

BAY WINDOW CALCULATIONS

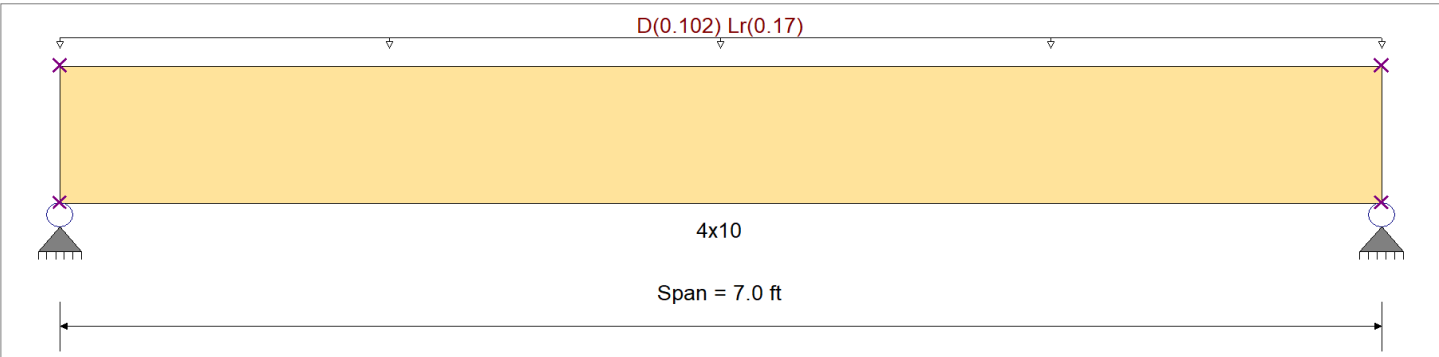
DESCRIPTION: 4X10 beam @ Top

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1,000.0 psi	E : Modulus of Elasticity	
Load Combination	IBC 2018	Fb -	1,000.0 psi	Ebend- xx	1,700.0ksi
		Fc - Prll	1,500.0 psi	Eminbend - xx	620.0ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade :	No.1	Fv	180.0 psi		
		Ft	675.0 psi	Density	31.210pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0120, Lr = 0.020 ksf, Tributary Width = 8.50 ft, (FROM ROOF)

DESIGN SUMMARY

DESIGN SUMMARY				Design OK			
Maximum Bending Stress Ratio	=	0.278	1	Maximum Shear Stress Ratio	=	0.157	: 1
Section used for this span		4x10		Section used for this span		4x10	
fb: Actual	=	410.88	psi	fv: Actual	=	35.34	psi
Fb: Allowable	=	1,475.84	psi	Fv: Allowable	=	225.00	psi
Load Combination		+D+Lr+H		Load Combination		+D+Lr+H	
Location of maximum on span	=	3.500	ft	Location of maximum on span	=	6.234	ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection		0.024	in	Ratio =	3568	>=360	
Max Upward Transient Deflection		0.000	in	Ratio =	0	<360	
Max Downward Total Deflection		0.039	in	Ratio =	2174	>=240	
Max Upward Total Deflection		0.000	in	Ratio =	0	<240	

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0386	3.526		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.977	0.977
Overall MINimum	0.595	0.595
+D+H	0.382	0.382
+D+L+H	0.382	0.382
+D+Lr+H	0.977	0.977
+D+S+H	0.382	0.382
+D+0.750Lr+0.750L+H	0.828	0.828
+D+0.750L+0.750S+H	0.382	0.382
+D+0.60W+H	0.382	0.382
+D+0.70E+H	0.382	0.382

DESCRIPTION: 4X10 beam @ Top

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+0.450W+H	0.828	0.828
+D+0.750L+0.750S+0.450W+H	0.382	0.382
+D+0.750L+0.750S+0.5250E+H	0.382	0.382
+0.60D+0.60W+0.60H	0.229	0.229
+0.60D+0.70E+0.60H	0.229	0.229
D Only	0.382	0.382
Lr Only	0.595	0.595
H Only		

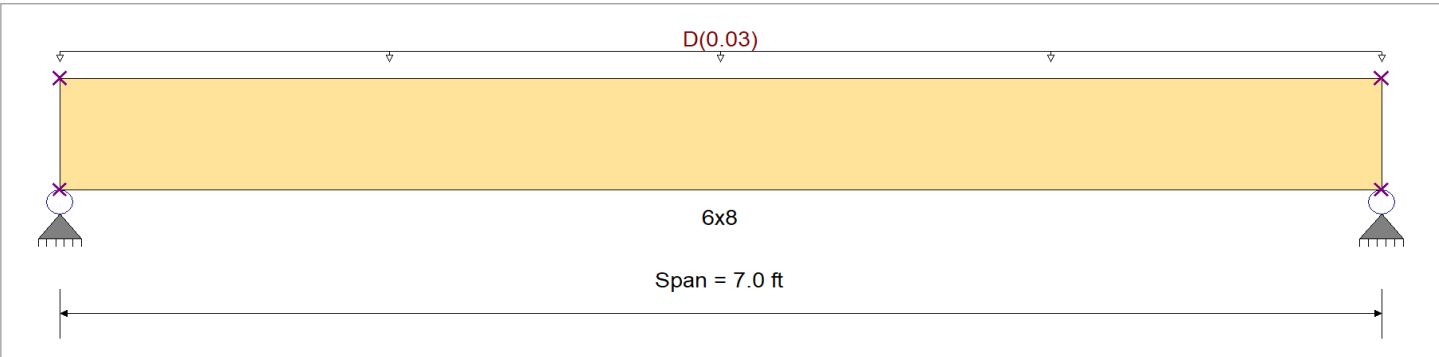
DESCRIPTION: 6X8 @ window sill

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1,350.0 psi	E : Modulus of Elasticity	
Load Combination	IBC 2018	Fb -	1,350.0 psi	Ebend- xx	1,600.0ksi
		Fc - Prll	925.0 psi	Eminbend - xx	580.0ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade :	No.1	Fv	170.0 psi		
		Ft	675.0 psi	Density	31.210pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.010 ksf, Tributary Width = 3.0 ft, (FROM glass)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.046	1	Maximum Shear Stress Ratio	=	0.027	1
Section used for this span		6x8		Section used for this span		6x8	
fb: Actual	=	55.51	psi	fv: Actual	=	4.09	psi
Fb: Allowable	=	1,210.53	psi	Fv: Allowable	=	153.00	psi
Load Combination		+D+H		Load Combination		+D+H	
Location of maximum on span	=	3.500	ft	Location of maximum on span	=	6.387	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		0.007	in	Ratio =		12281	>=240
Max Upward Total Deflection		0.000	in	Ratio =		0	<240

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.0068	3.526		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.136	0.136
Overall MINimum	0.136	0.136
+D+H	0.136	0.136
+D+L+H	0.136	0.136
+D+Lr+H	0.136	0.136
+D+S+H	0.136	0.136
+D+0.750Lr+0.750L+H	0.136	0.136
+D+0.750L+0.750S+H	0.136	0.136
+D+0.60W+H	0.136	0.136
+D+0.70E+H	0.136	0.136

DESCRIPTION: 6X8 @ window sill

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+0.450W+H	0.136	0.136
+D+0.750L+0.750S+0.450W+H	0.136	0.136
+D+0.750L+0.750S+0.5250E+H	0.136	0.136
+0.60D+0.60W+0.60H	0.082	0.082
+0.60D+0.70E+0.60H	0.082	0.082
D Only	0.136	0.136
H Only		

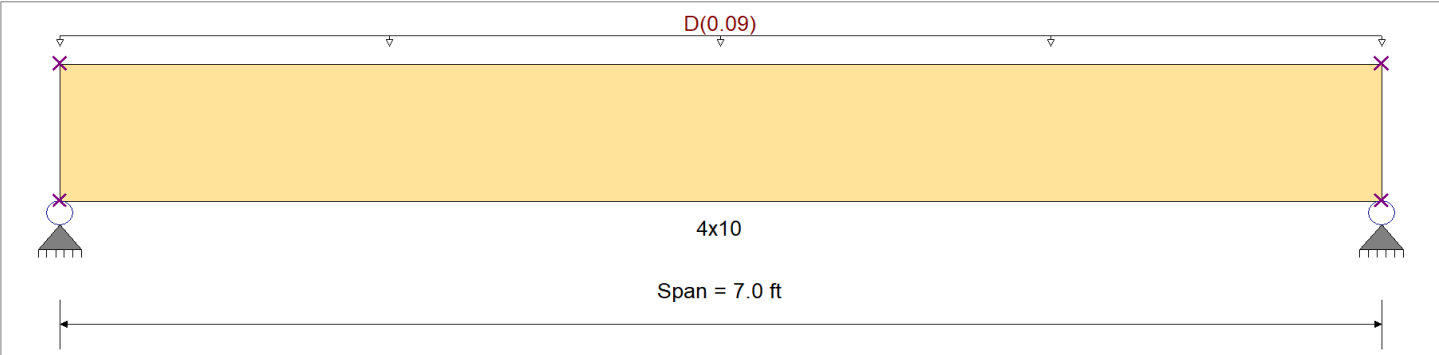
DESCRIPTION: 4X10 @ Bottom

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1,000.0	psi	E : Modulus of Elasticity	
Load Combination	IBC 2018	Fb -	1,000.0	psi	Ebend- xx	1,700.0ksi
		Fc - Prll	1,500.0	psi	Eminbend - xx	620.0ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625.0	psi		
Wood Grade :	No.1	Fv	180.0	psi		
		Ft	675.0	psi	Density	31.210pcf
Beam Bracing :	Completely Unbraced					



Applied Loads

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

Beam self weight calculated and added to loads
Uniform Load : D = 0.0180 ksf, Tributary Width = 5.0 ft, (FROM WALL)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.134	1	Maximum Shear Stress Ratio	=	0.076	1
Section used for this span		4x10		Section used for this span		4x10	
fb: Actual	=	142.87	psi	fv: Actual	=	12.29	psi
Fb: Allowable	=	1,068.39	psi	Fv: Allowable	=	162.00	psi
Load Combination		+D+H		Load Combination		+D+H	
Location of maximum on span	=	3.500	ft	Location of maximum on span	=	6.234	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		0.013	in	Ratio =		6253	>=240
Max Upward Total Deflection		0.000	in	Ratio =		0	<240

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
D Only	1	0.0134	3.526		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	0.340	0.340
+D+H	0.340	0.340
+D+L+H	0.340	0.340
+D+Lr+H	0.340	0.340
+D+S+H	0.340	0.340
+D+0.750Lr+0.750L+H	0.340	0.340
+D+0.750L+0.750S+H	0.340	0.340
+D+0.60W+H	0.340	0.340
+D+0.70E+H	0.340	0.340

DESCRIPTION: 4X10 @ Bottom

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+0.450W+H	0.340	0.340
+D+0.750L+0.750S+0.450W+H	0.340	0.340
+D+0.750L+0.750S+0.5250E+H	0.340	0.340
+0.60D+0.60W+0.60H	0.204	0.204
+0.60D+0.70E+0.60H	0.204	0.204
D Only	0.340	0.340
H Only		

DESCRIPTION: HSS6x3x3/16 (LLV) OUTRIGGER Top @ Roof

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2018

Material Properties

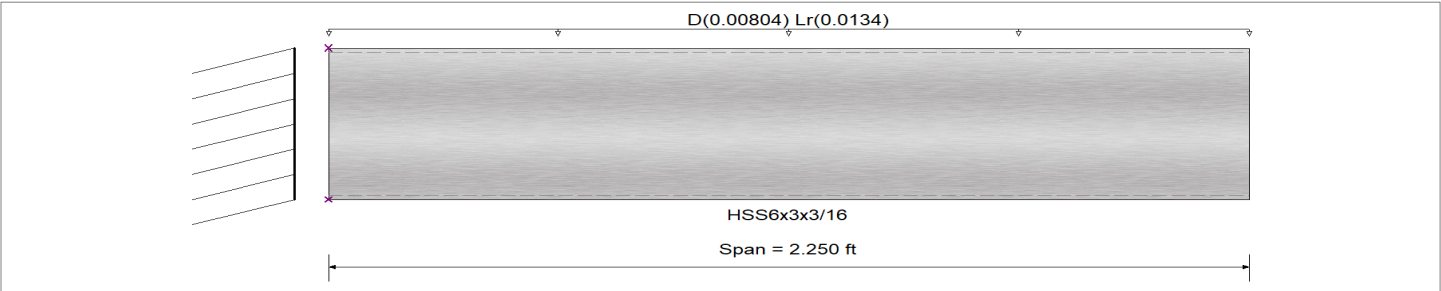
Analysis Method : Load Resistance Factor Design

Beam Bracing : Completely Unbraced

Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi

E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.0120, Lr = 0.020 ksf, Tributary Width = 0.670 ft, (FROM ROOF)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.006 : 1	Maximum Shear Stress Ratio =	0.002 : 1
Section used for this span	HSS6x3x3/16	Section used for this span	HSS6x3x3/16
Mu : Applied	0.111 k-ft	Vu : Applied	0.09884 k
Mn * Phi : Allowable	19.286 k-ft	Vn * Phi : Allowable	47.354 k
Load Combination	+1.20D+1.60Lr+0.50L+1.60H	Load Combination	+1.20D+1.60Lr+0.50L+1.60H
Location of maximum on span	0.000 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.000 in	Ratio =	0 < 360
Max Upward Transient Deflection	0.000 in	Ratio =	0 < 360
Max Downward Total Deflection	0.000 in	Ratio =	118167 >= 180
Max Upward Total Deflection	0.000 in	Ratio =	0 < 180

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0005	2.250		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	0.072	
Overall MINimum	0.025	
+D+H	0.042	
+D+L+H	0.042	
+D+Lr+H	0.072	
+D+S+H	0.042	
+D+0.750Lr+0.750L+H	0.065	
+D+0.750L+0.750S+H	0.042	
+D+0.60W+H	0.042	
+D+0.70E+H	0.042	
+D+0.750Lr+0.750L+0.450W+H	0.065	
+D+0.750L+0.750S+0.450W+H	0.042	
+D+0.750L+0.750S+0.5250E+H	0.042	
+0.60D+0.60W+0.60H	0.025	
+0.60D+0.70E+0.60H	0.025	
D Only	0.042	
Lr Only	0.030	
H Only		

DESCRIPTION: HSS6x3x3/16 (LLV) OUTRIGGER Bottom

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16

Load Combination Set : IBC 2018

Material Properties

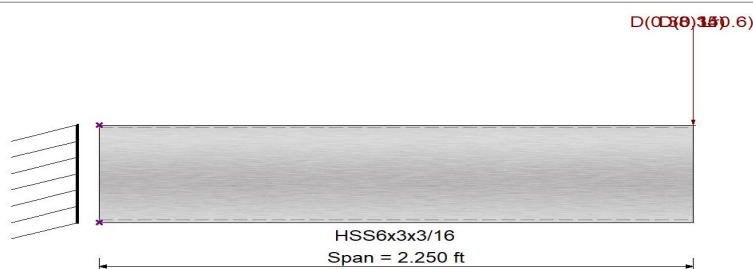
Analysis Method : Load Resistance Factor Design

Beam Bracing : Completely Unbraced

Bending Axis : Major Axis Bending

Fy : Steel Yield : 46.0 ksi

E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading

Load(s) for Span Number 1

Point Load : D = 0.380, Lr = 0.60 k @ 2.250 ft, (FROM FBM1)

Point Load : D = 0.140 k @ 2.250 ft, (FROM FBM2)

Point Load : D = 0.350 k @ 2.250 ft, (FROM FBM2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.235 : 1	Maximum Shear Stress Ratio =	0.043 : 1
Section used for this span	HSS6x3x3/16	Section used for this span	HSS6x3x3/16
Mu : Applied	4.542 k-ft	Vu : Applied	2.033 k
Mn * Phi : Allowable	19.286 k-ft	Vn * Phi : Allowable	47.354 k
Load Combination	+1.20D+1.60Lr+0.50L+1.60H	Load Combination	+1.20D+1.60Lr+0.50L+1.60H
Location of maximum on span	0.000 ft	Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.010 in	Ratio =	5,342 >=360
Max Upward Transient Deflection	0.000 in	Ratio =	0 <360
Max Downward Total Deflection	0.025 in	Ratio =	2167 >=180
Max Upward Total Deflection	0.000 in	Ratio =	0 <180

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+Lr+H	1	0.0249	2.250		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Overall MAXimum	1.494	
Overall MINimum	0.536	
+D+H	0.894	
+D+L+H	0.894	
+D+Lr+H	1.494	
+D+S+H	0.894	
+D+0.750Lr+0.750L+H	1.344	
+D+0.750L+0.750S+H	0.894	
+D+0.60W+H	0.894	
+D+0.70E+H	0.894	
+D+0.750Lr+0.750L+0.450W+H	1.344	
+D+0.750L+0.750S+0.450W+H	0.894	
+D+0.750L+0.750S+0.5250E+H	0.894	

DESCRIPTION: HSS6x3x3/16 (LLV) OUTRIGGER Bottom

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+0.60D+0.60W+0.60H	0.536	
+0.60D+0.70E+0.60H	0.536	
D Only	0.894	
Lr Only	0.600	
H Only		

DESCRIPTION: HSS4x4x3/16 POST

Steel Section Properties : HSS4x4x3/16

Depth	=	4.000 in	I xx	=	6.21 in^4	J	=	10.000 in^4
Design Thick	=	0.174 in	S xx	=	3.10 in^3			
Width	=	4.000 in	R xx	=	1.550 in			
Wall Thick	=	0.187 in	Zx	=	3.670 in^3			
Area	=	2.580 in^2	I yy	=	6.210 in^4	C	=	5.070 in^3
Weight	=	9.420 plf	S yy	=	3.100 in^3			
			R yy	=	1.550 in			

Ycg = 0.000 in

Sketches

