2.518		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.735	2.735
Overall MINimum	1.250	1.250
D Only	1.100	1.100
+D+L	2.030	2.030
+D+Lr	2.100	2.100
+D+S	2.350	2.350
+D+0.750Lr+0.750L	2.548	2.548
+D+0.750L+0.750S	2.735	2.735
+0.60D	0.660	0.660
Lr Only	1.000	1.000
L Only	0.930	0.930
S Only	1.250	1.250

Title Block Line 1
 You can change this area
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 Title Block Line 6

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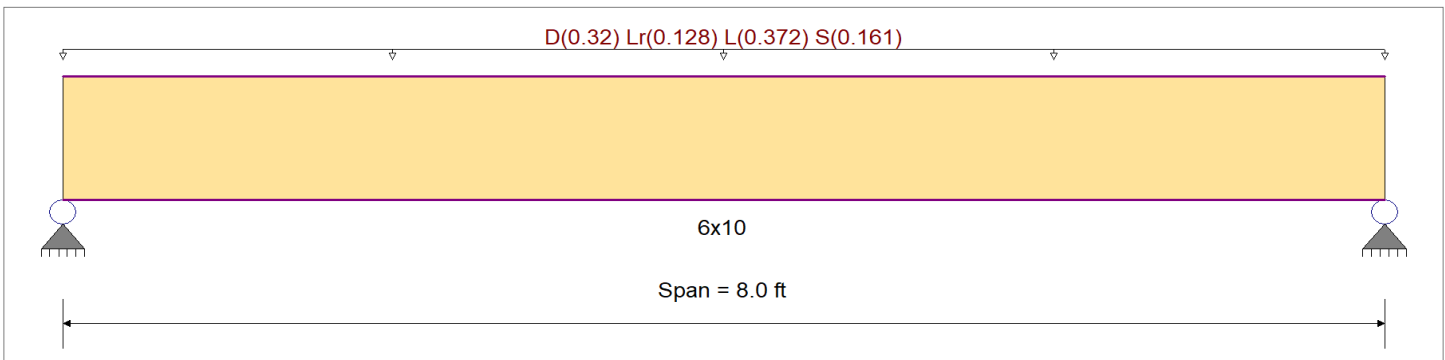
DESCRIPTION: UH5

CODE REFERENCES

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

Material Properties

Analysis Method : Allowable Stress Design	Fb +	1350 psi	E : Modulus of Elasticity	
Load Combination ASCE 7-16	Fb -	1350 psi	Ebend- xx	1600ksi
	Fc - Prll	925 psi	Eminbend - xx	580ksi
Wood Species : Douglas Fir-Larch	Fc - Perp	625 psi		
Wood Grade : No.1	Fv	170 psi		
	Ft	675 psi	Density	31.21 pcf
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Uniform Load : D = 0.320, Lr = 0.1280, L = 0.3720, S = 0.1610, Tributary Width = 1.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.595	1	Maximum Shear Stress Ratio =	0.375	: 1
Section used for this span	6x10		Section used for this span	6x10	
fb: Actual =	803.01	psi	fv: Actual =	63.80	psi
Fb: Allowable =	1,350.00	psi	Fv: Allowable =	170.00	psi
Load Combination =	+D+L		Load Combination =	+D+L	
Location of maximum on span =	4.000	ft	Location of maximum on span =	7.212	ft
Span # where maximum occurs =	Span # 1		Span # where maximum occurs =	Span # 1	
Maximum Deflection					
Max Downward Transient Deflection	0.055	in	Ratio =	1750	>=360
Max Upward Transient Deflection	0.000	in	Ratio =	0	<360
Max Downward Total Deflection	0.106	in	Ratio =	904	>=240
Max Upward Total Deflection	0.000	in	Ratio =	0	<240

Maximum Forces & Stresses for Load Combinations

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
		M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	Fv	
D Only Length = 8.0 ft	1	0.306	0.193	0.90	1.000	1.00	1.00	1.00	1.00	1.00	2.56	371.33	1215.00	0.00	1.03	29.50	153.00
+D+L Length = 8.0 ft	1	0.595	0.375	1.00	1.000	1.00	1.00	1.00	1.00	1.00	5.54	803.01	1350.00	0.00	0.00	0.00	0.00
+D+Lr Length = 8.0 ft	1	0.308	0.194	1.25	1.000	1.00	1.00	1.00	1.00	1.00	3.58	519.87	1687.50	0.00	0.00	0.00	0.00
+D+S Length = 8.0 ft	1	0.360	0.227	1.15	1.000	1.00	1.00	1.00	1.00	1.00	3.85	558.16	1552.50	0.00	0.00	0.00	0.00
+D+0.750Lr+0.750L Length = 8.0 ft	1	0.478	0.302	1.25	1.000	1.00	1.00	1.00	1.00	1.00	5.56	806.49	1687.50	0.00	2.23	64.08	212.50
+D+0.750L+0.750S Length = 8.0 ft	1	0.538	0.339	1.15	1.000	1.00	1.00	1.00	1.00	1.00	5.76	835.21	1552.50	0.00	0.00	0.00	0.00
+0.60D Length = 8.0 ft	1	0.103	0.065	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.54	222.80	2160.00	0.00	0.00	0.00	0.00

Title Block Line 1
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 Title Block Line 6

Project Title:
 Engineer:
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Wood Beam

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DESCRIPTION: UH5

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1061	4.029		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

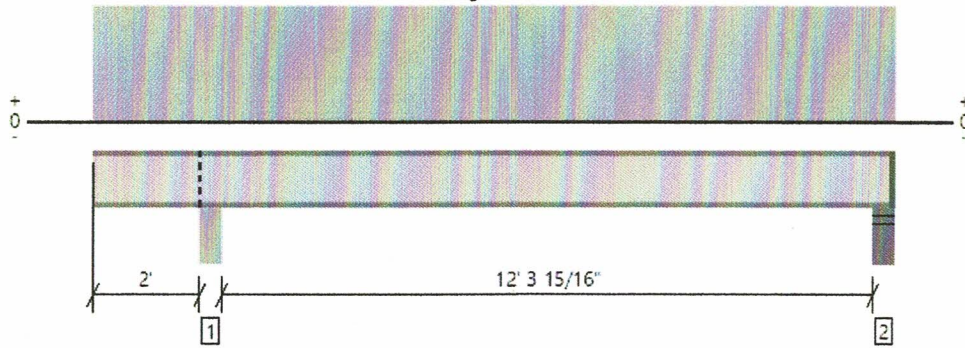
Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	2.879	2.879
Overall MINimum	0.644	0.644
D Only	1.280	1.280
+D+L	2.768	2.768
+D+Lr	1.792	1.792
+D+S	1.924	1.924
+D+0.750Lr+0.750L	2.780	2.780
+D+0.750L+0.750S	2.879	2.879
+0.60D	0.768	0.768
Lr Only	0.512	0.512
L Only	1.488	1.488
S Only	0.644	0.644

Main, MJ1

1 piece(s) 11 7/8" TJI® 110 @ 16" OC

Overall Length: 15' 2 15/16"



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)	478 @ 14' 10 7/16"	1375 (3.50")	Passed (35%)	1.00	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	454 @ 14' 9 7/16"	1560	Passed (29%)	1.00	1.0 D + 1.0 L (Alt Spans)
Moment (Ft-lbs)	1440 @ 8' 6 5/8"	3160	Passed (46%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.110 @ 8' 6 5/8"	0.316	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.149 @ 8' 6 13/16"	0.632	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	51	45	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/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 - GLB	5.50"	5.50"	3.50"	175	467	642	Blocking
2 - Stud wall - HF	5.50"	4.00"	1.75"	130	357/-4	487/-4	1 1/2" Rim Board

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 9" o/c	
Bottom Edge (Lu)	7' 4" o/c	

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 2 15/16"	16"	15.0	40.0	Default Load

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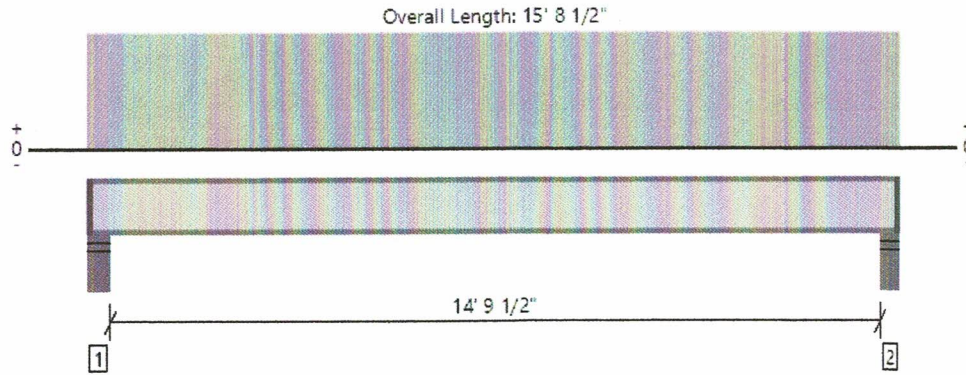
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Brian L2 Engineers, LLC (206) 251-2346 brian@l2engineers.com	



Main, MJ2

1 piece(s) 11 7/8" TJI@ 110 @ 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)	567 @ 4 1/2"	1375 (3.50")	Passed (41%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	542 @ 5 1/2"	1560	Passed (35%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	2051 @ 7' 10 1/4"	3160	Passed (65%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.206 @ 7' 10 1/4"	0.374	Passed (L/873)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.283 @ 7' 10 1/4"	0.748	Passed (L/635)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	47	45	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" 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 - Stud wall - HF	5.50"	4.00"	1.75"	157	419	576	1 1/2" Rim Board
2 - Stud wall - HF	5.50"	4.00"	1.75"	157	419	576	1 1/2" 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)	3' 11" o/c	
Bottom Edge (Lu)	15' 5" o/c	

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 15' 8 1/2"	16"	15.0	40.0	Default Load

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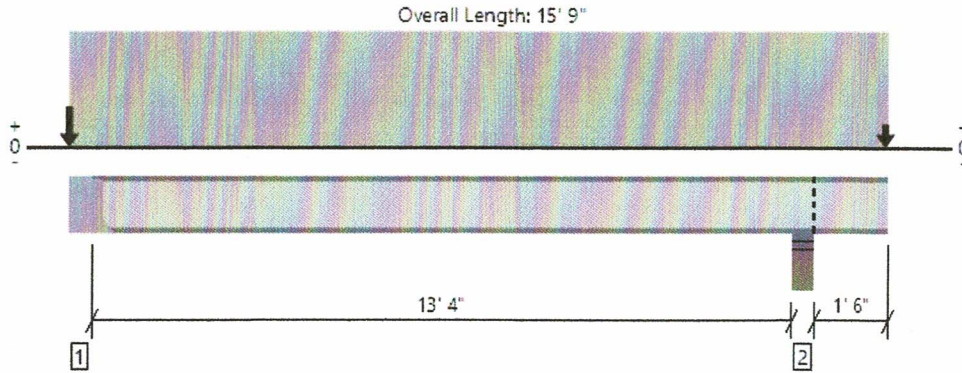
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Brian L2 Engineers, LLC (206) 251-2346 brian@l2engineers.com	



Main, MJ3

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)	434 @ 5 1/2"	1080 (1.75")	Passed (40%)	1.00	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	434 @ 5 1/2"	1705	Passed (25%)	1.00	1.0 D + 1.0 L (Alt Spans)
Moment (Ft-lbs)	1361 @ 6' 8 11/16"	6180	Passed (22%)	1.00	1.0 D + 1.0 L (Alt Spans)
Live Load Defl. (in)	0.104 @ 7' 2 7/8"	0.339	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.116 @ 7' 7/16"	0.678	Passed (L/999+)	--	1.0 D + 1.0 L (Alt Spans)
TJ-Pro™ Rating	53	40	Passed	--	--

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

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/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	Snow	Total	
1 - Hanger on 11 7/8" DF beam	5.50"	Hanger ¹	1.75" / - ²	336	770	183	1289	See note ¹
2 - Stud wall - SPF	5.50"	5.50"	3.50"	439	460	-	899	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.
- ² Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 2" o/c	
Bottom Edge (Lu)	9' 7" o/c	

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

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
1 - Face Mount Hanger	IUS2.37/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip		

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

Vertical Loads	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 15' 9"	16"	12.0	40.0	-	Default Load
2 - Point (PLF)	15' 8 3/8"	16"	200.0	-	-	
3 - Point (PLF)	0	16"	109.0	288.0	-	
4 - Point (PLF)	0	16"	83.0	-	137.0	

ForterWEB Software Operator	Job Notes
Brian L2 Engineers, LLC (206) 251-2346 brian@l2engineers.com	



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DESCRIPTION: MB1

CODE REFERENCES

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

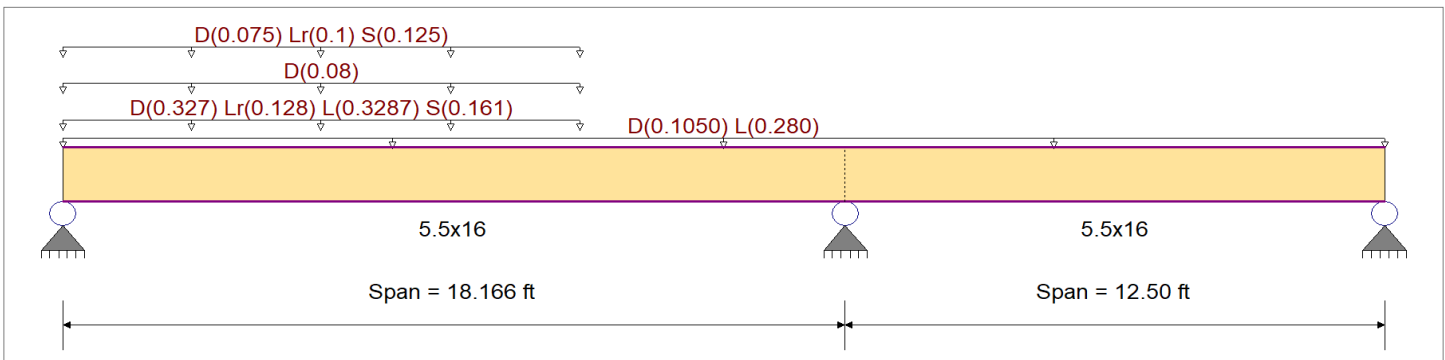
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

Wood Species : DF/DF
 Wood Grade : 24F-V8

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

F_b + : 2,400.0 psi
 F_b - : 2,400.0 psi
 F_c - Prll : 1,650.0 psi
 F_c - Perp : 650.0 psi
 F_v : 265.0 psi
 F_t : 1,100.0 psi
 E : Modulus of Elasticity
 E_{bend-xx} : 1,800.0 ksi
 E_{minbend-xx} : 950.0 ksi
 E_{bend-yy} : 1,600.0 ksi
 E_{minbend-yy} : 850.0 ksi
 Density : 31.210 pcf



Applied Loads

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

Loads on all spans...

Uniform Load on ALL spans : D = 0.0150, L = 0.040 ksf, Tributary Width = 7.0 ft

Load for Span Number 1

Uniform Load : D = 0.3270, Lr = 0.1280, L = 0.3287, S = 0.1610 k/ft, Extent = 0.0 -->> 12.0 ft, Tributary Width = 1.0 ft, (UJ5)

Uniform Load : D = 0.080 k/ft, Extent = 0.0 -->> 12.0 ft, Tributary Width = 1.0 ft, (Exterior Wall)

Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Extent = 0.0 -->> 12.0 ft, Tributary Width = 5.0 ft, (Low Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.670 : 1	Maximum Shear Stress Ratio	=	0.491 : 1
Section used for this span		5.5x16	Section used for this span		5.5x16
fb: Actual	=	1,574.70 psi	fv: Actual	=	130.11 psi
Fb: Allowable	=	2,349.34 psi	Fv: Allowable	=	265.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	7.206 ft	Location of maximum on span	=	16.847 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1
Maximum Deflection					
Max Downward Transient Deflection		0.233 in	Ratio =		935 >=360
Max Upward Transient Deflection		-0.033 in	Ratio =		4555 >=360
Max Downward Total Deflection		0.477 in	Ratio =		457 >=240
Max Upward Total Deflection		-0.086 in	Ratio =		1752 >=240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v		
D Only																			
	Length = 18.166 ft	1	0.363	0.245	0.90	0.979	1.00	1.00	1.00	1.00	1.00	15.01	767.47	2114.41	0.00	3.42	58.35	238.50	
	Length = 12.50 ft	2	0.271	0.245	0.90	1.000	1.00	1.00	1.00	1.00	1.00	11.44	584.90	2160.00	0.00	1.43	58.35	238.50	
+D+L																			
	Length = 18.166 ft	1	0.670	0.491	1.00	0.979	1.00	1.00	1.00	1.00	1.00	30.79	1,574.70	2349.34	0.00	7.63	130.11	265.00	
	Length = 12.50 ft	2	0.554	0.491	1.00	1.000	1.00	1.00	1.00	1.00	1.00	25.99	1,329.02	2400.00	0.00	3.97	130.11	265.00	
+D+Lr																			
	Length = 18.166 ft	1	0.362	0.244	1.25	0.979	1.00	1.00	1.00	1.00	1.00	20.79	1,062.89	2936.68	0.00	4.75	80.89	331.25	
	Length = 12.50 ft	2	0.260	0.244	1.25	1.000	1.00	1.00	1.00	1.00	1.00	15.24	779.29	3000.00	0.00	1.74	80.89	331.25	

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DESCRIPTION: MB1

Load Combination Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
		M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v	
+D+S																	
Length = 18.166 ft	1	0.421	0.284	1.15	0.979	1.00	1.00	1.00	1.00	1.00	22.26	1,138.04	2701.74	0.00	0.00	0.00	0.00
Length = 12.50 ft	2	0.300	0.284	1.15	1.000	1.00	1.00	1.00	1.00	1.00	16.21	828.74	2760.00	0.00	0.00	0.00	0.00
+D+0.750Lr+0.750L																	
Length = 18.166 ft	1	0.543	0.381	1.25	0.979	1.00	1.00	1.00	1.00	1.00	31.18	1,594.42	2936.68	0.00	0.00	0.00	0.00
Length = 12.50 ft	2	0.430	0.381	1.25	1.000	1.00	1.00	1.00	1.00	1.00	25.20	1,288.78	3000.00	0.00	0.00	0.00	0.00
+D+0.750L+0.750S																	
Length = 18.166 ft	1	0.611	0.426	1.15	0.979	1.00	1.00	1.00	1.00	1.00	32.28	1,650.78	2701.74	0.00	0.00	0.00	0.00
Length = 12.50 ft	2	0.480	0.426	1.15	1.000	1.00	1.00	1.00	1.00	1.00	25.93	1,325.87	2760.00	0.00	0.00	0.00	0.00
+0.60D																	
Length = 18.166 ft	1	0.123	0.083	1.60	0.979	1.00	1.00	1.00	1.00	1.00	9.01	460.48	3758.95	0.00	0.00	0.00	0.00
Length = 12.50 ft	2	0.091	0.083	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.86	350.94	3840.00	0.00	0.00	0.00	0.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.4765	8.119		0.0000	0.000
	2	0.0000	8.119	+D+0.750L+0.750S	-0.0856	4.679

Vertical Reactions

Load Combination	Support notation : Far left is #1			Values in KIPS
	Support 1	Support 2	Support 3	
Overall MAXimum	9.013	12.626	-0.640	
Overall MINimum	2.036	1.778	-0.381	
D Only	4.198	5.065	-0.259	
+D+L	8.582	12.626	0.327	
+D+Lr	5.821	6.482	-0.563	
+D+S	6.234	6.843	-0.640	
+D+0.750Lr+0.750L	8.703	11.799	-0.047	
+D+0.750L+0.750S	9.013	12.069	-0.106	
+0.60D	2.519	3.039	-0.155	
Lr Only	1.623	1.417	-0.304	
L Only	4.384	7.561	0.586	
S Only	2.036	1.778	-0.381	

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DESCRIPTION: MB2

CODE REFERENCES

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

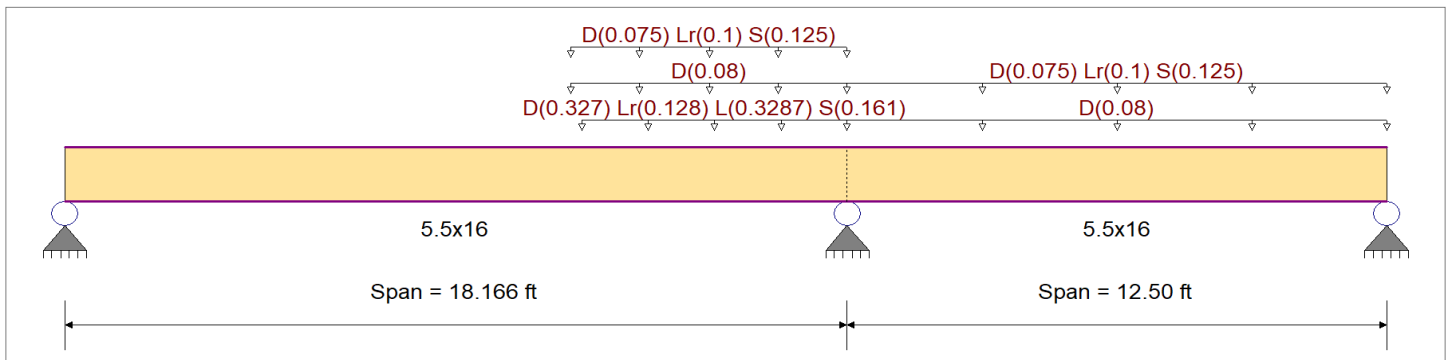
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

Wood Species : DF/DF
 Wood Grade : 24F-V8

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

Fb +	2,400.0 psi	E : Modulus of Elasticity	
Fb -	2,400.0 psi	Ebend- xx	1,800.0 ksi
Fc - Prll	1,650.0 psi	Eminbend - xx	950.0 ksi
Fc - Perp	650.0 psi	Ebend- yy	1,600.0 ksi
Fv	265.0 psi	Eminbend - yy	850.0 ksi
Ft	1,100.0 psi	Density	31.210 pcf



Applied Loads

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

Load for Span Number 1

Uniform Load : D = 0.3270, Lr = 0.1280, L = 0.3287, S = 0.1610 k/ft, Extent = 12.0 --> 18.166 ft, Tributary Width = 1.0 ft, (UJ5)
 Uniform Load : D = 0.080 k/ft, Extent = 11.750 --> 18.166 ft, Tributary Width = 1.0 ft, (Exterior Wall)
 Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Extent = 11.750 --> 18.166 ft, Tributary Width = 5.0 ft, (Low Roof)

Load for Span Number 2

Uniform Load : D = 0.010 ksf, Tributary Width = 8.0 ft, (Exterior Wall)
 Uniform Load : D = 0.0150, Lr = 0.020, S = 0.0250 ksf, Tributary Width = 5.0 ft, (Low Roof)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.178	1	Maximum Shear Stress Ratio	=	0.232	: 1
Section used for this span		5.5x16		Section used for this span		5.5x16	
fb: Actual	=	482.03 psi		fv: Actual	=	70.62 psi	
Fb: Allowable	=	2,701.74 psi		Fv: Allowable	=	304.75 psi	
Load Combination		+D+0.750L+0.750S		Load Combination		+D+0.750L+0.750S	
Location of maximum on span	=	18.166 ft		Location of maximum on span	=	16.847 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.035 in	Ratio = 6303	>=360			
Max Upward Transient Deflection		-0.013 in	Ratio = 11303	>=360			
Max Downward Total Deflection		0.080 in	Ratio = 2728	>=240			
Max Upward Total Deflection		-0.016 in	Ratio = 9363	>=240			

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values				
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v	
D Only																		
	Length = 18.166 ft	1	0.122	0.153	0.90	0.979	1.00	1.00	1.00	1.00	1.00	5.05	258.44	2114.41	0.00	2.14	36.40	238.50
	Length = 12.50 ft	2	0.120	0.153	0.90	1.000	1.00	1.00	1.00	1.00	1.00	5.05	258.44	2160.00	0.00	1.17	36.40	238.50
+D+L																		
	Length = 18.166 ft	1	0.166	0.227	1.00	0.979	1.00	1.00	1.00	1.00	1.00	7.61	388.92	2349.34	0.00	3.52	60.08	265.00
	Length = 12.50 ft	2	0.162	0.227	1.00	1.000	1.00	1.00	1.00	1.00	1.00	7.61	388.92	2400.00	0.00	1.37	60.08	265.00
+D+Lr																		
	Length = 18.166 ft	1	0.134	0.163	1.25	0.979	1.00	1.00	1.00	1.00	1.00	7.67	392.23	2936.68	0.00	3.16	53.90	331.25

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DESCRIPTION: MB2

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
+D+S	Length = 12.50 ft	2	0.131	0.163	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.67	392.23	3000.00	1.87	53.90	331.25
	Length = 18.166 ft	1	0.158	0.191	1.15	0.979	1.00	1.00	1.00	1.00	1.00	8.33	426.08	2701.74	0.00	0.00	0.00
+D+0.750Lr+0.750L	Length = 12.50 ft	2	0.154	0.191	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.33	426.08	2760.00	2.05	58.35	304.75
	Length = 18.166 ft	1	0.155	0.203	1.25	0.979	1.00	1.00	1.00	1.00	1.00	8.93	456.65	2936.68	0.00	0.00	0.00
+D+0.750L+0.750S	Length = 12.50 ft	2	0.152	0.203	1.25	1.000	1.00	1.00	1.00	1.00	1.00	8.93	456.65	3000.00	1.85	67.29	331.25
	Length = 18.166 ft	1	0.178	0.232	1.15	0.979	1.00	1.00	1.00	1.00	1.00	9.43	482.03	2701.74	0.00	0.00	0.00
+0.60D	Length = 12.50 ft	2	0.175	0.232	1.15	1.000	1.00	1.00	1.00	1.00	1.00	9.43	482.03	2760.00	1.98	70.62	304.75
	Length = 18.166 ft	1	0.041	0.052	1.60	0.979	1.00	1.00	1.00	1.00	1.00	3.03	155.06	3758.95	0.00	0.00	0.00
	Length = 12.50 ft	2	0.040	0.052	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.03	155.06	3840.00	1.28	21.84	424.00
															0.70	21.84	424.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.0799	9.844		0.0000	0.000
	2	0.0000	9.844	+D+L	-0.0160	3.911

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	0.489	7.696	1.083
Overall MINimum	0.130	2.709	0.519
D Only	0.240	4.144	0.564
+D+L	0.443	6.172	0.360
+D+Lr	0.343	6.306	0.980
+D+S	0.369	6.853	1.083
+D+0.750Lr+0.750L	0.470	7.286	0.723
+D+0.750L+0.750S	0.489	7.696	0.801
+0.60D	0.144	2.487	0.339
Lr Only	0.103	2.162	0.416
L Only	0.203	2.027	-0.204
S Only	0.130	2.709	0.519

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 L2 Engineers

DESCRIPTION: MB3

CODE REFERENCES

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

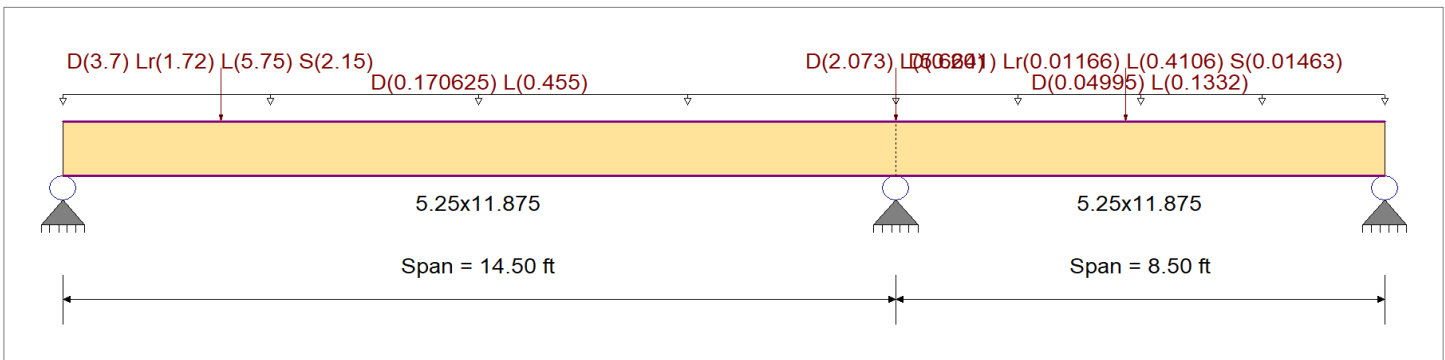
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

Wood Species : iLevel Truss Joist
 Wood Grade : Parallam PSL 2.2E

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

Fb + 2,900.0 psi E : Modulus of Elasticity
 Fb - 2,900.0 psi Ebend- xx 2,200.0ksi
 Fc - Prll 2,900.0 psi Eminbend - xx 1,118.19ksi
 Fc - Perp 750.0 psi
 Fv 290.0 psi
 Ft 2,025.0 psi Density 45.070pcf



Applied Loads

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

Load for Span Number 1

Point Load : D = 3.70, Lr = 1.720, L = 5.750, S = 2.150 k @ 2.750 ft
 Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 11.375 ft

Load for Span Number 2

Point Load : D = 0.2010, Lr = 0.01166, L = 0.4106, S = 0.01463 k @ 4.0 ft, (UB4)
 Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 3.330 ft
 Point Load : D = 2.073, L = 5.664 k @ 0.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.923	1	Maximum Shear Stress Ratio	=	0.851	1
Section used for this span		5.25x11.875		Section used for this span		5.25x11.875	
fb: Actual	=	2,676.06psi		fv: Actual	=	246.82 psi	
Fb: Allowable	=	2,900.00psi		Fv: Allowable	=	290.00 psi	
Load Combination		+D+L		Load Combination		+D+L	
Location of maximum on span	=	2.754ft		Location of maximum on span	=	0.000ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.323 in	Ratio =	539	>=	360	
Max Upward Transient Deflection		-0.051 in	Ratio =	2006	>=	360	
Max Downward Total Deflection		0.485 in	Ratio =	358	>=	240	
Max Upward Total Deflection		-0.076 in	Ratio =	1343	>=	240	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v	
D Only																		
	Length = 14.50 ft	1	0.366	0.336	0.90	1.000	1.00	1.00	1.00	1.00	1.00	9.82	955.36	2610.00	0.00	3.64	87.61	261.00
	Length = 8.50 ft	2	0.231	0.336	0.90	1.000	1.00	1.00	1.00	1.00	1.00	6.21	603.56	2610.00	1.00	87.61	261.00	
+D+L																		
	Length = 14.50 ft	1	0.923	0.851	1.00	1.000	1.00	1.00	1.00	1.00	1.00	27.52	2,676.06	2900.00	0.00	10.26	246.82	290.00
	Length = 8.50 ft	2	0.645	0.851	1.00	1.000	1.00	1.00	1.00	1.00	1.00	19.24	1,871.17	2900.00	3.19	246.82	290.00	
+D+Lr																		
	Length = 14.50 ft	1	0.359	0.328	1.25	1.000	1.00	1.00	1.00	1.00	1.00	13.38	1,301.31	3625.00	0.00	4.94	118.75	362.50

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DESCRIPTION: MB3

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
+D+S	Length = 8.50 ft	2	0.205	0.328	1.25	1.000	1.00	1.00	1.00	1.00	1.00	7.65	744.02	3625.00	1.18	118.75	362.50
						1.000	1.00	1.00	1.00	1.00	1.00		0.00		0.00	0.00	0.00
+D+0.750Lr+0.750L	Length = 14.50 ft	1	0.416	0.379	1.15	1.000	1.00	1.00	1.00	1.00	1.00	14.27	1,387.80	3335.00	5.26	126.54	333.50
	Length = 8.50 ft	2	0.234	0.379	1.15	1.000	1.00	1.00	1.00	1.00	1.00	8.01	779.14	3335.00	1.22	126.54	333.50
+D+0.750Lr+0.750S	Length = 14.50 ft	1	0.691	0.636	1.25	1.000	1.00	1.00	1.00	1.00	1.00	25.76	2,505.35	3625.00	9.57	230.37	362.50
	Length = 8.50 ft	2	0.458	0.636	1.25	1.000	1.00	1.00	1.00	1.00	1.00	17.06	1,659.62	3625.00	2.78	230.37	362.50
+D+0.60D	Length = 14.50 ft	1	0.771	0.708	1.15	1.000	1.00	1.00	1.00	1.00	1.00	26.43	2,570.22	3335.00	9.82	236.21	333.50
	Length = 8.50 ft	2	0.506	0.708	1.15	1.000	1.00	1.00	1.00	1.00	1.00	17.34	1,685.96	3335.00	2.81	236.21	333.50
+0.60D	Length = 14.50 ft	1	0.124	0.113	1.60	1.000	1.00	1.00	1.00	1.00	1.00	5.89	573.22	4640.00	2.18	52.57	464.00
	Length = 8.50 ft	2	0.078	0.113	1.60	1.000	1.00	1.00	1.00	1.00	1.00	3.72	362.13	4640.00	0.60	52.57	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.4851	6.156	+D+L	0.0000	0.000
	2	0.0000	6.156		-0.0759	3.419

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	10.867	18.758	-1.197
Overall MINimum	1.618	0.752	-0.423
D Only	3.807	5.489	-0.423
+D+L	10.867	18.758	-1.197
+D+Lr	5.101	6.090	-0.588
+D+S	5.425	6.241	-0.629
+D+0.750Lr+0.750L	10.072	15.892	-1.127
+D+0.750L+0.750S	10.315	16.005	-1.158
+0.60D	2.284	3.293	-0.254
Lr Only	1.294	0.602	-0.164
L Only	7.059	13.269	-0.774
S Only	1.618	0.752	-0.206

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DESCRIPTION: MB4

CODE REFERENCES

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

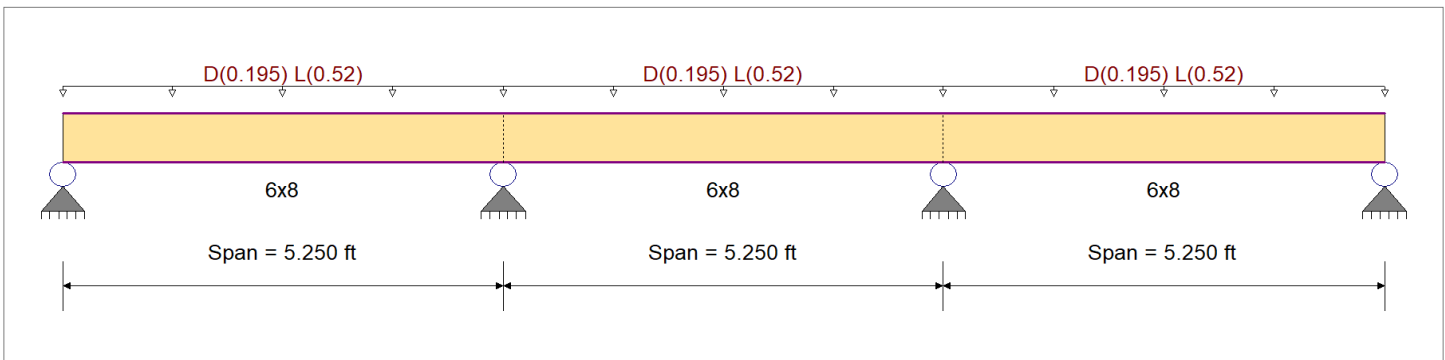
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination : ASCE 7-16

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

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

Fb + 1,300.0 psi E : Modulus of Elasticity
 Fb - 1,300.0 psi Ebend- xx 1,200.0ksi
 Fc - Prll 850.0 psi Eminbend - xx 440.0ksi
 Fc - Perp 520.0 psi
 Fv 165.0 psi
 Ft 625.0 psi Density 28.720pcf



Applied Loads

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

Load for Span Number 1
 Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 13.0 ft
 Load for Span Number 2
 Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 13.0 ft
 Load for Span Number 3
 Uniform Load : D = 0.0150, L = 0.040 ksf, Tributary Width = 13.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.353	1	Maximum Shear Stress Ratio	=	0.399	1
Section used for this span		6x8		Section used for this span		6x8	
fb: Actual	=	458.64	psi	fv: Actual	=	65.84	psi
Fb: Allowable	=	1,300.00	psi	Fv: Allowable	=	165.00	psi
Load Combination		+D+L		Load Combination		+D+L	
Location of maximum on span	=	5.250	ft	Location of maximum on span	=	4.632	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.021	in	Ratio =		3063	>=360
Max Upward Transient Deflection		-0.001	in	Ratio =		47338	>=360
Max Downward Total Deflection		0.028	in	Ratio =		2228	>=240
Max Upward Total Deflection		-0.002	in	Ratio =		34427	>=240

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values				
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v	
D Only																		
Length = 5.250 ft	1	1	0.107	0.121	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.54	125.08	1170.00	0.49	17.96	148.50	
Length = 5.250 ft	2	2	0.107	0.121	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.54	125.08	1170.00	0.49	17.96	148.50	
Length = 5.250 ft	3	3	0.107	0.121	0.90	1.000	1.00	1.00	1.00	1.00	1.00	0.54	125.08	1170.00	0.49	17.96	148.50	
+D+L																		
Length = 5.250 ft	1	1	0.353	0.399	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.97	458.64	1300.00	0.00	0.00	0.00	
Length = 5.250 ft	2	2	0.353	0.399	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.97	458.64	1300.00	1.81	65.84	165.00	
Length = 5.250 ft	3	3	0.353	0.399	1.00	1.000	1.00	1.00	1.00	1.00	1.00	1.97	458.64	1300.00	1.81	65.84	165.00	
+D+0.750L																		
						1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	0.00

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DESCRIPTION: MB4

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values			
			M	V	C _d	C _{F/V}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v
Length = 5.250 ft		1	0.231	0.261	1.25	1.000	1.00	1.00	1.00	1.00	1.00	1.61	375.25	1625.00	1.48	53.87	206.25
Length = 5.250 ft		2	0.231	0.261	1.25	1.000	1.00	1.00	1.00	1.00	1.61	375.25	1625.00	1.48	53.87	206.25	
Length = 5.250 ft		3	0.231	0.261	1.25	1.000	1.00	1.00	1.00	1.00	1.61	375.25	1625.00	1.48	53.87	206.25	
+0.60D						1.000	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00	
Length = 5.250 ft		1	0.036	0.041	1.60	1.000	1.00	1.00	1.00	1.00	0.32	75.05	2080.00	0.30	10.77	264.00	
Length = 5.250 ft		2	0.036	0.041	1.60	1.000	1.00	1.00	1.00	1.00	0.32	75.05	2080.00	0.30	10.77	264.00	
Length = 5.250 ft		3	0.036	0.041	1.60	1.000	1.00	1.00	1.00	1.00	0.32	75.05	2080.00	0.30	10.77	264.00	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0283	2.382		0.0000	0.000
+D+L	2	0.0020	2.647	+D+L	-0.0018	0.618
+D+L	3	0.0280	2.912		0.0000	0.618

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3	Support 4
Overall MAXimum	1.502	4.129	4.129	1.502
Overall MINimum	1.092	3.003	3.003	1.092
D Only	0.410	1.126	1.126	0.410
+D+L	1.502	4.129	4.129	1.502
+D+0.750L	1.229	3.378	3.378	1.229
+0.60D	0.246	0.676	0.676	0.246
L Only	1.092	3.003	3.003	1.092

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DESCRIPTION: MP1

Code References

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

General Information

Analysis Method :	Allowable Stress Design			Wood Section Name	6x6
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber
Overall Column Height	11 ft			Wood Member Type	Sawn
<i>(Used for non-slender calculations)</i>					
Wood Species	Douglas Fir-Larch			Exact Width	5.50 in
Wood Grade	No.1			Exact Depth	5.50 in
Fb +	1,200.0 psi	Fv	170.0 psi	Area	30.250 in ²
Fb -	1,200.0 psi	Ft	825.0 psi	Ix	76.255 in ⁴
Fc - Prll	1,000.0 psi	Density	31.210 pcf	Iy	76.255 in ⁴
Fc - Perp	625.0 psi			Allow Stress Modification Factors	
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial	Cf or Cv for Bending	
	Basic	1,600.0	1,600.0	1,600.0 ksi	1.0
	Minimum	580.0	580.0		1.0
					Cf or Cv for Compression
					1.0
					Cf or Cv for Tension
					1.0
					Cm : Wet Use Factor
					1.0
					Ct : Temperature Factor
					1.0
					Cfu : Flat Use Factor
					1.0
					Kf : Built-up columns
					1.0 NDS 15.3.2
					Use Cr : Repetitive ?
					No

Brace condition for deflection (buckling) along columns :
 X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 11 ft, K = 1.0
 Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 11 ft, K = 1.0

Applied Loads

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

Column self weight included : 72.119 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 11.0 ft, D = 5.065, Lr = 1.417, L = 7.561, S = 1.778 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.6744 : 1	Maximum SERVICE Lateral Load Reactions . .	
Load Combination	+D+L	Top along Y-Y	0.0 k
Governing NDS Formula	Comp Only, f_c/F_c'	Bottom along Y-Y	0.0 k
Location of max. above base	0.0 ft	Top along X-X	0.0 k
At maximum location values are . . .		Bottom along X-X	0.0 k
Applied Axial	12.698 k	Maximum SERVICE Load Lateral Deflections . . .	
Applied Mx	0.0 k-ft	Along Y-Y	0.0 in at 0.0 ft above base
Applied My	0.0 k-ft	for load combination :	n/a
Fc : Allowable	622.46 psi	Along X-X	0.0 in at 0.0 ft above base
		for load combination :	n/a
PASS Maximum Shear Stress Ratio =	0.0 : 1	Other Factors used to calculate allowable stresses . . .	
Load Combination	+0.60D	Bending	Compression
Location of max. above base	11.0 ft	Tension	
Applied Design Shear	0.0 psi		
Allowable Shear	272.0 psi		

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.661	0.2853	PASS	0.0 ft	0.0	PASS	11.0 ft
+D+L	1.000	0.622	0.6744	PASS	0.0 ft	0.0	PASS	11.0 ft
+D+Lr	1.250	0.537	0.3226	PASS	0.0 ft	0.0	PASS	11.0 ft
+D+S	1.150	0.569	0.3492	PASS	0.0 ft	0.0	PASS	11.0 ft
+D+0.750Lr+0.750L	1.250	0.537	0.5842	PASS	0.0 ft	0.0	PASS	11.0 ft
+D+0.750L+0.750S	1.150	0.569	0.6131	PASS	0.0 ft	0.0	PASS	11.0 ft
+0.60D	1.600	0.446	0.1429	PASS	0.0 ft	0.0	PASS	11.0 ft

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DESCRIPTION: MP1

Maximum Reactions

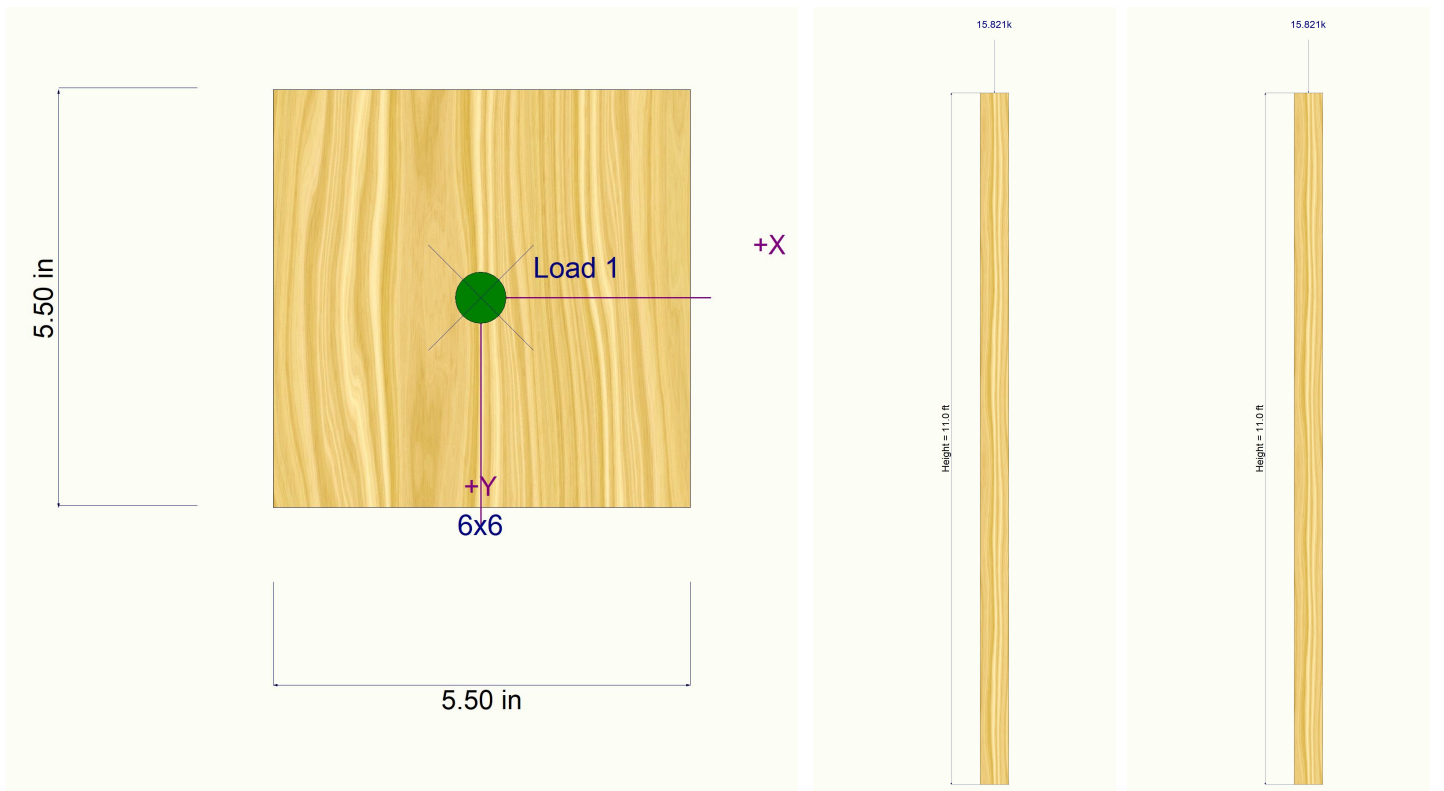
Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						5.137				
+D+L						12.698				
+D+Lr						6.554				
+D+S						6.915				
+D+0.750Lr+0.750L						11.871				
+D+0.750L+0.750S						12.141				
+0.60D						3.082				
Lr Only						1.417				
L Only						7.561				
S Only						1.778				

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+L	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+Lr	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.0000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft

Sketches



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DESCRIPTION: MP2

Code References

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

General Information

Analysis Method :	Allowable Stress Design			Wood Section Name	6x8
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber
Overall Column Height	11 ft			Wood Member Type	Sawn
<i>(Used for non-slender calculations)</i>					
Wood Species	Douglas Fir-Larch			Exact Width	5.50 in
Wood Grade	No.1			Exact Depth	7.50 in
Fb +	1,200.0 psi	Fv	170.0 psi	Area	41.250 in ²
Fb -	1,200.0 psi	Ft	825.0 psi	Ix	193.359 in ⁴
Fc - Prll	1,000.0 psi	Density	31.210 pcf	Iy	103.984 in ⁴
Fc - Perp	625.0 psi			Allow Stress Modification Factors	
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial	Cf or Cv for Bending	
	Basic	1,600.0	1,600.0	1,600.0 ksi	1.0
	Minimum	580.0	580.0		1.0
					Cf or Cv for Compression
					1.0
					Cf or Cv for Tension
					1.0
					Cm : Wet Use Factor
					1.0
					Ct : Temperature Factor
					1.0
					Cfu : Flat Use Factor
					1.0
					Kf : Built-up columns
					1.0 <small>NDS 15.3.2</small>
					Use Cr : Repetitive ?
					No

Brace condition for deflection (buckling) along columns :
 X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 11 ft, K = 1.0
 Y-Y (depth) axis : Unbraced Length for buckling ABOUT X-X Axis = 11 ft, K = 1.0

Applied Loads

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

Column self weight included : 98.344 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 11.0 ft, D = 5.489, Lr = 0.6019, L = 13.269, S = 0.7524 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio =	0.7344 : 1	Maximum SERVICE Lateral Load Reactions . .	
Load Combination	+D+L	Top along Y-Y	0.0 k
Governing NDS Formula	Comp Only, fc/Fc'	Bottom along Y-Y	0.0 k
Location of max.above base	0.0 ft	Top along X-X	0.0 k
At maximum location values are . . .		Bottom along X-X	0.0 k
Applied Axial	18.856 k	Maximum SERVICE Load Lateral Deflections . . .	
Applied Mx	0.0 k-ft	Along Y-Y	0.0 in at 0.0 ft above base
Applied My	0.0 k-ft	for load combination :	n/a
Fc : Allowable	622.46 psi	Along X-X	0.0 in at 0.0 ft above base
		for load combination :	n/a
PASS Maximum Shear Stress Ratio =	0.0 : 1	Other Factors used to calculate allowable stresses . . .	
Load Combination	+0.60D	Bending	Compression
Location of max.above base	11.0 ft	Tension	
Applied Design Shear	0.0 psi		
Allowable Shear	272.0 psi		

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.661	0.2276	PASS	0.0 ft	0.0	PASS	11.0 ft
+D+L	1.000	0.622	0.7344	PASS	0.0 ft	0.0	PASS	11.0 ft
+D+Lr	1.250	0.537	0.2234	PASS	0.0 ft	0.0	PASS	11.0 ft
+D+S	1.150	0.569	0.2348	PASS	0.0 ft	0.0	PASS	11.0 ft
+D+0.750Lr+0.750L	1.250	0.537	0.5771	PASS	0.0 ft	0.0	PASS	11.0 ft
+D+0.750L+0.750S	1.150	0.569	0.5963	PASS	0.0 ft	0.0	PASS	11.0 ft
+0.60D	1.600	0.446	0.1140	PASS	0.0 ft	0.0	PASS	11.0 ft

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 Title Block Line 6

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Wood Column

Lic. #: KW-06011909

File: Chen.ec6
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 L2 Engineers

DESCRIPTION: MP2

Note: Only non-zero reactions are listed.

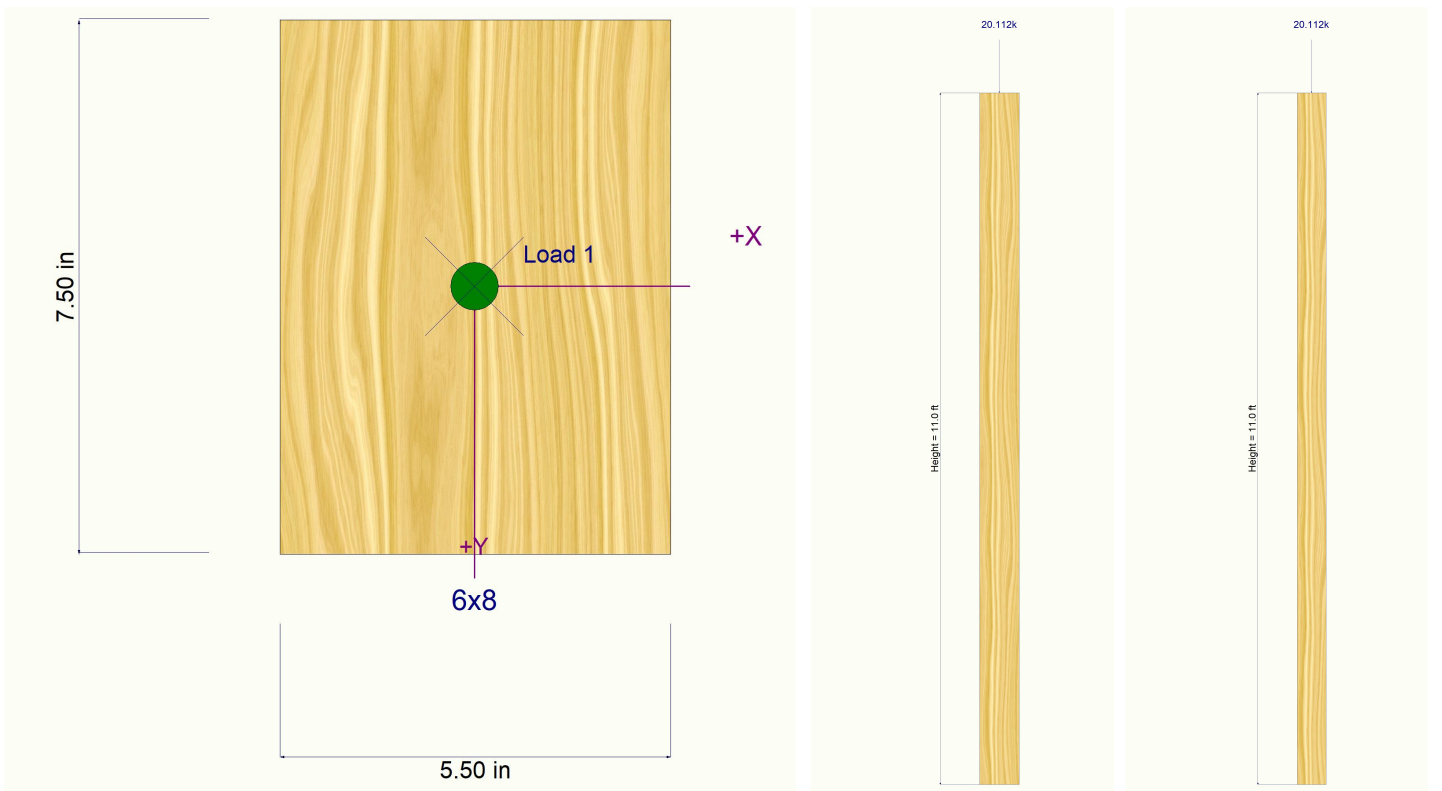
Maximum Reactions

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						5.587				
+D+L						18.856				
+D+Lr						6.189				
+D+S						6.340				
+D+0.750Lr+0.750L						15.991				
+D+0.750L+0.750S						16.103				
+0.60D						3.352				
Lr Only						0.602				
L Only						13.269				
S Only						0.752				

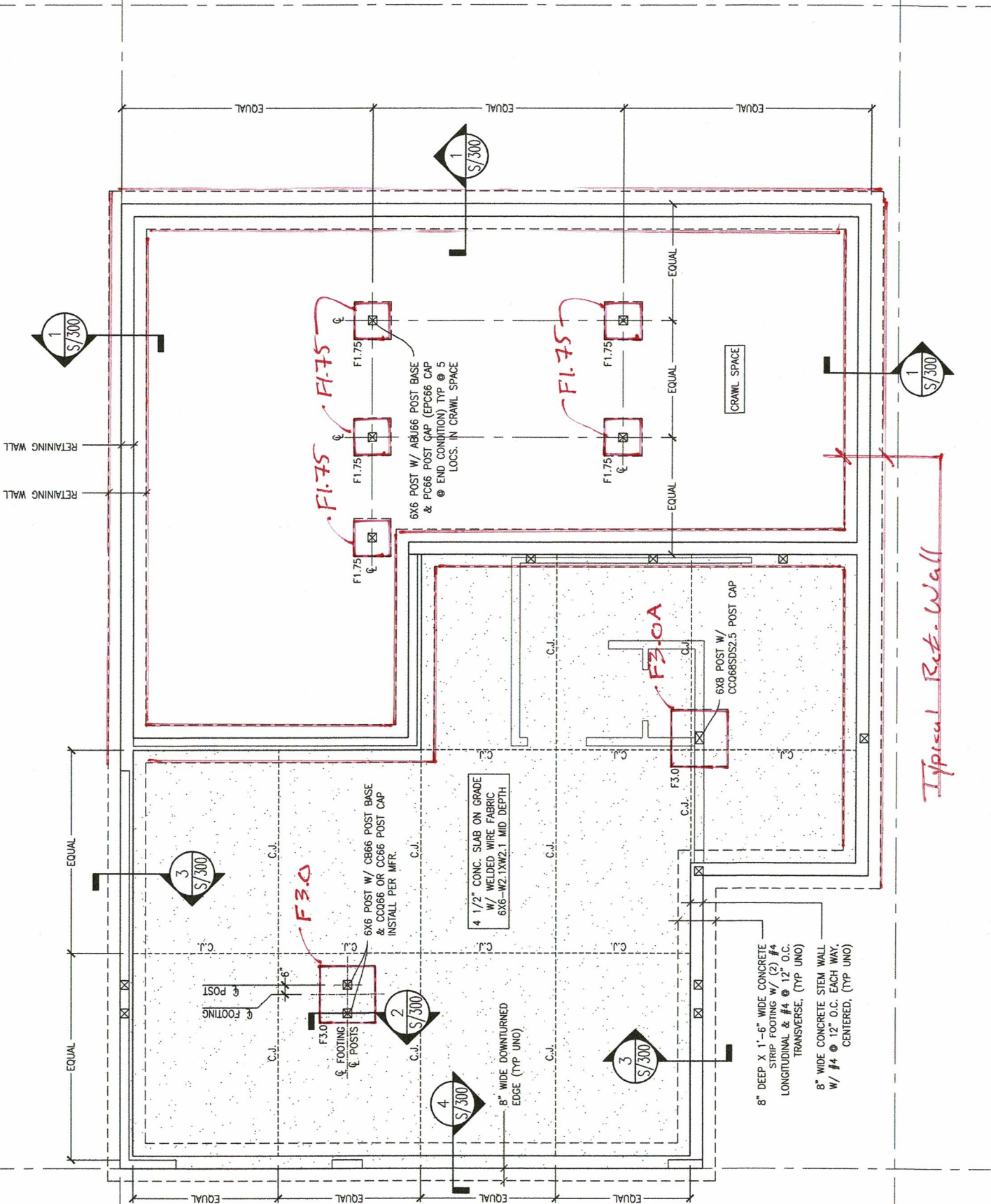
Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+L	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+Lr	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750Lr+0.750L	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+D+0.750L+0.750S	0.0000 in	0.000 ft	0.0000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.0000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
L Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.0000 in	0.000 ft

Sketches



Foundation Key Plan



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 Title Block Line 6

Project Title:
 Engineer:
 Project ID:
 Project Descr:

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General Footing

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 L2 Engineers

Lic. #: KW-06011909

DESCRIPTION: F1.75

Code References

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

General Information

Material Properties

f_c : Concrete 28 day strength	=	2.50 ksi
f_y : Rebar Yield	=	60.0 ksi
E_c : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
ϕ Values Flexure	=	0.90
Shear	=	0.750

Soil Design Values

Allowable Soil Bearing	=	2.50 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Increases based on footing Depth

Footing base depth below soil surface	=	8.0 ft
Allow press. increase per foot of depth when footing base is below	=	ksf ft

Increases based on footing plan dimension

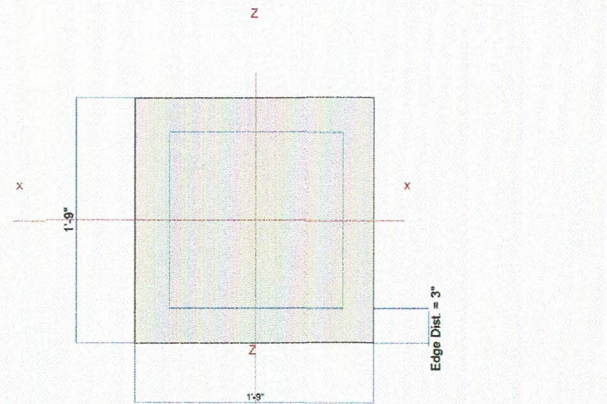
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf ft
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Dimensions

Width parallel to X-X Axis	=	1.750 ft
Length parallel to Z-Z Axis	=	1.750 ft
Footing Thickness	=	8.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	2.0
Reinforcing Bar Size	=	# 4
Bars parallel to Z-Z Axis	=	
Number of Bars	=	2.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

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



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	1.130		3.0			k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

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 Project ID:
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L2 Engineers

General Footing

Lic. #: KW-06011909

DESCRIPTION: F1.75

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9008	Soil Bearing	2.252 ksf	2.50 ksf	+D+L about Z-Z axis
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.1581	Z Flexure (+X)	0.7695 k-ft/ft	4.866 k-ft/ft	+1.20D+1.60L
PASS	0.1581	Z Flexure (-X)	0.7695 k-ft/ft	4.866 k-ft/ft	+1.20D+1.60L
PASS	0.1581	X Flexure (+Z)	0.7695 k-ft/ft	4.866 k-ft/ft	+1.20D+1.60L
PASS	0.1581	X Flexure (-Z)	0.7695 k-ft/ft	4.866 k-ft/ft	+1.20D+1.60L
PASS	0.2032	1-way Shear (+X)	15.243 psi	75.0 psi	+1.20D+1.60L
PASS	0.2032	1-way Shear (-X)	15.243 psi	75.0 psi	+1.20D+1.60L
PASS	0.2032	1-way Shear (+Z)	15.243 psi	75.0 psi	+1.20D+1.60L
PASS	0.2032	1-way Shear (-Z)	15.243 psi	75.0 psi	+1.20D+1.60L
PASS	0.3868	2-way Punching	58.014 psi	150.0 psi	+1.20D+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.50	n/a	0.0	1.272	1.272	n/a	n/a	0.509
X-X, +D+L	2.50	n/a	0.0	2.252	2.252	n/a	n/a	0.901
X-X, +D+0.750L	2.50	n/a	0.0	2.007	2.007	n/a	n/a	0.803
X-X, +0.60D	2.50	n/a	0.0	0.7634	0.7634	n/a	n/a	0.305
Z-Z, D Only	2.50	0.0	n/a	n/a	n/a	1.272	1.272	0.509
Z-Z, +D+L	2.50	0.0	n/a	n/a	n/a	2.252	2.252	0.901
Z-Z, +D+0.750L	2.50	0.0	n/a	n/a	n/a	2.007	2.007	0.803
Z-Z, +0.60D	2.50	0.0	n/a	n/a	n/a	0.7634	0.7634	0.305

Overturing Stability

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

Sliding Stability

All units k

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

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.1978	+Z	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
X-X, +1.40D	0.1978	-Z	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
X-X, +1.20D+1.60L	0.7695	+Z	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
X-X, +1.20D+1.60L	0.7695	-Z	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
X-X, +1.20D+L	0.5445	+Z	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
X-X, +1.20D+L	0.5445	-Z	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
X-X, +1.20D	0.1695	+Z	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
X-X, +1.20D	0.1695	-Z	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
X-X, +0.90D	0.1271	+Z	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
X-X, +0.90D	0.1271	-Z	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
Z-Z, +1.40D	0.1978	-X	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
Z-Z, +1.40D	0.1978	+X	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
Z-Z, +1.20D+1.60L	0.7695	-X	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
Z-Z, +1.20D+1.60L	0.7695	+X	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
Z-Z, +1.20D+L	0.5445	-X	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
Z-Z, +1.20D+L	0.5445	+X	Bottom	0.1728	Min Temp %	0.2286	4.866	OK

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General Footing

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Lic. #: KW-06011909

L2 Engineers

DESCRIPTION: F1.75

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
Z-Z. +1.20D	0.1695	-X	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
Z-Z. +1.20D	0.1695	+X	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
Z-Z. +0.90D	0.1271	-X	Bottom	0.1728	Min Temp %	0.2286	4.866	OK
Z-Z. +0.90D	0.1271	+X	Bottom	0.1728	Min Temp %	0.2286	4.866	OK

One Way Shear

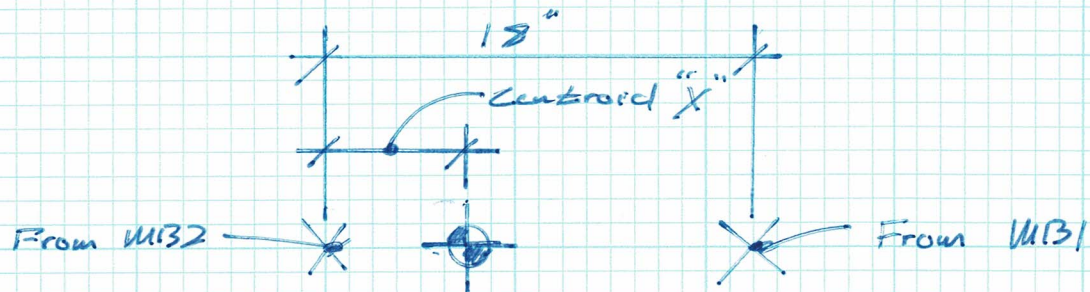
Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	3.92 psi	3.92 psi	3.92 psi	3.92 psi	3.92 psi	75.00 psi	0.05	OK
+1.20D+1.60L	15.24 psi	15.24 psi	15.24 psi	15.24 psi	15.24 psi	75.00 psi	0.20	OK
+1.20D+L	10.79 psi	10.79 psi	10.79 psi	10.79 psi	10.79 psi	75.00 psi	0.14	OK
+1.20D	3.36 psi	3.36 psi	3.36 psi	3.36 psi	3.36 psi	75.00 psi	0.04	OK
+0.90D	2.52 psi	2.52 psi	2.52 psi	2.52 psi	2.52 psi	75.00 psi	0.03	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	14.91 psi	150.00 psi	0.09939	OK
+1.20D+1.60L	58.01 psi	150.00 psi	0.3868	OK
+1.20D+L	41.05 psi	150.00 psi	0.2737	OK
+1.20D	12.78 psi	150.00 psi	0.08519	OK
+0.90D	9.58 psi	150.00 psi	0.0639	OK

Find Centroidal Retention Posts For P30



$$\begin{array}{l} \text{MB1: } D = 5.065 \\ \quad L_R = 1.417 \\ \quad L = 7.581 \\ \quad S = 1.778 \end{array} \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \begin{array}{l} D + L = 12.646 \text{ K Governs} \\ D + 0.75(L + S) = 12.070 \text{ K} \end{array}$$

$$\begin{array}{l} \text{MB2: } D = 4.114 \\ \quad L_R = 2.162 \\ \quad L = 2.709 \\ \quad S = 0.519 \end{array} \left. \begin{array}{l} \\ \\ \\ \end{array} \right\} \begin{array}{l} D + L = 6.875 \text{ K} \\ D + 0.75(L + S) = 6.587 \text{ K} \end{array}$$

Find "x"

$$\begin{aligned} 6.875(x) &= 12.070(18-x) \\ &= 217.26 - 12.070x \\ 6.875x + 12.070x &= 217.26 \end{aligned}$$

$$\therefore x = 217.26 / (6.875 + 12.07) = 11.46''$$

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L2 Engineers

General Footing

Lic. #: KW-06011909

DESCRIPTION: F3.0

Code References

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

General Information

Material Properties

f'_c : Concrete 28 day strength	=	3.0 ksi
f_y : Rebar Yield	=	60.0 ksi
E_c : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
ϕ Values Flexure	=	0.90
Shear	=	0.750

Soil Design Values

Allowable Soil Bearing	=	2.50 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Increases based on footing Depth

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

Increases based on footing plan dimension

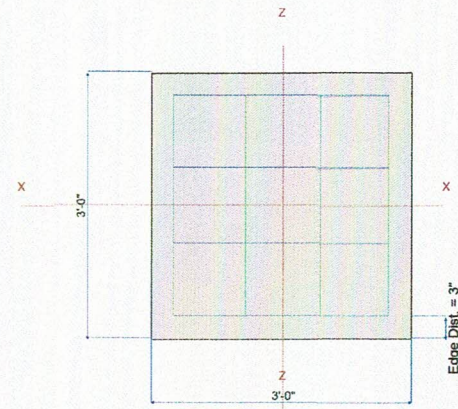
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf
	=	ft

Dimensions

Width parallel to X-X Axis	=	3.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

p_x : parallel to X-X Axis	=	in
p_z : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



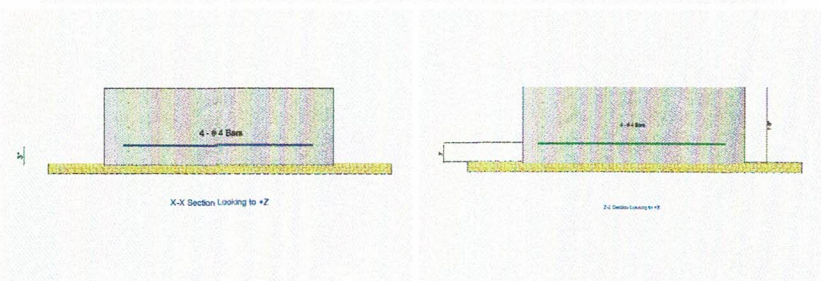
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis	=	
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

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



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	9.209	3.579	10.270	2.297		k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

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L2 Engineers

General Footing

Lic. #: KW-06011909

DESCRIPTION: F3.0

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9288	Soil Bearing	2.322 ksf	2.50 ksf	+D+0.750Lr+0.750L about Z-Z axis
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3489	Z Flexure (+X)	3.659 k-ft/ft	10.486 k-ft/ft	+1.20D+0.50Lr+1.60L
PASS	0.3489	Z Flexure (-X)	3.659 k-ft/ft	10.486 k-ft/ft	+1.20D+0.50Lr+1.60L
PASS	0.3489	X Flexure (+Z)	3.659 k-ft/ft	10.486 k-ft/ft	+1.20D+0.50Lr+1.60L
PASS	0.3489	X Flexure (-Z)	3.659 k-ft/ft	10.486 k-ft/ft	+1.20D+0.50Lr+1.60L
PASS	0.2749	1-way Shear (+X)	22.587 psi	82.158 psi	+1.20D+0.50Lr+1.60L
PASS	0.2749	1-way Shear (-X)	22.587 psi	82.158 psi	+1.20D+0.50Lr+1.60L
PASS	0.2749	1-way Shear (+Z)	22.587 psi	82.158 psi	+1.20D+0.50Lr+1.60L
PASS	0.2749	1-way Shear (-Z)	22.587 psi	82.158 psi	+1.20D+0.50Lr+1.60L
PASS	0.5155	2-way Punching	84.70 psi	164.317 psi	+1.20D+0.50Lr+1.60L

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc (in)	Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
				Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.50	n/a	0.0	1.168	1.168	n/a	n/a	0.467
X-X, +D+L	2.50	n/a	0.0	2.309	2.309	n/a	n/a	0.924
X-X, +D+Lr	2.50	n/a	0.0	1.566	1.566	n/a	n/a	0.626
X-X, +D+S	2.50	n/a	0.0	1.423	1.423	n/a	n/a	0.569
X-X, +D+0.750Lr+0.750L	2.50	n/a	0.0	2.322	2.322	n/a	n/a	0.929
X-X, +D+0.750L+0.750S	2.50	n/a	0.0	2.215	2.215	n/a	n/a	0.886
X-X, +0.60D	2.50	n/a	0.0	0.7009	0.7009	n/a	n/a	0.280
Z-Z, D Only	2.50	0.0	n/a	n/a	n/a	1.168	1.168	0.467
Z-Z, +D+L	2.50	0.0	n/a	n/a	n/a	2.309	2.309	0.924
Z-Z, +D+Lr	2.50	0.0	n/a	n/a	n/a	1.566	1.566	0.626
Z-Z, +D+S	2.50	0.0	n/a	n/a	n/a	1.423	1.423	0.569
Z-Z, +D+0.750Lr+0.750L	2.50	0.0	n/a	n/a	n/a	2.322	2.322	0.929
Z-Z, +D+0.750L+0.750S	2.50	0.0	n/a	n/a	n/a	2.215	2.215	0.886
Z-Z, +0.60D	2.50	0.0	n/a	n/a	n/a	0.7009	0.7009	0.280

Overturing Stability

Rotation Axis & Load Combination...	Overturing Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturing				
All units k				

Sliding Stability

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

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	1.612	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.40D	1.612	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+0.50Lr+1.60L	3.659	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+0.50Lr+1.60L	3.659	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60L+0.50S	3.579	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60L+0.50S	3.579	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60Lr+L	3.381	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60Lr+L	3.381	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60Lr	2.097	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60Lr	2.097	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK

Title Block Line 1
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General Footing

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L2 Engineers

DESCRIPTION: F3.0

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X. +1.20D+L+1.60S	3.125	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +1.20D+L+1.60S	3.125	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +1.20D+1.60S	1.841	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +1.20D+1.60S	1.841	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +1.20D+0.50Lr+L	2.889	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +1.20D+0.50Lr+L	2.889	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +1.20D+L+0.50S	2.809	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +1.20D+L+0.50S	2.809	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +0.90D	1.036	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +0.90D	1.036	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +1.20D+L+0.20S	2.723	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X. +1.20D+L+0.20S	2.723	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.40D	1.612	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.40D	1.612	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+0.50Lr+1.60L	3.659	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+0.50Lr+1.60L	3.659	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+1.60L+0.50S	3.579	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+1.60L+0.50S	3.579	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+1.60Lr+L	3.381	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+1.60Lr+L	3.381	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+1.60Lr	2.097	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+1.60Lr	2.097	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+L+1.60S	3.125	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+L+1.60S	3.125	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+1.60S	1.841	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+1.60S	1.841	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+0.50Lr+L	2.889	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+0.50Lr+L	2.889	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+L+0.50S	2.809	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+L+0.50S	2.809	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +0.90D	1.036	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +0.90D	1.036	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+L+0.20S	2.723	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z. +1.20D+L+0.20S	2.723	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	9.95 psi	9.95 psi	9.95 psi	9.95 psi	9.95 psi	82.16 psi	0.12	OK
+1.20D+0.50Lr+1.60L	22.59 psi	22.59 psi	22.59 psi	22.59 psi	22.59 psi	82.16 psi	0.27	OK
+1.20D+1.60L+0.50S	22.09 psi	22.09 psi	22.09 psi	22.09 psi	22.09 psi	82.16 psi	0.27	OK
+1.20D+1.60Lr+L	20.87 psi	20.87 psi	20.87 psi	20.87 psi	20.87 psi	82.16 psi	0.25	OK
+1.20D+1.60Lr	12.95 psi	12.95 psi	12.95 psi	12.95 psi	12.95 psi	82.16 psi	0.16	OK
+1.20D+L+1.60S	19.29 psi	19.29 psi	19.29 psi	19.29 psi	19.29 psi	82.16 psi	0.23	OK
+1.20D+1.60S	11.36 psi	11.36 psi	11.36 psi	11.36 psi	11.36 psi	82.16 psi	0.14	OK
+1.20D+0.50Lr+L	17.83 psi	17.83 psi	17.83 psi	17.83 psi	17.83 psi	82.16 psi	0.22	OK
+1.20D+L+0.50S	17.34 psi	17.34 psi	17.34 psi	17.34 psi	17.34 psi	82.16 psi	0.21	OK
+0.90D	6.40 psi	6.40 psi	6.40 psi	6.40 psi	6.40 psi	82.16 psi	0.08	OK
+1.20D+L+0.20S	16.81 psi	16.81 psi	16.81 psi	16.81 psi	16.81 psi	82.16 psi	0.20	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	37.31 psi	164.32 psi	0.227	OK
+1.20D+0.50Lr+1.60L	84.70 psi	164.32 psi	0.5155	OK
+1.20D+1.60L+0.50S	82.85 psi	164.32 psi	0.5042	OK
+1.20D+1.60Lr+L	78.26 psi	164.32 psi	0.4763	OK
+1.20D+1.60Lr	48.55 psi	164.32 psi	0.2954	OK
+1.20D+L+1.60S	72.33 psi	164.32 psi	0.4402	OK
+1.20D+1.60S	42.61 psi	164.32 psi	0.2593	OK
+1.20D+0.50Lr+L	66.87 psi	164.32 psi	0.407	OK
+1.20D+L+0.50S	65.02 psi	164.32 psi	0.3957	OK
+0.90D	23.98 psi	164.32 psi	0.1459	OK
+1.20D+L+0.20S	63.02 psi	164.32 psi	0.3835	OK

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DESCRIPTION: F3.0-A

Code References

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

General Information

Material Properties

f_c : Concrete 28 day strength	=	3.0 ksi
f_y : Rebar Yield	=	60.0 ksi
E_c : Concrete Elastic Modulus	=	3,122.0 ksi
Concrete Density	=	145.0 pcf
ϕ Values Flexure	=	0.90
Shear	=	0.750

Soil Design Values

Allowable Soil Bearing	=	2.50 ksf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Increases based on footing Depth

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

Increases based on footing plan dimension

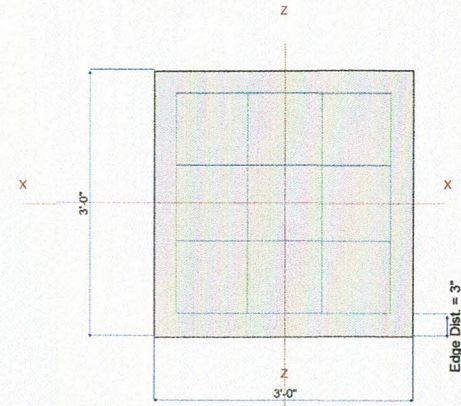
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf
	=	ft

Dimensions

Width parallel to X-X Axis	=	3.0 ft
Length parallel to Z-Z Axis	=	3.0 ft
Footing Thickness	=	12.0 in

Pedestal dimensions...

p_x : parallel to X-X Axis	=	in
p_z : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in



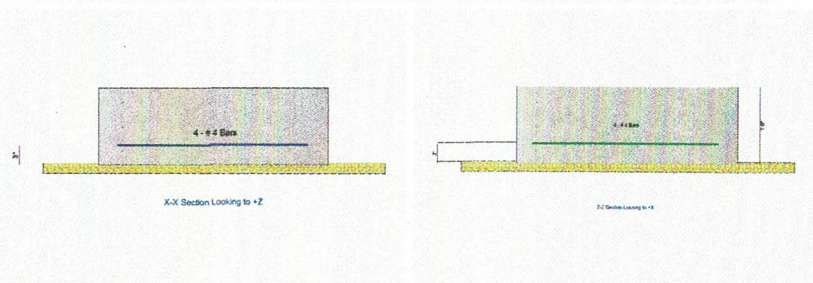
Reinforcing

Bars parallel to X-X Axis	=	
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis	=	
Number of Bars	=	4.0
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

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



Applied Loads

	D	Lr	L	S	W	E	H
P : Column Load	=	5.490	0.60	13.270	0.750		k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

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DESCRIPTION: F3.0-A

DESIGN SUMMARY

Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8916	Soil Bearing	2.229 ksf	2.50 ksf	+D+L about Z-Z axis
PASS	n/a	Overturing - X-X	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Overturing - Z-Z	0.0 k-ft	0.0 k-ft	No Overturing
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3361	Z Flexure (+X)	3.524 k-ft/ft	10.486 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.3361	Z Flexure (-X)	3.524 k-ft/ft	10.486 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.3361	X Flexure (+Z)	3.524 k-ft/ft	10.486 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.3361	X Flexure (-Z)	3.524 k-ft/ft	10.486 k-ft/ft	+1.20D+1.60L+0.50S
PASS	0.2648	1-way Shear (+X)	21.755 psi	82.158 psi	+1.20D+1.60L+0.50S
PASS	0.2648	1-way Shear (-X)	21.755 psi	82.158 psi	+1.20D+1.60L+0.50S
PASS	0.2648	1-way Shear (+Z)	21.755 psi	82.158 psi	+1.20D+1.60L+0.50S
PASS	0.2648	1-way Shear (-Z)	21.755 psi	82.158 psi	+1.20D+1.60L+0.50S
PASS	0.4965	2-way Punching	81.583 psi	164.317 psi	+1.20D+1.60L+0.50S

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc		Actual Soil Bearing Stress @ Location				Actual / Allow Ratio
		Zecc (in)		Bottom, -Z	Top, +Z	Left, -X	Right, +X	
X-X, D Only	2.50	n/a	0.0	0.7550	0.7550	n/a	n/a	0.302
X-X, +D+L	2.50	n/a	0.0	2.229	2.229	n/a	n/a	0.892
X-X, +D+Lr	2.50	n/a	0.0	0.8217	0.8217	n/a	n/a	0.329
X-X, +D+S	2.50	n/a	0.0	0.8383	0.8383	n/a	n/a	0.335
X-X, +D+0.750Lr+0.750L	2.50	n/a	0.0	1.911	1.911	n/a	n/a	0.764
X-X, +D+0.750L+0.750S	2.50	n/a	0.0	1.923	1.923	n/a	n/a	0.769
X-X, +0.60D	2.50	n/a	0.0	0.4530	0.4530	n/a	n/a	0.181
Z-Z, D Only	2.50	0.0	n/a	n/a	n/a	0.7550	0.7550	0.302
Z-Z, +D+L	2.50	0.0	n/a	n/a	n/a	2.229	2.229	0.892
Z-Z, +D+Lr	2.50	0.0	n/a	n/a	n/a	0.8217	0.8217	0.329
Z-Z, +D+S	2.50	0.0	n/a	n/a	n/a	0.8383	0.8383	0.335
Z-Z, +D+0.750Lr+0.750L	2.50	0.0	n/a	n/a	n/a	1.911	1.911	0.764
Z-Z, +D+0.750L+0.750S	2.50	0.0	n/a	n/a	n/a	1.923	1.923	0.769
Z-Z, +0.60D	2.50	0.0	n/a	n/a	n/a	0.4530	0.4530	0.181

Overturing Stability

Rotation Axis & Load Combination...	Overturing Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturing				
All units k				

Sliding Stability

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

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.40D	0.9608	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.40D	0.9608	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+0.50Lr+1.60L	3.515	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+0.50Lr+1.60L	3.515	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60L+0.50S	3.524	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60L+0.50S	3.524	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60Lr+L	2.602	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60Lr+L	2.602	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60Lr	0.9435	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60Lr	0.9435	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK

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DESCRIPTION: F3.0-A

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Side	Tension Surface	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
X-X, +1.20D+L+1.60S	2.632	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+L+1.60S	2.632	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60S	0.9735	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+1.60S	0.9735	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+0.50Lr+L	2.520	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+0.50Lr+L	2.520	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+L+0.50S	2.529	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+L+0.50S	2.529	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +0.90D	0.6176	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +0.90D	0.6176	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+L+0.20S	2.501	+Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
X-X, +1.20D+L+0.20S	2.501	-Z	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.40D	0.9608	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.40D	0.9608	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+0.50Lr+1.60L	3.515	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+0.50Lr+1.60L	3.515	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+1.60L+0.50S	3.524	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+1.60L+0.50S	3.524	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+1.60Lr+L	2.602	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+1.60Lr+L	2.602	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+1.60Lr	0.9435	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+1.60Lr	0.9435	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+L+1.60S	2.632	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+L+1.60S	2.632	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+1.60S	0.9735	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+1.60S	0.9735	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+0.50Lr+L	2.520	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+0.50Lr+L	2.520	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+L+0.50S	2.529	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+L+0.50S	2.529	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +0.90D	0.6176	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +0.90D	0.6176	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+L+0.20S	2.501	-X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK
Z-Z, +1.20D+L+0.20S	2.501	+X	Bottom	0.2592	Min Temp %	0.2667	10.486	OK

One Way Shear

Load Combination...	Vu @ -X	Vu @ +X	Vu @ -Z	Vu @ +Z	Vu:Max	Phi Vn	Vu / Phi*Vn	Status
+1.40D	5.93 psi	5.93 psi	5.93 psi	5.93 psi	5.93 psi	82.16 psi	0.07	OK
+1.20D+0.50Lr+1.60L	21.70 psi	21.70 psi	21.70 psi	21.70 psi	21.70 psi	82.16 psi	0.26	OK
+1.20D+1.60L+0.50S	21.76 psi	21.76 psi	21.76 psi	21.76 psi	21.76 psi	82.16 psi	0.26	OK
+1.20D+1.60Lr+L	16.06 psi	16.06 psi	16.06 psi	16.06 psi	16.06 psi	82.16 psi	0.20	OK
+1.20D+1.60Lr	5.82 psi	5.82 psi	5.82 psi	5.82 psi	5.82 psi	82.16 psi	0.07	OK
+1.20D+L+1.60S	16.25 psi	16.25 psi	16.25 psi	16.25 psi	16.25 psi	82.16 psi	0.20	OK
+1.20D+1.60S	6.01 psi	6.01 psi	6.01 psi	6.01 psi	6.01 psi	82.16 psi	0.07	OK
+1.20D+0.50Lr+L	15.55 psi	15.55 psi	15.55 psi	15.55 psi	15.55 psi	82.16 psi	0.19	OK
+1.20D+L+0.50S	15.61 psi	15.61 psi	15.61 psi	15.61 psi	15.61 psi	82.16 psi	0.19	OK
+0.90D	3.81 psi	3.81 psi	3.81 psi	3.81 psi	3.81 psi	82.16 psi	0.05	OK
+1.20D+L+0.20S	15.44 psi	15.44 psi	15.44 psi	15.44 psi	15.44 psi	82.16 psi	0.19	OK

Two-Way "Punching" Shear

All units k

Load Combination...	Vu	Phi*Vn	Vu / Phi*Vn	Status
+1.40D	22.24 psi	164.32psi	0.1353	OK
+1.20D+0.50Lr+1.60L	81.37 psi	164.32psi	0.4952	OK
+1.20D+1.60L+0.50S	81.58 psi	164.32psi	0.4965	OK
+1.20D+1.60Lr+L	60.24 psi	164.32psi	0.3666	OK
+1.20D+1.60Lr	21.84 psi	164.32psi	0.1329	OK
+1.20D+L+1.60S	60.93 psi	164.32psi	0.3708	OK
+1.20D+1.60S	22.54 psi	164.32psi	0.1371	OK
+1.20D+0.50Lr+L	58.33 psi	164.32psi	0.355	OK
+1.20D+L+0.50S	58.55 psi	164.32psi	0.3563	OK
+0.90D	14.30 psi	164.32psi	0.08701	OK
+1.20D+L+0.20S	57.89 psi	164.32psi	0.3523	OK

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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Printed: 19 FEB 2021, 12:41PM

Cantilevered Retaining Wall

File: Chen.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.17

Lic. #: KW-06011909

L2 Engineers

DESCRIPTION: *Typical Retaining Wall*

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft
Vertical component of active Lateral soil pressure options:		
NOT USED for Soil Pressure.		
NOT USED for Sliding Resistance.		
NOT USED for Overturning Resistance.		

Soil Data

Allow Soil Bearing	=	2,500.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
Toe Active Pressure	=	35.0 psf/ft
Passive Pressure	=	300.0 psf/ft
Soil Density, Heel	=	120.00 pcf
Soil Density, Toe	=	120.00 pcf
Friction Coeff btwn Ftg & Soil	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Calculations per ACI 318-14, TMS 402-16, IBC 2018,
 CBC 2019, ASCE 7-16

Surcharge Loads

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

Lateral Load Applied to Stem

Lateral Load	=	50.0 plf
...Height to Top	=	10.00 ft
...Height to Bottom	=	0.00 ft

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Wind on Exposed Stem

Wind on Exposed Stem	=	0.0 psf
----------------------	---	---------

Design Summary

Wall Stability Ratios		
Overturning	=	2.24 OK
Sliding	=	0.99 OK
<i>Slab Resists All Sliding !</i>		
Total Bearing Load	=	6,444 lbs
...resultant ecc.	=	11.68 in
Soil Pressure @ Toe	=	1,995 psf OK
Soil Pressure @ Heel	=	67 psf OK
Allowable	=	2,500 psf
<i>Soil Pressure Less Than Allowable</i>		
ACI Factored @ Toe	=	2,394 psf
ACI Factored @ Heel	=	81 psf
Footing Shear @ Toe	=	17.6 psi OK
Footing Shear @ Heel	=	44.7 psi OK
Allowable	=	75.0 psi
Sliding Calcs		<i>Slab Resists All Sliding !</i>
Lateral Sliding Force	=	2,658.3 lbs
less 100% Passive Force	= -	54.2 lbs
less 100% Friction Force	= -	2,570.8 lbs
Added Force Req'd	=	26.7 lbs NG
....for 1.5 : 1 Stability	=	1,355.8 lbs NG

Stem Construction

Design Height Above Ftg	ft =	0.00
Wall Material Above "Ht"	=	Concrete
Thickness	in =	10.00
Rebar Size	=	# 5
Rebar Spacing	in =	6.00
Rebar Placed at	=	Center
Design Data		
fb/FB + fa/Fa	=	0.947
Total Force @ Section	lbs =	3,300.0
Moment....Actual	ft-l =	11,833.3
Moment....Allowable	ft-l =	12,492.0
Shear.....Actual	psi =	55.0
Shear.....Allowable	psi =	88.7
Wall Weight	psf =	125.0
Rebar Depth 'd'	in =	5.00
Lap splice if above	in =	18.73
Lap splice if below	in =	10.50
Hook embed into footing	in =	10.50

Concrete Data

f'c	psi =	3,500.0
Fy	psi =	

Load Factors

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

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

Project Title:
 Engineer:
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 Project Descr:

Printed: 19 FEB 2021, 12:41PM

Cantilevered Retaining Wall

File: Chen.ec6

Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.17

Lic. #: KW-06011909

L2 Engineers

DESCRIPTION: Interior Retaining Wall

Footing Dimensions & Strengths

Toe Width	=	2.00	ft
Heel Width	=	4.25	
Total Footing Width	=	6.25	
Footing Thickness	=	14.00	in
Key Width	=	0.00	in
Key Depth	=	0.00	in
Key Distance from Toe	=	0.00	ft
f'c =	2,500	psi	Fy = 60,000 psi
Footing Concrete Density	=	150.00	pcf
Min. As %	=	0.0018	
Cover @ Top	3.00		@ Btm. = 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	2,394	81 psf
Mu' : Upward	=	4,294	0 ft-lb
Mu' : Downward	=	420	9,631 ft-lb
Mu: Design	=	3,874	9,631 ft-lb
Actual 1-Way Shear	=	17.64	44.74 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 5 @ 12.00 in	
Heel Reinforcing	=	# 5 @ 12.00 in	
Key Reinforcing	=	None Spec'd	

Other Acceptable Sizes & Spacings

Toe: #4@ 10.75 in, #5@ 16.50 in, #6@ 23.50 in, #7@ 31.75 in, #8@ 42.00 in, #9@ 4
 Heel: #4@ 8.75 in, #5@ 13.50 in, #6@ 19.25 in, #7@ 26.00 in, #8@ 34.25 in, #9@ 43
 Key: No key defined

Summary of Overturning & Resisting Forces & Moments

ItemOVERTURNING.....		RESISTING.....					
	Force lbs	Distance ft	Moment ft-lb	Force lbs	Distance ft	Moment ft-lb			
Heel Active Pressure	=	2,182.2	3.72	8,122.5	Soil Over Heel	=	4,100.0	4.54	18,620.8
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Toe Active Pressure	=	-23.8	0.39	-9.3	Surcharge Over Heel	=			
Surcharge Over Toe	=				Adjacent Footing Load	=			
Adjacent Footing Load	=				Axial Dead Load on Stem	=			
Added Lateral Load	=	500.0	6.17	3,083.3	* Axial Live Load on Stem	=			
Load @ Stem Above Soil	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
					Stem Weight(s)	=	1,250.0	2.42	3,020.8
					Earth @ Stem Transitions	=			
					Footing Weight	=	1,093.8	3.13	3,418.0
					Key Weight	=			
					Vert. Component	=			
Total	=	2,658.3	O.T.M.	=	11,196.5	Total	=	6,443.8 lbs	R.M. = 25,059.6
Resisting/Overturning Ratio			=	2.24					
Vertical Loads used for Soil Pressure =				6,443.8 lbs					

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

L2 ENGINEERS, LLC

17848 NE 198th Place
Woodinville, WA 98072



Lateral Analysis

Lateral Summary

- Wind

$$V[ASD]_{N-S} = 24.48 \text{ K}$$

$$V[ASD]_{E-W} = 19.48 \text{ K}$$

- Seismic

$$V[ASD] = 9.46 \text{ K}$$

Wind \gg Seismic \therefore No Seismic Review Req'd.

Wind Base Shear

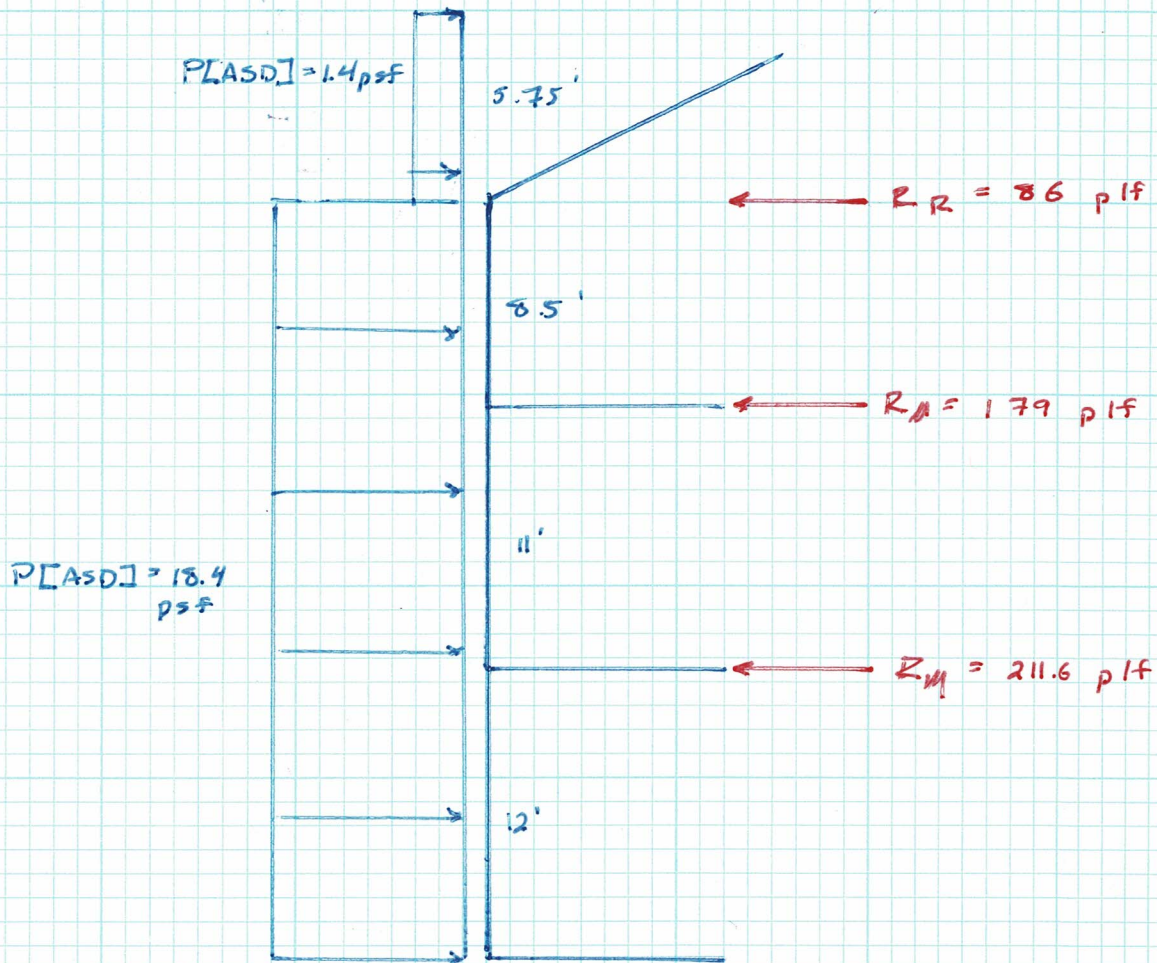
- Risk Category II
- Basic Wind Speed = 110 mph
- Wind Load Parameters
 - $K_d = 0.85$ (Table 26.6)
 - Exposure B (Mercer Island Wind Exposure Map)
 - $K_{zt} = 1.6$ " "
 - $K_c = 1.0$ (Table 26.9-1)
 - Enclosure Classification: Fully Enclosed (26.12)
 - $G C_{pi} = \pm 0.18$ (Table 26.13-1)
- $K_z / K_n = 0.76$ (Table 26.10-1)
- $q_z = 0.00256 K_z K_{zt} K_d K_c V^2$ (26.10-1)
 $= 0.00256 (0.76) (1.6) (0.85) (110^2) = 32.0 \text{ psf}$
- External Pressure Coefficients

Roof Angle θ (degrees)	Building Surface							
	1	2	3	4	1E	2E	3E	4E
0-5	0.40	-0.69	-0.37	-0.29	0.61	-1.07	-0.53	-0.43
20	0.53	-0.69	-0.48	-0.43	0.80	-1.07	-0.69	-0.64
30-45	0.56	0.21	-0.43	-0.37	0.69	0.27	-0.53	-0.48
90	0.56	0.56	-0.37	-0.37	0.69	0.69	-0.48	-0.48

- Wind Pressure: $P = q_z [G C_{pe} - G C_{pi}]$
- Region 2 & 3: $P = 2.3 \text{ psf}$ [See Next pg.] $P[ASD] = 1.4$
- Region 1 & 4: $P = 32 (0.53 - (-0.43)) = 30.72 \text{ psf}$ $P[ASD] = 18.4$

$$\text{Base Shear N-S [ASD]} < 0.6 (2.3 (238) + 30.7 (1311)) = 24.48 \text{ K}$$

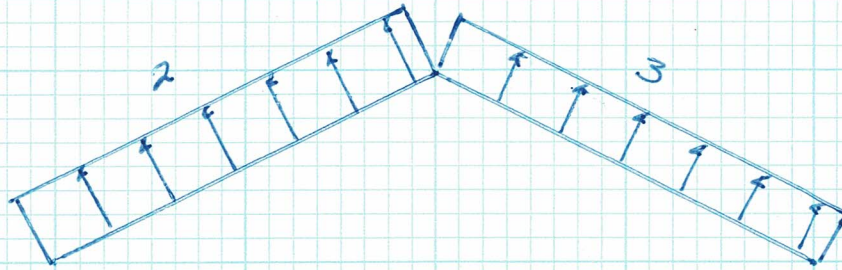
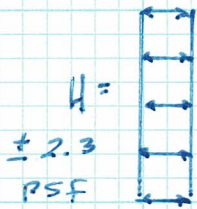
$$\text{Base Shear E-W [ASD]} = 0.6 (2.3 (201) + 30.72 (1042)) = 19.48 \text{ K}$$



$$R_R = 1.4 (5.75) + (8.5/2) 18.4 = \underline{86 \text{ plf}}$$

$$R_M = [(8.5 + 11)/2] 18.4 = \underline{179.4 \text{ plf}}$$

$$R_M = [(11 + 12)/2] 18.4 = \underline{211.6 \text{ plf}}$$

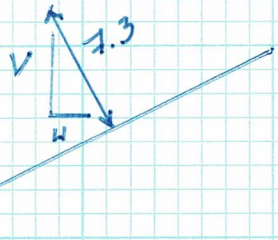


Wind →

$$\textcircled{2} = 32 (-0.69) = -22.1$$

$$\textcircled{3} = 32 (-0.43) = -13.8$$

$$\text{Net for WFRS} = -21.1 - (-13.8) = -7.3$$

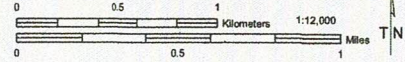


$$H = -7.3 \sin(18.4) = -2.3$$

$$V = -7.3 \cos(18.4) = -6.9$$

Mercer Island Wind Exposure and Wind Speed-Up (Topographic Effect)

by Development Services Group (DSG), City of Mercer Island
April 2009



WIND EXPOSURE CATEGORIES & WIND SPEED-UP FACTORS (ICC Section 1609 & ASCE 7-05 Chapter 6)

It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the K_{zt} factor to be utilized for each specific project. The K_{zt} factors and wind exposure categories indicated on this map are the minimum values accepted by the City of Mercer Island without requiring the design professional to submit additional calculations and supporting topographic documentation (to verify the values utilized in their wind load determination).

Please note – The K_{zt} values indicated on this map are approximations based upon periodic calculations of representative samplings around Mercer Island. These values are intended for City of Mercer Island's plan review purposes only.

WIND EXPOSURE CATEGORIES:

Wind Exposure Category	Exposure 'C' (1500 feet from Lake)
Exposure 'B' (all other areas)	

WIND SPEED-UP (TOPOGRAPHIC EFFECT) - K_{zt} Factor:

K_{zt} Factor	$K_{zt} = 1.0$
	$K_{zt} = 1.3$
	$K_{zt} = 1.6$
	$K_{zt} = 1.9$

5024 W Mercer Way
 $K_{zt} = 1.6$
Exposure = B

GENERAL NOTES FOR WIND EXPOSURE AND WIND SPEED-UP MAP

This map is the Wind Exposure Category and Wind Speed-up (Topographic Effects) Map for the City of Mercer Island. This map shows the minimum wind exposure category and the minimum wind speed-up, " K_{zt} " factor, which will be accepted without site specific documentation and calculation.

Other wind speed phenomena may occur on Mercer Island that is not specifically identified on this map. It is the responsibility of the Owner (or their Design Professional) to review site conditions and determine the appropriate design wind speed and exposure category for their specific project and location.

This map is for the sole use of the staff of the City of Mercer Island's Development Services Group (DSG) for the purposes of permit application evaluation. This map provides DSG staff a general assessment of Wind Exposure Category and Wind Speed-up (Topographic Effects). All areas have not been specifically evaluated and there may be locations that are not correctly represented on this map. It is the responsibility of individual property owners and map users to evaluate risk associated with their proposed development. No site-specific assessment of risk is implied or otherwise indicated by the City of Mercer Island with this map.

Information about data used for the map, references, and data limitation are all described the associated "Read Me" document. The digital version of this map is accompanied by a meta data file containing pertinent information about map construction. This data map is available on the City of Mercer Island website.

The City of Mercer Island is using guidance provided within ICC Section 1609 & ASCE 7-05 Chapter 6 regarding definitions used when creating this map.

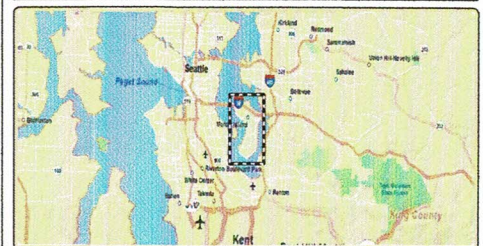
DEFINITIONS:

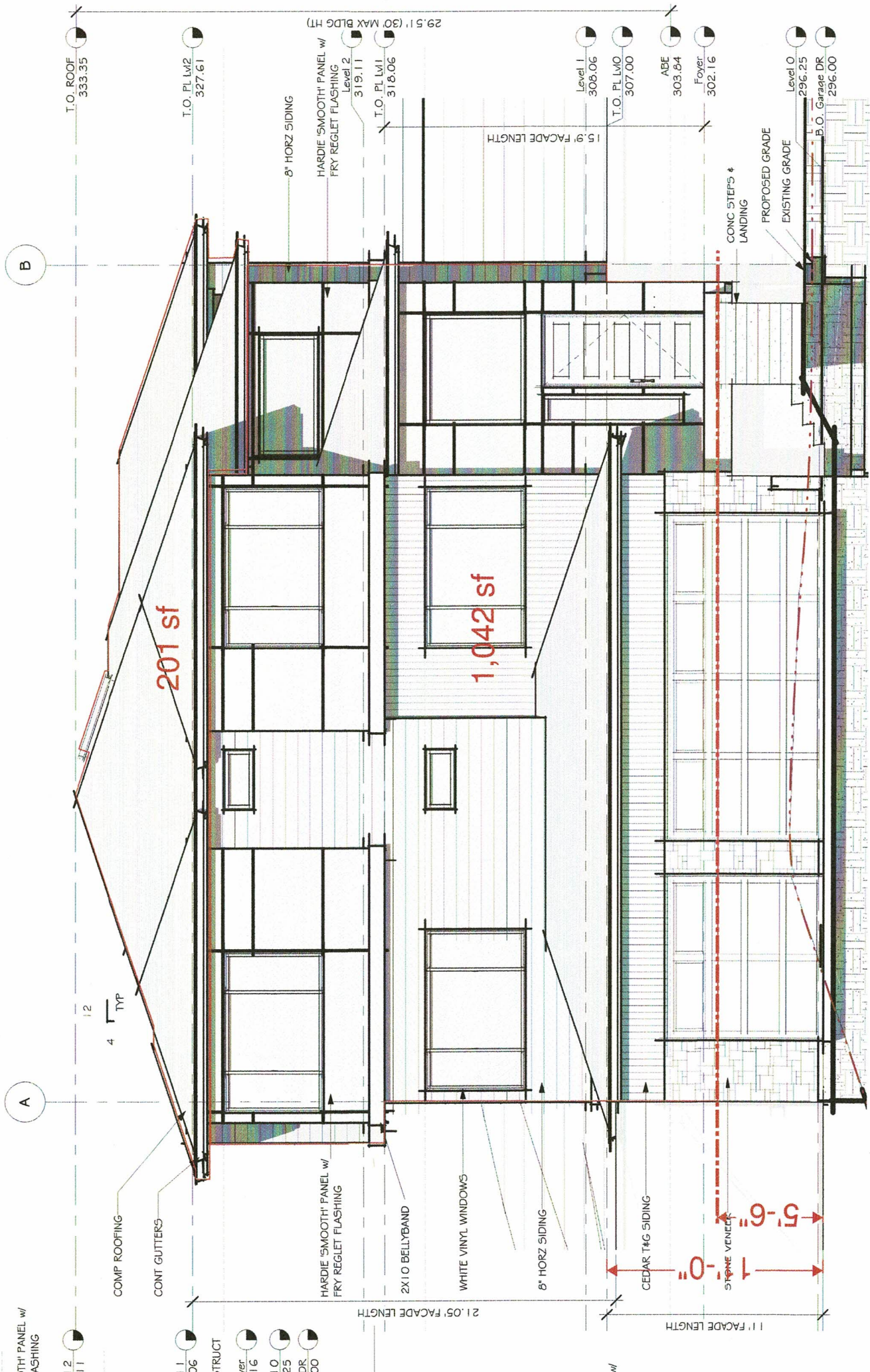
K_{zt} factor: The topographic effect of wind speed-up at isolated hills, ridges, and escarpments constituting abrupt changes in the general topography, located in any exposure category, that meet all of the conditions noted in ASCE 7-05 Minimum Design Loads for Buildings and Other Structures, Section 6.5.7.

Exposure B: The wind exposure category that applies where the site in question is located a minimum of 1500 feet from the shoreline and the mean roof height is less than or equal to 30 feet per IBC 2006 section 1609.4.3.

Exposure C: The wind exposure category that applies where the site in question is located within 1500 feet from the shoreline per IBC 2006 section 1609.4.3.

Wind Speed: Minimum 85 mph 3-second gust per IRC Figure R301.2(4)





T.O. ROOF 333.35

T.O. PL Lvl 2 327.61

29.5' (30' MAX BLDG HT)

Level 1 308.06

T.O. PL Lvl 0 307.00

ABE 303.84

Foyer 302.16

Level 0 296.25

B.O. Garage DR 296.00

201 sf

1,042 sf

12

4 TYP

21.05' FACADE LENGTH

11' FACADE LENGTH

15.9' FACADE LENGTH

CONC STEPS & LANDING

PROPOSED GRADE

EXISTING GRADE

B.O. Garage DR

3/4\"/>

L2 11

L1 06

STRUCT

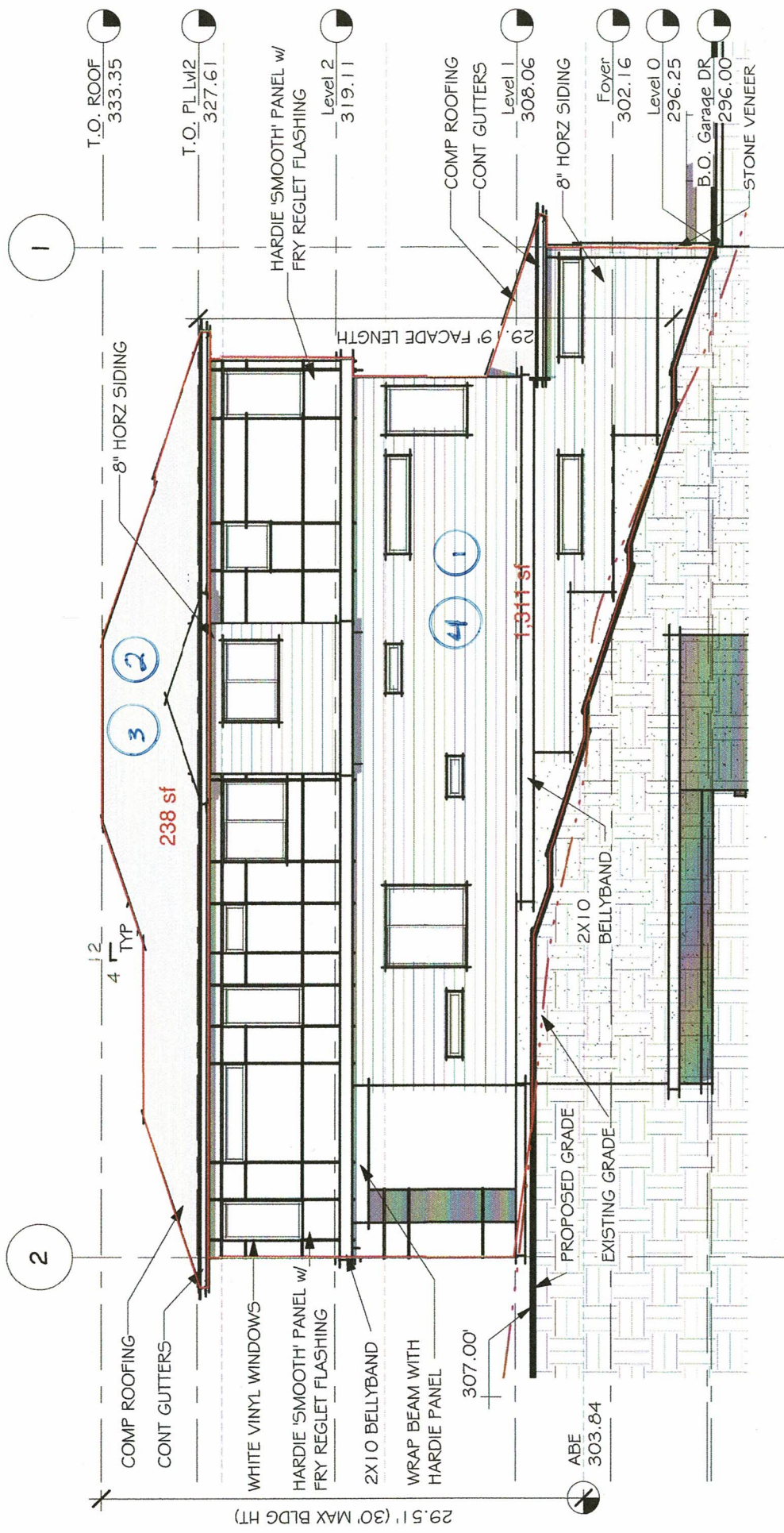
1/2\"/>

L0 25

DR 00

1 WEST ELEVATION

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



NORTH ELEVATION

SCALE: 1/8" = 1'-0"

3

2

1

T.O. ROOF 333.35
 T.O. PL Lvl2 327.61
 Level 2 319.11
 Level 1 308.06
 Foyer 302.16
 Level 0 296.25
 B.O. Garage DR 296.00
 STONE VENEER
 8" HORZ SIDING
 29' 9" FACADE LENGTH
 238 sf
 1,311 sf
 2X10 BELLYBAND
 PROPOSED GRADE
 EXISTING GRADE
 ABE 303.84
 307.00'
 29' 5" (30' MAX BLDG HT)
 1/2
 4 TYP
 8" HORZ SIDING
 COMP ROOFING
 CONT GUTTERS
 WHITE VINYL WINDOWS
 HARDIE 'SMOOTH' PANEL w/
 FRY REGLET FLASHING
 2X10 BELLYBAND
 WRAP BEAM WITH
 HARDIE PANEL
 HARDIE 'SMOOTH' PANEL w/
 FRY REGLET FLASHING
 COMP ROOFING
 CONT GUTTERS
 8" HORZ SIDING
 B.O. Garage DR
 STONE VENEER
 Foyer
 Level 0
 Level 1
 Level 2
 T.O. ROOF
 T.O. PL Lvl2

Seismic Base Shear

$$V = C_s W$$

$$C_s = S_{DS} / R / I$$

$$= 0.958 / 6.5 / 1 = 0.147$$

Weight

Level	Area (sf)	Weight (psf)	Weight (lb)
Roof	2184	15	32,760
UPPER	1915	15	28,725
Main	2027	15	30,405

$$\Sigma = 91,890 \text{ lb}$$

$$V [ASD] = 0.7 (0.147) (91,890) = 9,455 \text{ lb}$$

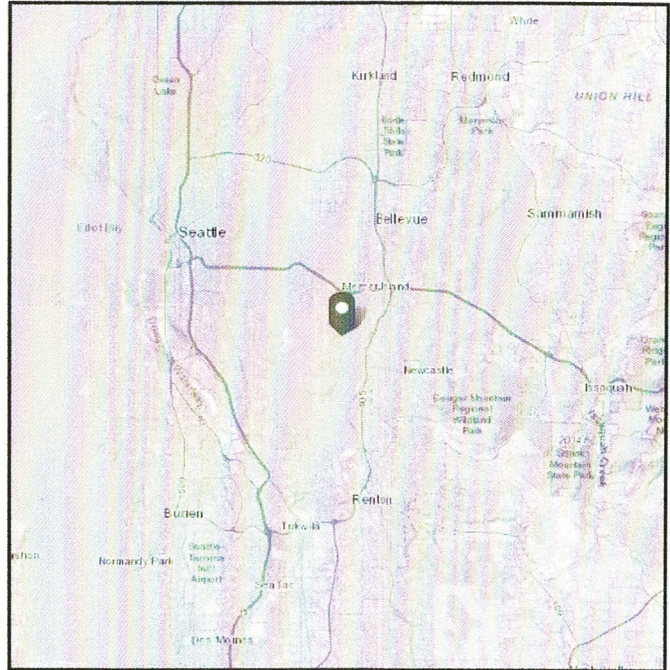
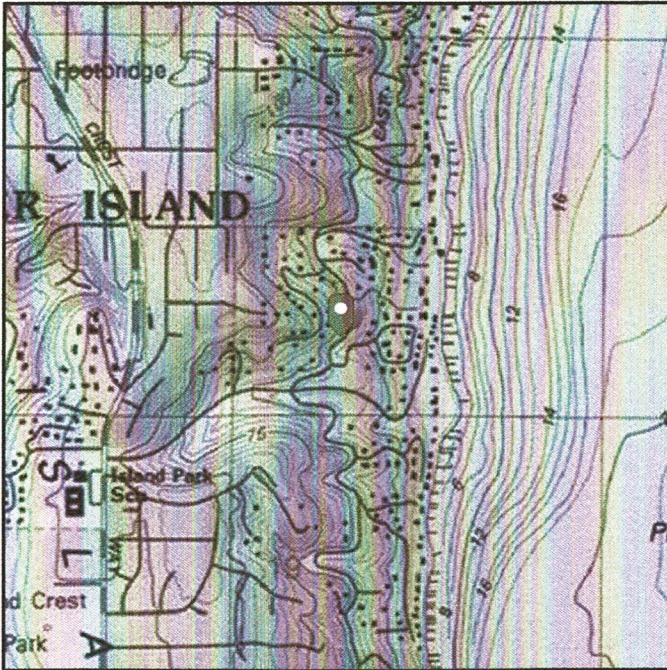
$$V [ASD] = 9.46 \text{ K}$$

ASCE 7 Hazards Report

Address:
5024 E Mercer Way
Mercer Island, Washington
98040

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 144.31 ft (NAVD 88)
Latitude: 47.557245
Longitude: -122.21316



Seismic

Site Soil Class: D - Stiff Soil

Results:

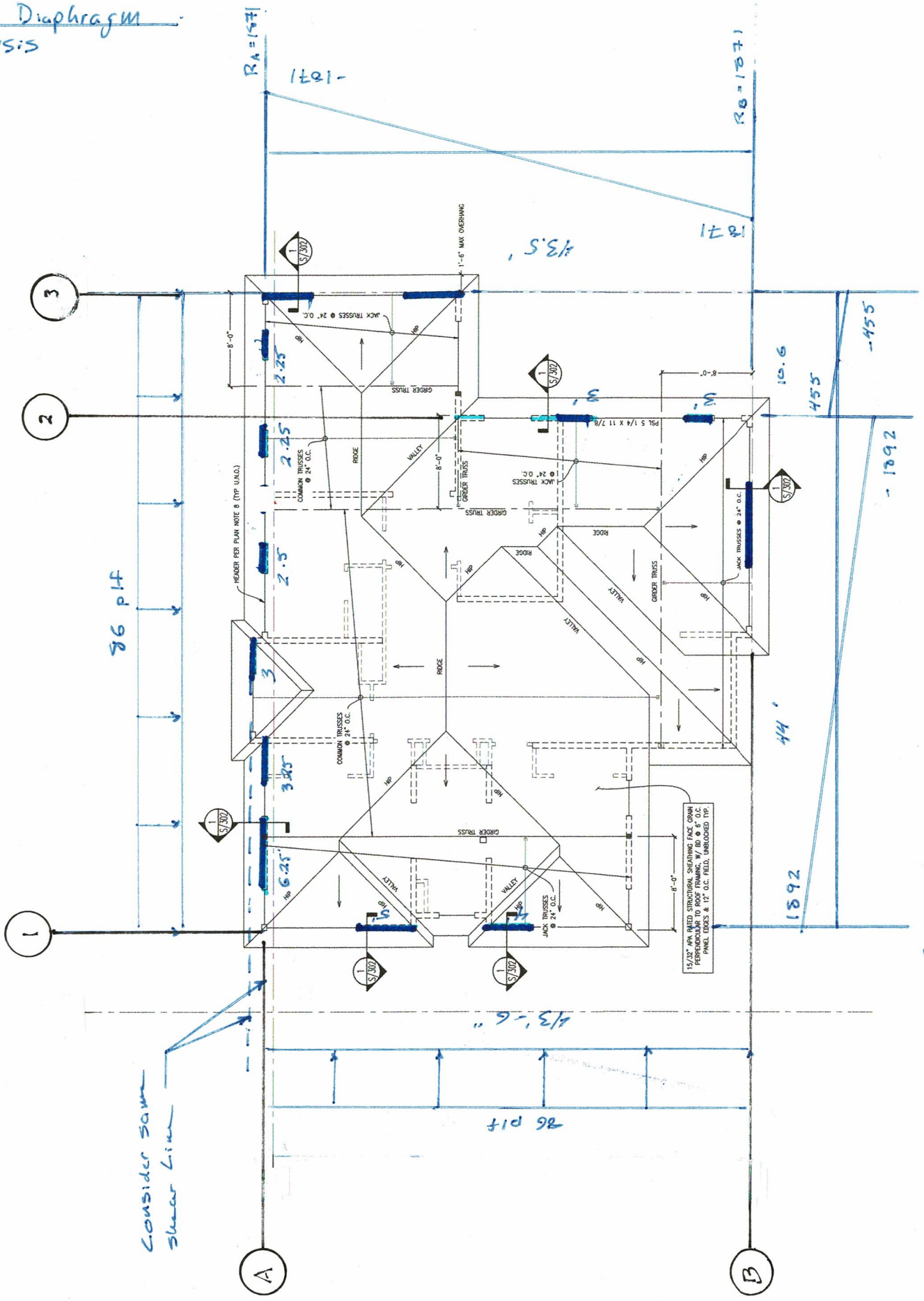
S_s :	1.437	S_{D1} :	N/A
S_1 :	0.499	T_L :	6
F_a :	1	PGA :	0.615
F_v :	N/A	PGA _M :	0.677
S_{MS} :	1.437	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.958	C_v :	1.387

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Fri Feb 19 2021

Date Source: [USGS Seismic Design Maps](#)

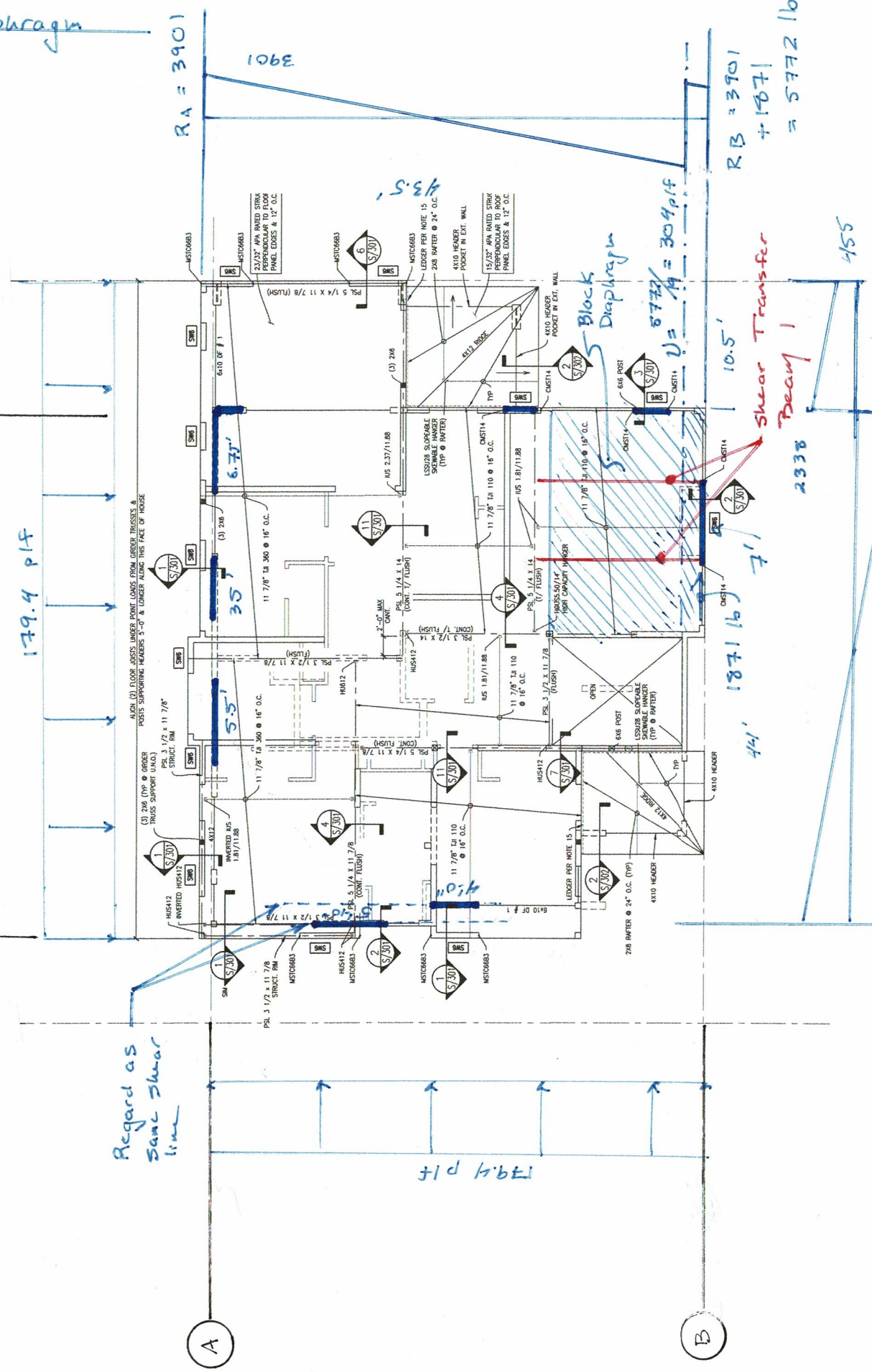
Roof Diaphragm Analysis



UPRR Diaphragm Analysis

2

1



Regard as
Same Shear
line

179.4 plf

179.4 plf

$$RA = 3901$$

$$RB = 3901 + 1871 = 5772.16$$

$$R_1 = 3946 + 1892 = 5838.16$$

$$R_2 = 3946 + 2338 = 6284.16$$

Block Diaphragm

Shear Transfer Beam!

$$U = 8772 / 14 = 309.4 \text{ plf}$$

455

2338

1871 lb

4.4'

10.5'

106E

455

A

B

35'

6.71'

5.5'

43.5'

2.2/32" AIA BATED STRIK PERPENDICULAR TO FLOOR PANEL EDGES & 12" O.C.

LEADER PER NOTE 15

2x8 RAFTER @ 24" O.C.

4X10 HEADER POCKET IN EXT. WALL

2.2/32" AIA BATED STRIK PERPENDICULAR TO FLOOR PANEL EDGES & 12" O.C.

4X10 HEADER POCKET IN EXT. WALL

2x8 RAFTER @ 24" O.C.

4X10 HEADER POCKET IN EXT. WALL

2x8 RAFTER @ 24" O.C.

4X10 HEADER POCKET IN EXT. WALL

2x8 RAFTER @ 24" O.C.

4X10 HEADER POCKET IN EXT. WALL

2x8 RAFTER @ 24" O.C.

4X10 HEADER POCKET IN EXT. WALL

2x8 RAFTER @ 24" O.C.

4X10 HEADER POCKET IN EXT. WALL

2x8 RAFTER @ 24" O.C.

4X10 HEADER POCKET IN EXT. WALL

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5.5'

6.71'

10.5'

7.1'

4.4'

35'

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6.71'

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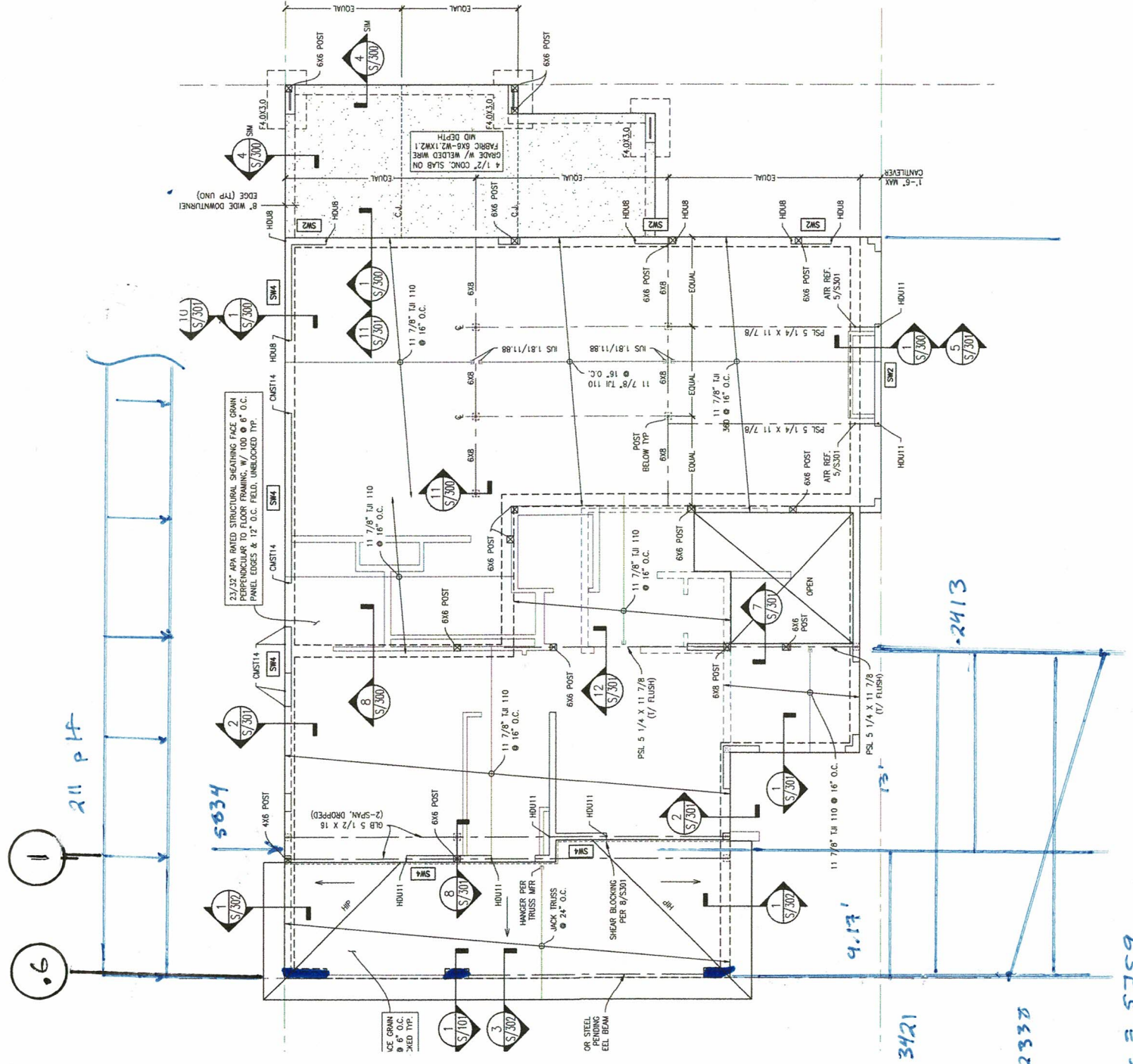
Blocked Diaphragm

15/32" w/ bd @ 6"oc

$$\text{Capacity} = 755/\Omega = 755/2 = 378 \text{ lb} \quad V_{\text{max}} = 304 \therefore \text{OK}$$

Lower Diaphragm Analysis

Note: Diaphragm is Developed into FNDN on (3) Sides
 Review only Region shear-line O.G



211 ptf

5034

2413

3421

2330

ROG = 5759

Shear Line A

4 TYP

2

8" HORZ SIDING

HARDI
FRY RE

29.1' FACADE LENGTH

5w6

5w6

5w6

5w6

5w6

5w6

4MST16
TYP

4MST14

5w4

5w4

5w4

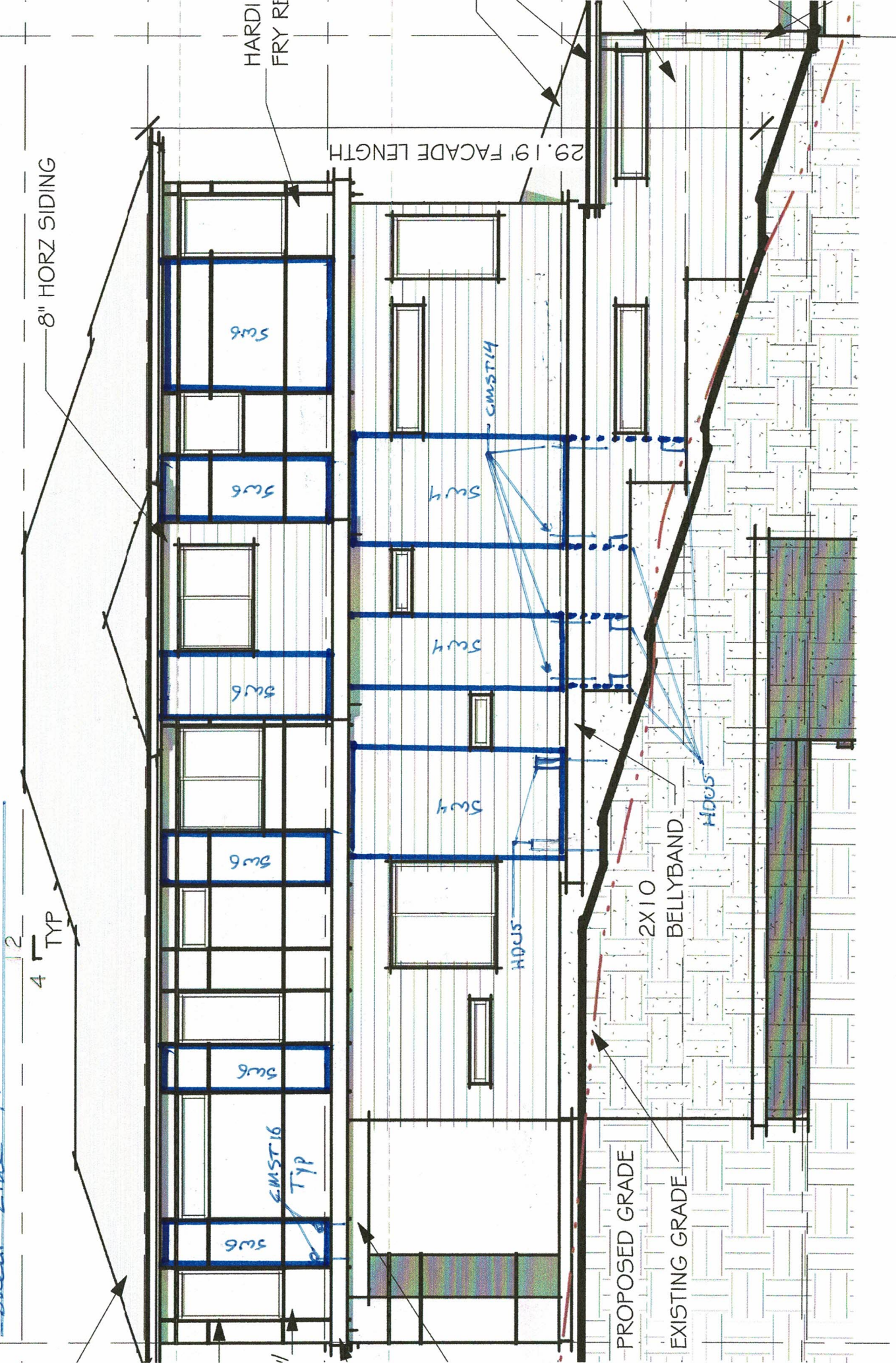
4MST14

PROPOSED GRADE

EXISTING GRADE

2X10
BELLYBAND

Hides



Shear Wall & Holddown Design Shear Line A

• UPRR FLR

Max Aspect Ratio = 3.78 ∴ OK

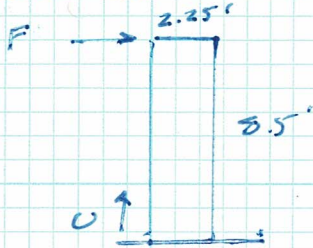
$$L = (6.25 + 3.25 + 3 + 2.5 + 2.25 + 2.25) = 19.5'$$

$$V = 1871 / 19.5 = 95.9 \text{ plf} \quad \boxed{\text{Use SW6}} \quad \text{Capacity} = 339$$

Capacity is \gg Demand NO
Need to check (WSP)

Uplift

Worst case width = 2.25'



$$F = 95.9 \times 2.25 = 215.8 \text{ lb}$$

$$M_{OF} = 216(8.5) = 1836 \text{ ft lb}$$

$$M_R = 0.6 D (2.25) / 2 = 0.6 (1425)(2.25) / 2 = 980.1$$

$$D = \text{Wall WT.} + \text{Roof WT.} = 1425 \text{ lb}$$

$$\text{Wall} = 2.25(8.5)(10) = 192 \text{ lb}$$

$$\text{Roof} = 4.7(17.5)(15) = 1234 \text{ lb}$$

$$M_{TOT} = 1836 - 980 = 856 \text{ ft lb}$$

$$\text{Uplift} = 856 / 2.25 = 380 \text{ lb} \quad \boxed{\text{Use C5 16}}$$

↳ TJI to Rng connection can take
this load by Insp.

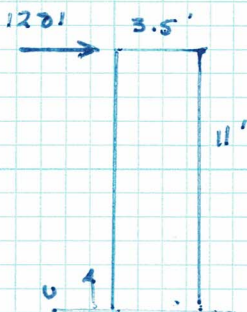
• Main FLR

$$L = 6.75' + 3.5' + 5.5' = 15.75'$$

$$V = 5772 / 15.75 = 366 \text{ plf} \quad \boxed{\text{Use SW4}}$$

Uplift

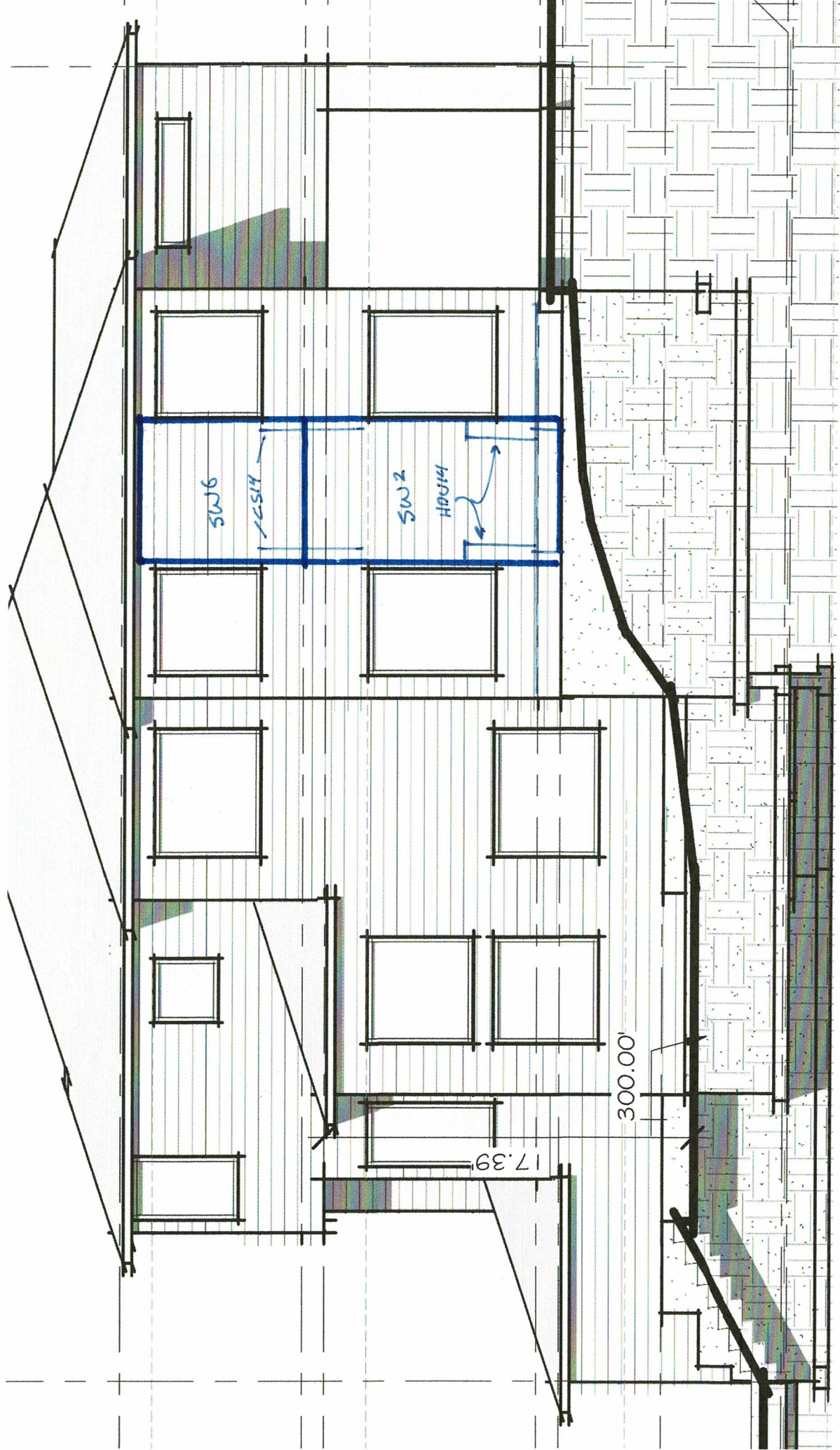
Worst case width = 3'-6"



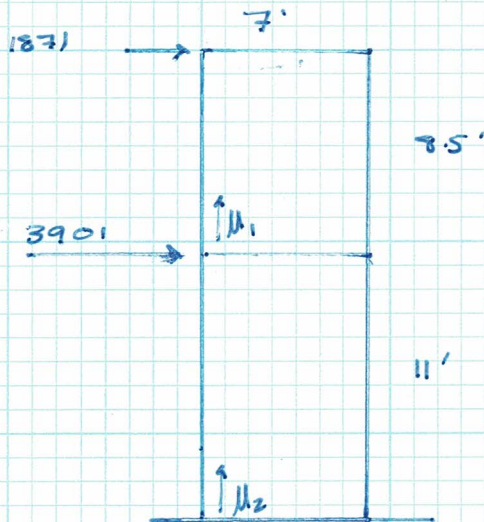
Disregard DL... Trivial

$$M = M_{TOT} / 3.5 = 1281(11) / 3.5 = 4026 \text{ lb} \quad \boxed{\text{Use HDU5 \& CMST 14 @ THRU FLR}}$$

Shear Line B



Shear Wall & Holddown Design Shear Line B



• UPPR FLR

$$V = 1871 / 7 = 267.3 \text{ plf} \quad \boxed{\text{USE SW6}} \quad \text{Capacity} = 339 \text{ plf}$$

$$M_{OT} = 1871 (8.5) = 15904 \text{ ft-lb}$$

$$M_R = 0.6 D (7) / 2 = 0.6 (1765) / 2 = 3706 \text{ ft-lb}$$

$$D = 7 (8.5)(10) + 12 (6.5)(15) = 1765$$

$$M_{TOT} = 15904 - 3706 = 12198 \text{ ft-lb}$$

$$M_{\text{uplift}} (M_1) = 12198 / 7 = 1743 \text{ lb} \quad \boxed{\text{USE C514}} \quad \text{capacity} = 2490 \text{ lb}$$

• Main FLR

$$V (1871 + 3901) / 7 = 825 \text{ plf} \quad \boxed{\text{USE SW2}} \quad \text{Capacity} = 832 \text{ plf}$$

$$M_{OT} = 1871 (8.5 + 11) + 3901 (11) = 79,395 \text{ ft-lb}$$

$$M_R = 0.6 D (7) / 2 + M_R (\text{UPPR}) = 0.6 (2066) (7) / 2 + 3706 = 8045 \text{ ft-lb}$$

$$D = 7 (11)(10) + 12 (7.2)(15) = 2066 \text{ lb}$$

$$M_{TOT} = 79,395 - 8045 = 71,350 \text{ ft-lb}$$

$$M_{\text{uplift}} = 71,350 / 7 = 10,192 \text{ lbs} \quad \boxed{\text{ASD}}$$

Unfactored Loads for
Beam Calc.

$$\text{Uplift} = (79,395 / 7) / 0.6 \\ = 18.9 \text{ K}$$

$$\text{Down Load} = (8045 / 7) / 0.6 = 1.9 \text{ K}$$

USE HDU14 @ End Stud To Rim
USE HHGU.5.50 Rim To BM
14550 lb uplift \therefore OK
17845 lb Down load
USE PABD Equivalent
BM TO CONC

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

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Printed: 21 FEB 2021, 11:40AM

Wood Beam

File: Chen.ec6
 Software copyright ENERCALC, INC. 1983-2020, Build:12.20.8.17
 L2 Engineers

Lic. #: KW-06011909

DESCRIPTION: Shear Transfer Beam 1

CODE REFERENCES

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

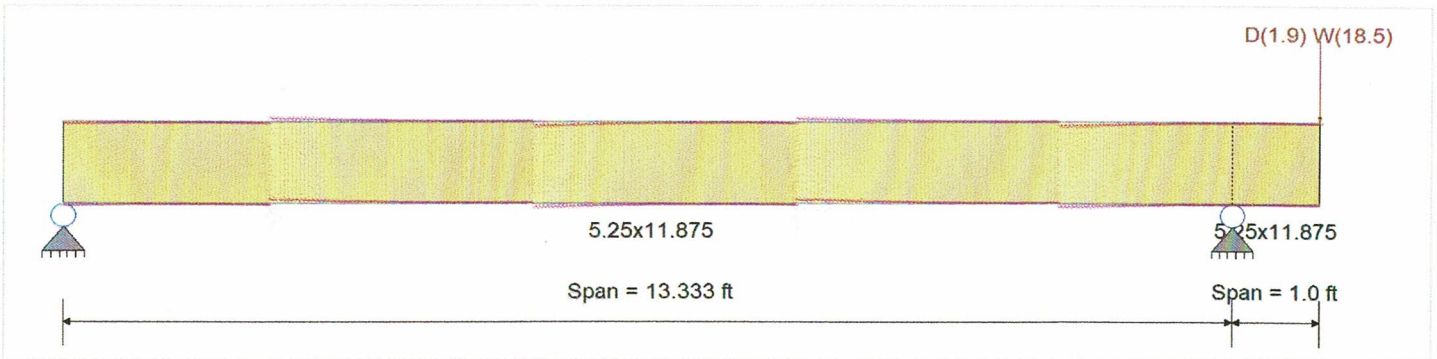
Material Properties

Analysis Method : Allowable Stress Design
 Load Combination ASCE 7-16

Wood Species : iLevel Truss Joist
 Wood Grade : Parallam PSL 2.2E

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

Fb +	2900 psi	E : Modulus of Elasticity	
Fb -	2900 psi	Ebend- xx	2200ksi
Fc - Prll	2900 psi	Eminbend - xx	1118.19ksi
Fc - Perp	750 psi		
Fv	290 psi		
Ft	2025 psi	Density	45.07 pcf



Applied Loads

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

Load for Span Number 2
 Point Load : D = 1.90, W = 18.50 k @ 1.0 ft

DESIGN SUMMARY

				Design OK			
Maximum Bending Stress Ratio	=	0.272	1	Maximum Shear Stress Ratio	=	0.674	: 1
Section used for this span	=	5.25x11.875		Section used for this span	=	5.25x11.875	
fb: Actual	=	1,264.30psi		fv: Actual	=	312.78 psi	
Fb: Allowable	=	4,640.00psi		Fv: Allowable	=	464.00 psi	
Load Combination	=	+D+0.60W		Load Combination	=	+D+0.60W	
Location of maximum on span	=	13.333ft		Location of maximum on span	=	13.333ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.095 in	Ratio = 252 >=240				
Max Upward Transient Deflection		-0.228 in	Ratio = 702 >=240				
Max Downward Total Deflection		0.067 in	Ratio = 360 >=180				
Max Upward Total Deflection		-0.160 in	Ratio = 999 >=180				

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios									Moment Values			Shear Values				
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	fb	F'b	V	fv	F'v		
D Only																			
Length = 13.333 ft	1	0.071	0.175	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.90	184.78	2610.00	1.90	45.71	261.00			
Length = 1.0 ft	2	0.071	0.175	0.90	1.000	1.00	1.00	1.00	1.00	1.00	1.90	184.78	2610.00	1.90	45.71	261.00			
+D+0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00			
Length = 13.333 ft	1	0.272	0.674	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.00	1,264.30	4640.00	13.00	312.78	464.00			
Length = 1.0 ft	2	0.272	0.674	1.60	1.000	1.00	1.00	1.00	1.00	1.00	13.00	1,264.30	4640.00	13.00	312.78	464.00			
+D-0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00			
Length = 13.333 ft	1	0.193	0.477	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.20	894.73	4640.00	9.20	221.35	464.00			
Length = 1.0 ft	2	0.193	0.477	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.20	894.73	4640.00	9.20	221.35	464.00			
+D+0.450W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00			
Length = 13.333 ft	1	0.214	0.530	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.22	994.42	4640.00	10.23	246.02	464.00			
Length = 1.0 ft	2	0.214	0.530	1.60	1.000	1.00	1.00	1.00	1.00	1.00	10.22	994.42	4640.00	10.23	246.02	464.00			
+D-0.450W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00			

Title Block Line 1
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 and then using the "Printing &
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 Title Block Line 6

Project Title:
 Engineer:
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Wood Beam

File: Chen.ec6
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 L2 Engineers

Lic. #: KW-06011909

DESCRIPTION: Shear Transfer Beam 1

Load Combination	Segment Length	Span #	Max Stress Ratios								Moment Values			Shear Values		
			M	V	C _d	C _{FV}	C _i	C _r	C _m	C _t	C _L	M	f _b	F _b	V	f _v
Length = 13.333 ft	1	0.135	0.333	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.42	624.85	4640.00	6.43	154.59	464.00
Length = 1.0 ft	2	0.135	0.333	1.60	1.000	1.00	1.00	1.00	1.00	1.00	6.42	624.85	4640.00	6.43	154.59	464.00
+0.60D+0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.333 ft	1	0.257	0.635	1.60	1.000	1.00	1.00	1.00	1.00	1.00	12.24	1,190.38	4640.00	12.24	294.50	464.00
Length = 1.0 ft	2	0.257	0.635	1.60	1.000	1.00	1.00	1.00	1.00	1.00	12.24	1,190.38	4640.00	12.24	294.50	464.00
+0.60D-0.60W					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.333 ft	1	0.209	0.516	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.96	968.65	4640.00	9.96	239.64	464.00
Length = 1.0 ft	2	0.209	0.516	1.60	1.000	1.00	1.00	1.00	1.00	1.00	9.96	968.65	4640.00	9.96	239.64	464.00
+0.60D					1.000	1.00	1.00	1.00	1.00	1.00			0.00	0.00	0.00	0.00
Length = 13.333 ft	1	0.024	0.059	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.14	110.87	4640.00	1.14	27.43	464.00
Length = 1.0 ft	2	0.024	0.059	1.60	1.000	1.00	1.00	1.00	1.00	1.00	1.14	110.87	4640.00	1.14	27.43	464.00

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	W Only	-0.2278	7.747
W Only	2	0.0947	1.000		0.0000	7.747

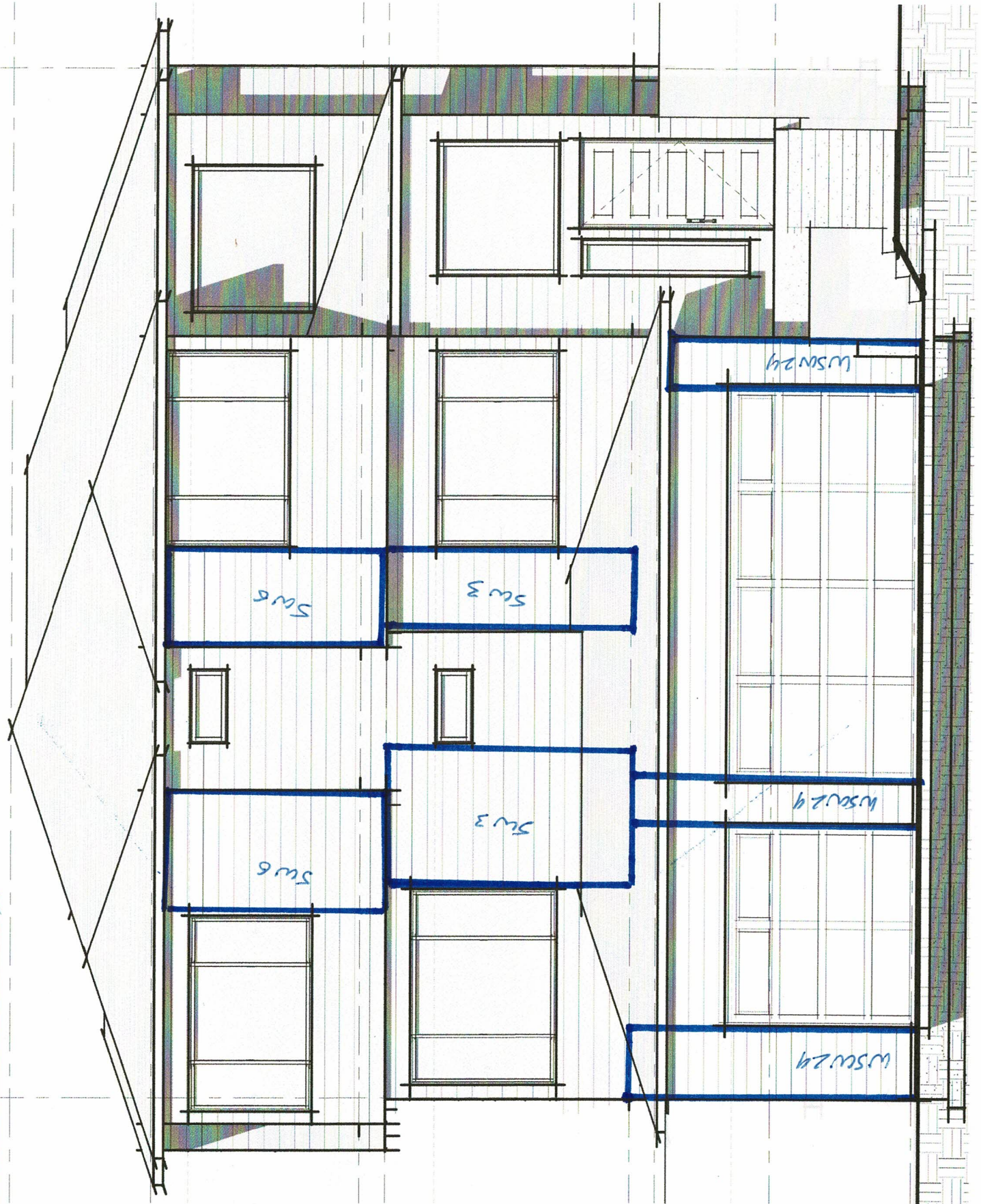
Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Overall MAXimum	-1.388	19.888	
Overall MINimum	-0.143	19.888	
D Only	-0.143	2.043	
+D+0.60W	-0.975	13.975	
+D+0.450W	-0.767	10.992	
+0.60D+0.60W	-0.918	13.158	
+0.60D	-0.086	1.226	
W Only	-1.388	19.888	

Shear Lines 0.6 to 1.0



Shear Wall & Holddown Design Shear Line 1

- UPPR

$$L = 9'$$

$$V = 1892 / 9 = 210 \text{ p/f} \quad \boxed{\text{USE SW6}}$$

$$\text{Mplift} = 210 (4) (8.5) / 4 = 1787 \text{ lb}$$

$$\boxed{\text{USE W5TC66 B3}}$$

- Main

$$L = 9.83'$$

$$V = 5834 / 9.83 = 593 \text{ p/f} \quad \boxed{\text{USE SW3}}$$

$$\text{Mplift} = 4(593)(11) / 4 = 6523 \text{ lb}$$

$$\boxed{\text{USE HD11}}$$

See strong wall calcs, next pg.

- Lower

Total Length \therefore use WSW

$$V = 5759 / 72" = 80 \text{ lb/inch}$$

$$\text{WSW 24} = 1920 \text{ lb}$$

See Strong Wall Analysis
next pg.



Job Name: Job #1
Wall Name: Wall Line 1
Application: Standard Wall on Concrete

Design Criteria:

- * 2018 International Bldg Code
- * Seismic R=6.5
- * 3500 psi concrete
- * ASD Design Shear = 1920 lbs

Selected Strong-Wall® Panel Solution:

Model	Type	W (in)	H (in)	T (in)	Sill Anchor	End Anchor Bolts	Total Axial Load (lbs)	Actual Uplift (lbs)
WSW24x11	Wood	24	129.25	3.5	N/A	2 - 1"	0	13102 lb

Actual Shear & Drift Distribution:

Model	Actual Shear (lbs)	Allowable Shear (lbs)	Actual / Allow Shear	Actual Drift (in)	Drift Limit (in)
WSW24x11	1920	≤ 3295 OK	0.58	0.31	0.58

Notes:

1. Strong-Wall Wood Shearwalls have been evaluated to the 2018 IBC/IRC. See www.strongtie.com for additional design and installation information.
2. Anchor templates are recommended for proper anchor bolt placement, and are required in some jurisdictions.
3. The applied vertical load shall be a concentric point load or a uniformly distributed load not exceeding the allowable vertical load. Alternatively, the load may be applied anywhere along the width of the panel if imposed by a continuous bearing vertical load transfer element such as a rimboard or beam. For eccentric axial loads applied directly to the panel, the allowable vertical load shall be divided by two.
4. Panels may be trimmed to a minimum height of 74 1/2".

Disclaimer:

It is the Designer's responsibility to verify product suitability under applicable building codes. In order to verify code listed applications please refer to the appropriate product code reports at www.strongtie.com or contact Simpson Strong-Tie Company Inc. at 1-800-999-5099.

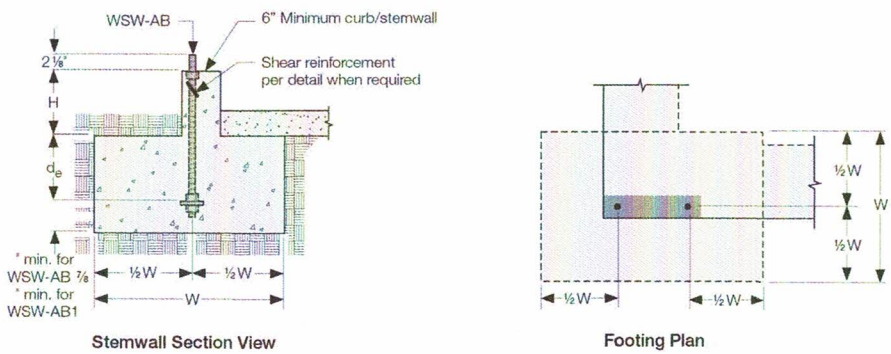
Job Name: Job #1
Wall Name: Wall Line 1
Application: Standard Wall on Concrete

Design Criteria:

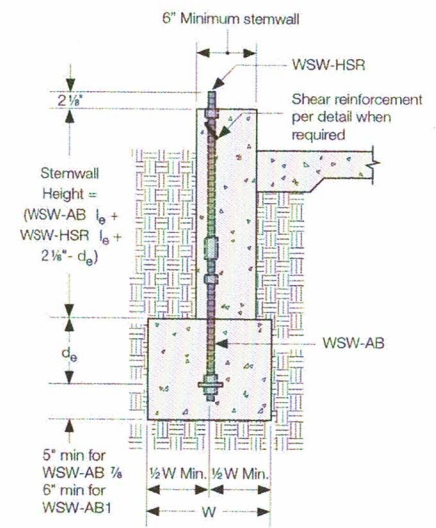
- * Stemwall - Perimeter
- * 2018 International Bldg Code
- * Seismic R=6.5
- * 3500 psi concrete

Anchor Solution Details:

Stemwall Installation



Stemwall Extension Installation



Section at Stemwall
 WSW-AB and WSW-HSR
 Extension Application

Anchor Solution Assuming Cracked Concrete Design:

Anchor Solution Assuming Uncracked Concrete Design:

Model	W	de	S	Anchor Bolt	Strength
WSW24x11	29	10	20	WSW-AB1	Standard

Model	W	de	S	Anchor Bolt	Strength
WSW24x11	25	9	20	WSW-AB1	Standard

SIMPSON STRONG-TIE COMPANY INC.

(800) 999-5099

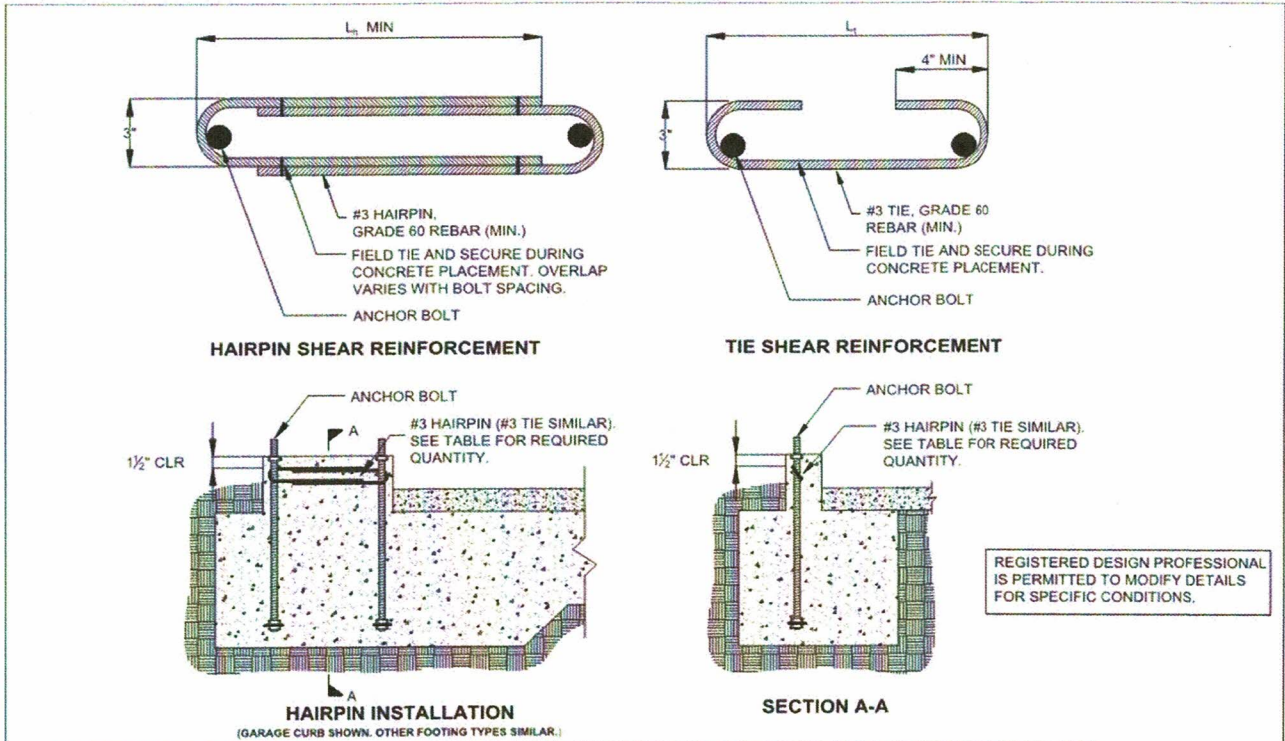
5956 W. Las Positas Blvd., Pleasanton, CA 94588.

www.strongtie.com



Notes:

1. Anchorage designs conform to ACI 318-14 and 318-11 Appendix D with no supplementary reinforcement for cracked and uncracked concrete as noted.
2. Anchorage strength indicates required grade of anchor bolt. Standard (ASTM F1554 grade 36) or High Strength (HS)(ASTM A449).
3. Seismic indicates Seismic Design Category C though F. Detached 1 & 2 family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-11 section D.3.3.4.3 and ACI 318-14 section 17.2.3.4.3
4. Foundation dimensions are for anchorage only. Foundation design (size and reinforcement) by others. The registered design professional may specify alternate embedment, footing size or anchor bolt.

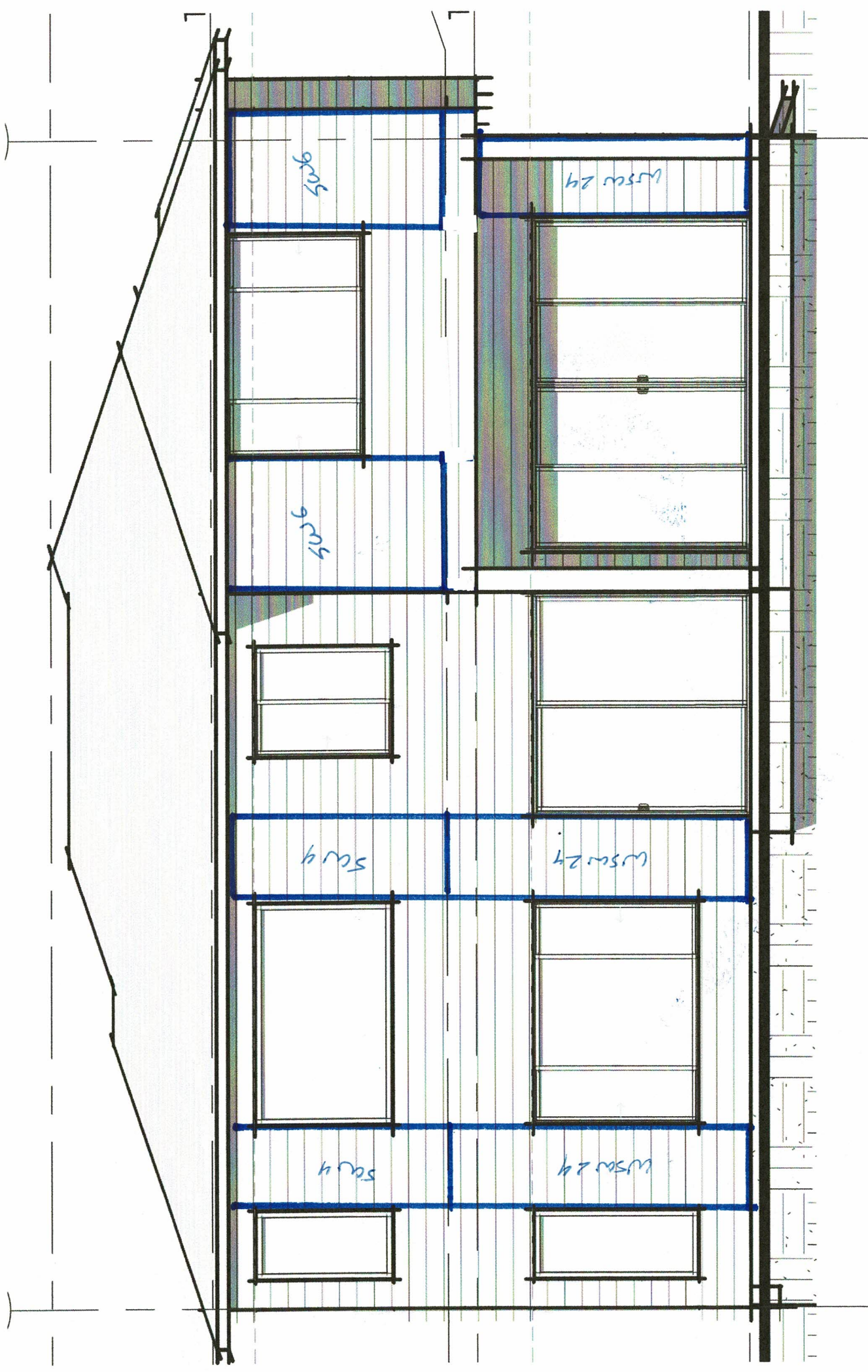


STRONG-WALL® WOOD SHEARWALL SHEAR ANCHORAGE							
MODEL	L_s OR L_n (in.)	SEISMIC ³		WIND ⁴			
		SHEAR REINFORCEMENT	MINIMUM CURB/STEMWALL WIDTH (in.)	SHEAR REINFORCEMENT	MINIMUM CURB/STEMWALL WIDTH (in.)	ASD ALLOWABLE SHEAR LOAD, V (lb.) ⁶	
						UNCRAKED	CRACKED
WSW12	10 1/4	(1) #3 HAIRPIN	8 ⁵	SEE NOTE 6	6	1,035	740
WSW18	15	(1) #3 HAIRPIN	8 ⁵	(1) #3 HAIRPIN	6	HAIRPIN REINFORCEMENT ACHIEVES MAXIMUM ALLOWABLE SHEAR LOAD OF THE WSW	
WSW24	19	(2) #3 HAIRPINS	8 ⁵	(1) #3 HAIRPIN	6		

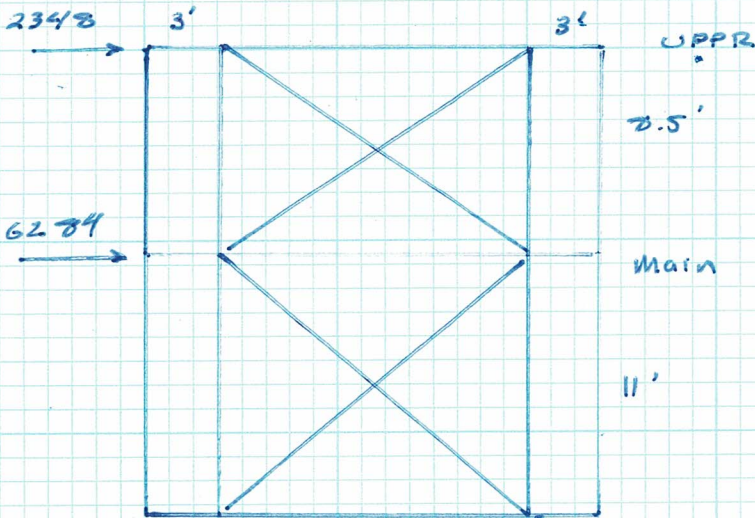
- NOTES:
1. SHEAR ANCHORAGE DESIGNS CONFORM TO ACI 318-11 AND ACI 318-14 AND ASSUME MINIMUM 2,500 PSI CONCRETE.
 2. SHEAR REINFORCEMENT IS NOT REQUIRED FOR INTERIOR FOUNDATION APPLICATIONS (PANEL INSTALLED AWAY FROM EDGE OF CONCRETE), OR BRACED WALL PANEL APPLICATIONS.
 3. SEISMIC INDICATES SEISMIC DESIGN CATEGORY C THROUGH F. DETACHED 1 AND 2 FAMILY DWELLINGS IN SDC C MAY USE WIND ANCHORAGE SOLUTIONS.
 4. WIND INCLUDES SEISMIC DESIGN CATEGORY A AND B AND DETACHED 1 AND 2 FAMILY DWELLINGS IN SDC C.
 5. WHERE NOTED, MINIMUM CURB/STEMWALL WIDTH IS 6 INCHES WHEN STANDARD STRENGTH ANCHOR BOLT IS USED.
 6. USE (1) #3 TIE FOR WSW12 WHEN PANEL DESIGN SHEAR FORCE EXCEEDS TABULATED ANCHORAGE ALLOWABLE SHEAR LOAD.
 7. #4 GRADE 40 SHEAR REINFORCEMENT MAY BE SUBSTITUTED FOR WSW SHEAR ANCHORAGE SOLUTIONS.

STRONG-WALL® WSW SHEAR ANCHORAGE SCHEDULE AND DETAILS

Shear Line 2 of 3



Shear Line 2



Disregard Dead Loads
for uplift Analysis
(Negligible due to small width)

$$WSP[UPPR] = 1.25 - 0.125 \cdot 2.5/3 = 0.89$$

$$WSP[Main] = 1.25 - 0.125 \cdot (11/3) = 0.67$$



→ Add 3rd Available Segment

• UPPR

$$V = 2348 / 6 = 391 \text{ pt } \boxed{\text{MSE SW 4}}$$

$$\text{Capacity} = 495 (0.89) = 440 \checkmark$$

$$M_{\text{uplift}} = 391 (8.5) = 3324 \text{ lb } \text{use } \boxed{\text{CM 2TC 16}}$$

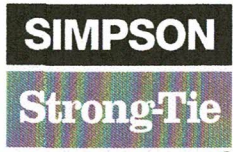
• Main

Use Strong Walls

$$V = 2348 + 6284 = 8632$$

$$\text{Available Wall for (3) WSW 24, } V_{\text{per Wall}} = 2877 \text{ lb}$$

Strong wall Analysis on following Pages



Job Name: Job #1
Wall Name: Wall Line 1
Application: Standard Wall on Concrete

Design Criteria:

- * 2018 International Bldg Code
- * Seismic R=6.5
- * 3500 psi concrete
- * ASD Design Shear = 2877 lbs

Selected Strong-Wall® Panel Solution:

Model	Type	W (in)	H (in)	T (in)	Sill Anchor	End Anchor Bolts	Total Axial Load (lbs)	Actual Uplift (lbs)
WSW24x10	Wood	24	117.25	3.5	N/A	2 - 1"	0	17810 lb

Actual Shear & Drift Distribution:

Model	Actual Shear (lbs)	Allowable Shear (lbs)	Actual / Allow Shear	Actual Drift (in)	Drift Limit (in)
WSW24x10	2877	≤ 3675 OK	0.78	0.38	0.52

Notes:

1. Strong-Wall Wood Shearwalls have been evaluated to the 2018 IBC/IRC. See www.strongtie.com for additional design and installation information.
2. Anchor templates are recommended for proper anchor bolt placement, and are required in some jurisdictions.
3. The applied vertical load shall be a concentric point load or a uniformly distributed load not exceeding the allowable vertical load. Alternatively, the load may be applied anywhere along the width of the panel if imposed by a continuous bearing vertical load transfer element such as a rimboard or beam. For eccentric axial loads applied directly to the panel, the allowable vertical load shall be divided by two.
4. Panels may be trimmed to a minimum height of 74 1/2".

Disclaimer:

It is the Designer's responsibility to verify product suitability under applicable building codes. In order to verify code listed applications please refer to the appropriate product code reports at www.strongtie.com or contact Simpson Strong-Tie Company Inc. at 1-800-999-5099.

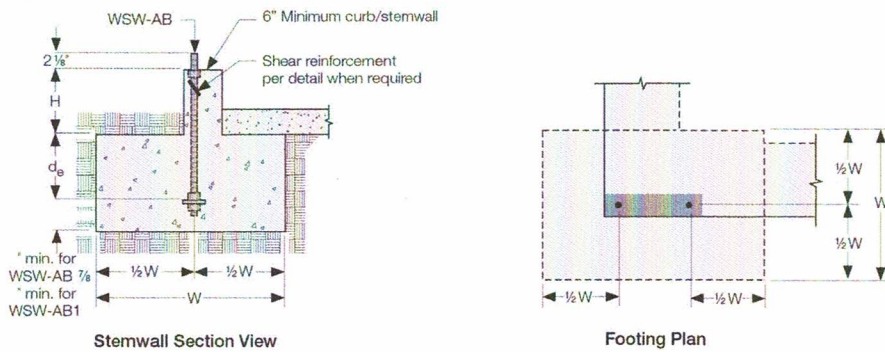
Job Name: Job #1
Wall Name: Wall Line 1
Application: Standard Wall on Concrete

Design Criteria:

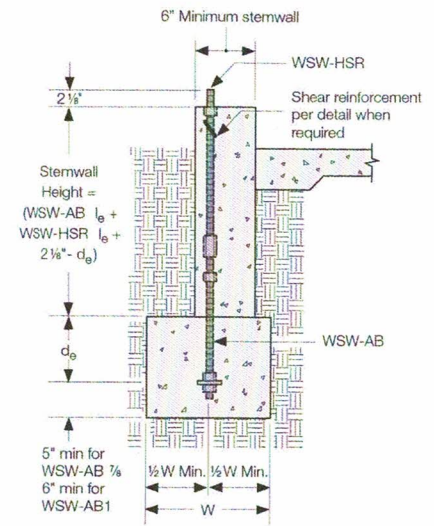
- * Stemwall - Perimeter
- * 2018 International Bldg Code
- * Seismic R=6.5
- * 3500 psi concrete

Anchor Solution Details:

Stemwall Installation



Stemwall Extension Installation



Section at Stemwall
 WSW-AB and WSW-HSR
 Extension Application

Anchor Solution Assuming Cracked Concrete Design:

Anchor Solution Assuming Uncracked Concrete Design:

Model	W	de	S	Anchor Bolt	Strength
WSW24x10	46	16	20	WSW-AB1	High Strength

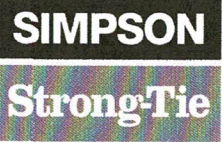
Model	W	de	S	Anchor Bolt	Strength
WSW24x10	40	14	20	WSW-AB1	High Strength

SIMPSON STRONG-TIE COMPANY INC.

(800) 999-5099

5956 W. Las Positas Blvd., Pleasanton, CA 94588.

www.strongtie.com



Notes:

1. Anchorage designs conform to ACI 318-14 and 318-11 Appendix D with no supplementary reinforcement for cracked and uncracked concrete as noted.
2. Anchorage strength indicates required grade of anchor bolt. Standard (ASTM F1554 grade 36) or High Strength (HS)(ASTM A449).
3. Seismic indicates Seismic Design Category C though F. Detached 1 & 2 family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-11 section D.3.3.4.3 and ACI 318-14 section 17.2.3.4.3
4. Foundation dimensions are for anchorage only. Foundation design (size and reinforcement) by others. The registered design professional may specify alternate embedment, footing size or anchor bolt.

HAIRPIN SHEAR REINFORCEMENT

TIE SHEAR REINFORCEMENT

HAIRPIN INSTALLATION
(GARAGE CURB SHOWN, OTHER FOOTING TYPES SIMILAR.)

SECTION A-A

REGISTERED DESIGN PROFESSIONAL IS PERMITTED TO MODIFY DETAILS FOR SPECIFIC CONDITIONS.

STRONG-WALL® WOOD SHEARWALL SHEAR ANCHORAGE							
MODEL	L ₁ OR L ₂ (in.)	SEISMIC ¹		WIND ⁴			
		SHEAR REINFORCEMENT	MINIMUM CURB/STEMWALL WIDTH (in.)	SHEAR REINFORCEMENT	MINIMUM CURB/STEMWALL WIDTH (in.)	ASD ALLOWABLE SHEAR LOAD, V (lb.) ⁶	
						UNCRACKED	CRACKED
WSW12	10 1/4	(1) #3 HAIRPIN	8 ⁵	SEE NOTE 6	6	1,035	740
WSW18	15	(1) #3 HAIRPIN	8 ⁵	(1) #3 HAIRPIN	6	HAIRPIN REINFORCEMENT ACHIEVES MAXIMUM ALLOWABLE SHEAR LOAD OF THE WSW	
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STRONG-WALL® WSW SHEAR ANCHORAGE SCHEDULE AND DETAILS