Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

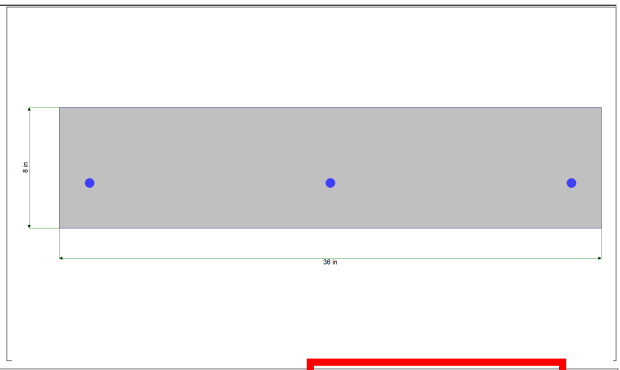
DESCRIPTION: ONE-WAY GARAGE SLAB (Distr. Loads)

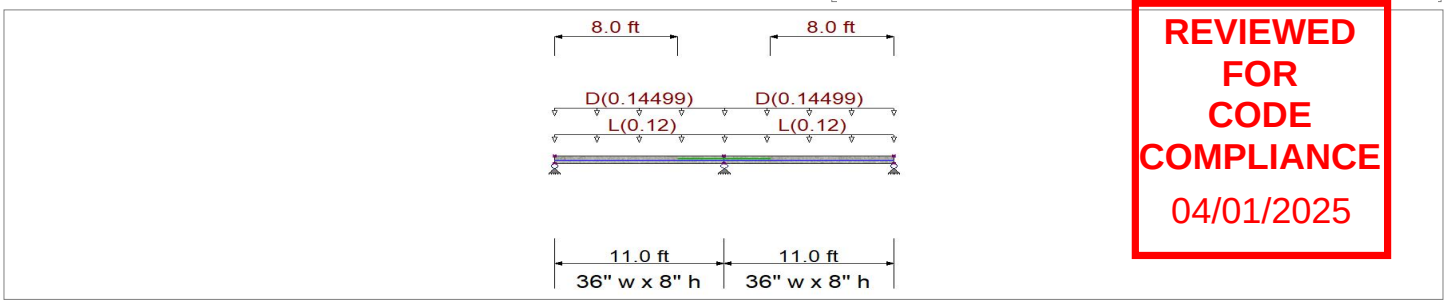
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

General Information

f'c	=	5.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = $f'c^{1/2}$ * 7.50	=	530.33 psi		Shear :	0.750
ψ Density	=	145.0 pcf	β_1	=	0.80
λ LtWt Factor	=	1.0			
Elastic Modulus	=	3,122.0 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		3
			Number of Resisting Legs Per Stirrup	=	2





REVIEWED FOR CODE COMPLIANCE
04/01/2025

Cross Section & Reinforcing Details

Rectangular Section, Width = 36.0 in, Height = 8.0 in
Span #1 Reinforcing....
3-#5 at 3.0 in from Bottom, from 0.0 to 11.0 ft in this span
3-#5 at 3.0 in from Top, from 8.0 to 11.0 ft in this span
Span #2 Reinforcing....
3-#5 at 3.0 in from Bottom, from 0.0 to 11.0 ft in this span
3-#5 at 3.0 in from Top, from 0.0 to 3.0 ft in this span

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : L = 0.040 ksf, Tributary Width = 3.0 ft, (Car)
Uniform Load : D = 0.04833 ksf, Tributary Width = 3.0 ft, (4" Topping Slab)
Load for Span Number 2
Uniform Load : L = 0.040 ksf, Tributary Width = 3.0 ft, (Car)
Uniform Load : D = 0.04833 ksf, Tributary Width = 3.0 ft, (4" Topping Slab)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio = **0.355** : 1

Section used for this span	**Typical Section**	
Mu : Applied	-10.799	k-ft
Mn * Phi : Allowable	30.427	k-ft
Location of maximum on span	0.000	ft
Span # where maximum occurs	Span # 2	

Maximum Deflection

Max Downward Transient Deflection	0.003 in	Ratio =	38559	>=360.0	L Only
Max Upward Transient Deflection	0.000 in	Ratio =	0	<360.0	L Only
Max Downward Total Deflection	0.016 in	Ratio =	8337	>=180.0	Span: 2 : +D+L
Max Upward Total Deflection	0.000 in	Ratio =	0	<180.0	Span: 2 : +D+L

Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: ONE-WAY GARAGE SLAB (Distr. Loads)

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	2.289	7.631	2.289
Max Upward from Load Combinations	2.289	7.631	2.289
Max Upward from Load Cases	1.794	5.981	1.794
D Only	1.794	5.981	1.794
+D+L	2.289	7.631	2.289
+D+0.750L	2.166	7.219	2.166
+0.60D	1.077	3.589	1.077
L Only	0.495	1.650	0.495

Shear Stirrup Requirements

Entire Beam Span Length : Vu < Phi*Vc / 2, Req'd Vs = Not Reqd per 9.6.3.1, Stirrups are not required.

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	11.000	-10.58	30.43	0.35
Span # 2	2	11.000	-10.80	30.43	0.35
+1.40D					
Span # 1	1	11.000	-9.02	30.43	0.30
Span # 2	2	11.000	-9.21	30.43	0.30
+1.20D+1.60L					
Span # 1	1	11.000	-10.58	30.43	0.35
Span # 2	2	11.000	-10.80	30.43	0.35
+1.20D+0.50L					
Span # 1	1	11.000	-8.62	30.43	0.28
Span # 2	2	11.000	-8.80	30.43	0.29
+1.20D					
Span # 1	1	11.000	-7.73	30.43	0.25
Span # 2	2	11.000	-7.90	30.43	0.26
+0.90D					
Span # 1	1	11.000	-5.80	30.43	0.19
Span # 2	2	11.000	-5.92	30.43	0.19

Overall Maximum Deflections

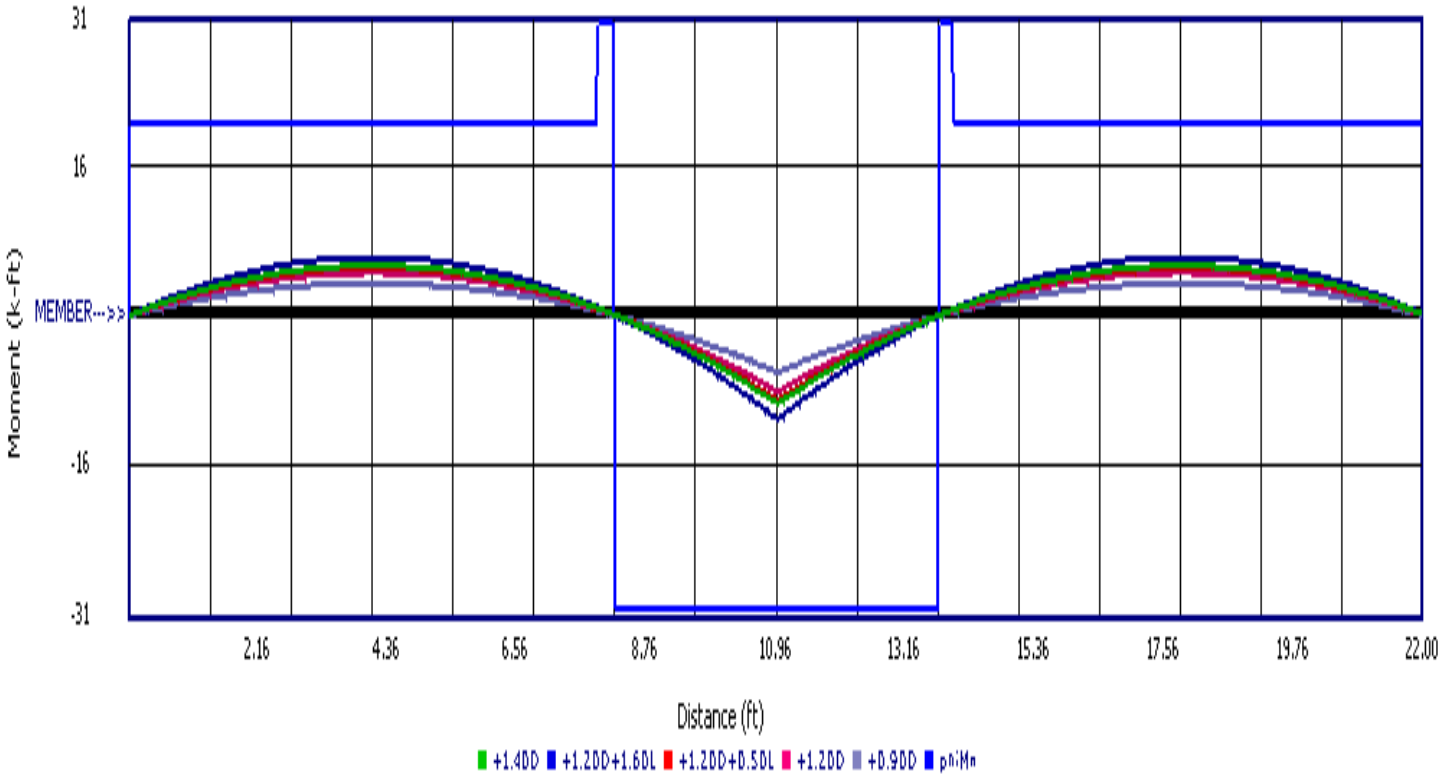
Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft	Load Combination	Max. "+" Defl (in)	Location in Span (ft
+D+L	1	0.0158	4.557		0.0000	0.000
+D+L	2	0.0158	6.443		0.0000	0.000

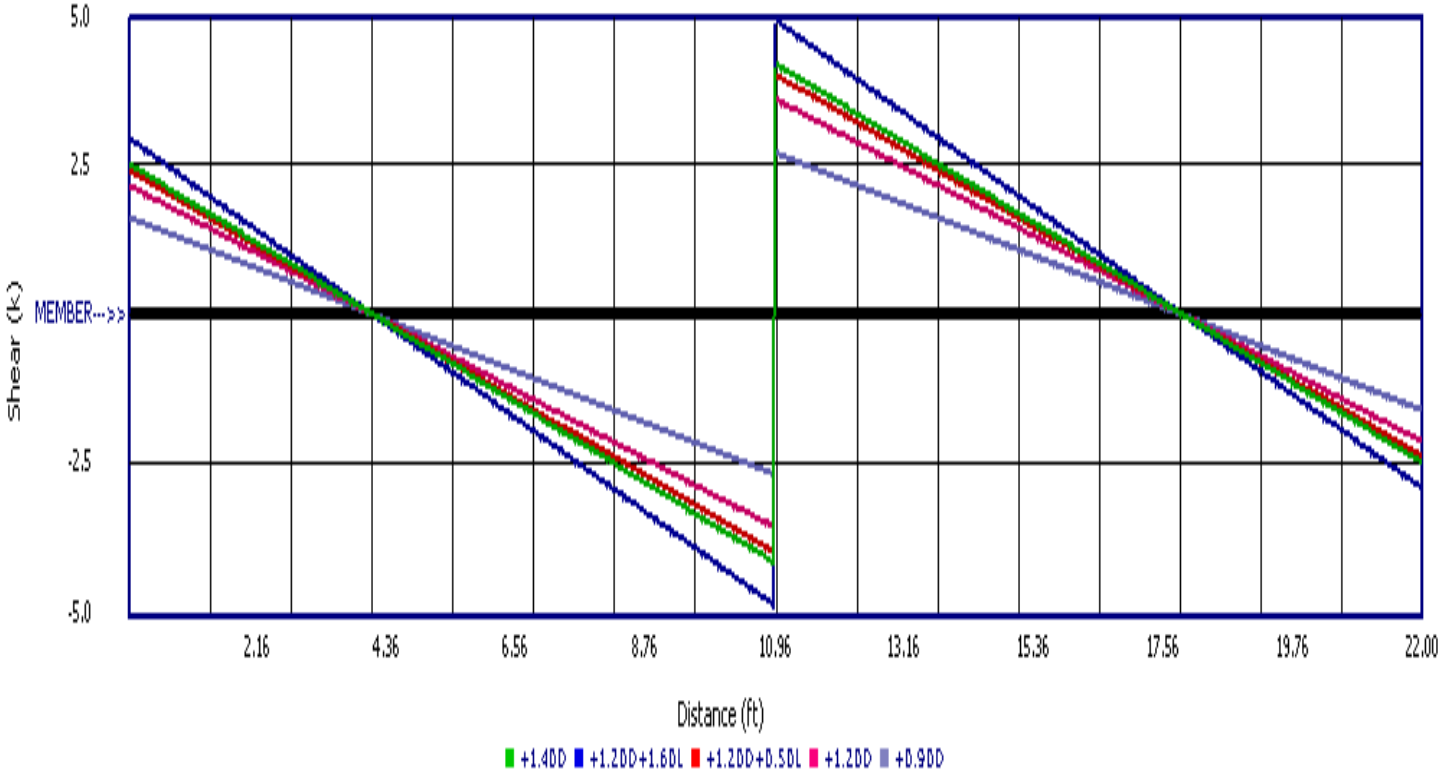
Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: ONE-WAY GARAGE SLAB (Distr. Loads)



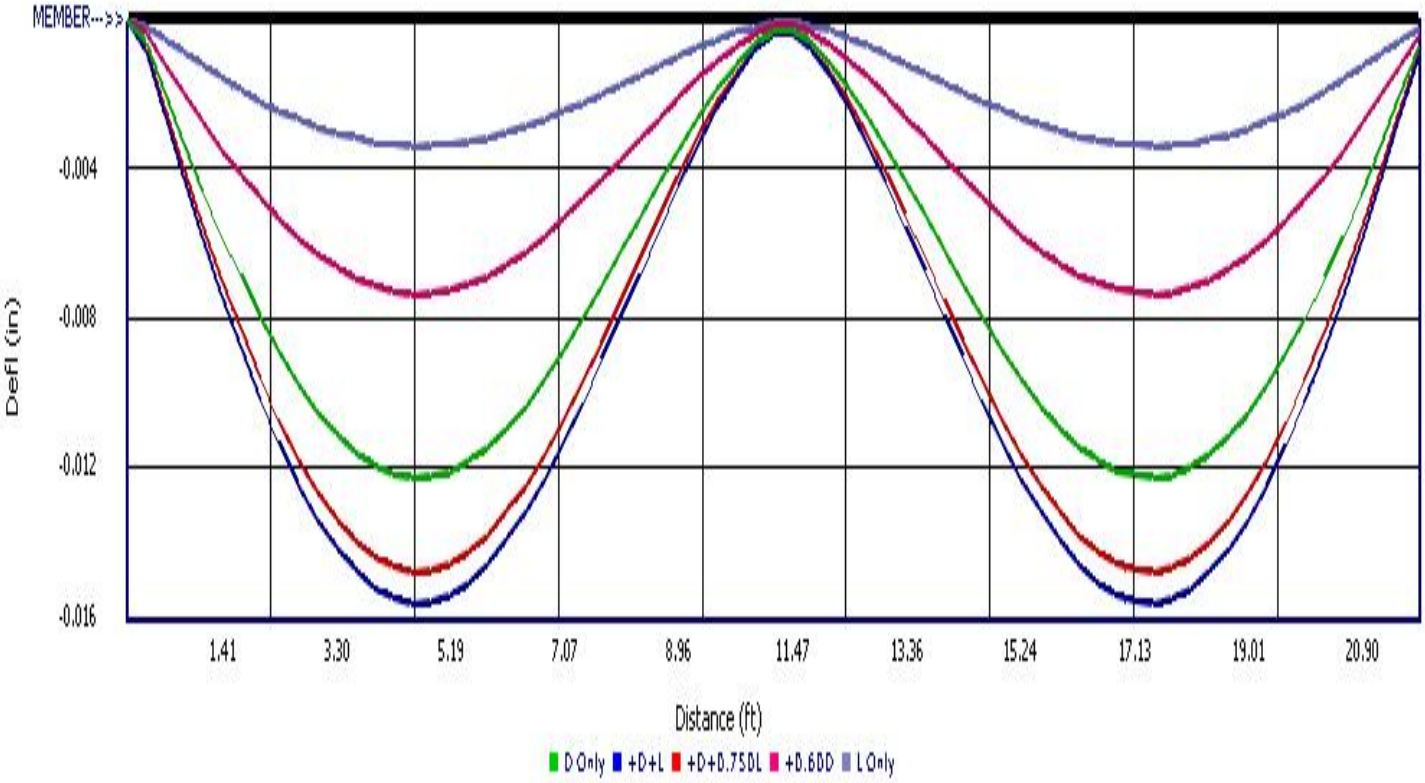


Concrete Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: ONE-WAY GARAGE SLAB (Distr. Loads)



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 2 COLUMN (COL_A2.75)

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design	Wood Section Name	**8.75x12**
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Western
Overall Column Height	10.5 ft	Wood Member Type	GLB
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: AC	Exact Width	**8.750** in
Wood Grade	L2, >= 4 Laminations	Exact Depth	**12.0** in

Fb +	1,400.0 psi	Fv	230.0 psi
Fb -	1,350.0 psi	Ft	975.0 psi
Fc - Prll	1,450.0 psi	Density	pcf
Fc - Perp	470.0 psi		

Area	105.0 in^2
Ix	1,260.0 in^4
Iy	669.92 in^4
Incising Factors :	
for Bending	0.80
for Elastic Modulus	0.95

Allow Stress Modification Factors

Cf or Cv for Bending	N/A
Cf or Cv for Compressio	N/A
Cf or Cv for Tension	N/A
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,300.0	1,300.0	1,300.0 ksi
Minimum	690.0	690.0	

Column Buckling Condition:
ABOUT X-X Axis: Lux = 10.5 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 10.5 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
COLUMNS ABOVE: Axial Load at 10.50 ft, D = 15.0, S = 31.920 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.3371 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	46.920 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,325.40 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	10.50 ft
Applied Design Shear	0.0 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

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

Maximum SERVICE Load Lateral Deflections . . .

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

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

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.927	0.1181	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+S	1.000	0.914	0.3371	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+0.750S	1.000	0.914	0.2798	PASS	0.0 ft	0.0	PASS	10.50 ft
+0.60D	1.600	0.816	0.04526	PASS	0.0 ft	0.0	PASS	10.50 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					15.000				
+D+S					46.920				
+D+0.750S					38.940				

Wood Column

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 2 COLUMN (COL_A2.75)

Maximum Reactions

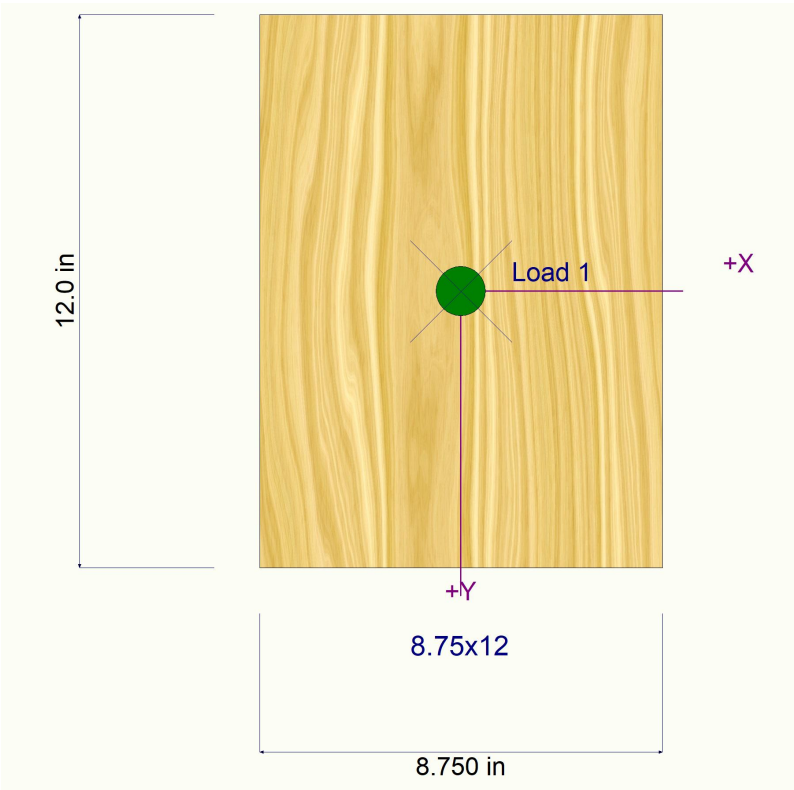
Note: Only non-zero reactions are listed.

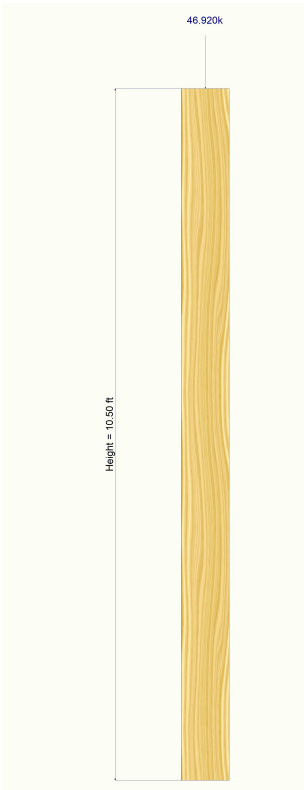
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+0.60D						9.000					
S Only						31.920					

Maximum Deflections for Load Combinations

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

Sketches





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 2 COLUMN (COL_A2.5)

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design	Wood Section Name	**5.5x10.5**
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Western
Overall Column Height	10.5 ft	Wood Member Type	GLB
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: AC	Exact Width	**5.50** in
Wood Grade	L2, >= 4 Laminations	Exact Depth	**10.50** in

Fb +	1400 psi	Fv	230 psi
Fb -	1350 psi	Ft	975 psi
Fc - Prll	1450 psi	Density	pcf
Fc - Perp	470 psi		

Area	57.750 in^2
Ix	530.58 in^4
Iy	145.578 in^4

Incising Factors :

for Bending	0.80
for Elastic Modulus	0.95

Allow Stress Modification Factors

Cf or Cv for Bending	N/A
Cf or Cv for Compressio	N/A
Cf or Cv for Tension	N/A
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1300	1300	1300 ksi
Minimum	690	690	

Column Buckling Condition:
ABOUT X-X Axis: Lux = 10.5 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 10.5 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
COLUMNS ABOVE: Axial Load at 10.50 ft, D = 11.720, S = 41.630 k

DESIGN SUMMARY

Bending & Shear Check Results

FAIL Max. Axial+Bending Stress Ratio = **1.003 : 1**

Load Combination	+D+S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	53.350 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	920.61 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	10.50 ft
Applied Design Shear	0.0 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

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

Maximum SERVICE Load Lateral Deflections . . .

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

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

Other Factors used to calculate allowable stresses . . .

Bending Compression Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.682	0.2280	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+S	1.000	0.635	1.003	FAIL !	0.0 ft	0.0	PASS	10.50 ft
+D+0.750S	1.000	0.635	0.8077	PASS	0.0 ft	0.0	PASS	10.50 ft
+0.60D	1.600	0.433	0.1213	PASS	0.0 ft	0.0	PASS	10.50 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					11.720				
+D+S					53.350				
+D+0.750S					42.943				

Wood Column

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 2 COLUMN (COL_A2.5)

Maximum Reactions

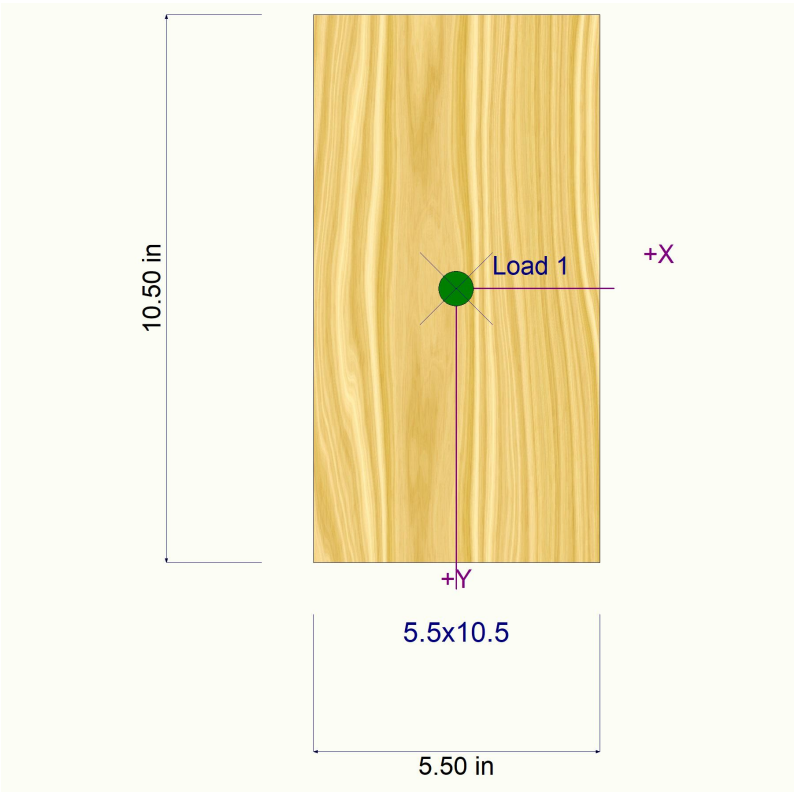
Note: Only non-zero reactions are listed.

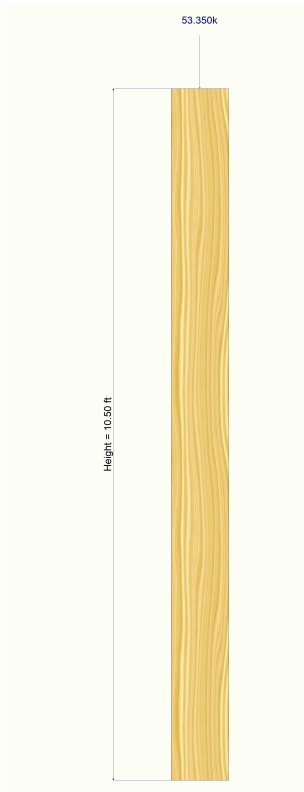
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
+0.60D						7.032					
S Only						41.630					

Maximum Deflections for Load Combinations

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

Sketches





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 2 COLUMN (COL_A2.25)

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design	Wood Section Name	**5.5x6**
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Western
Overall Column Height	26.5 ft	Wood Member Type	GLB
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: AC	Exact Width	**5.50** in
Wood Grade	L2, >= 4 Laminations	Exact Depth	**6.0** in

Fb +	1,400.0 psi	Fv	230.0 psi
Fb -	1,350.0 psi	Ft	975.0 psi
Fc - Prll	1,450.0 psi	Density	pcf
Fc - Perp	470.0 psi		

Area	33.0 in^2
Ix	99.0 in^4
Iy	83.188 in^4
Incising Factors :	
for Bending	0.80
for Elastic Modulus	0.95

Allow Stress Modification Factors

Cf or Cv for Bending	N/A
Cf or Cv for Compressio	N/A
Cf or Cv for Tension	N/A
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,300.0	1,300.0	1,300.0 ksi
Minimum	690.0	690.0	

Column Buckling Condition:
ABOUT X-X Axis: Lux = 11.750 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 11.750 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
Roof Bm: Axial Load at 26.50 ft, D = 1.130, S = 5.530 k
Upper Level Bm: Axial Load at 17.950 ft, D = 1.120, L = 4.10 k
Main Level Bm: Axial Load at 6.20 ft, D = 1.120, L = 4.10 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5349 : 1**

Load Combination	+D+0.750L+0.750S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	26.50 ft
At maximum location values are .	
Applied Axial	13.668 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	774.27 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	26.50 ft
Applied Design Shear	0.0 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

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

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base
for load combination : n/a
Along X-X 0.0 in at 0.0 ft above base
for load combination : n/a

Other Factors used to calculate allowable stresses . . .

Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.581	0.1347	PASS	26.50 ft	0.0	PASS	26.50 ft
+D+L	1.000	0.534	0.4528	PASS	0.0 ft	0.0	PASS	26.50 ft
+D+S	1.000	0.534	0.3483	PASS	0.0 ft	0.0	PASS	26.50 ft
+D+0.750L	1.250	0.441	0.3607	PASS	0.0 ft	0.0	PASS	26.50 ft
+D+0.750L+0.750S	1.000	0.534	0.5349	PASS	26.50 ft	0.0	PASS	26.50 ft
+0.60D	1.600	0.353	0.07487	PASS	26.50 ft	0.0	PASS	26.50 ft

Wood Column

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 2 COLUMN (COL_A2.25)

Maximum Reactions

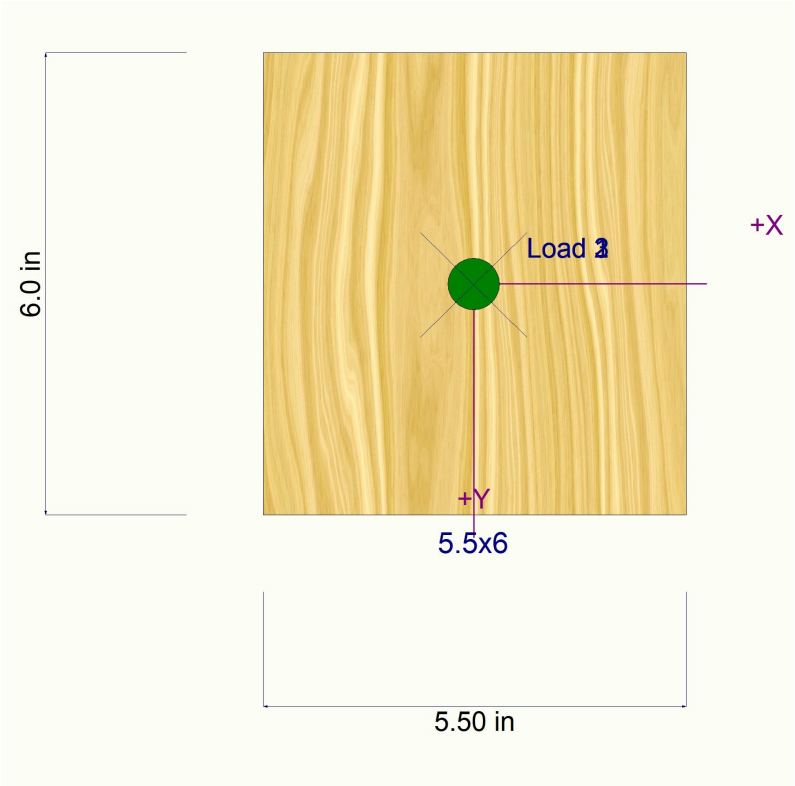
Note: Only non-zero reactions are listed.

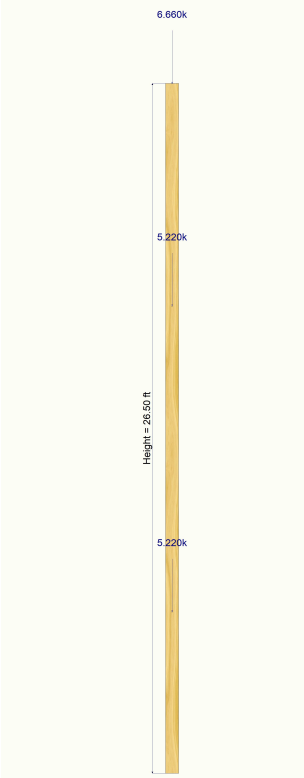
Load Combination	X-X Axis Reaction @ Base	@ Top	k	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments @ Base	@ Top	k-ft	Mx - End Moments @ Base	@ Top
D Only						3.370					
+D+L						11.570					
+D+S						8.900					
+D+0.750L						9.520					
+D+0.750L+0.750S						13.668					
+0.60D						2.022					
L Only						8.200					
S Only						5.530					

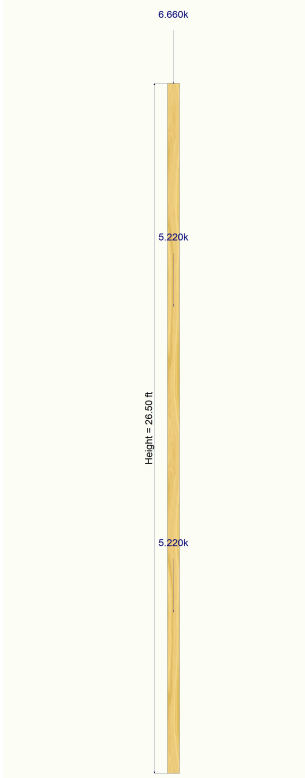
Maximum Deflections for Load Combinations

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

Sketches







FLOOR 1

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

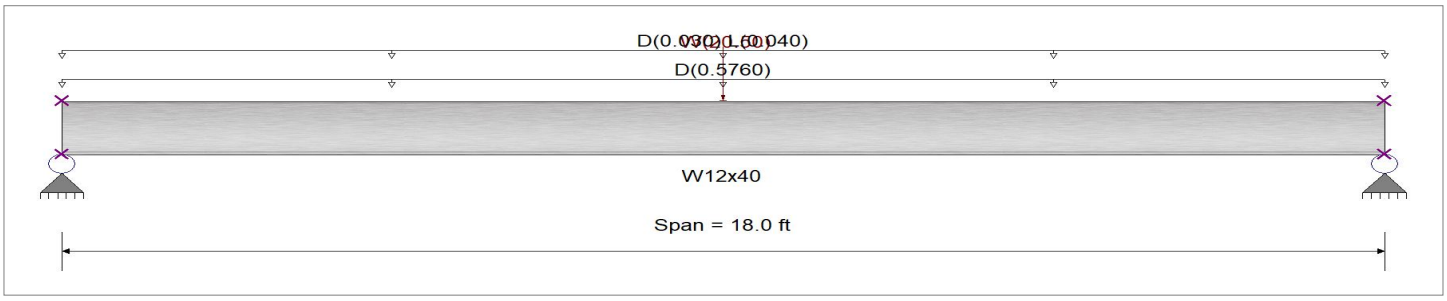
DESCRIPTION: 1b1

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.5760 k/ft, Tributary Width = 1.0 ft, (WALL)

Uniform Load : D = 0.030, L = 0.040 k/ft, Tributary Width = 1.0 ft, (FLOOR)

Point Load : W = 20.50 k @ 9.0 ft, (WIND HOLD DOWN)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.642** : 1	Maximum Shear Stress Ratio =	**0.170** : 1
Section used for this span	**W12x40**	Section used for this span	**W12x40**
Ma : Applied	81.513 k-ft	Va : Applied	11.964 k
Mn / Omega : Allowable	127.032 k-ft	Vn/Omega : Allowable	70.210 k
Load Combination	+D+0.60W	Load Combination	+D+0.60W
		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	0.485 in	Ratio =	444	>=360	Span: 1 : W Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.463 in	Ratio =	466	>=240.	Span: 1 : +D+0.60W
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega
D Only												
Dsgn. L = 18.00 ft	1	0.227	0.083	26.16		26.16	192.49	115.26	1.14	1.00	5.81	105.32	70.21
+D+L												
Dsgn. L = 18.00 ft	1	0.241	0.088	27.78		27.78	192.49	115.26	1.14	1.00	6.17	105.32	70.21
+D+0.750L												
Dsgn. L = 18.00 ft	1	0.238	0.087	27.38		27.38	192.49	115.26	1.14	1.00	6.08	105.32	70.21
+D+0.60W												
Dsgn. L = 18.00 ft	1	0.642	0.170	81.51		81.51	212.14	127.03	1.25	1.00	11.96	105.32	70.21
+D+0.750L+0.450W												
Dsgn. L = 18.00 ft	1	0.548	0.152	68.89		68.89	209.77	125.61	1.24	1.00	10.70	105.32	70.21
+0.60D+0.60W												
Dsgn. L = 18.00 ft	1	0.551	0.137	71.05		71.05	215.36	128.96	1.27	1.00	9.64	105.32	70.21
+0.60D												
Dsgn. L = 18.00 ft	1	0.136	0.050	15.70		15.70	192.49	115.26	1.14	1.00	3.49	105.32	70.21

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1b1

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
W Only	1	0.4855	9.000		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.1722	9.051		0.0000	0.000
+D+L	1	0.1828	9.051		0.0000	0.000
+D+0.750L	1	0.1802	9.051		0.0000	0.000
+D+0.60W	1	0.4635	9.051		0.0000	0.000
+D+0.750L+0.450W	1	0.3986	9.051		0.0000	0.000
+0.60D+0.60W	1	0.3946	9.051		0.0000	0.000
+0.60D	1	0.1033	9.051		0.0000	0.000
L Only	1	0.0107	9.051		0.0000	0.000
W Only	1	0.4855	9.000		0.0000	0.000

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	11.964	11.964
Max Upward from Load Combinations	11.964	11.964
Max Upward from Load Cases	10.250	10.250
D Only	5.814	5.814
+D+L	6.174	6.174
+D+0.750L	6.084	6.084
+D+0.60W	11.964	11.964
+D+0.750L+0.450W	10.697	10.697
+0.60D+0.60W	9.638	9.638
+0.60D	3.488	3.488
L Only	0.360	0.360
W Only	10.250	10.250

Steel Section Properties : W12x40

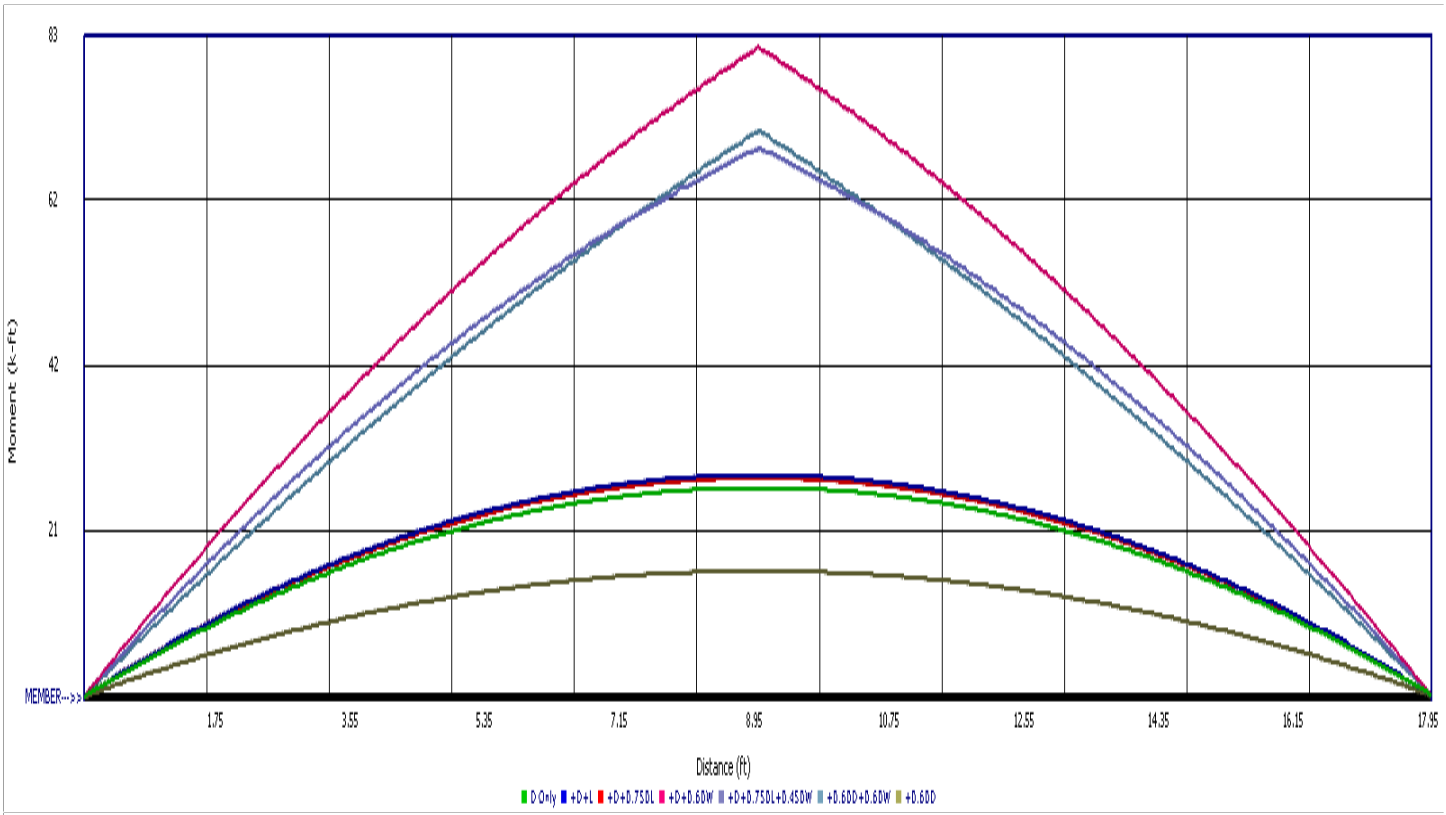
Depth	=	11.900	in	I xx	=	307.00	in^4	J	=	0.906 in^4
Web Thick	=	0.295	in	S xx		51.50	in^3	Cw	=	1,440.00 in^6
Flange Width	=	8.010	in	R xx	=	5.130	in			
Flange Thick	=	0.515	in	Zx	=	57.000	in^3			
Area	=	11.700	in^2	I yy	=	44.100	in^4			
Weight	=	40.000	plf	S yy	=	11.000	in^3	Wno	=	22.800 in^2
Kdesign	=	1.020	in	R yy	=	1.940	in	Sw	=	23.500 in^4
K1	=	0.875	in	Zy	=	16.800	in^3	Qf	=	11.300 in^3
rts	=	2.210	in					Qw	=	27.800 in^3
Ycg	=	5.950	in							

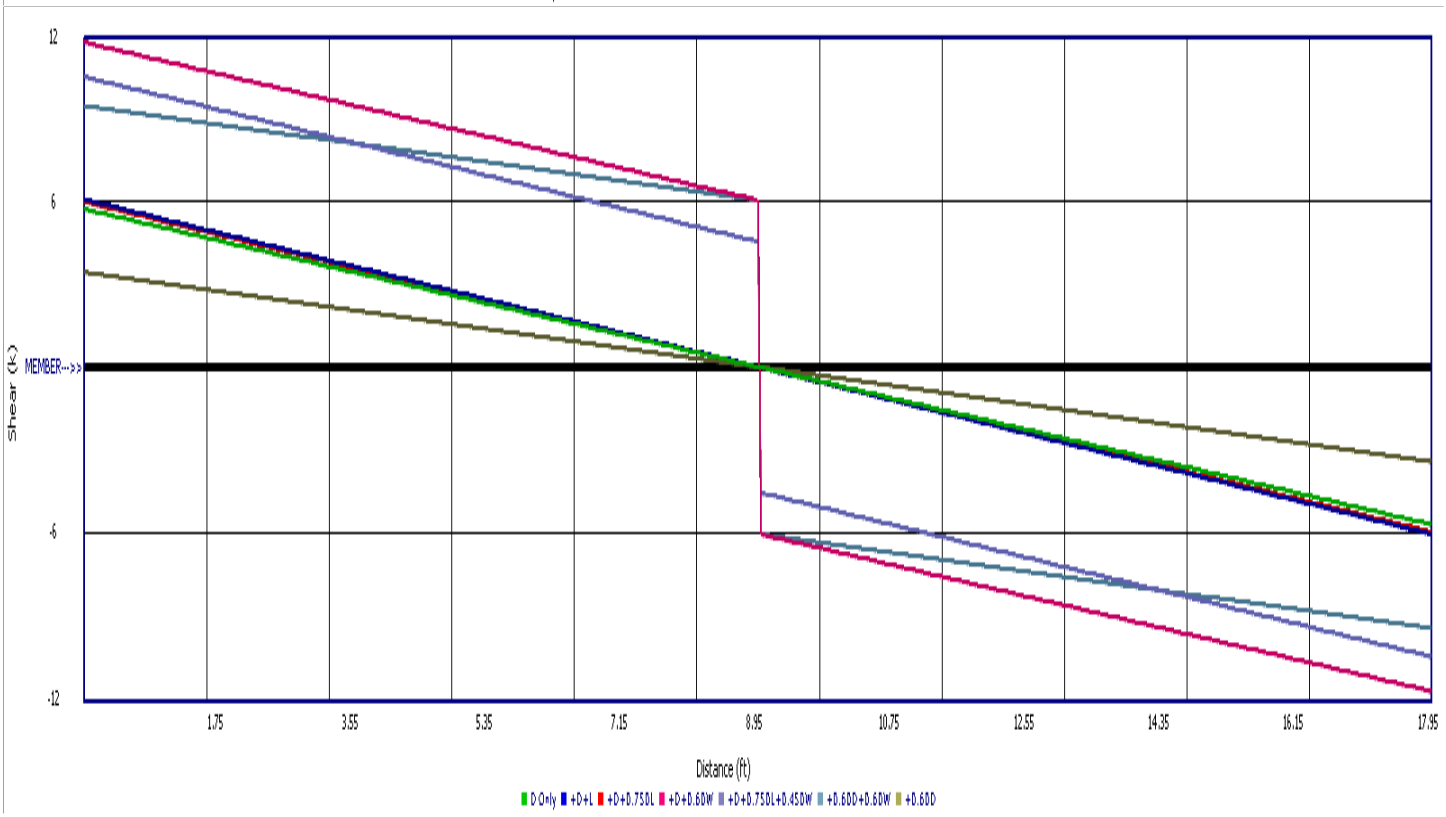
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1b1



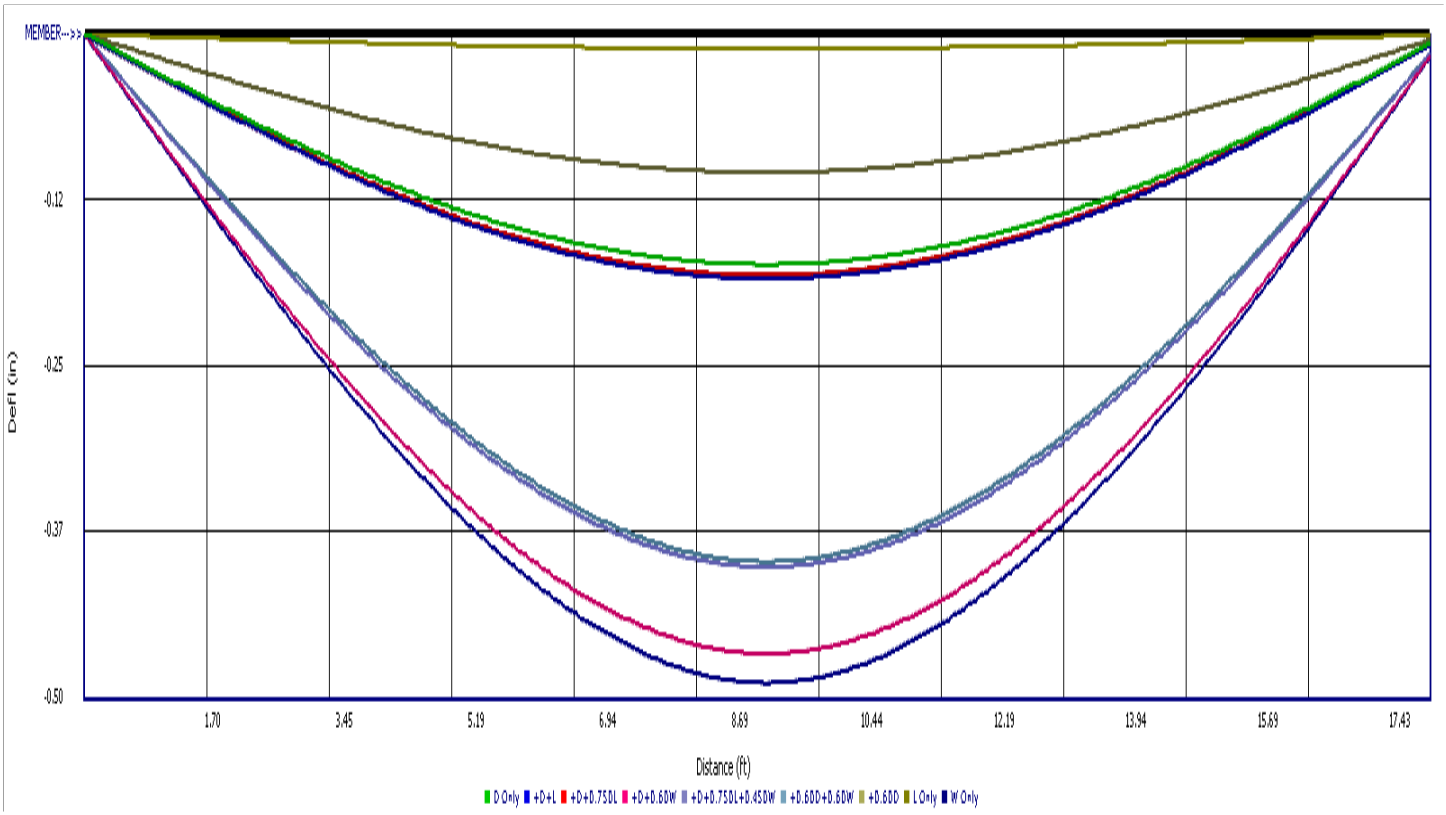


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1b1



Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1b2

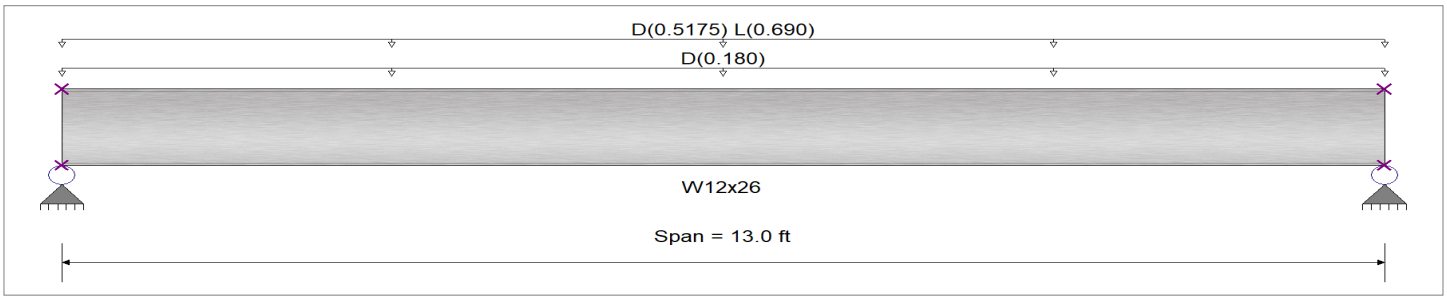
CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 50.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.180 k/ft, Tributary Width = 1.0 ft, (WALL)

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 17.250 ft, (FLOOR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.403** : 1	Maximum Shear Stress Ratio =	**0.164** : 1
Section used for this span	**W12x26**	Section used for this span	**W12x26**
Ma : Applied	29.860 k-ft	Va : Applied	9.188 k
Mn / Omega : Allowable	74.028 k-ft	Vn/Omega : Allowable	56.120 k
Load Combination	+D+L	Load Combination	+D+L
		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	0.075 in	Ratio =	2,071	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.154 in	Ratio =	1011	>=240.	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 13.00 ft	1	0.206	0.084	15.28		15.28	123.63	74.03	1.14	1.00	4.70	84.18	56.12
+D+L													
Dsgn. L = 13.00 ft	1	0.403	0.164	29.86		29.86	123.63	74.03	1.14	1.00	9.19	84.18	56.12
+D+0.750L													
Dsgn. L = 13.00 ft	1	0.354	0.144	26.22		26.22	123.63	74.03	1.14	1.00	8.07	84.18	56.12
+0.60D													
Dsgn. L = 13.00 ft	1	0.124	0.050	9.17		9.17	123.63	74.03	1.14	1.00	2.82	84.18	56.12

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.1542	6.537		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.0789	6.537		0.0000	0.000
+D+L	1	0.1542	6.537		0.0000	0.000
+D+0.750L	1	0.1354	6.537		0.0000	0.000
+0.60D	1	0.0474	6.537		0.0000	0.000
L Only	1	0.0753	6.537		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1b2

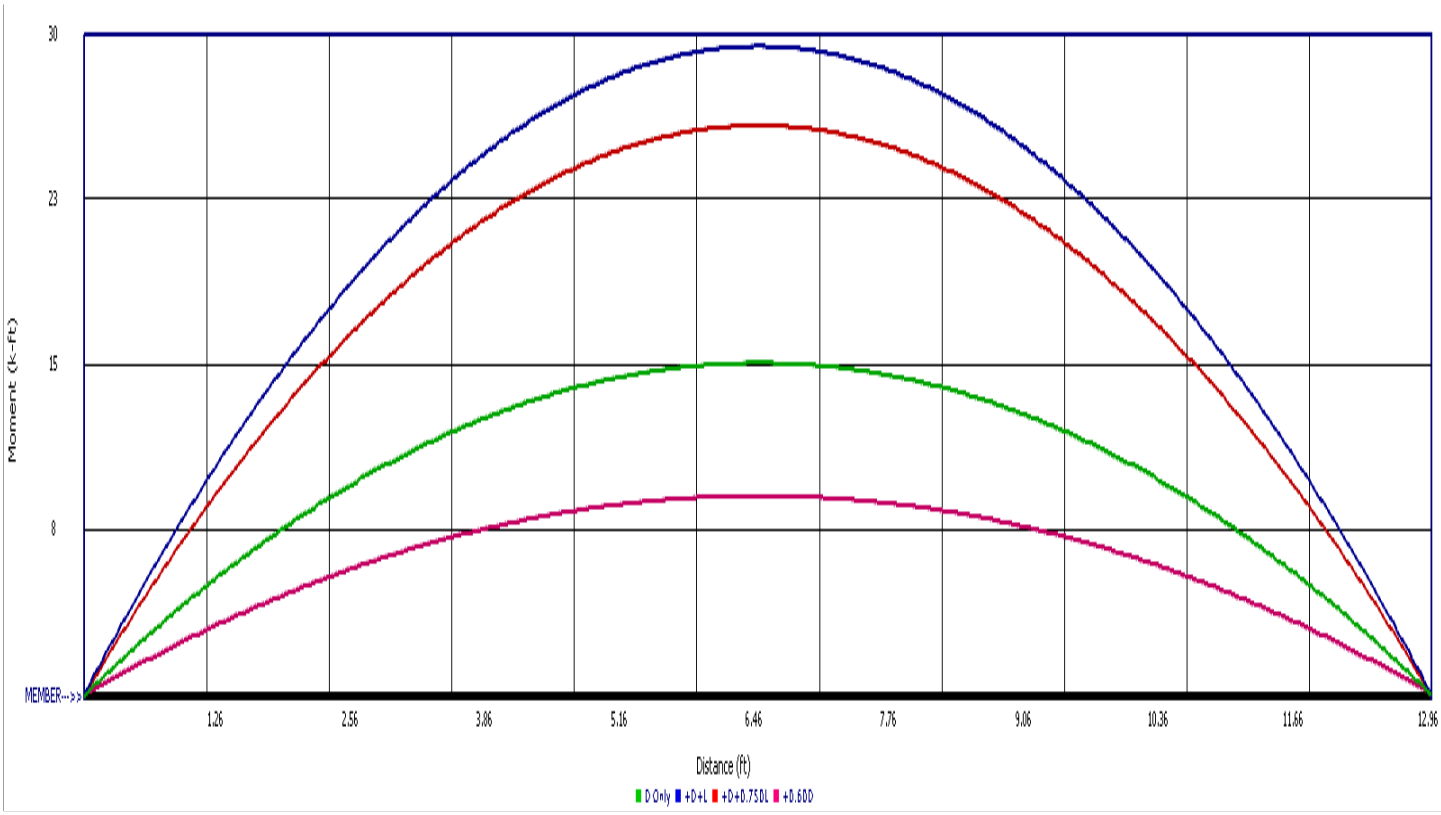
Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	9.188	9.188
Max Upward from Load Combinations	9.188	9.188
Max Upward from Load Cases	4.703	4.703
D Only	4.703	4.703
+D+L	9.188	9.188
+D+0.750L	8.067	8.067
+0.60D	2.822	2.822
L Only	4.485	4.485

Steel Section Properties : W12x26

Depth	=	12.200	in	I xx	=	204.00	in^4	J	=	0.300	in^4
Web Thick	=	0.230	in	S xx		33.40	in^3	Cw	=	607.00	in^6
Flange Width	=	6.490	in	R xx	=	5.170	in				
Flange Thick	=	0.380	in	Zx	=	37.200	in^3				
Area	=	7.650	in^2	I yy	=	17.300	in^4				
Weight	=	26.000	plf	S yy	=	5.340	in^3	Wno	=	19.200	in^2
Kdesign	=	0.680	in	R yy	=	1.510	in	Sw	=	11.800	in^4
K1	=	0.750	in	Zy	=	8.170	in^3	Qf	=	7.030	in^3
rts	=	1.750	in					Qw	=	18.300	in^3
Ycg	=	6.100	in								

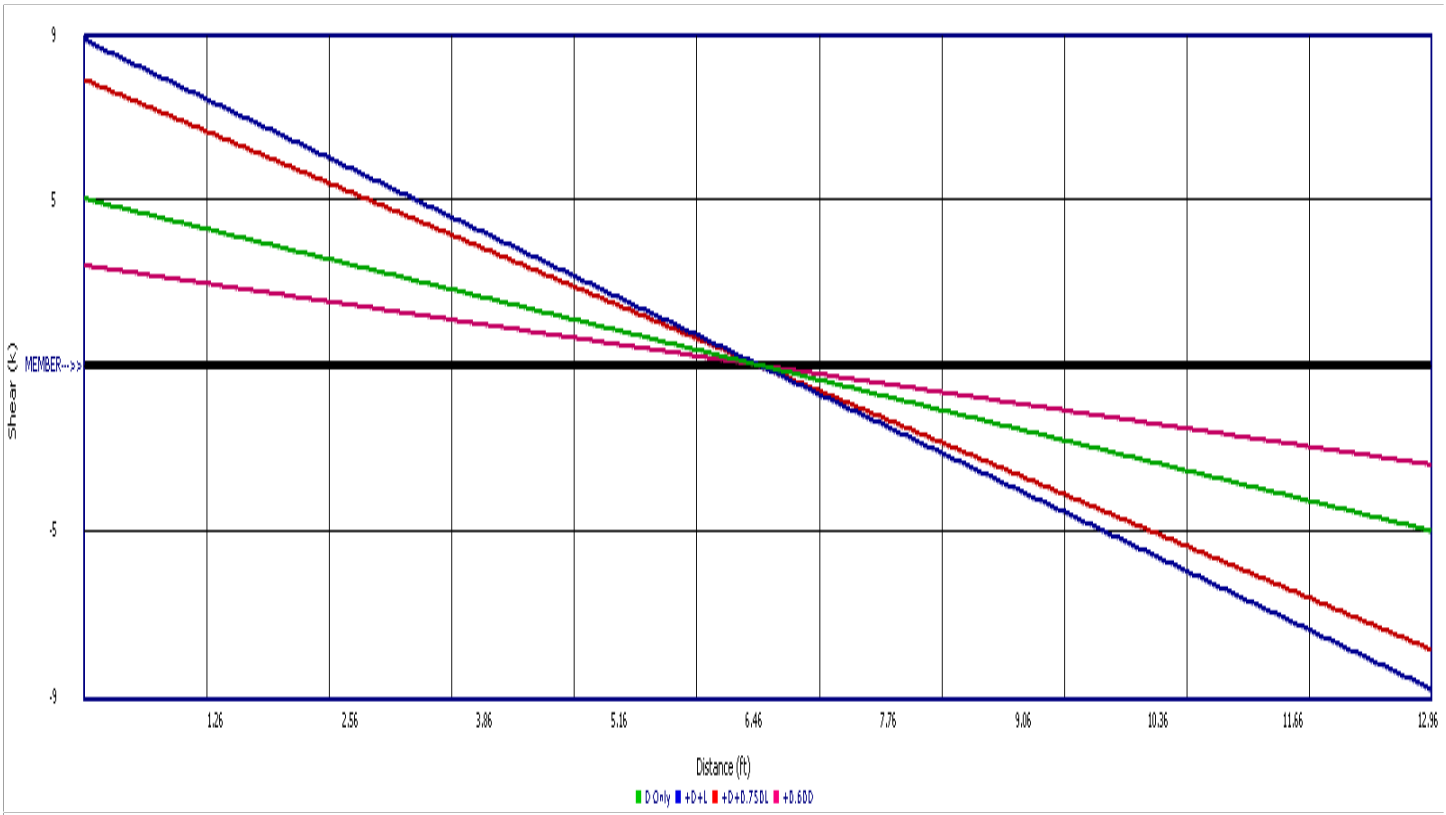


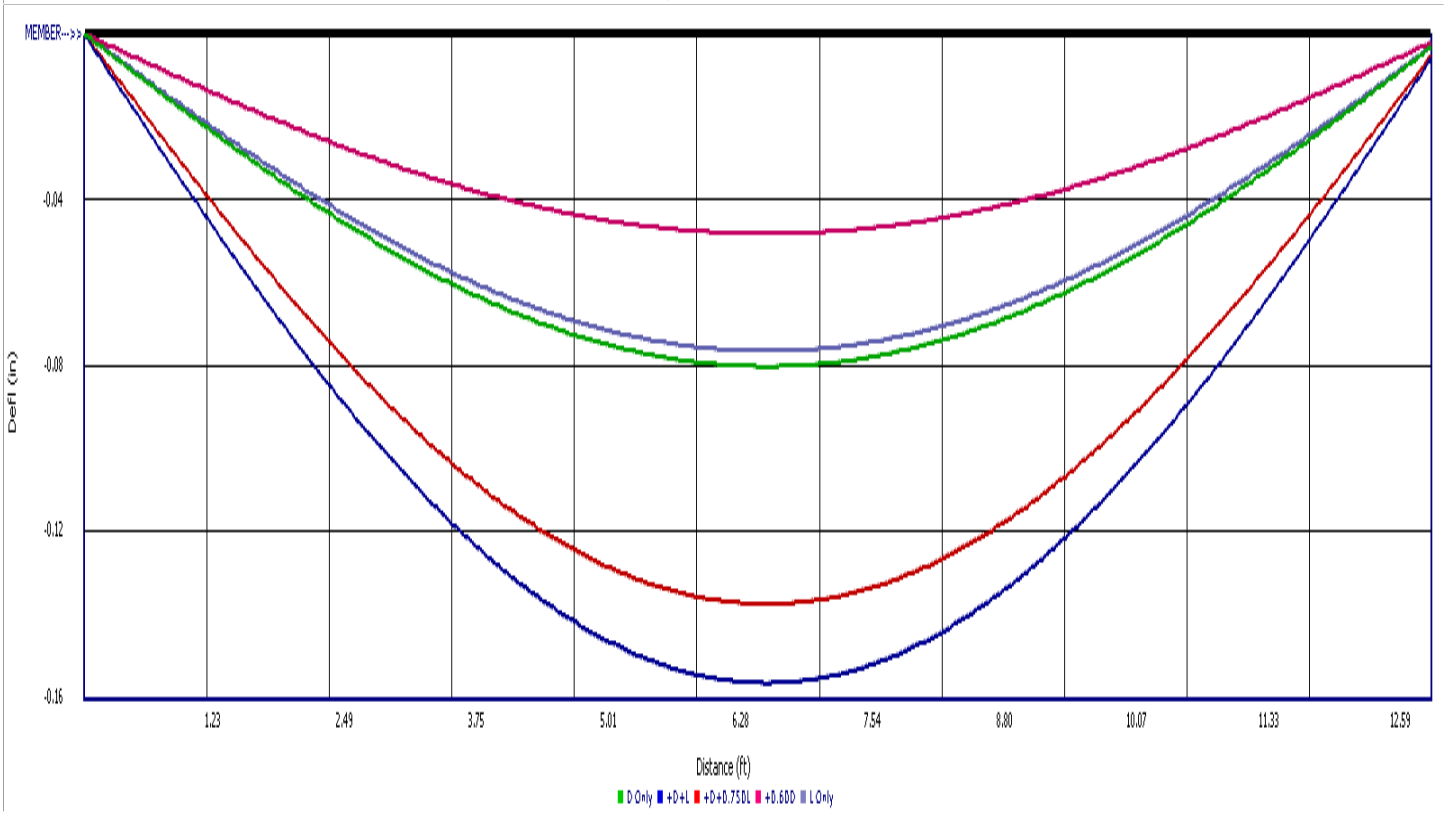
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1b2





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

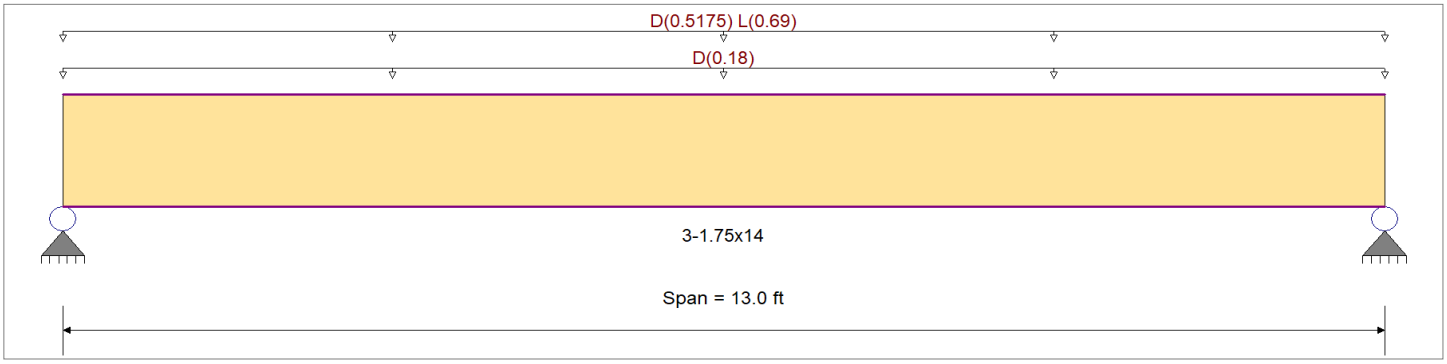
DESCRIPTION: 1b2 WOOD (FLUSH)

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2600 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2600 psi	Ebend- xx	2000 ksi
		Fc - Prll	2510 psi	Eminbend - xx	1016.535 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285 psi		
		Ft	1555 psi	Density	42.01 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.180 , Tributary Width = 1.0 ft, (WALL)
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 17.250 ft, (FLOOR)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.818 : 1	Maximum Shear Stress Ratio	=	0.541 : 1
Section used for this span		**3-1.75x14**	Section used for this span		**3-1.75x14**
fb: Actual	=	2,082.61 psi	fv: Actual	=	154.16 psi
F'b	=	2,546.06 psi	F'v	=	285.00 psi
Load Combination		+D+L	Load Combination		+D+L
Location of maximum on span	=	6.500 ft	Location of maximum on span	=	11.861 ft
Span # where maximum occurs	=	Span # 1	Span # where maximum occurs	=	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.186 in	Ratio =	839	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.379 in	Ratio =	411	>=240	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 13.0 ft	1	0.464	0.307	0.90	1.00	1.00	1.00	0.979	1.00	1.00	1.00	15.19	1,062.7	2,291.5	3.85	78.7	256.5
+D+L					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.0 ft	1	0.818	0.541	1.00	1.00	1.00	1.00	0.979	1.00	1.00	1.00	29.76	2,082.6	2,546.1	7.55	154.2	285.0
+D+0.750L					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.0 ft	1	0.574	0.380	1.25	1.00	1.00	1.00	0.979	1.00	1.00	1.00	26.12	1,827.6	3,182.6	6.63	135.3	356.3
+0.60D					1.00	1.00	1.00	0.979	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 13.0 ft	1	0.157	0.104	1.60	1.00	1.00	1.00	0.979	1.00	1.00	1.00	9.11	637.6	4,073.7	2.31	47.2	456.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1b2 WOOD (FLUSH)

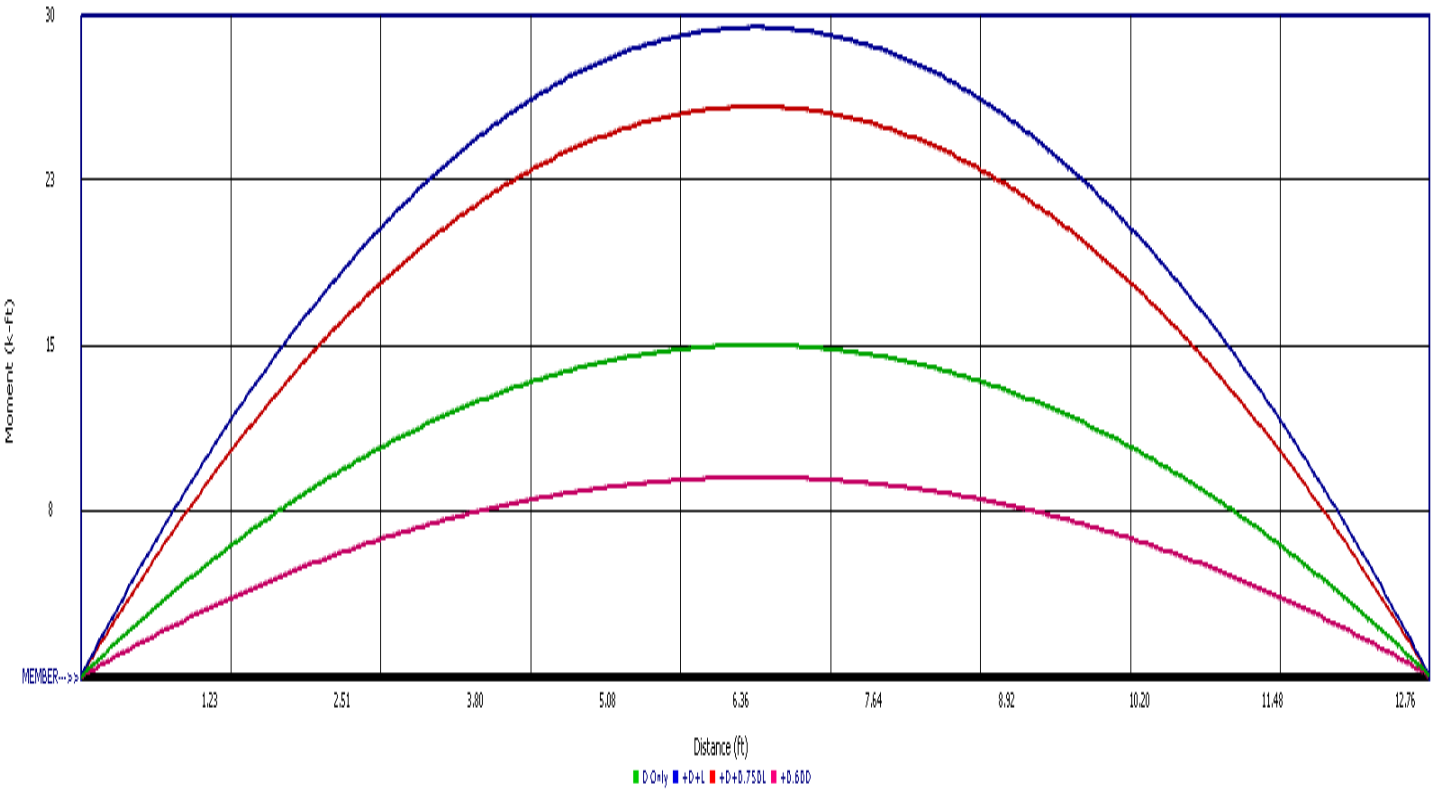
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.3793	6.547		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	9.158	9.158
Max Upward from Load Combinations	9.158	9.158
Max Upward from Load Cases	4.673	4.673
D Only	4.673	4.673
+D+L	9.158	9.158
+D+0.750L	8.037	8.037
+0.60D	2.804	2.804
L Only	4.485	4.485

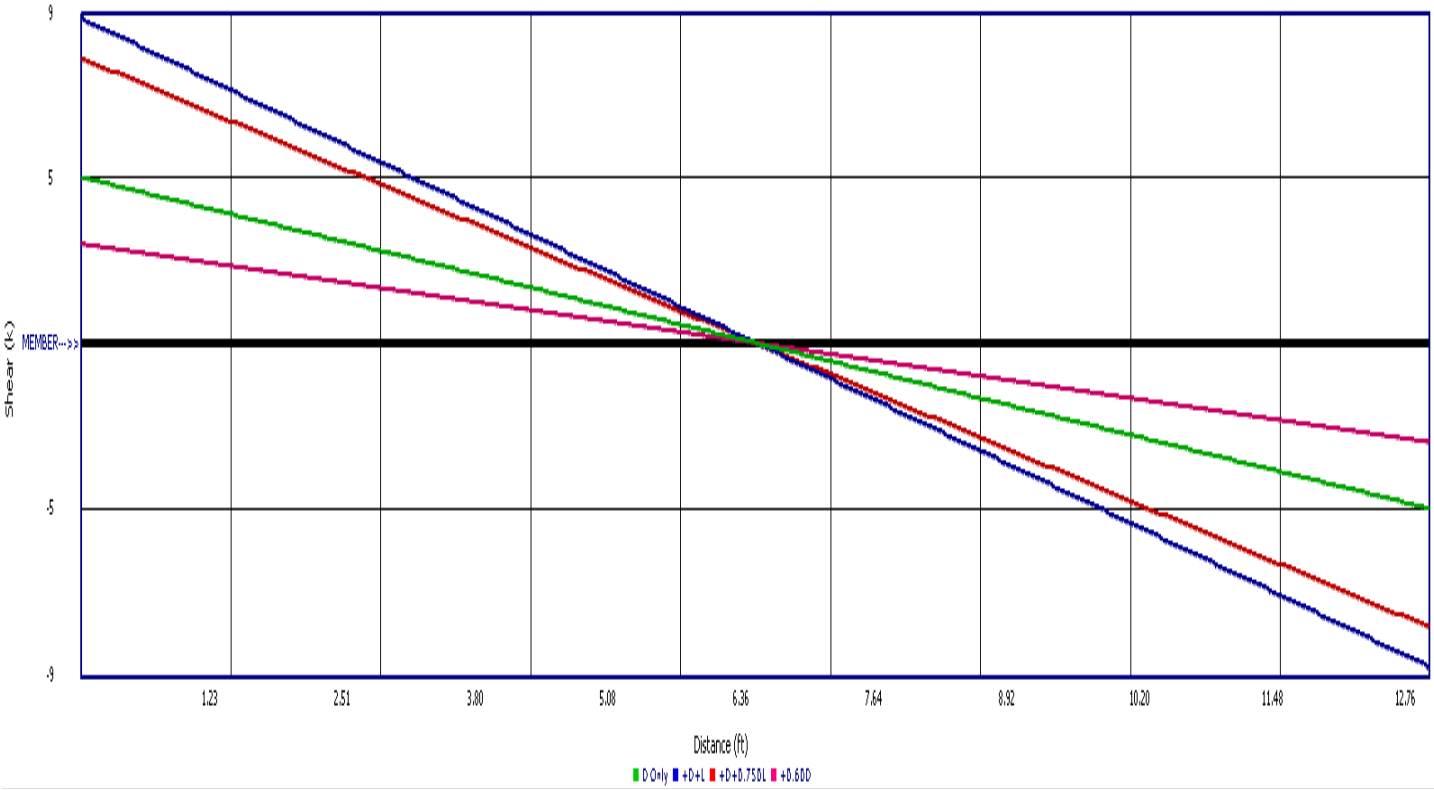


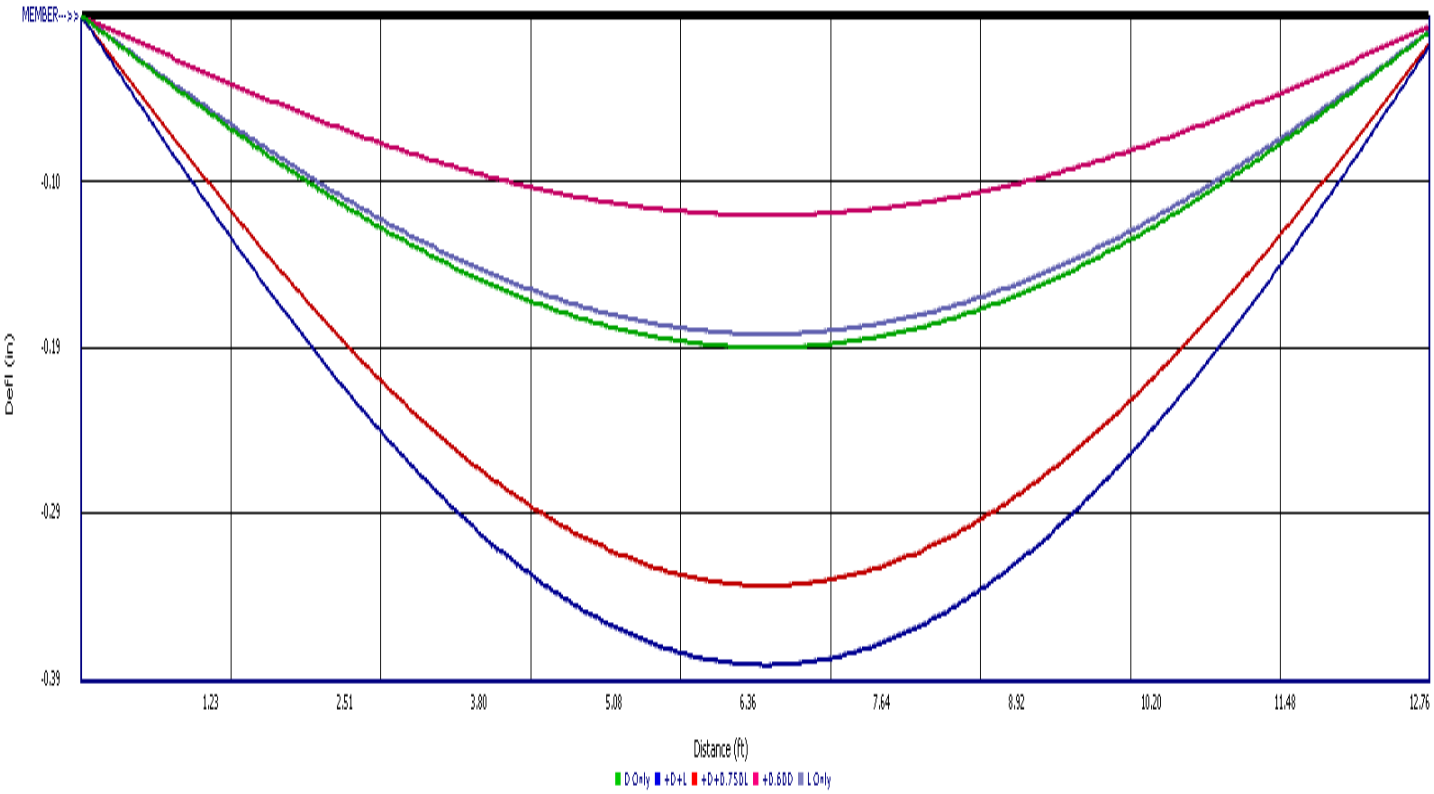
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1b2 WOOD (FLUSH)





Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

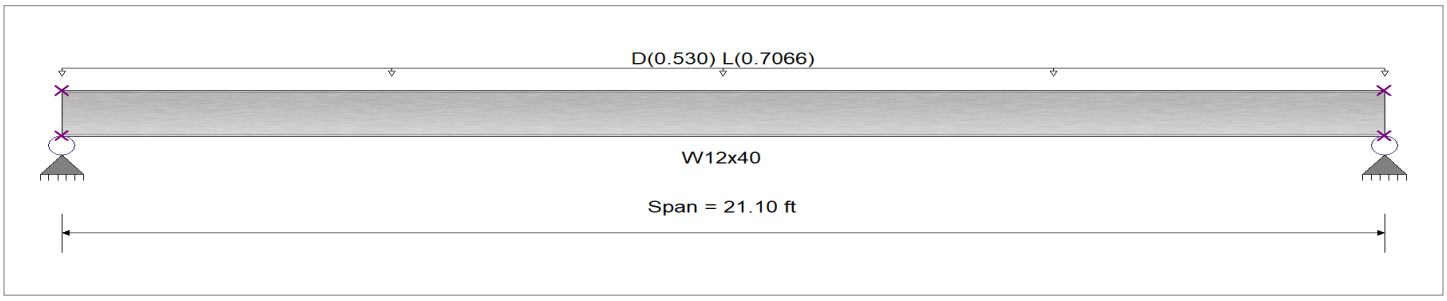
DESCRIPTION: Living Rm Bm (1B3) DROPPED

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Strength Design	Fy : Steel Yield :	50.0 ksi
Beam Bracing :	Completely Unbraced	E: Modulus :	29,000.0 ksi
Bending Axis :	Major Axis Bending		



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 17.665 ft, (Floor Joists)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.672** : 1	Maximum Shear Stress Ratio =	**0.186** : 1
Section used for this span	**W12x40**	Section used for this span	**W12x40**
Ma : Applied	68.816 k-ft	Va : Applied	13.046 k
Mn / Omega : Allowable	102.388 k-ft	Vn/Omega : Allowable	70.210 k
Load Combination	+D+L	Load Combination	+D+L
		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	0.355 in	Ratio =	712	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.622 in	Ratio =	407	>=240.	Span: 1 : +D+L
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega	
D Only													
Dsgn. L = 21.10 ft	1	0.288	0.080	29.49		29.49	170.99	102.39	1.14	1.00	5.59	105.32	70.21
+D+L													
Dsgn. L = 21.10 ft	1	0.672	0.186	68.82		68.82	170.99	102.39	1.14	1.00	13.05	105.32	70.21
+D+0.750L													
Dsgn. L = 21.10 ft	1	0.576	0.159	58.98		58.98	170.99	102.39	1.14	1.00	11.18	105.32	70.21
+0.60D													
Dsgn. L = 21.10 ft	1	0.173	0.048	17.70		17.70	170.99	102.39	1.14	1.00	3.35	105.32	70.21

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.6223	10.610		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.2667	10.610		0.0000	0.000
+D+L	1	0.6223	10.610		0.0000	0.000
+D+0.750L	1	0.5334	10.610		0.0000	0.000
+0.60D	1	0.1600	10.610		0.0000	0.000
L Only	1	0.3556	10.610		0.0000	0.000

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: Living Rm Bm (1B3) DROPPED

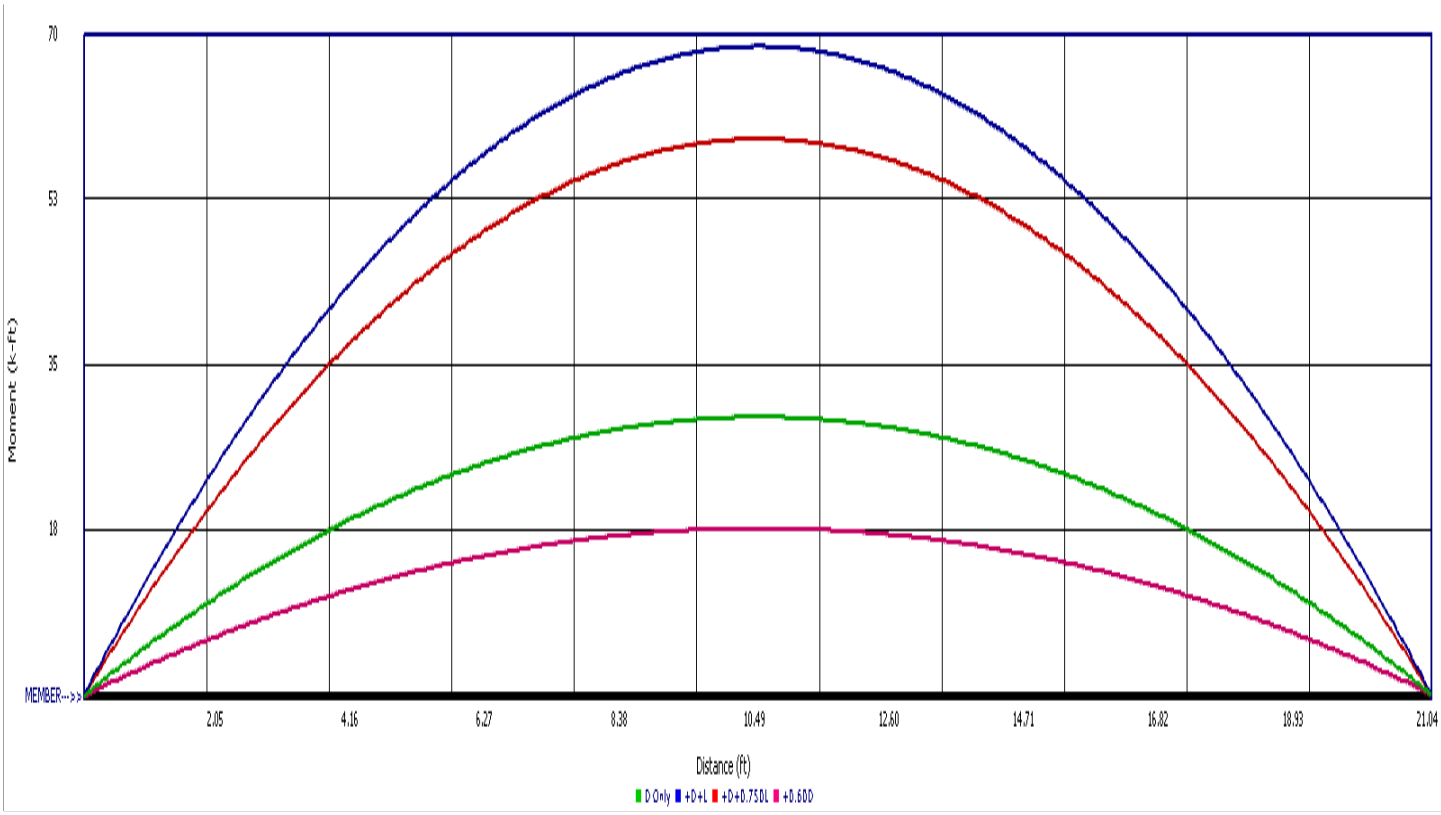
Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	13.046	13.046
Max Upward from Load Combinations	13.046	13.046
Max Upward from Load Cases	7.455	7.455
D Only	5.591	5.591
+D+L	13.046	13.046
+D+0.750L	11.182	11.182
+0.60D	3.355	3.355
L Only	7.455	7.455

Steel Section Properties : W12x40

Depth	=	11.900	in	I xx	=	307.00	in^4	J	=	0.906	in^4
Web Thick	=	0.295	in	S xx		51.50	in^3	Cw	=	1,440.00	in^6
Flange Width	=	8.010	in	R xx	=	5.130	in				
Flange Thick	=	0.515	in	Zx	=	57.000	in^3				
Area	=	11.700	in^2	I yy	=	44.100	in^4				
Weight	=	40.000	plf	S yy	=	11.000	in^3	Wno	=	22.800	in^2
Kdesign	=	1.020	in	R yy	=	1.940	in	Sw	=	23.500	in^4
K1	=	0.875	in	Zy	=	16.800	in^3	Qf	=	11.300	in^3
rts	=	2.210	in					Qw	=	27.800	in^3
Ycg	=	5.950	in								

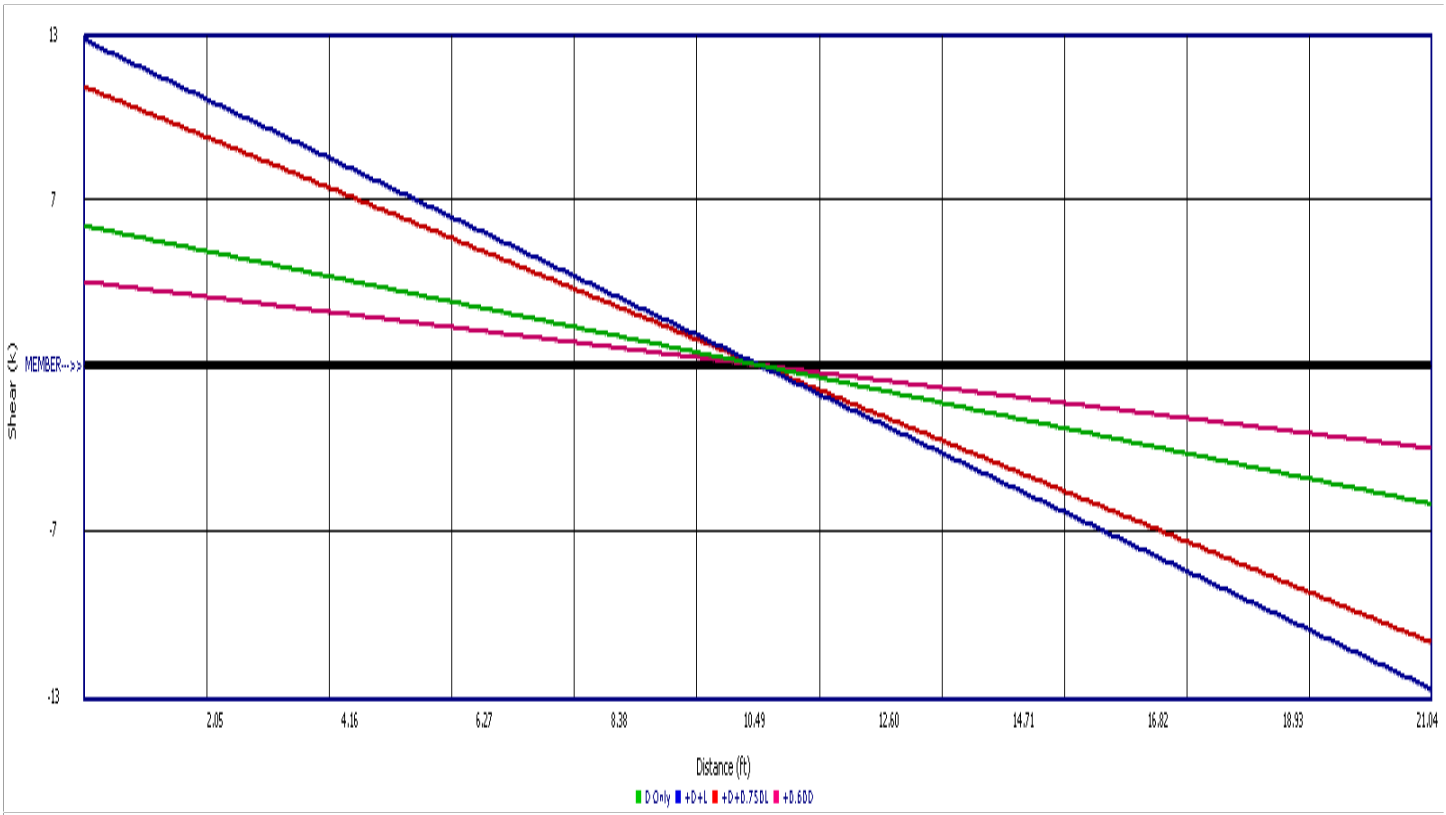


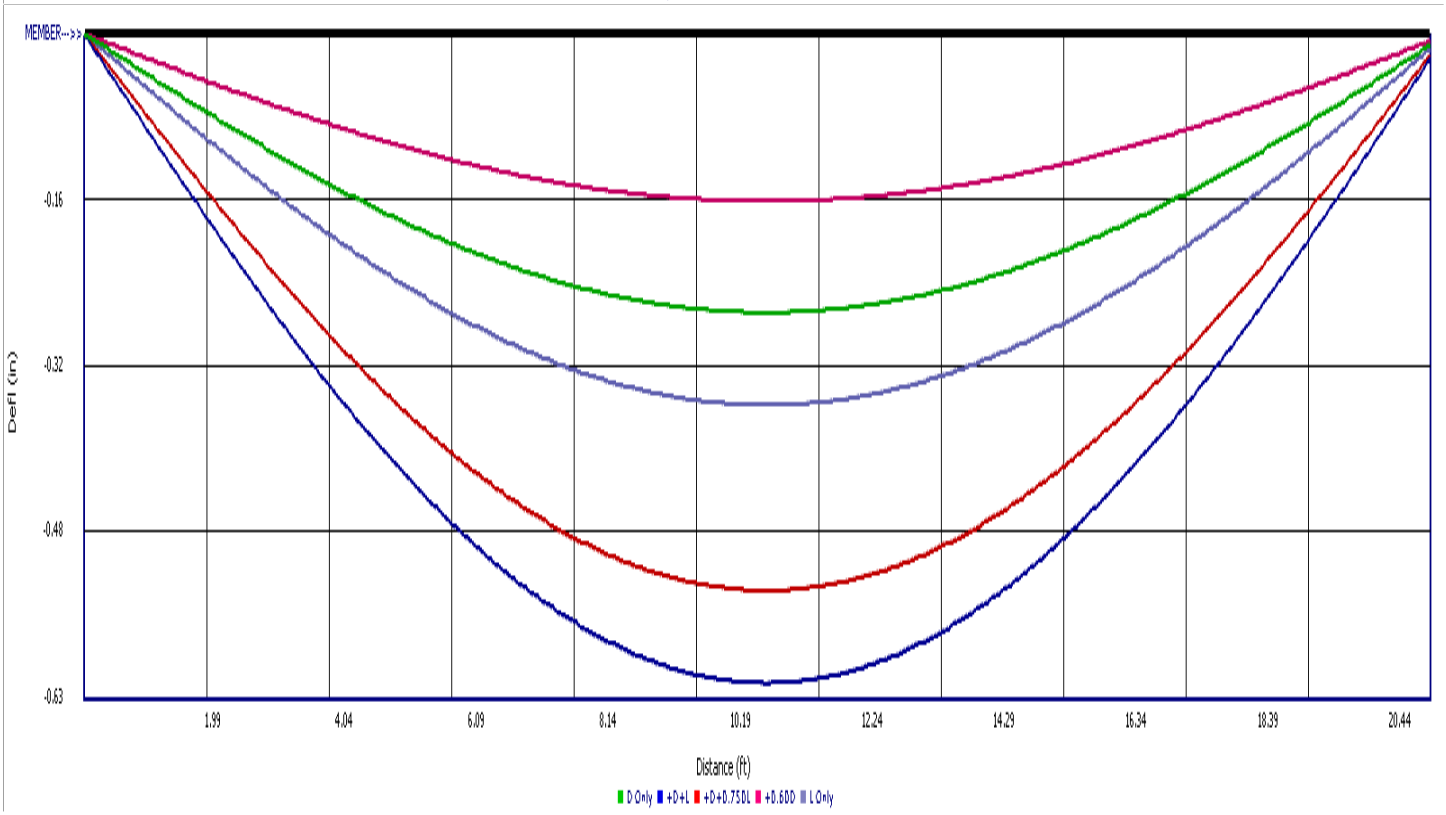
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: Living Rm Bm (1B3) DROPPED





Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

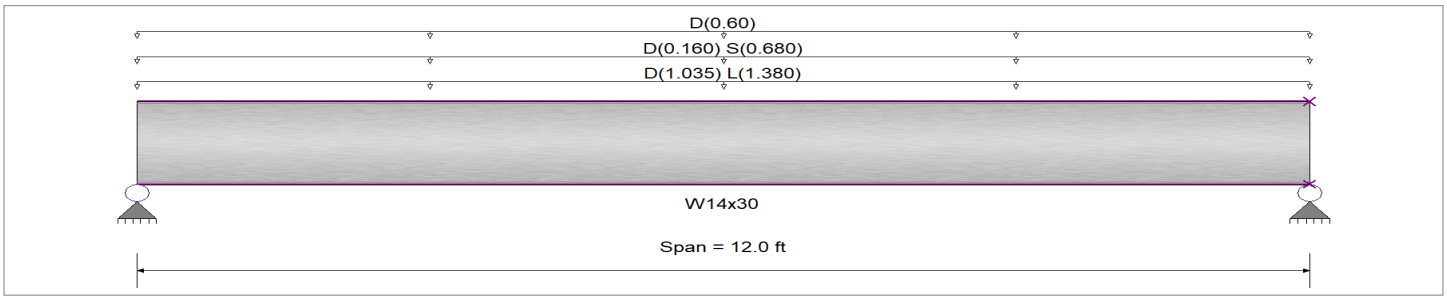
DESCRIPTION: 1B4

CODE REFERENCES

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

Material Properties

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



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.090, L = 0.120 ksf, Tributary Width = 11.50 ft, (FLOOR LOAD 3 FLOORS)

Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 8.0 ft, (ROOF)

Uniform Load : D = 0.60 k/ft, Tributary Width = 1.0 ft, (WALL 4-STORY)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.514** : 1	Maximum Shear Stress Ratio =	**0.271** : 1
Section used for this span	**W14x30**	Section used for this span	**W14x30**
Ma : Applied	60.660 k-ft	Va : Applied	20.220 k
Mn / Omega : Allowable	118.014 k-ft	Vn/Omega : Allowable	74.520 k
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
		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	0.077 in	Ratio =	1,878	>=360	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.187 in	Ratio =	769	>=240.	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega
D Only												
Dsgn. L = 12.00 ft	1	0.278	0.147	32.85		32.85	197.08	118.01	1.00	1.00	10.95	111.78	74.52
+D+L												
Dsgn. L = 12.00 ft	1	0.489	0.258	57.69		57.69	197.08	118.01	1.00	1.00	19.23	111.78	74.52
+D+S												
Dsgn. L = 12.00 ft	1	0.382	0.202	45.09		45.09	197.08	118.01	1.00	1.00	15.03	111.78	74.52
+D+0.750L												
Dsgn. L = 12.00 ft	1	0.436	0.230	51.48		51.48	197.08	118.01	1.00	1.00	17.16	111.78	74.52
+D+0.750L+0.750S												
Dsgn. L = 12.00 ft	1	0.514	0.271	60.66		60.66	197.08	118.01	1.00	1.00	20.22	111.78	74.52
+0.60D												
Dsgn. L = 12.00 ft	1	0.167	0.088	19.71		19.71	197.08	118.01	1.00	1.00	6.57	111.78	74.52

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.1872	6.034		0.0000	0.000

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B4

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.1014	6.034		0.0000	0.000
+D+L	1	0.1780	6.034		0.0000	0.000
+D+S	1	0.1391	6.034		0.0000	0.000
+D+0.750L	1	0.1588	6.034		0.0000	0.000
+D+0.750L+0.750S	1	0.1872	6.034		0.0000	0.000
+0.60D	1	0.0608	6.034		0.0000	0.000
L Only	1	0.0766	6.034		0.0000	0.000
S Only	1	0.0378	6.034		0.0000	0.000

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	20.220	20.220
Max Upward from Load Combinations	20.220	20.220
Max Upward from Load Cases	10.950	10.950
D Only	10.950	10.950
+D+L	19.230	19.230
+D+S	15.030	15.030
+D+0.750L	17.160	17.160
+D+0.750L+0.750S	20.220	20.220
+0.60D	6.570	6.570
L Only	8.280	8.280
S Only	4.080	4.080

Steel Section Properties : W14x30

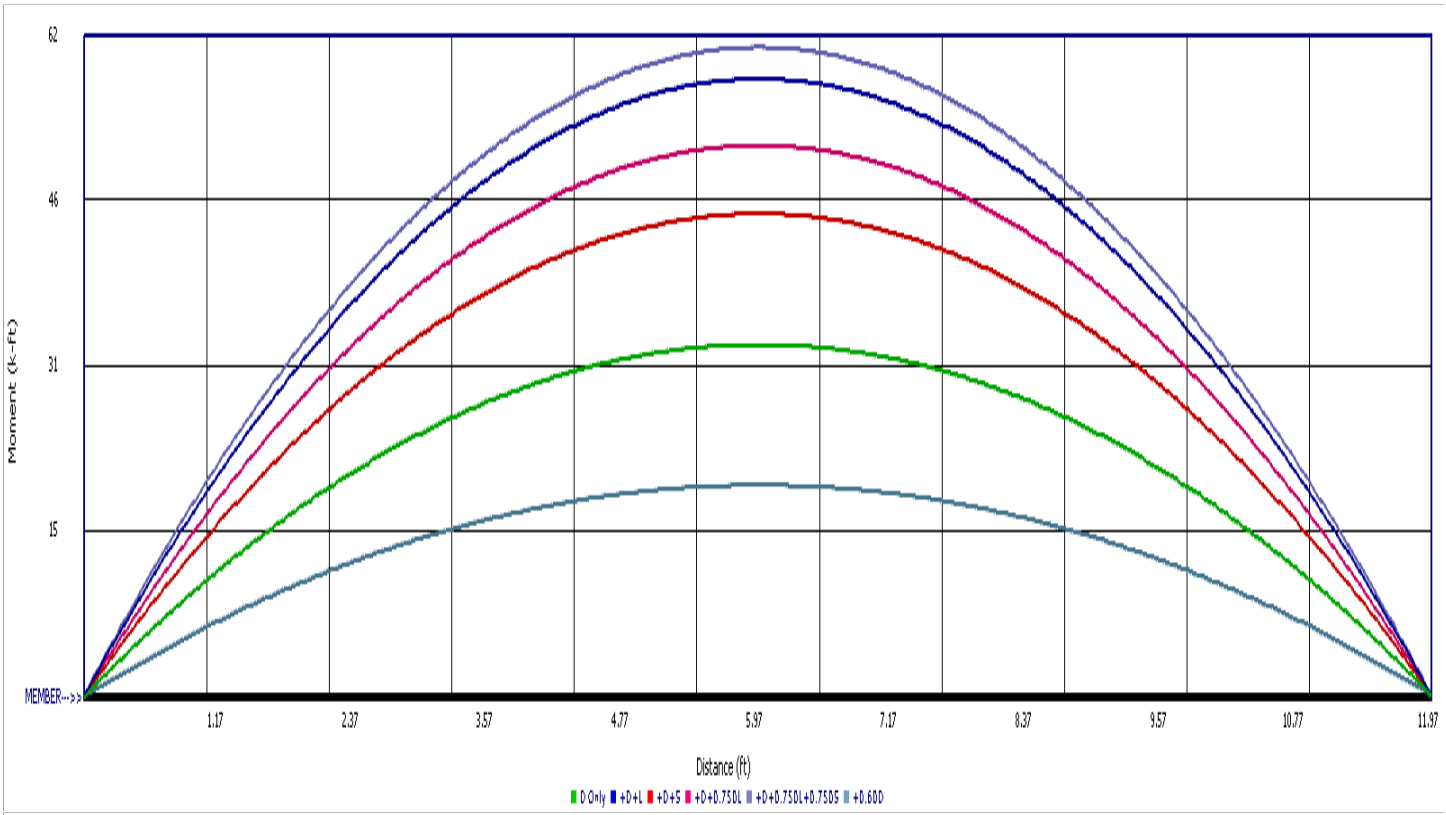
Depth	=	13.800	in	I xx	=	291.00	in^4	J	=	0.380 in^4
Web Thick	=	0.270	in	S xx		42.00	in^3	Cw	=	887.00 in^6
Flange Width	=	6.730	in	R xx	=	5.730	in			
Flange Thick	=	0.385	in	Zx	=	47.300	in^3			
Area	=	8.850	in^2	I yy	=	19.600	in^4			
Weight	=	30.000	plf	S yy	=	5.820	in^3	Wno	=	22.600 in^2
Kdesign	=	0.785	in	R yy	=	1.490	in	Sw	=	14.600 in^4
K1	=	0.750	in	Zy	=	8.990	in^3	Qf	=	8.340 in^3
rts	=	1.770	in					Qw	=	23.100 in^3
Ycg	=	6.900	in							

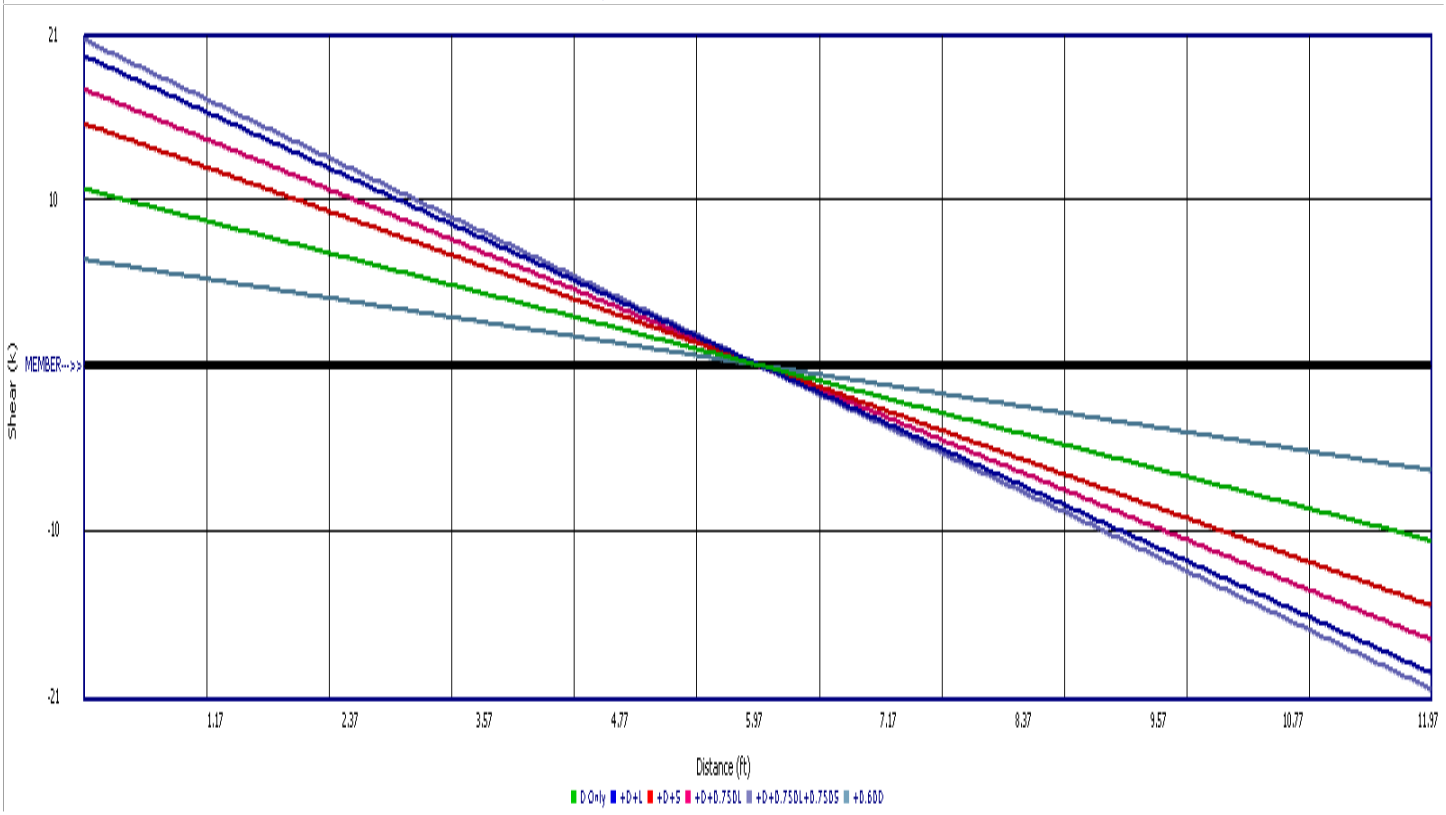
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B4



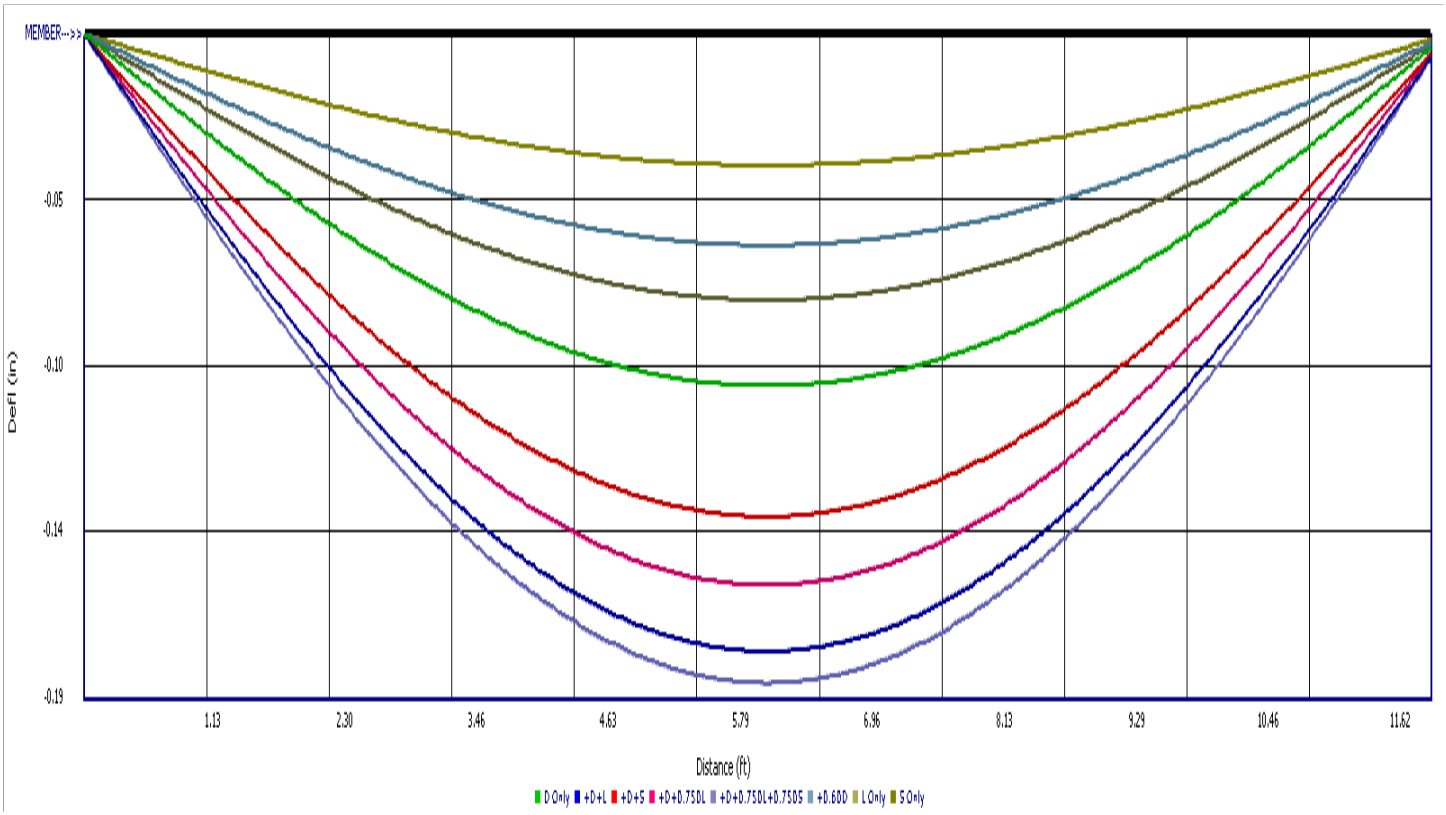


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B4



Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

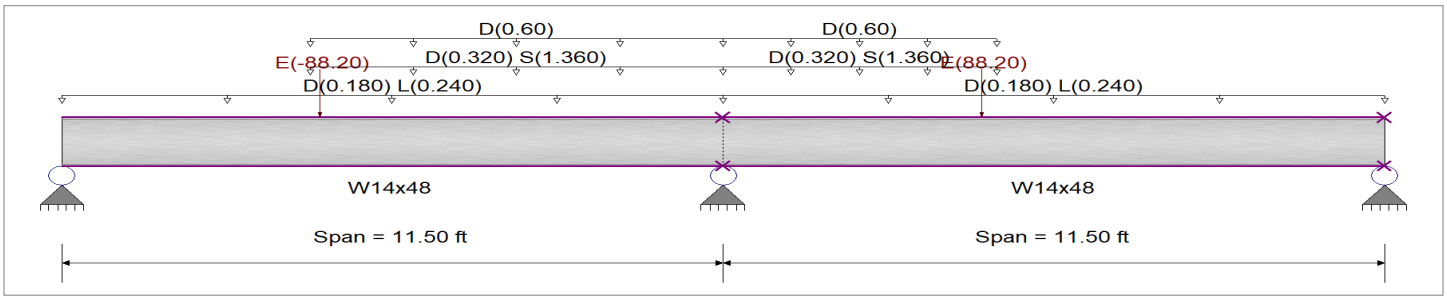
DESCRIPTION: 1B5

CODE REFERENCES

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

Material Properties

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



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.0 ft, (1ST FLOOR)

Uniform Load : D = 0.020, S = 0.0850 ksf, Extent = 4.330 -->> 11.50 ft, Tributary Width = 16.0 ft, (ROOF)

Uniform Load : D = 0.60 k/ft, Extent = 4.330 -->> 11.50 ft, Tributary Width = 1.0 ft, (WALL 4-STORY)

Point Load : E = -88.20 k @ 4.50 ft, (ATS HOLD DOWNS (3X OVERSTRENGTH))

Load for Span Number 2

Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 6.0 ft, (1ST FLOOR)

Uniform Load : D = 0.020, S = 0.0850 ksf, Extent = 0.0 -->> 4.750 ft, Tributary Width = 16.0 ft, (ROOF)

Uniform Load : D = 0.60 k/ft, Extent = 0.0 -->> 4.750 ft, Tributary Width = 1.0 ft, (WALL 4-STORY)

Point Load : E = 88.20 k @ 4.50 ft, (ATS HOLD DOWN (3X OVERSTREGTH))

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.858** : 1	Maximum Shear Stress Ratio =	**0.472** : 1
Section used for this span	**W14x48**	Section used for this span	**W14x48**
Ma : Applied	167.787 k-ft	Va : Applied	44.258 k
Mn / Omega : Allowable	195.609 k-ft	Vn/Omega : Allowable	93.840 k
Load Combination	+0.60D+0.70E+H	Load Combination	+D+0.70E+0.60H
		Location of maximum on span	11.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.311 in	Ratio =	443	>=360	Span: 2 : E Only
Max Upward Transient Deflection	-0.338 in	Ratio =	407	>=360	Span: 2 : E Only
Max Downward Total Deflection	0.221 in	Ratio =	625	>=240.	Span: 2 : +D+0.70E+0.60H
Max Upward Total Deflection	-0.230 in	Ratio =	600	>=240.	Span: 2 : +0.60D+0.70E+H

Maximum Forces & Stresses for Load Combinations

Load Combination			Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length		Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H														
Dsgn. L =	11.50 ft	1	0.065	0.074	8.40	-12.64	12.64	326.67	195.61	1.00	1.00	6.95	140.76	93.84

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B5

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 11.50 ft	2	0.065	0.063	2.72	-12.64	12.64	326.67	195.61	1.00	1.00	5.88	140.76	93.84
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 11.50 ft	1	0.075	0.079	7.47	-14.62	14.62	326.67	195.61	1.00	1.00	7.43	140.76	93.84
Dsgn. L = 11.50 ft	2	0.075	0.079	5.76	-14.62	14.62	326.67	195.61	1.00	1.00	7.43	140.76	93.84
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 11.50 ft	1	0.075	0.091	11.42	-14.62	14.62	326.67	195.61	1.00	1.00	8.50	140.76	93.84
Dsgn. L = 11.50 ft	2	0.075	0.064	1.95	-14.62	14.62	326.67	195.61	1.00	1.00	6.05	140.76	93.84
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 11.50 ft	1	0.085	0.092	10.50	-16.60	16.60	326.67	195.61	1.00	1.00	8.67	140.76	93.84
Dsgn. L = 11.50 ft	2	0.085	0.081	4.94	-16.60	16.60	326.67	195.61	1.00	1.00	7.60	140.76	93.84
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 11.50 ft	1	0.065	0.074	8.40	-12.64	12.64	326.67	195.61	1.00	1.00	6.95	140.76	93.84
Dsgn. L = 11.50 ft	2	0.065	0.063	2.72	-12.64	12.64	326.67	195.61	1.00	1.00	5.88	140.76	93.84
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 11.50 ft	1	0.065	0.074	8.40	-12.64	12.64	326.67	195.61	1.00	1.00	6.95	140.76	93.84
Dsgn. L = 11.50 ft	2	0.065	0.063	2.72	-12.64	12.64	326.67	195.61	1.00	1.00	5.88	140.76	93.84
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 11.50 ft	1	0.065	0.074	8.40	-12.64	12.64	326.67	195.61	1.00	1.00	6.95	140.76	93.84
Dsgn. L = 11.50 ft	2	0.065	0.063	2.72	-12.64	12.64	326.67	195.61	1.00	1.00	5.88	140.76	93.84
+D+S+H													
Dsgn. L = 11.50 ft	1	0.132	0.158	17.93	-25.75	25.75	326.67	195.61	1.00	1.00	14.80	140.76	93.84
Dsgn. L = 11.50 ft	2	0.132	0.129	3.76	-25.75	25.75	326.67	195.61	1.00	1.00	12.14	140.76	93.84
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 11.50 ft	1	0.072	0.075	7.70	-14.13	14.13	326.67	195.61	1.00	1.00	7.08	140.76	93.84
Dsgn. L = 11.50 ft	2	0.072	0.075	5.00	-14.13	14.13	326.67	195.61	1.00	1.00	7.04	140.76	93.84
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 11.50 ft	1	0.072	0.086	10.66	-14.13	14.13	326.67	195.61	1.00	1.00	8.11	140.76	93.84
Dsgn. L = 11.50 ft	2	0.072	0.064	2.13	-14.13	14.13	326.67	195.61	1.00	1.00	6.01	140.76	93.84
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 11.50 ft	1	0.080	0.088	9.97	-15.61	15.61	326.67	195.61	1.00	1.00	8.24	140.76	93.84
Dsgn. L = 11.50 ft	2	0.080	0.076	4.38	-15.61	15.61	326.67	195.61	1.00	1.00	7.17	140.76	93.84
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 11.50 ft	1	0.122	0.138	14.83	-23.96	23.96	326.67	195.61	1.00	1.00	12.97	140.76	93.84
Dsgn. L = 11.50 ft	2	0.122	0.125	5.75	-23.96	23.96	326.67	195.61	1.00	1.00	11.74	140.76	93.84
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 11.50 ft	1	0.122	0.149	17.80	-23.96	23.96	326.67	195.61	1.00	1.00	14.00	140.76	93.84
Dsgn. L = 11.50 ft	2	0.122	0.114	2.80	-23.96	23.96	326.67	195.61	1.00	1.00	10.71	140.76	93.84
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 11.50 ft	1	0.130	0.151	17.08	-25.45	25.45	326.67	195.61	1.00	1.00	14.13	140.76	93.84
Dsgn. L = 11.50 ft	2	0.130	0.126	5.08	-25.45	25.45	326.67	195.61	1.00	1.00	11.87	140.76	93.84
+D+0.60W+H													
Dsgn. L = 11.50 ft	1	0.065	0.074	8.40	-12.64	12.64	326.67	195.61	1.00	1.00	6.95	140.76	93.84
Dsgn. L = 11.50 ft	2	0.065	0.063	2.72	-12.64	12.64	326.67	195.61	1.00	1.00	5.88	140.76	93.84
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 11.50 ft	1	0.072	0.075	7.70	-14.13	14.13	326.67	195.61	1.00	1.00	7.08	140.76	93.84
Dsgn. L = 11.50 ft	2	0.072	0.075	5.00	-14.13	14.13	326.67	195.61	1.00	1.00	7.04	140.76	93.84
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 11.50 ft	1	0.072	0.086	10.66	-14.13	14.13	326.67	195.61	1.00	1.00	8.11	140.76	93.84
Dsgn. L = 11.50 ft	2	0.072	0.064	2.13	-14.13	14.13	326.67	195.61	1.00	1.00	6.01	140.76	93.84
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 11.50 ft	1	0.080	0.088	9.97	-15.61	15.61	326.67	195.61	1.00	1.00	8.24	140.76	93.84
Dsgn. L = 11.50 ft	2	0.080	0.076	4.38	-15.61	15.61	326.67	195.61	1.00	1.00	7.17	140.76	93.84
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 11.50 ft	1	0.122	0.138	14.83	-23.96	23.96	326.67	195.61	1.00	1.00	12.97	140.76	93.84
Dsgn. L = 11.50 ft	2	0.122	0.125	5.75	-23.96	23.96	326.67	195.61	1.00	1.00	11.74	140.76	93.84
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 11.50 ft	1	0.122	0.149	17.80	-23.96	23.96	326.67	195.61	1.00	1.00	14.00	140.76	93.84
Dsgn. L = 11.50 ft	2	0.122	0.114	2.80	-23.96	23.96	326.67	195.61	1.00	1.00	10.71	140.76	93.84
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 11.50 ft	1	0.130	0.151	17.08	-25.45	25.45	326.67	195.61	1.00	1.00	14.13	140.76	93.84
Dsgn. L = 11.50 ft	2	0.130	0.126	5.08	-25.45	25.45	326.67	195.61	1.00	1.00	11.87	140.76	93.84
+0.60D+0.60W+0.60H													
Dsgn. L = 11.50 ft	1	0.039	0.044	5.04	-7.58	7.58	326.67	195.61	1.00	1.00	4.17	140.76	93.84

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B5

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 11.50 ft	2	0.039	0.038	1.63	-7.58	7.58	326.67	195.61	1.00	1.00	3.53	140.76	93.84
+D+0.70E+0.60H													
Dsgn. L = 11.50 ft	1	0.842	0.472		-164.63	164.63	326.67	195.61	1.00	1.00	44.26	140.76	93.84
Dsgn. L = 11.50 ft	2	0.846	0.472	165.53	-21.83	165.53	326.67	195.61	1.00	1.00	44.26	140.76	93.84
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 11.50 ft	1	0.591	0.432		-115.67	115.67	326.67	195.61	1.00	1.00	40.53	140.76	93.84
Dsgn. L = 11.50 ft	2	0.652	0.432	127.61	-30.85	127.61	326.67	195.61	1.00	1.00	40.53	140.76	93.84
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 11.50 ft	1	0.577	0.421		-112.84	112.84	326.67	195.61	1.00	1.00	39.49	140.76	93.84
Dsgn. L = 11.50 ft	2	0.638	0.421	124.78	-30.85	124.78	326.67	195.61	1.00	1.00	39.49	140.76	93.84
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 11.50 ft	1	0.580	0.433		-113.42	113.42	326.67	195.61	1.00	1.00	40.66	140.76	93.84
Dsgn. L = 11.50 ft	2	0.648	0.433	126.71	-32.34	126.71	326.67	195.61	1.00	1.00	40.66	140.76	93.84
+0.60D+0.70E+H													
Dsgn. L = 11.50 ft	1	0.858	0.447		-167.79	167.79	326.67	195.61	1.00	1.00	41.91	140.76	93.84
Dsgn. L = 11.50 ft	2	0.842	0.447	164.65	-16.77	164.65	326.67	195.61	1.00	1.00	41.91	140.76	93.84

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	E Only	-0.3383	5.474
E Only	2	0.3115	5.428		0.0000	5.474

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
+D+H	1	0.0115	5.382	2	-0.0005	0.920
+D+L+H, LL Comb Run (*L)	1	0.0096	5.244	2	-0.0000	0.138
+D+L+H, LL Comb Run (L*)	1	0.0163	5.428	2	-0.0015	1.656
+D+L+H, LL Comb Run (LL)	1	0.0143	5.290	2	-0.0004	0.644
+D+Lr+H, LL Comb Run (*L)	1	0.0115	5.382	2	-0.0005	0.920
+D+Lr+H, LL Comb Run (L*)	1	0.0115	5.382	2	-0.0005	0.920
+D+Lr+H, LL Comb Run (LL)	1	0.0115	5.382	2	-0.0005	0.920
+D+S+H	1	0.0247	5.474	2	-0.0015	1.150
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	1	0.0100	5.290	2	-0.0001	0.276
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	1	0.0151	5.428	2	-0.0012	1.472
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	1	0.0136	5.336	2	-0.0004	0.690
+D+0.750L+0.750S+H, LL Comb Run (*L)	1	0.0199	5.428	2	-0.0005	0.690
+D+0.750L+0.750S+H, LL Comb Run (L*)	1	0.0250	5.474	2	-0.0020	1.472
+D+0.750L+0.750S+H, LL Comb Run (LL)	1	0.0235	5.428	2	-0.0010	0.966
+D+0.60W+H	1	0.0115	5.382	2	-0.0005	0.920
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	1	0.0100	5.290	2	-0.0001	0.276
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	1	0.0151	5.428	2	-0.0012	1.472
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	1	0.0136	5.336	2	-0.0004	0.690
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	1	0.0199	5.428	2	-0.0005	0.690
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	1	0.0250	5.474	2	-0.0020	1.472
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	1	0.0235	5.428	2	-0.0010	0.966
+0.60D+0.60W+0.60H	1	0.0069	5.382	2	-0.0003	0.920
+D+0.70E+0.60H	2	0.2208	5.474	1	-0.2253	5.474
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.1701	5.474	1	-0.1577	5.474
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.1650	5.474	1	-0.1527	5.428
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.1685	5.474	1	-0.1542	5.474
+0.60D+0.70E+H	2	0.2197	5.428	1	-0.2299	5.474
D Only	1	0.0115	5.382	2	-0.0005	0.920
L Only, LL Comb Run (*L)	2	0.0048	6.072	1	-0.0021	6.670
L Only, LL Comb Run (L*)	1	0.0048	5.474	2	-0.0021	4.876
L Only, LL Comb Run (LL)	1	0.0028	4.876		0.0000	0.000
S Only	1	0.0131	5.566	2	-0.0011	1.472
E Only	2	0.3115	5.428	1	-0.3383	5.474

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	4.599	37.268	33.371
Max Upward from Load Combinations	4.599	37.268	24.475
Max Upward from Load Cases	2.268	21.457	33.371

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B5

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Downward from all Load Conditions (Resis	-54.829		-0.172
Max Downward from Load Combinations (Resi	-37.019		
Max Downward from Load Cases (Resisting Up	-54.829		-0.172
+D+H	2.268	12.827	1.115
+D+L+H, LL Comb Run (*L)	2.096	14.552	2.322
+D+L+H, LL Comb Run (L*)	3.476	14.552	0.942
+D+L+H, LL Comb Run (LL)	3.303	16.277	2.150
+D+Lr+H, LL Comb Run (*L)	2.268	12.827	1.115
+D+Lr+H, LL Comb Run (L*)	2.268	12.827	1.115
+D+Lr+H, LL Comb Run (LL)	2.268	12.827	1.115
+D+S+H	4.168	26.945	1.309
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2.139	14.121	2.020
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	3.174	14.121	0.985
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	3.045	15.415	1.891
+D+0.750L+0.750S+H, LL Comb Run (*L)	3.564	24.709	2.166
+D+0.750L+0.750S+H, LL Comb Run (L*)	4.599	24.709	1.131
+D+0.750L+0.750S+H, LL Comb Run (LL)	4.470	26.003	2.036
+D+0.60W+H	2.268	12.827	1.115
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	2.139	14.121	2.020
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	3.174	14.121	0.985
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	3.045	15.415	1.891
+D+0.750L+0.750S+0.450W+H, LL Comb Run	3.564	24.709	2.166
+D+0.750L+0.750S+0.450W+H, LL Comb Run	4.599	24.709	1.131
+D+0.750L+0.750S+0.450W+H, LL Comb Run	4.470	26.003	2.036
+0.60D+0.60W+0.60H	1.361	7.696	0.669
+D+0.70E+0.60H	-36.112	27.848	24.475
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	-25.221	35.974	19.686
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	-24.186	35.974	18.651
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	-24.315	37.268	19.556
+0.60D+0.70E+H	-37.019	22.717	24.029
D Only	2.268	12.827	1.115
L Only, LL Comb Run (*L)	-0.172	1.725	1.208
L Only, LL Comb Run (L*)	1.208	1.725	-0.172
L Only, LL Comb Run (LL)	1.035	3.450	1.035
S Only	1.900	14.117	0.194
E Only	-54.829	21.457	33.371
H Only			

Steel Section Properties : W14x48

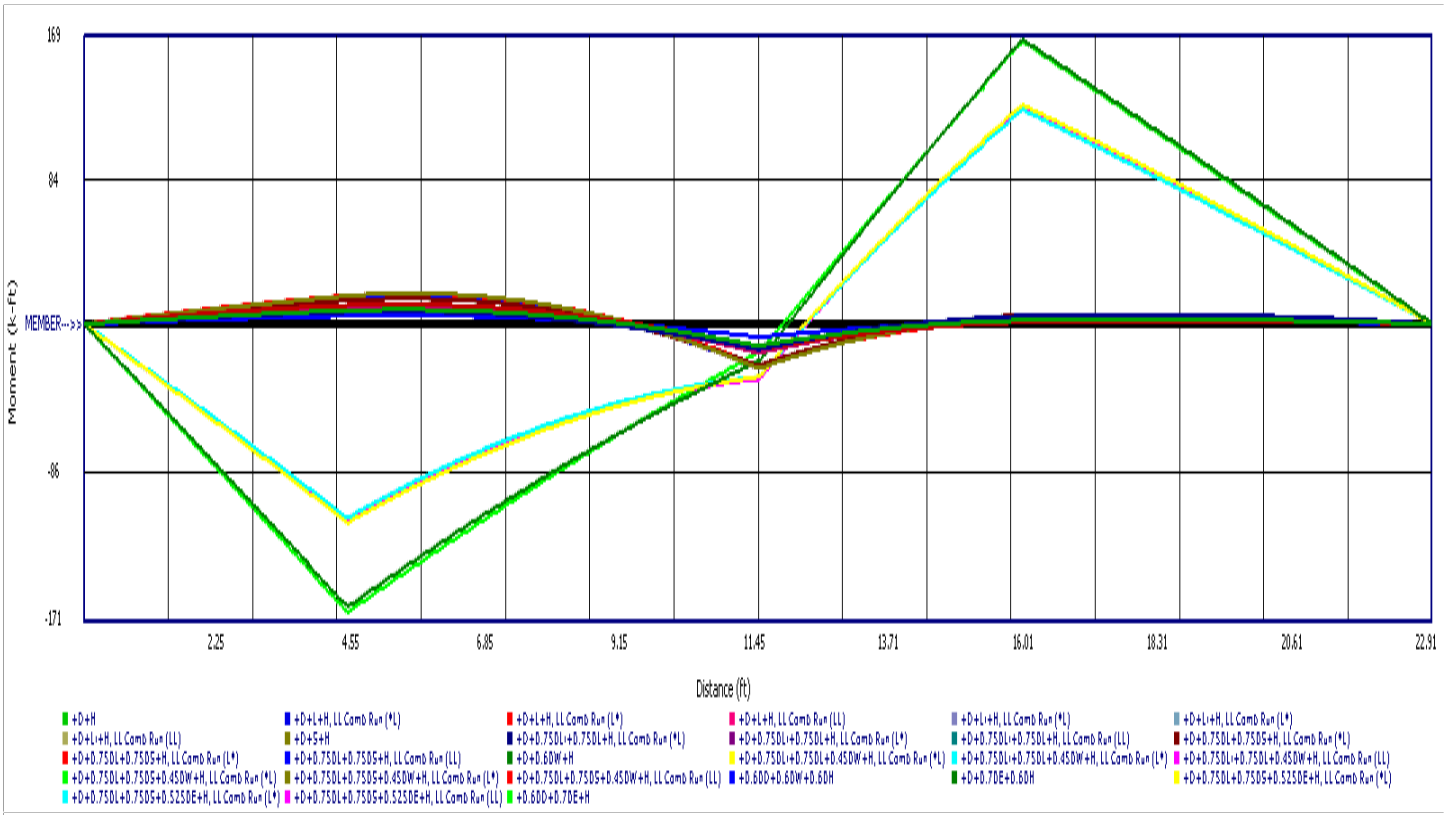
Depth	=	13.800	in	I xx	=	484.00	in^4	J	=	1.450	in^4
Web Thick	=	0.340	in	S xx		70.20	in^3	Cw	=	2,240.00	in^6
Flange Width	=	8.030	in	R xx	=	5.850	in				
Flange Thick	=	0.595	in	Zx	=	78.400	in^3				
Area	=	14.100	in^2	I yy	=	51.400	in^4				
Weight	=	48.000	plf	S yy	=	12.800	in^3	Wno	=	26.500	in^2
Kdesign	=	1.190	in	R yy	=	1.910	in	Sw	=	31.700	in^4
K1	=	1.000	in	Zy	=	19.600	in^3	Qf	=	15.100	in^3
rts	=	2.200	in					Qw	=	38.300	in^3
Ycg	=	6.900	in								

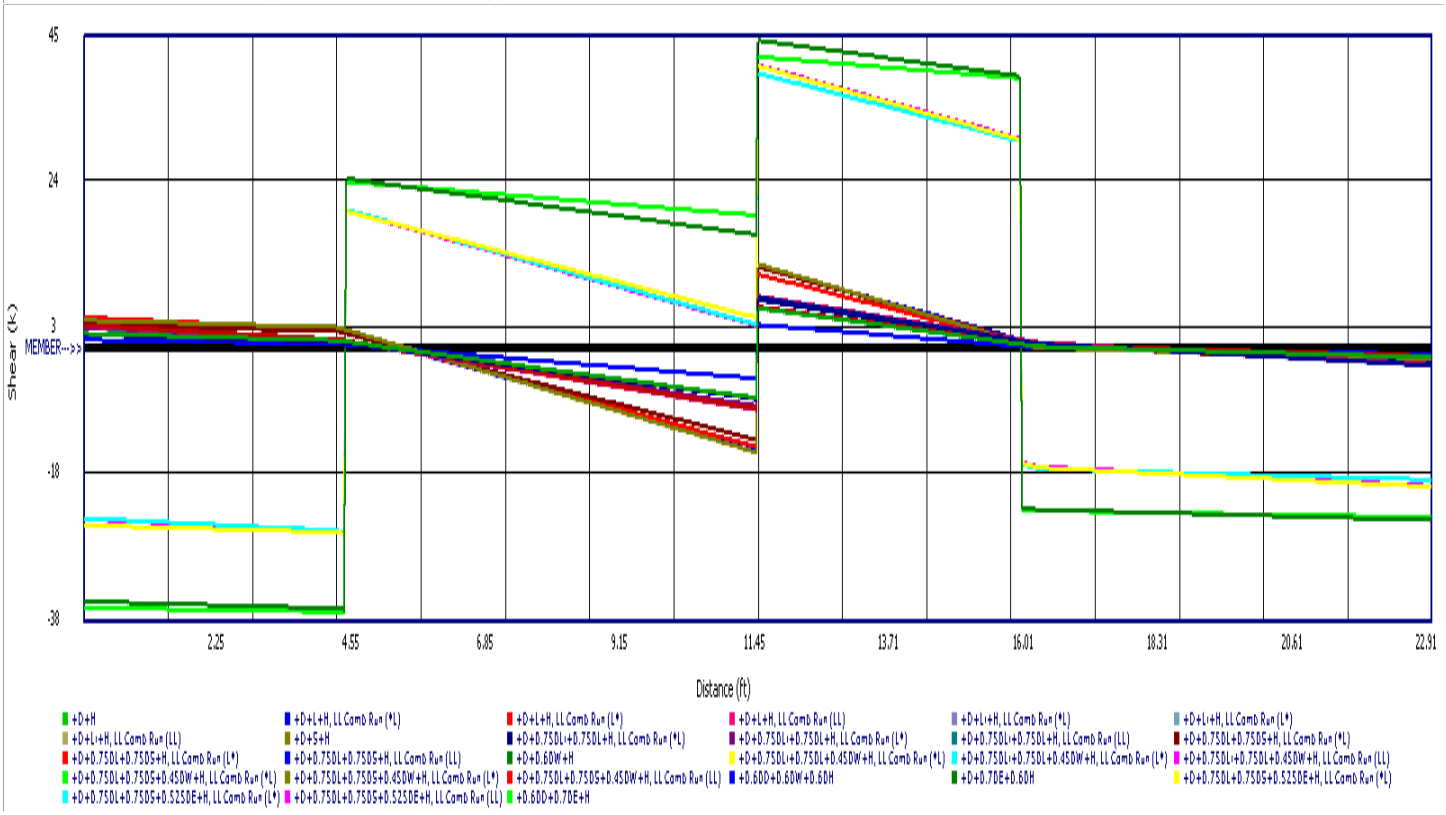
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B5



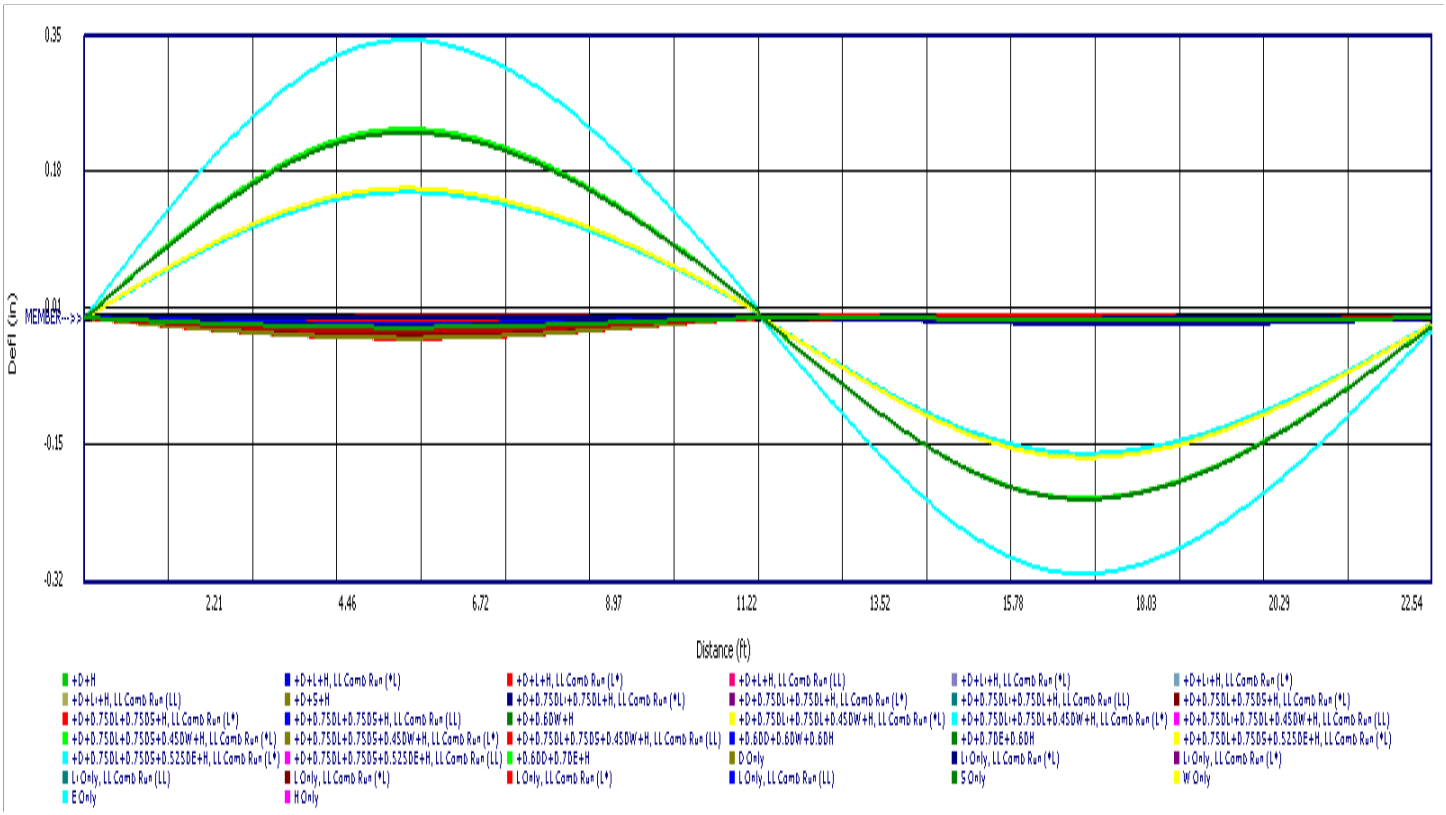


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B5



Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

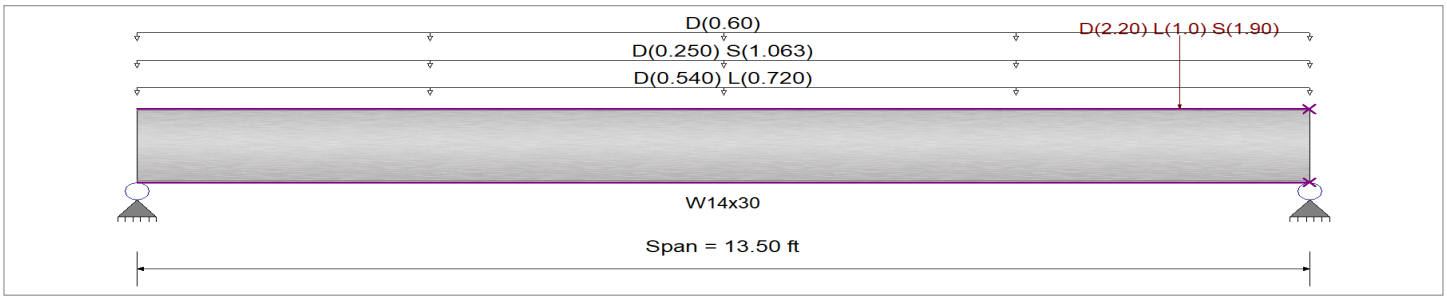
DESCRIPTION: 1B6

CODE REFERENCES

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

Material Properties

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



Applied Loads

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

Beam self weight calculated and added to loading

Uniform Load : D = 0.090, L = 0.120 ksf, Tributary Width = 6.0 ft, (3 FLOORS)

Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 12.50 ft, (ROOF)

Uniform Load : D = 0.60 k/ft, Tributary Width = 1.0 ft, (WALL 4-STORY)

Point Load : D = 2.20, L = 1.0, S = 1.90 k @ 12.0 ft, (1B5)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.560** : 1	Maximum Shear Stress Ratio =	**0.302** : 1
Section used for this span	**W14x30**	Section used for this span	**W14x30**
Ma : Applied	66.129 k-ft	Va : Applied	22.498 k
Mn / Omega : Allowable	118.014 k-ft	Vn/Omega : Allowable	74.520 k
Load Combination	+D+0.750L+0.750S	Load Combination	+D+0.750L+0.750S
		Location of maximum on span	13.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.101 in	Ratio =	1,602	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.260 in	Ratio =	622	>=240.	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values						Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega
D Only												
Dsgn. L = 13.50 ft	1	0.288	0.155	34.02		34.02	197.08	118.01	1.00	1.00	11.54	111.78	74.52
+D+L												
Dsgn. L = 13.50 ft	1	0.434	0.232	51.18		51.18	197.08	118.01	1.00	1.00	17.29	111.78	74.52
+D+S												
Dsgn. L = 13.50 ft	1	0.506	0.274	59.67		59.67	197.08	118.01	1.00	1.00	20.40	111.78	74.52
+D+0.750L												
Dsgn. L = 13.50 ft	1	0.397	0.213	46.89		46.89	197.08	118.01	1.00	1.00	15.85	111.78	74.52
+D+0.750L+0.750S												
Dsgn. L = 13.50 ft	1	0.560	0.302	66.13		66.13	197.08	118.01	1.00	1.00	22.50	111.78	74.52
+0.60D												
Dsgn. L = 13.50 ft	1	0.173	0.093	20.41		20.41	197.08	118.01	1.00	1.00	6.92	111.78	74.52

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B6

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.2604	6.827		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.1339	6.827		0.0000	0.000
+D+L	1	0.2014	6.827		0.0000	0.000
+D+S	1	0.2350	6.827		0.0000	0.000
+D+0.750L	1	0.1846	6.827		0.0000	0.000
+D+0.750L+0.750S	1	0.2604	6.827		0.0000	0.000
+0.60D	1	0.0804	6.827		0.0000	0.000
L Only	1	0.0675	6.827		0.0000	0.000
S Only	1	0.1011	6.827		0.0000	0.000

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	19.095	22.498
Max Upward from Load Combinations	19.095	22.498
Max Upward from Load Cases	9.829	11.541
D Only	9.829	11.541
+D+L	14.801	17.289
+D+S	17.212	20.401
+D+0.750L	13.558	15.852
+D+0.750L+0.750S	19.095	22.498
+0.60D	5.898	6.924
L Only	4.971	5.749
S Only	7.383	8.861

Steel Section Properties : W14x30

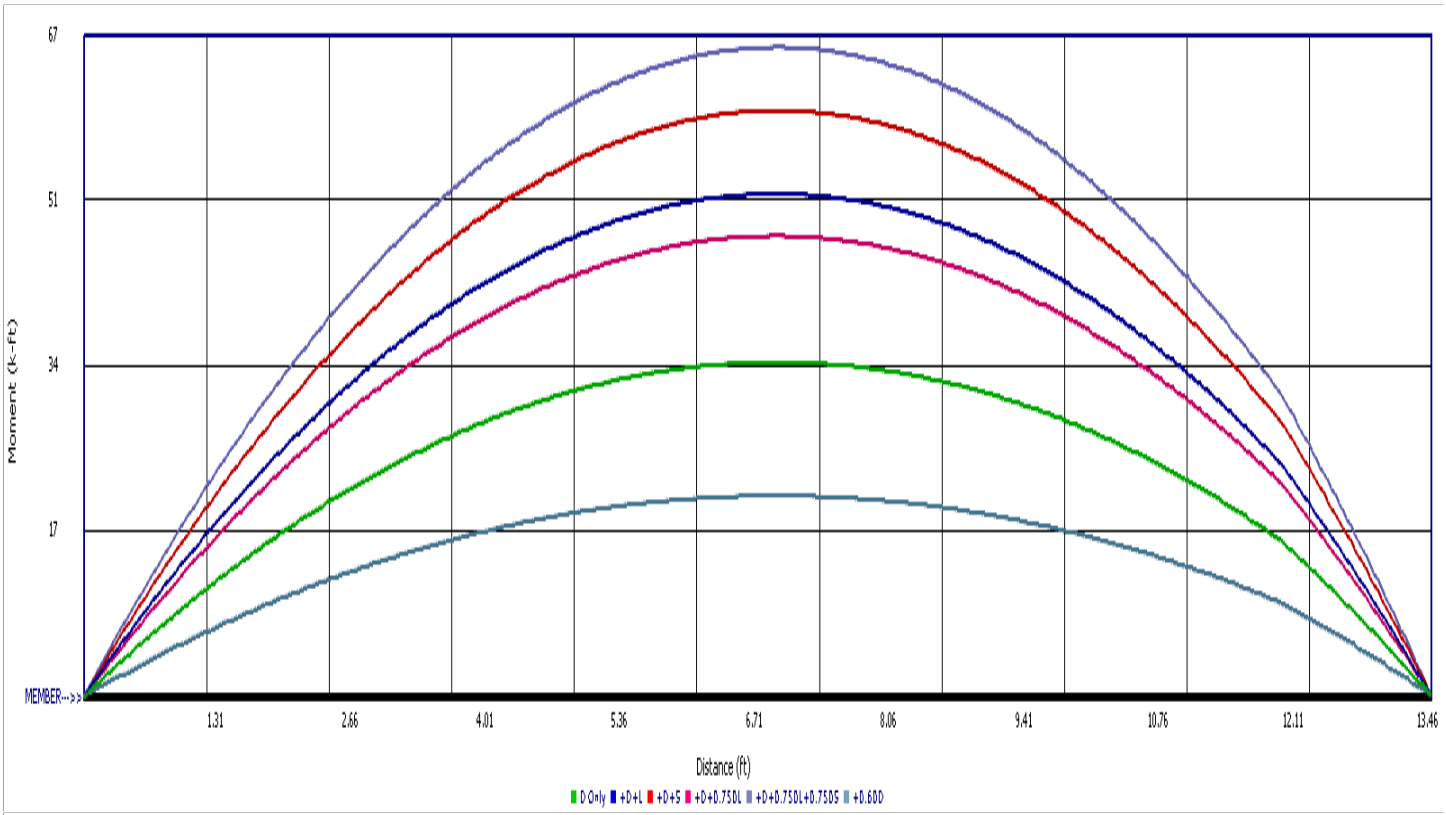
Depth	=	13.800	in	I xx	=	291.00	in^4	J	=	0.380	in^4
Web Thick	=	0.270	in	S xx		42.00	in^3	Cw	=	887.00	in^6
Flange Width	=	6.730	in	R xx	=	5.730	in				
Flange Thick	=	0.385	in	Zx	=	47.300	in^3				
Area	=	8.850	in^2	I yy	=	19.600	in^4				
Weight	=	30.000	plf	S yy	=	5.820	in^3	Wno	=	22.600	in^2
Kdesign	=	0.785	in	R yy	=	1.490	in	Sw	=	14.600	in^4
K1	=	0.750	in	Zy	=	8.990	in^3	Qf	=	8.340	in^3
rts	=	1.770	in					Qw	=	23.100	in^3
Ycg	=	6.900	in								

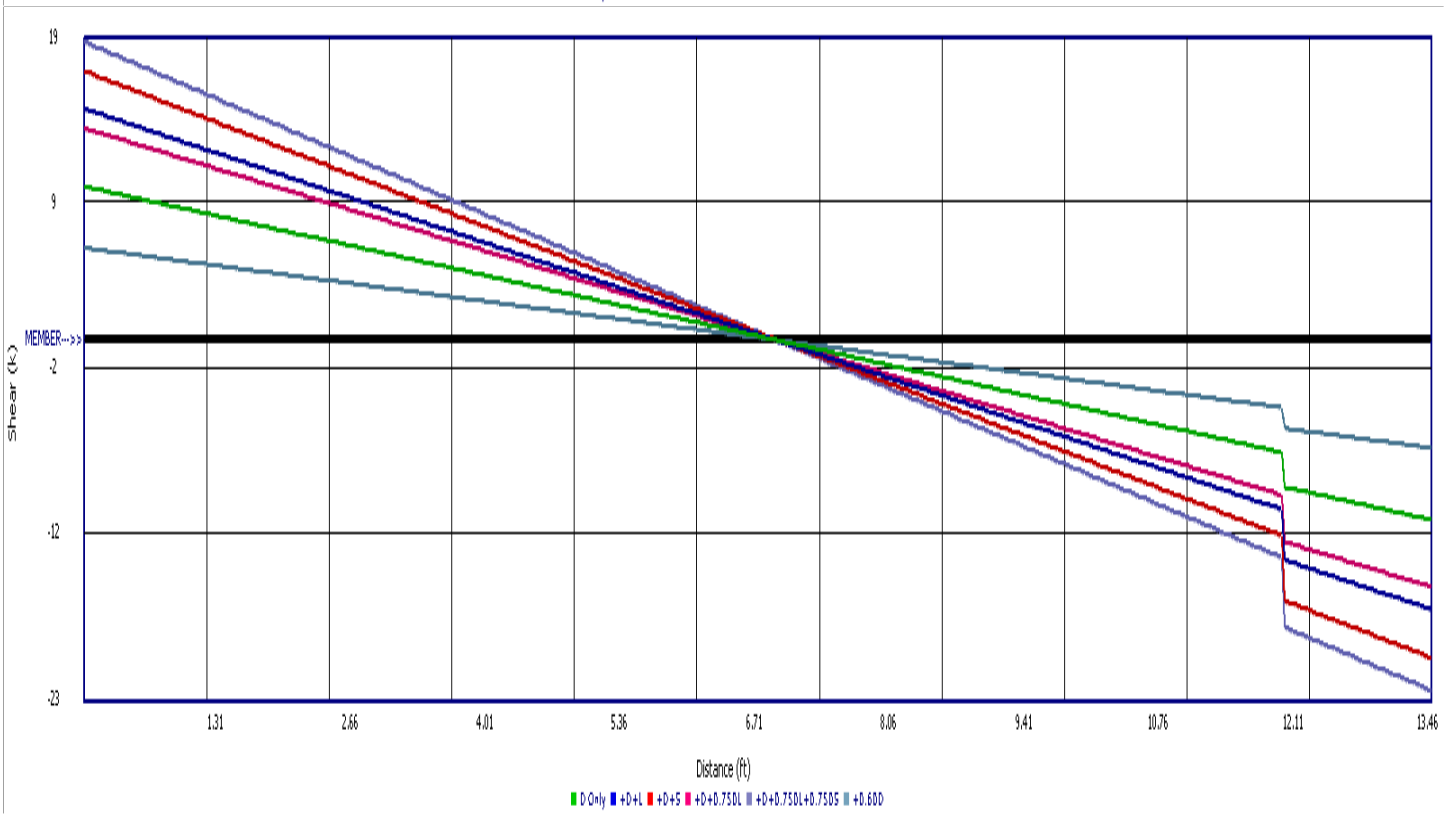
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B6



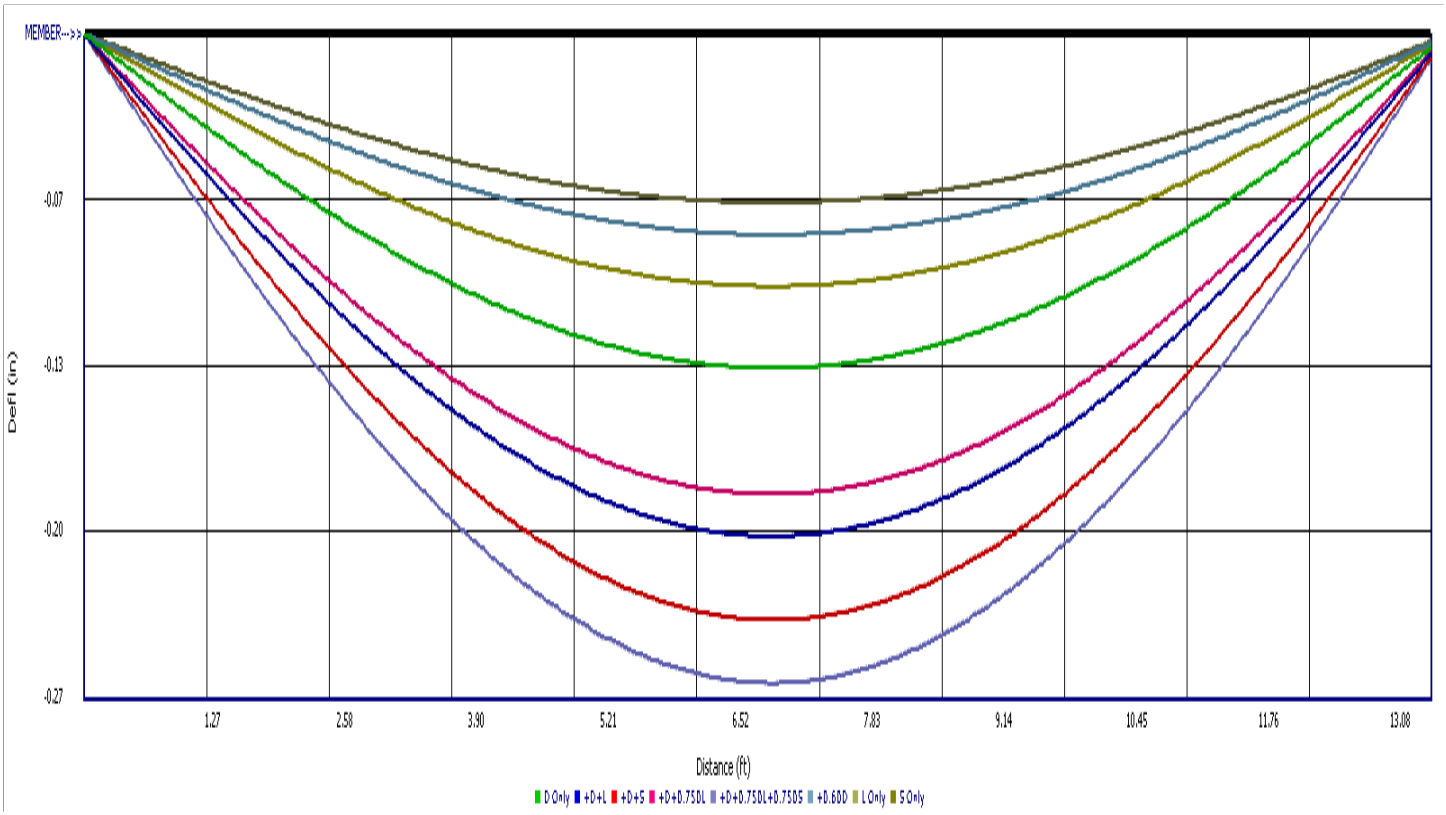


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B6



Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

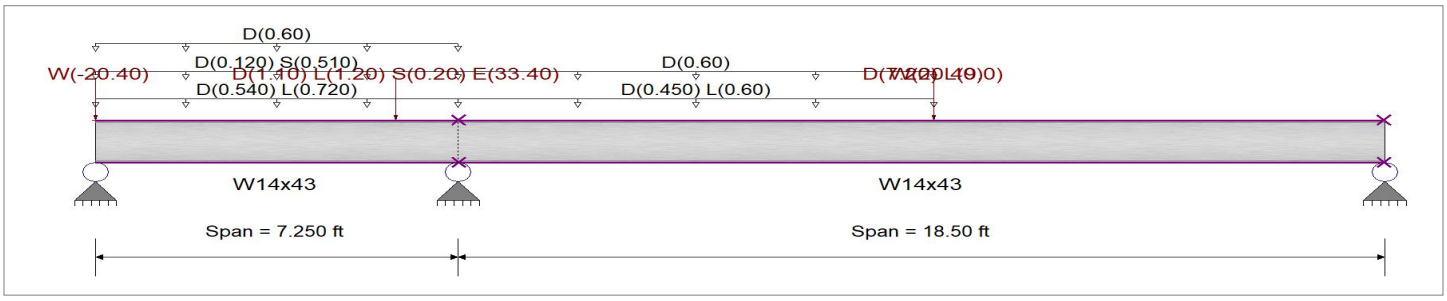
DESCRIPTION: 1B9

CODE REFERENCES

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

Material Properties

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



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1

Uniform Load : D = 0.090, L = 0.120 ksf, Tributary Width = 6.0 ft, (3 FLOORS)

Uniform Load : D = 0.020, S = 0.0850 ksf, Tributary Width = 6.0 ft, (ROOF)

Uniform Load : D = 0.60 k/ft, Tributary Width = 1.0 ft, (WALL 4-STORY)

Point Load : D = 1.10, L = 1.20, S = 0.20, E = 33.40 k @ 6.0 ft, (1B5)

Point Load : W = -20.40 k @ 0.0 ft, (ATS HOLD DOWN (WIND))

Load for Span Number 2

Uniform Load : D = 0.090, L = 0.120 ksf, Extent = 0.0 -->> 9.50 ft, Tributary Width = 5.0 ft, (3 FLOORS)

Uniform Load : D = 0.60 k/ft, Extent = 0.0 -->> 9.50 ft, Tributary Width = 1.0 ft, (WALL 4-STORY)

Point Load : D = 7.20, L = 9.0 k @ 9.50 ft, (1B5)

Point Load : W = 20.40 k @ 9.50 ft, (ATS HOLD DOWN (WIND))

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.567** : 1	Maximum Shear Stress Ratio =	**0.410** : 1
Section used for this span	**W14x43**	Section used for this span	**W14x43**
Ma : Applied	98.523 k-ft	Va : Applied	34.285 k
Mn / Omega : Allowable	173.653 k-ft	Vn/Omega : Allowable	83.570 k
Load Combination	+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (*L)	Load Combination	+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)
		Location of maximum on span	7.250 ft
Span # where maximum occurs	Span # 2	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.227 in	Ratio =	977	>=360	Span: 2 : W Only
Max Upward Transient Deflection	-0.024 in	Ratio =	3,662	>=360	Span: 2 : W Only
Max Downward Total Deflection	0.340 in	Ratio =	652	>=240.	Span: 2 : +D+0.750Lr+0.750L+0.450W+H, LL Comb Run
Max Upward Total Deflection	-0.035 in	Ratio =	2518	>=240.	Span: 2 : +D+0.750Lr+0.750L+0.450W+H, LL Comb Run

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B9

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 7.25 ft	1	0.234	0.162		-40.60	40.60	290.00	173.65	1.00	1.00	13.51	125.36	83.57
Dsgn. L = 18.50 ft	2	0.234	0.162	38.33	-40.60	40.60	290.00	173.65	1.00	1.00	13.51	125.36	83.57
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 7.25 ft	1	0.424	0.286		-73.55	73.55	290.00	173.65	1.00	1.00	23.91	125.36	83.57
Dsgn. L = 18.50 ft	2	0.443	0.286	76.93	-73.55	76.93	290.00	173.65	1.00	1.00	23.91	125.36	83.57
+D+L+H, LL Comb Run (L*)													
Dsgn. L = 7.25 ft	1	0.243	0.180	0.89	-42.25	42.25	290.00	173.65	1.00	1.00	15.06	125.36	83.57
Dsgn. L = 18.50 ft	2	0.243	0.163	37.52	-42.25	42.25	290.00	173.65	1.00	1.00	13.60	125.36	83.57
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 7.25 ft	1	0.433	0.287		-75.21	75.21	290.00	173.65	1.00	1.00	23.99	125.36	83.57
Dsgn. L = 18.50 ft	2	0.438	0.287	76.12	-75.21	76.12	290.00	173.65	1.00	1.00	23.99	125.36	83.57
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 7.25 ft	1	0.234	0.162		-40.60	40.60	290.00	173.65	1.00	1.00	13.51	125.36	83.57
Dsgn. L = 18.50 ft	2	0.234	0.162	38.33	-40.60	40.60	290.00	173.65	1.00	1.00	13.51	125.36	83.57
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 7.25 ft	1	0.234	0.162		-40.60	40.60	290.00	173.65	1.00	1.00	13.51	125.36	83.57
Dsgn. L = 18.50 ft	2	0.234	0.162	38.33	-40.60	40.60	290.00	173.65	1.00	1.00	13.51	125.36	83.57
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 7.25 ft	1	0.234	0.162		-40.60	40.60	290.00	173.65	1.00	1.00	13.51	125.36	83.57
Dsgn. L = 18.50 ft	2	0.234	0.162	38.33	-40.60	40.60	290.00	173.65	1.00	1.00	13.51	125.36	83.57
+D+S+H													
Dsgn. L = 7.25 ft	1	0.240	0.162	0.31	-41.59	41.59	290.00	173.65	1.00	1.00	13.56	125.36	83.57
Dsgn. L = 18.50 ft	2	0.240	0.162	37.84	-41.59	41.59	290.00	173.65	1.00	1.00	13.56	125.36	83.57
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 7.25 ft	1	0.376	0.255		-65.32	65.32	290.00	173.65	1.00	1.00	21.31	125.36	83.57
Dsgn. L = 18.50 ft	2	0.387	0.255	67.28	-65.32	67.28	290.00	173.65	1.00	1.00	21.31	125.36	83.57
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 7.25 ft	1	0.241	0.169	0.43	-41.84	41.84	290.00	173.65	1.00	1.00	14.11	125.36	83.57
Dsgn. L = 18.50 ft	2	0.241	0.162	37.72	-41.84	41.84	290.00	173.65	1.00	1.00	13.58	125.36	83.57
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 7.25 ft	1	0.383	0.256		-66.55	66.55	290.00	173.65	1.00	1.00	21.37	125.36	83.57
Dsgn. L = 18.50 ft	2	0.384	0.256	66.67	-66.55	66.67	290.00	173.65	1.00	1.00	21.37	125.36	83.57
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 7.25 ft	1	0.380	0.255		-66.06	66.06	290.00	173.65	1.00	1.00	21.35	125.36	83.57
Dsgn. L = 18.50 ft	2	0.385	0.255	66.91	-66.06	66.91	290.00	173.65	1.00	1.00	21.35	125.36	83.57
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 7.25 ft	1	0.245	0.188	1.48	-42.58	42.58	290.00	173.65	1.00	1.00	15.72	125.36	83.57
Dsgn. L = 18.50 ft	2	0.245	0.163	37.36	-42.58	42.58	290.00	173.65	1.00	1.00	13.62	125.36	83.57
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 7.25 ft	1	0.388	0.256		-67.30	67.30	290.00	173.65	1.00	1.00	21.41	125.36	83.57
Dsgn. L = 18.50 ft	2	0.388	0.256	66.31	-67.30	67.30	290.00	173.65	1.00	1.00	21.41	125.36	83.57
+D+0.60W+H													
Dsgn. L = 7.25 ft	1	0.408	0.252		-70.80	70.80	290.00	173.65	1.00	1.00	21.10	125.36	83.57
Dsgn. L = 18.50 ft	2	0.461	0.252	79.99	-70.80	79.99	290.00	173.65	1.00	1.00	21.10	125.36	83.57
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 7.25 ft	1	0.507	0.323		-87.97	87.97	290.00	173.65	1.00	1.00	27.00	125.36	83.57
Dsgn. L = 18.50 ft	2	0.567	0.323	98.52	-87.97	98.52	290.00	173.65	1.00	1.00	27.00	125.36	83.57
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 7.25 ft	1	0.371	0.231		-64.49	64.49	290.00	173.65	1.00	1.00	19.27	125.36	83.57
Dsgn. L = 18.50 ft	2	0.397	0.231	68.97	-64.49	68.97	290.00	173.65	1.00	1.00	19.27	125.36	83.57
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 7.25 ft	1	0.514	0.324		-89.21	89.21	290.00	173.65	1.00	1.00	27.06	125.36	83.57
Dsgn. L = 18.50 ft	2	0.564	0.324	97.92	-89.21	97.92	290.00	173.65	1.00	1.00	27.06	125.36	83.57
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 7.25 ft	1	0.511	0.324		-88.72	88.72	290.00	173.65	1.00	1.00	27.04	125.36	83.57
Dsgn. L = 18.50 ft	2	0.565	0.324	98.16	-88.72	98.16	290.00	173.65	1.00	1.00	27.04	125.36	83.57
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 7.25 ft	1	0.376	0.231		-65.24	65.24	290.00	173.65	1.00	1.00	19.31	125.36	83.57
Dsgn. L = 18.50 ft	2	0.395	0.231	68.60	-65.24	68.60	290.00	173.65	1.00	1.00	19.31	125.36	83.57
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 7.25 ft	1	0.518	0.324		-89.96	89.96	290.00	173.65	1.00	1.00	27.10	125.36	83.57
Dsgn. L = 18.50 ft	2	0.562	0.324	97.55	-89.96	97.55	290.00	173.65	1.00	1.00	27.10	125.36	83.57

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B9

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+0.60D+0.60W+0.60H													
Dsgn. L = 7.25 ft	1	0.314	0.188		-54.57	54.57	290.00	173.65	1.00	1.00	15.69	125.36	83.57
Dsgn. L = 18.50 ft	2	0.372	0.188	64.66	-54.57	64.66	290.00	173.65	1.00	1.00	15.69	125.36	83.57
+D+0.70E+0.60H													
Dsgn. L = 7.25 ft	1	0.270	0.376	2.37	-46.82	46.82	290.00	173.65	1.00	1.00	31.44	125.36	83.57
Dsgn. L = 18.50 ft	2	0.270	0.166	35.29	-46.82	46.82	290.00	173.65	1.00	1.00	13.85	125.36	83.57
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 7.25 ft	1	0.407	0.376		-70.73	70.73	290.00	173.65	1.00	1.00	31.41	125.36	83.57
Dsgn. L = 18.50 ft	2	0.407	0.258	64.64	-70.73	70.73	290.00	173.65	1.00	1.00	21.60	125.36	83.57
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 7.25 ft	1	0.272	0.369	5.49	-47.25	47.25	290.00	173.65	1.00	1.00	30.88	125.36	83.57
Dsgn. L = 18.50 ft	2	0.272	0.166	35.08	-47.25	47.25	290.00	173.65	1.00	1.00	13.87	125.36	83.57
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 7.25 ft	1	0.414	0.410	0.53	-71.97	71.97	290.00	173.65	1.00	1.00	34.29	125.36	83.57
Dsgn. L = 18.50 ft	2	0.414	0.259	64.03	-71.97	71.97	290.00	173.65	1.00	1.00	21.67	125.36	83.57
+0.60D+0.70E+H													
Dsgn. L = 7.25 ft	1	0.176	0.322	4.87	-30.58	30.58	290.00	173.65	1.00	1.00	26.95	125.36	83.57
Dsgn. L = 18.50 ft	2	0.176	0.101	19.96	-30.58	30.58	290.00	173.65	1.00	1.00	8.44	125.36	83.57

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+0.750Lr+0.750L+0.450W+H	-0.0345	4.321
+D+0.750Lr+0.750L+0.450W+H	2	0.3405	9.842		0.0000	4.321

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
+D+H	2	0.1375	9.694	1	-0.0123	4.524
+D+L+H, LL Comb Run (*L)	2	0.2720	9.768	1	-0.0278	4.350
+D+L+H, LL Comb Run (L*)	2	0.1326	9.768	1	-0.0091	4.814
+D+L+H, LL Comb Run (LL)	2	0.2671	9.768	1	-0.0244	4.437
+D+Lr+H, LL Comb Run (*L)	2	0.1375	9.694	1	-0.0123	4.524
+D+Lr+H, LL Comb Run (L*)	2	0.1375	9.694	1	-0.0123	4.524
+D+Lr+H, LL Comb Run (LL)	2	0.1375	9.694	1	-0.0123	4.524
+D+S+H	2	0.1346	9.768	1	-0.0103	4.698
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.2384	9.768	1	-0.0239	4.350
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	2	0.1338	9.768	1	-0.0099	4.727
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.2347	9.768	1	-0.0214	4.466
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.2361	9.768	1	-0.0223	4.437
+D+0.750L+0.750S+H, LL Comb Run (L*)	2	0.1316	9.768	1	-0.0084	4.930
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.2325	9.768	1	-0.0198	4.524
+D+0.60W+H	2	0.2737	9.842	1	-0.0265	4.350
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	2	0.3405	9.842	1	-0.0345	4.321
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	2	0.2360	9.842	1	-0.0204	4.466
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	2	0.3368	9.842	1	-0.0320	4.379
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	2	0.3383	9.842	1	-0.0330	4.350
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	2	0.2338	9.842	1	-0.0189	4.553
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	2	0.3346	9.842	1	-0.0305	4.408
+0.60D+0.60W+0.60H	2	0.2187	9.916	1	-0.0216	4.321
+D+0.70E+0.60H	2	0.1192	9.916	1	-0.0027	5.742
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.2224	9.842	1	-0.0147	4.582
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.1179	9.916	1	-0.0021	6.148
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.2188	9.842	1	-0.0124	4.785
+0.60D+0.70E+H	2	0.0642	10.064	1	-0.0001	7.018
D Only	2	0.1375	9.694	1	-0.0123	4.524
L Only, LL Comb Run (*L)	2	0.1345	9.768	1	-0.0156	4.205
L Only, LL Comb Run (L*)	1	0.0035	3.625	2	-0.0051	7.844
L Only, LL Comb Run (LL)	2	0.1296	9.842	1	-0.0122	4.379
S Only	1	0.0022	3.567	2	-0.0031	7.844
W Only	2	0.2271	9.990	1	-0.0238	4.205
E Only	1	0.0146	4.118	2	-0.0275	7.844

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B9

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	4.944	55.951	11.179
Max Upward from Load Combinations	4.944	55.951	11.179
Max Upward from Load Cases	4.532	29.348	7.754
Max Downward from all Load Conditions (Resis	-27.344		-0.481
Max Downward from Load Combinations (Resi	-17.093		
Max Downward from Load Cases (Resisting Up	-27.344		-0.481
+D+H	-0.687	24.742	4.462
+D+L+H, LL Comb Run (*L)	-5.232	39.684	8.765
+D+L+H, LL Comb Run (L*)	1.902	28.662	4.372
+D+L+H, LL Comb Run (LL)	-2.643	43.604	8.676
+D+Lr+H, LL Comb Run (*L)	-0.687	24.742	4.462
+D+Lr+H, LL Comb Run (L*)	-0.687	24.742	4.462
+D+Lr+H, LL Comb Run (LL)	-0.687	24.742	4.462
+D+S+H	1.059	26.948	4.408
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	-4.096	35.949	7.690
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	1.255	27.682	4.395
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	-2.154	38.889	7.623
+D+0.750L+0.750S+H, LL Comb Run (*L)	-2.787	37.603	7.649
+D+0.750L+0.750S+H, LL Comb Run (L*)	2.564	29.337	4.354
+D+0.750L+0.750S+H, LL Comb Run (LL)	-0.845	40.543	7.582
+D+0.60W+H	-17.093	36.496	9.114
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	-16.401	44.764	11.179
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	-11.050	36.498	7.884
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	-14.459	47.704	11.112
+D+0.750L+0.750S+0.450W+H, LL Comb Run	-15.091	46.418	11.139
+D+0.750L+0.750S+0.450W+H, LL Comb Run	-9.740	38.152	7.844
+D+0.750L+0.750S+0.450W+H, LL Comb Run	-13.150	49.358	11.072
+0.60D+0.60W+0.60H	-16.818	26.599	7.330
+D+0.70E+0.60H	2.486	45.286	4.125
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	-0.407	53.011	7.397
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	4.944	44.744	4.102
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	1.535	55.951	7.330
+0.60D+0.70E+H	2.761	35.389	2.341
D Only	-0.687	24.742	4.462
L Only, LL Comb Run (*L)	-4.546	14.942	4.304
L Only, LL Comb Run (L*)	2.589	3.920	-0.089
L Only, LL Comb Run (LL)	-1.957	18.862	4.214
S Only	1.746	2.206	-0.054
W Only	-27.344	19.590	7.754
E Only	4.532	29.348	-0.481
H Only			

Steel Section Properties : W14x43

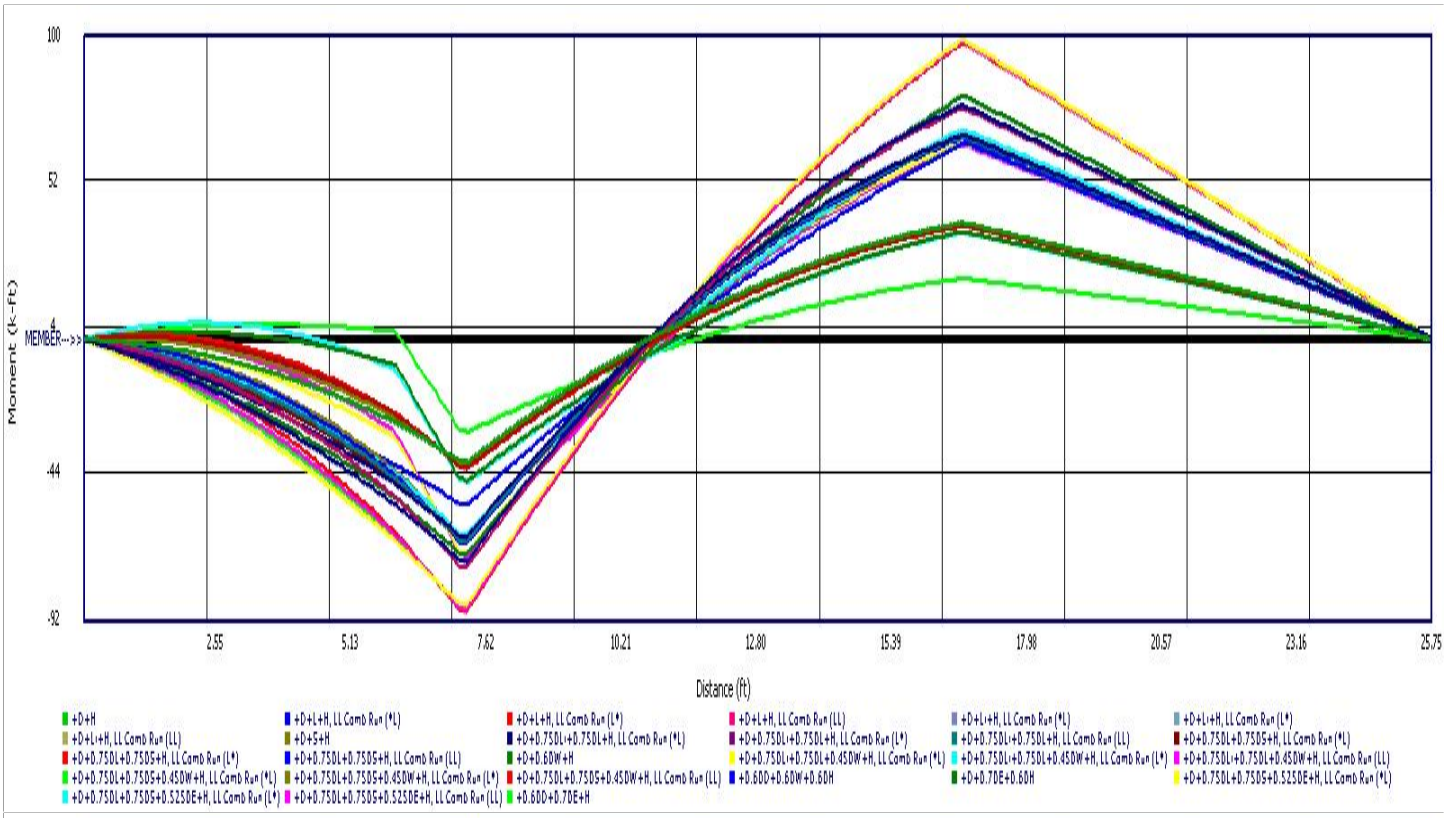
Depth	=	13.700	in	I xx	=	428.00	in^4	J	=	1.050	in^4
Web Thick	=	0.305	in	S xx		62.60	in^3	Cw	=	1,950.00	in^6
Flange Width	=	8.000	in	R xx	=	5.820	in				
Flange Thick	=	0.530	in	Zx	=	69.600	in^3				
Area	=	12.600	in^2	I yy	=	45.200	in^4				
Weight	=	43.000	plf	S yy	=	11.300	in^3	Wno	=	26.300	in^2
Kdesign	=	1.120	in	R yy	=	1.890	in	Sw	=	27.900	in^4
K1	=	1.000	in	Zy	=	17.300	in^3	Qf	=	13.400	in^3
rts	=	2.180	in					Qw	=	34.000	in^3
Ycg	=	6.850	in								

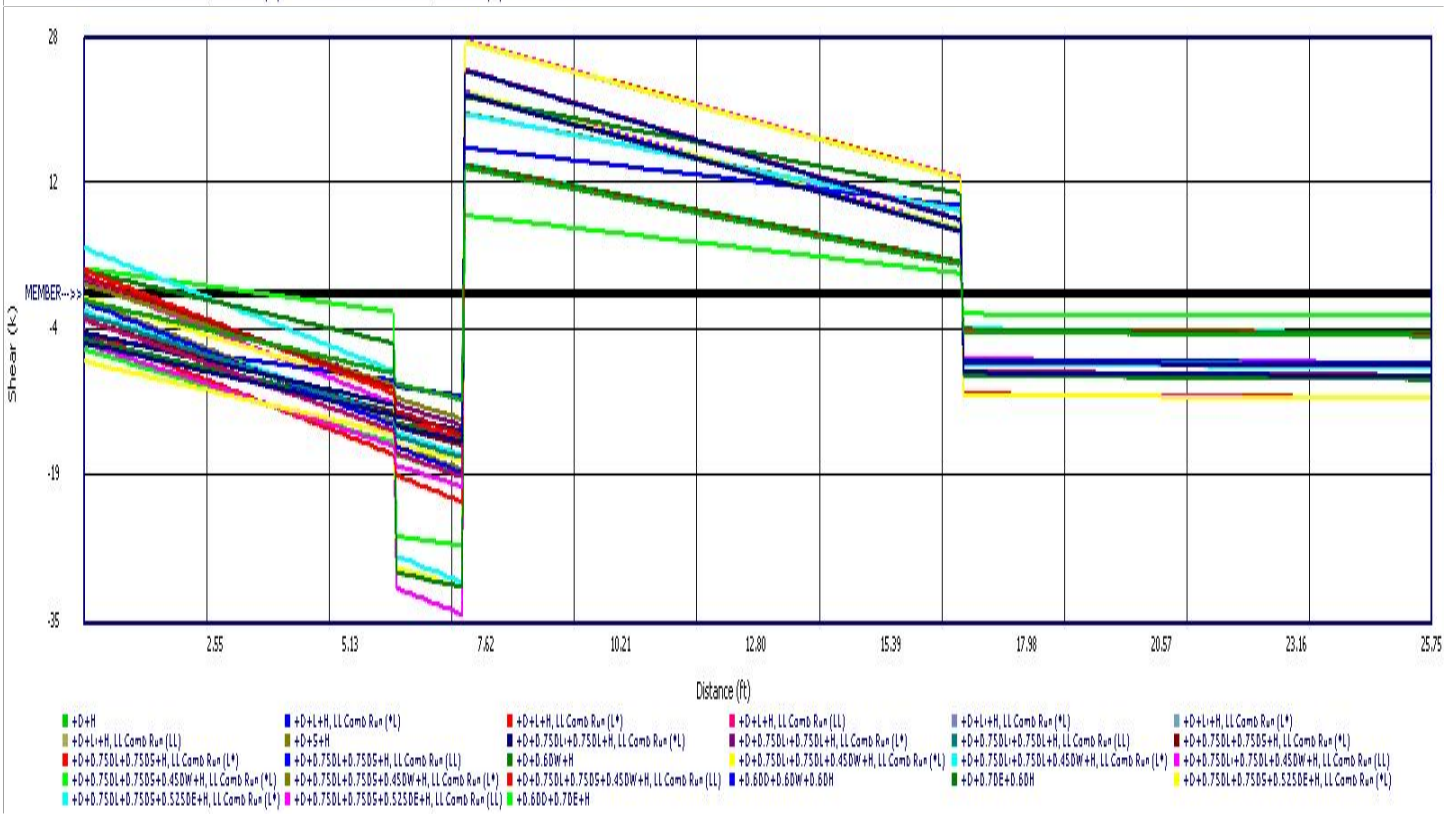
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B9



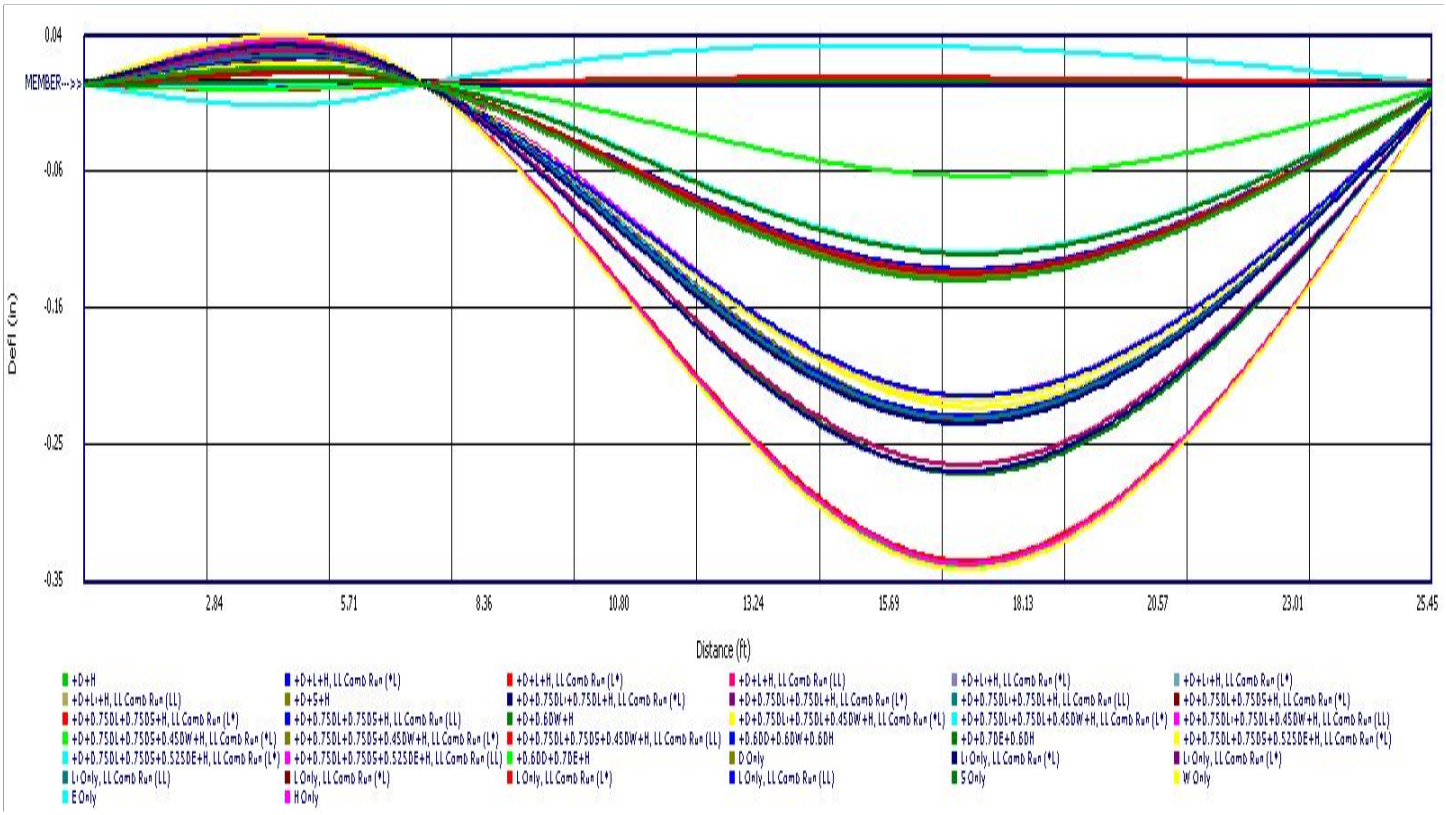


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B9



Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

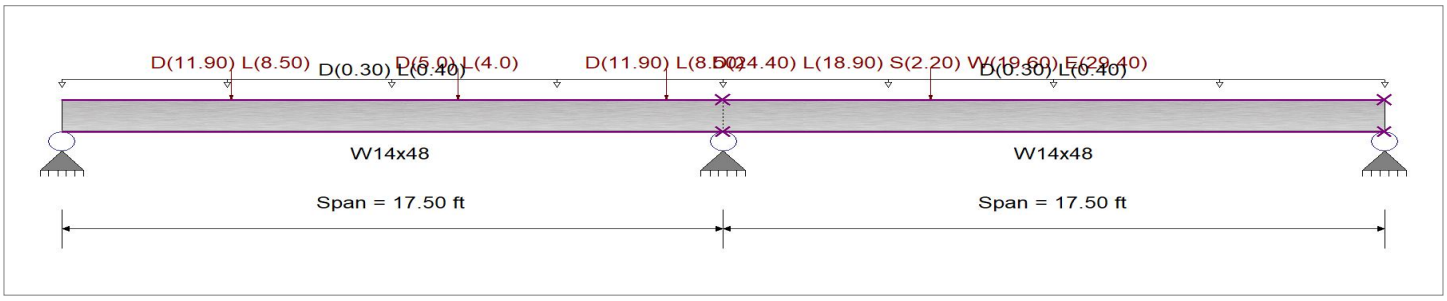
DESCRIPTION: 1B10

CODE REFERENCES

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

Material Properties

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



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 10.0 ft, (1ST FLOOR)

Point Load : D = 11.90, L = 8.50 k @ 4.50 ft, (1B7)

Point Load : D = 5.0, L = 4.0 k @ 10.50 ft, (1B8)

Point Load : D = 11.90, L = 8.50 k @ 16.0 ft, (1B7)

Load for Span Number 2
Uniform Load : D = 0.030, L = 0.040 ksf, Tributary Width = 10.0 ft, (1ST FLOOR)

Point Load : D = 24.40, L = 18.90, S = 2.20, W = 19.60, E = 29.40 k @ 5.50 ft, (1B9)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.807** : 1	Maximum Shear Stress Ratio =	**0.563** : 1
Section used for this span	**W14x48**	Section used for this span	**W14x48**
Ma : Applied	157.906 k-ft	Va : Applied	52.860 k
Mn / Omega : Allowable	195.609 k-ft	Vn/Omega : Allowable	93.840 k
Load Combination	+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)	Load Combination	+D+0.750L+0.750S+0.5250E+H, LL Comb Run (LL)
		Location of maximum on span	17.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.223 in	Ratio =	940	>=360	Span: 2 : E Only
Max Upward Transient Deflection	-0.114 in	Ratio =	1,848	>=360	Span: 2 : E Only
Max Downward Total Deflection	0.405 in	Ratio =	518	>=240.	Span: 2 : +D+0.750L+0.750S+0.5250E+H, LL Comb Run
Max Upward Total Deflection	-0.086 in	Ratio =	2430	>=240.	Span: 2 : +D+0.750L+0.750S+0.5250E+H, LL Comb Run

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+H													
Dsgn. L = 17.50 ft	1	0.413	0.262	42.61	-80.82	80.82	326.67	195.61	1.00	1.00	24.60	140.76	93.84
Dsgn. L = 17.50 ft	2	0.413	0.260	48.03	-80.82	80.82	326.67	195.61	1.00	1.00	24.39	140.76	93.84
+D+L+H, LL Comb Run (*L)													
Dsgn. L = 17.50 ft	1	0.606	0.458	32.94	-118.51	118.51	326.67	195.61	1.00	1.00	43.01	140.76	93.84
Dsgn. L = 17.50 ft	2	0.606	0.458	106.59	-118.51	118.51	326.67	195.61	1.00	1.00	43.01	140.76	93.84
+D+L+H, LL Comb Run (L*)													

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B10

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 17.50 ft	1	0.561	0.449	85.78	-109.70	109.70	326.67	195.61	1.00	1.00	42.11	140.76	93.84
Dsgn. L = 17.50 ft	2	0.561	0.278	28.28	-109.70	109.70	326.67	195.61	1.00	1.00	26.05	140.76	93.84
+D+L+H, LL Comb Run (LL)													
Dsgn. L = 17.50 ft	1	0.754	0.476	75.98	-147.40	147.40	326.67	195.61	1.00	1.00	44.66	140.76	93.84
Dsgn. L = 17.50 ft	2	0.754	0.476	86.83	-147.40	147.40	326.67	195.61	1.00	1.00	44.66	140.76	93.84
+D+Lr+H, LL Comb Run (*L)													
Dsgn. L = 17.50 ft	1	0.413	0.262	42.61	-80.82	80.82	326.67	195.61	1.00	1.00	24.60	140.76	93.84
Dsgn. L = 17.50 ft	2	0.413	0.260	48.03	-80.82	80.82	326.67	195.61	1.00	1.00	24.39	140.76	93.84
+D+Lr+H, LL Comb Run (L*)													
Dsgn. L = 17.50 ft	1	0.413	0.262	42.61	-80.82	80.82	326.67	195.61	1.00	1.00	24.60	140.76	93.84
Dsgn. L = 17.50 ft	2	0.413	0.260	48.03	-80.82	80.82	326.67	195.61	1.00	1.00	24.39	140.76	93.84
+D+Lr+H, LL Comb Run (LL)													
Dsgn. L = 17.50 ft	1	0.413	0.262	42.61	-80.82	80.82	326.67	195.61	1.00	1.00	24.60	140.76	93.84
Dsgn. L = 17.50 ft	2	0.413	0.260	48.03	-80.82	80.82	326.67	195.61	1.00	1.00	24.39	140.76	93.84
+D+S+H													
Dsgn. L = 17.50 ft	1	0.431	0.278	41.70	-84.31	84.31	326.67	195.61	1.00	1.00	26.10	140.76	93.84
Dsgn. L = 17.50 ft	2	0.431	0.278	53.92	-84.31	84.31	326.67	195.61	1.00	1.00	26.10	140.76	93.84
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 17.50 ft	1	0.558	0.409	35.36	-109.09	109.09	326.67	195.61	1.00	1.00	38.35	140.76	93.84
Dsgn. L = 17.50 ft	2	0.558	0.409	91.95	-109.09	109.09	326.67	195.61	1.00	1.00	38.35	140.76	93.84
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 17.50 ft	1	0.524	0.402	74.99	-102.48	102.48	326.67	195.61	1.00	1.00	37.73	140.76	93.84
Dsgn. L = 17.50 ft	2	0.524	0.273	33.21	-102.48	102.48	326.67	195.61	1.00	1.00	25.63	140.76	93.84
+D+0.750Lr+0.750L+H, LL Comb													
Dsgn. L = 17.50 ft	1	0.668	0.422	67.64	-130.75	130.75	326.67	195.61	1.00	1.00	39.59	140.76	93.84
Dsgn. L = 17.50 ft	2	0.668	0.422	77.13	-130.75	130.75	326.67	195.61	1.00	1.00	39.59	140.76	93.84
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 17.50 ft	1	0.571	0.422	34.68	-111.71	111.71	326.67	195.61	1.00	1.00	39.64	140.76	93.84
Dsgn. L = 17.50 ft	2	0.571	0.422	96.36	-111.71	111.71	326.67	195.61	1.00	1.00	39.64	140.76	93.84
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 17.50 ft	1	0.537	0.404	74.31	-105.10	105.10	326.67	195.61	1.00	1.00	37.88	140.76	93.84
Dsgn. L = 17.50 ft	2	0.537	0.287	37.63	-105.10	105.10	326.67	195.61	1.00	1.00	26.91	140.76	93.84
+D+0.750L+0.750S+H, LL Comb													
Dsgn. L = 17.50 ft	1	0.682	0.436	66.96	-133.37	133.37	326.67	195.61	1.00	1.00	40.87	140.76	93.84
Dsgn. L = 17.50 ft	2	0.682	0.436	81.55	-133.37	133.37	326.67	195.61	1.00	1.00	40.87	140.76	93.84
+D+0.60W+H													
Dsgn. L = 17.50 ft	1	0.509	0.357	37.81	-99.51	99.51	326.67	195.61	1.00	1.00	33.53	140.76	93.84
Dsgn. L = 17.50 ft	2	0.509	0.357	79.49	-99.51	99.51	326.67	195.61	1.00	1.00	33.53	140.76	93.84
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 17.50 ft	1	0.629	0.482	31.77	-123.11	123.11	326.67	195.61	1.00	1.00	45.20	140.76	93.84
Dsgn. L = 17.50 ft	2	0.629	0.482	115.54	-123.11	123.11	326.67	195.61	1.00	1.00	45.20	140.76	93.84
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 17.50 ft	1	0.596	0.411	71.34	-116.50	116.50	326.67	195.61	1.00	1.00	38.53	140.76	93.84
Dsgn. L = 17.50 ft	2	0.596	0.346	56.81	-116.50	116.50	326.67	195.61	1.00	1.00	32.48	140.76	93.84
+D+0.750Lr+0.750L+0.450W+H,													
Dsgn. L = 17.50 ft	1	0.740	0.495	64.01	-144.77	144.77	326.67	195.61	1.00	1.00	46.44	140.76	93.84
Dsgn. L = 17.50 ft	2	0.740	0.495	100.72	-144.77	144.77	326.67	195.61	1.00	1.00	46.44	140.76	93.84
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 17.50 ft	1	0.643	0.495	31.10	-125.73	125.73	326.67	195.61	1.00	1.00	46.49	140.76	93.84
Dsgn. L = 17.50 ft	2	0.643	0.495	119.96	-125.73	125.73	326.67	195.61	1.00	1.00	46.49	140.76	93.84
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 17.50 ft	1	0.609	0.412	70.66	-119.12	119.12	326.67	195.61	1.00	1.00	38.68	140.76	93.84
Dsgn. L = 17.50 ft	2	0.609	0.360	61.22	-119.12	119.12	326.67	195.61	1.00	1.00	33.76	140.76	93.84
+D+0.750L+0.750S+0.450W+H, L													
Dsgn. L = 17.50 ft	1	0.754	0.509	63.34	-147.39	147.39	326.67	195.61	1.00	1.00	47.72	140.76	93.84
Dsgn. L = 17.50 ft	2	0.754	0.509	105.14	-147.39	147.39	326.67	195.61	1.00	1.00	47.72	140.76	93.84
+0.60D+0.60W+0.60H													
Dsgn. L = 17.50 ft	1	0.343	0.253	20.77	-67.18	67.18	326.67	195.61	1.00	1.00	23.77	140.76	93.84
Dsgn. L = 17.50 ft	2	0.343	0.253	60.28	-67.18	67.18	326.67	195.61	1.00	1.00	23.77	140.76	93.84
+D+0.70E+0.60H													
Dsgn. L = 17.50 ft	1	0.580	0.430	34.22	-113.53	113.53	326.67	195.61	1.00	1.00	40.38	140.76	93.84
Dsgn. L = 17.50 ft	2	0.580	0.430	103.08	-113.53	113.53	326.67	195.61	1.00	1.00	40.38	140.76	93.84
+D+0.750L+0.750S+0.5250E+H,													

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B10

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
Dsgn. L = 17.50 ft	1	0.697	0.550	28.40	-136.24	136.24	326.67	195.61	1.00	1.00	51.62	140.76	93.84
Dsgn. L = 17.50 ft	2	0.704	0.550	137.65	-136.24	137.65	326.67	195.61	1.00	1.00	51.62	140.76	93.84
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 17.50 ft	1	0.663	0.419	67.93	-129.63	129.63	326.67	195.61	1.00	1.00	39.29	140.76	93.84
Dsgn. L = 17.50 ft	2	0.663	0.415	78.91	-129.63	129.63	326.67	195.61	1.00	1.00	38.90	140.76	93.84
+D+0.750L+0.750S+0.5250E+H,													
Dsgn. L = 17.50 ft	1	0.807	0.563	60.65	-157.91	157.91	326.67	195.61	1.00	1.00	52.86	140.76	93.84
Dsgn. L = 17.50 ft	2	0.807	0.563	122.83	-157.91	157.91	326.67	195.61	1.00	1.00	52.86	140.76	93.84
+0.60D+0.70E+H													
Dsgn. L = 17.50 ft	1	0.415	0.326	17.18	-81.20	81.20	326.67	195.61	1.00	1.00	30.62	140.76	93.84
Dsgn. L = 17.50 ft	2	0.429	0.326	83.87	-81.20	83.87	326.67	195.61	1.00	1.00	30.62	140.76	93.84

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L+H	1	0.2487	7.490	+D+0.750L+0.750S+0.5250E+H	-0.0789	14.630
+D+0.750L+0.750S+0.5250E+H	2	0.4051	8.470		0.0000	14.630

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
+D+H	2	0.1367	8.750	1	-0.0021	16.730
+D+L+H, LL Comb Run (*L)	2	0.3219	8.610	1	-0.0517	14.000
+D+L+H, LL Comb Run (L*)	1	0.2487	7.490	2	-0.0079	1.190
+D+L+H, LL Comb Run (LL)	2	0.2529	8.820	1	-0.0041	16.660
+D+Lr+H, LL Comb Run (*L)	2	0.1367	8.750	1	-0.0021	16.730
+D+Lr+H, LL Comb Run (L*)	2	0.1367	8.750	1	-0.0021	16.730
+D+Lr+H, LL Comb Run (LL)	2	0.1367	8.750	1	-0.0021	16.730
+D+S+H	2	0.1533	8.750	1	-0.0044	16.380
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	2	0.2756	8.610	1	-0.0353	14.560
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	1	0.2095	7.350	2	-0.0032	0.770
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	2	0.2238	8.820	1	-0.0036	16.660
+D+0.750L+0.750S+H, LL Comb Run (*L)	2	0.2881	8.610	1	-0.0397	14.420
+D+0.750L+0.750S+H, LL Comb Run (L*)	1	0.2038	7.350	2	-0.0019	0.560
+D+0.750L+0.750S+H, LL Comb Run (LL)	2	0.2363	8.750	1	-0.0052	16.520
+D+0.60W+H	2	0.2257	8.540	1	-0.0208	15.190
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	2	0.3424	8.540	1	-0.0603	13.790
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	1	0.1793	7.070		0.0000	0.000
+D+0.750Lr+0.750L+0.450W+H, LL Comb Run (	2	0.2905	8.680	1	-0.0147	15.960
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	2	0.3549	8.540	1	-0.0653	13.650
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	1	0.1737	7.000		0.0000	0.000
+D+0.750L+0.750S+0.450W+H, LL Comb Run (	2	0.3030	8.680	1	-0.0174	15.820
+0.60D+0.60W+0.60H	2	0.1711	8.470	1	-0.0241	14.350
+D+0.70E+0.60H	2	0.2926	8.470	1	-0.0428	14.280
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.4051	8.470	1	-0.0864	13.230
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.2141	8.680	1	-0.0030	16.730
+D+0.750L+0.750S+0.5250E+H, LL Comb Run (	2	0.3531	8.610	1	-0.0300	15.330
+0.60D+0.70E+H	2	0.2380	8.400	1	-0.0507	13.230
D Only	2	0.1367	8.750	1	-0.0021	16.730
L Only, LL Comb Run (*L)	2	0.1854	8.400	1	-0.0916	10.150
L Only, LL Comb Run (L*)	1	0.1580	8.190	2	-0.0706	7.420
L Only, LL Comb Run (LL)	2	0.1162	8.890	1	-0.0020	16.660
S Only	2	0.0167	8.190	1	-0.0085	10.150
W Only	2	0.1489	8.190	1	-0.0757	10.150
E Only	2	0.2234	8.190	1	-0.1136	10.150

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	20.779	93.761	15.378
Max Upward from Load Combinations	20.779	93.761	15.378
Max Upward from Load Cases	10.492	48.997	7.286
Max Downward from all Load Conditions (Resis	-2.670		-1.651
Max Downward from Load Cases (Resisting Up	-2.670		-1.651
+D+H	10.287	48.997	6.096
+D+L+H, LL Comb Run (*L)	8.133	69.766	13.382

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B10

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+L+H, LL Comb Run (L*)	20.779	68.156	4.445
+D+L+H, LL Comb Run (LL)	18.625	88.924	11.731
+D+Lr+H, LL Comb Run (*L)	10.287	48.997	6.096
+D+Lr+H, LL Comb Run (L*)	10.287	48.997	6.096
+D+Lr+H, LL Comb Run (LL)	10.287	48.997	6.096
+D+S+H	10.087	50.906	6.587
+D+0.750Lr+0.750L+H, LL Comb Run (*L)	8.671	64.574	11.560
+D+0.750Lr+0.750L+H, LL Comb Run (L*)	18.156	63.366	4.858
+D+0.750Lr+0.750L+H, LL Comb Run (LL)	16.541	78.942	10.322
+D+0.750L+0.750S+H, LL Comb Run (*L)	8.522	66.005	11.929
+D+0.750L+0.750S+H, LL Comb Run (L*)	18.006	64.797	5.226
+D+0.750L+0.750S+H, LL Comb Run (LL)	16.391	80.373	10.691
+D+0.60W+H	9.219	59.198	8.723
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	7.870	72.224	13.531
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	17.355	71.016	6.829
+D+0.750Lr+0.750L+0.450W+H, LL Comb Rur	15.740	86.592	12.293
+D+0.750L+0.750S+0.450W+H, LL Comb Run	7.721	73.655	13.900
+D+0.750L+0.750S+0.450W+H, LL Comb Run	17.205	72.447	7.197
+D+0.750L+0.750S+0.450W+H, LL Comb Run	15.590	88.024	12.662
+0.60D+0.60W+0.60H	5.104	39.599	6.285
+D+0.70E+0.60H	8.418	66.848	10.694
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	7.120	79.392	15.378
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	16.604	78.185	8.675
+D+0.750L+0.750S+0.5250E+H, LL Comb Rur	14.989	93.761	14.140
+0.60D+0.70E+H	4.303	47.249	8.256
D Only	10.287	48.997	6.096
L Only, LL Comb Run (*L)	-2.154	20.768	7.286
L Only, LL Comb Run (L*)	10.492	19.158	-1.651
L Only, LL Comb Run (LL)	8.338	39.926	5.635
S Only	-0.200	1.908	0.492
W Only	-1.780	17.000	4.380
E Only	-2.670	25.500	6.570
H Only			

Steel Section Properties : W14x48

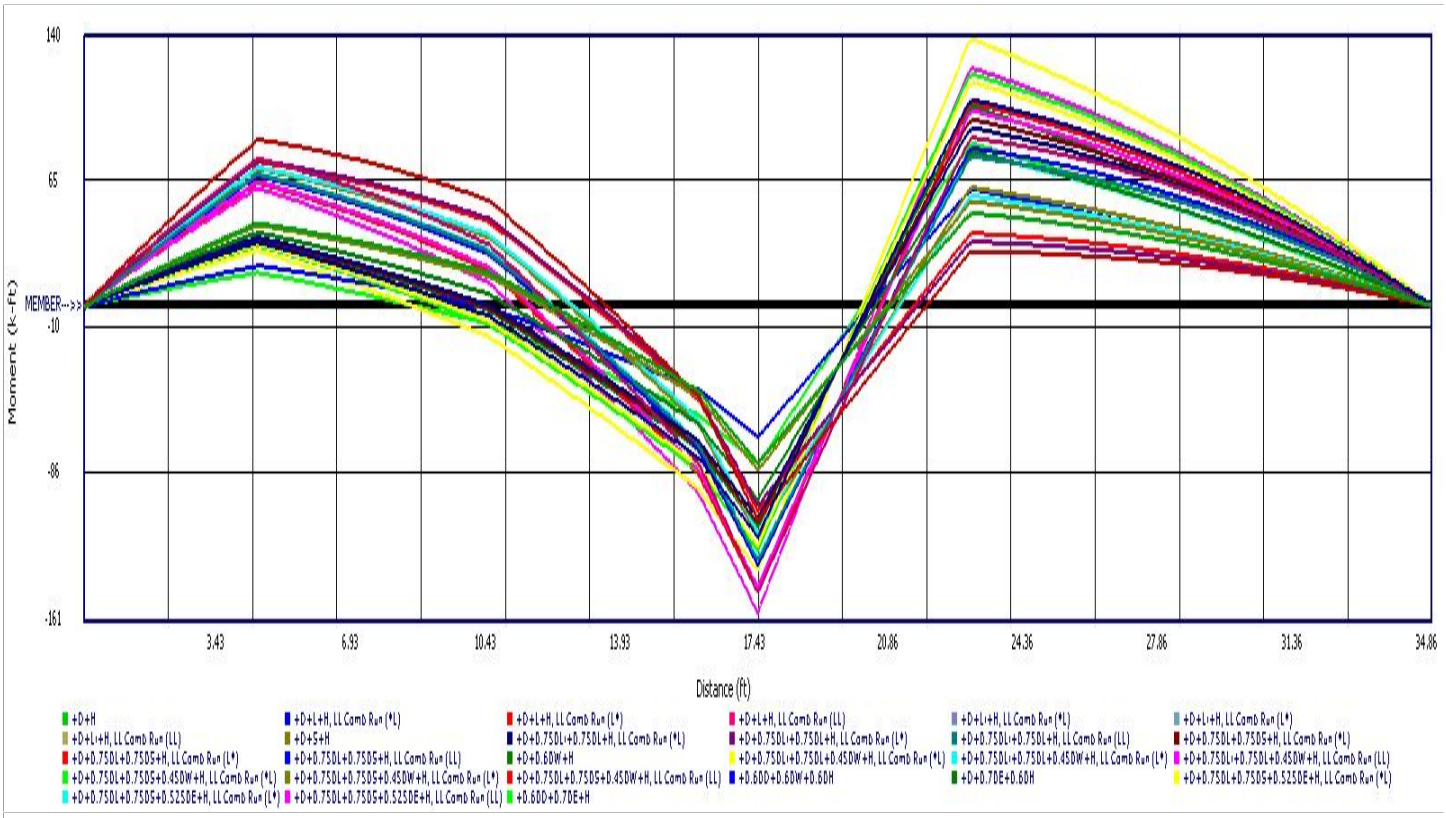
Depth	=	13.800	in	I xx	=	484.00	in^4	J	=	1.450	in^4
Web Thick	=	0.340	in	S xx		70.20	in^3	Cw	=	2,240.00	in^6
Flange Width	=	8.030	in	R xx	=	5.850	in				
Flange Thick	=	0.595	in	Zx	=	78.400	in^3				
Area	=	14.100	in^2	I yy	=	51.400	in^4				
Weight	=	48.000	plf	S yy	=	12.800	in^3	Wno	=	26.500	in^2
Kdesign	=	1.190	in	R yy	=	1.910	in	Sw	=	31.700	in^4
K1	=	1.000	in	Zy	=	19.600	in^3	Qf	=	15.100	in^3
rts	=	2.200	in					Qw	=	38.300	in^3
Ycg	=	6.900	in								

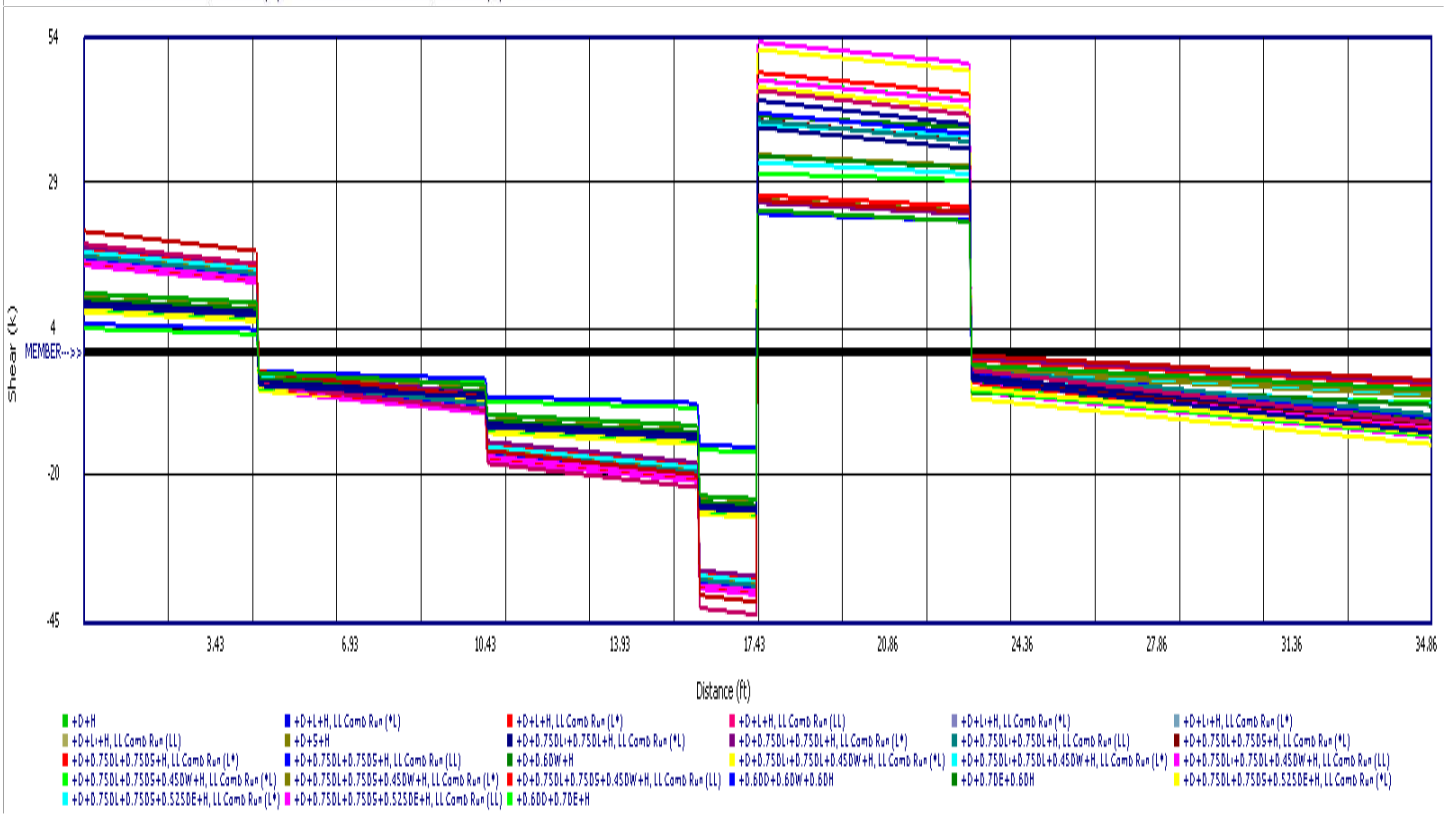
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B10



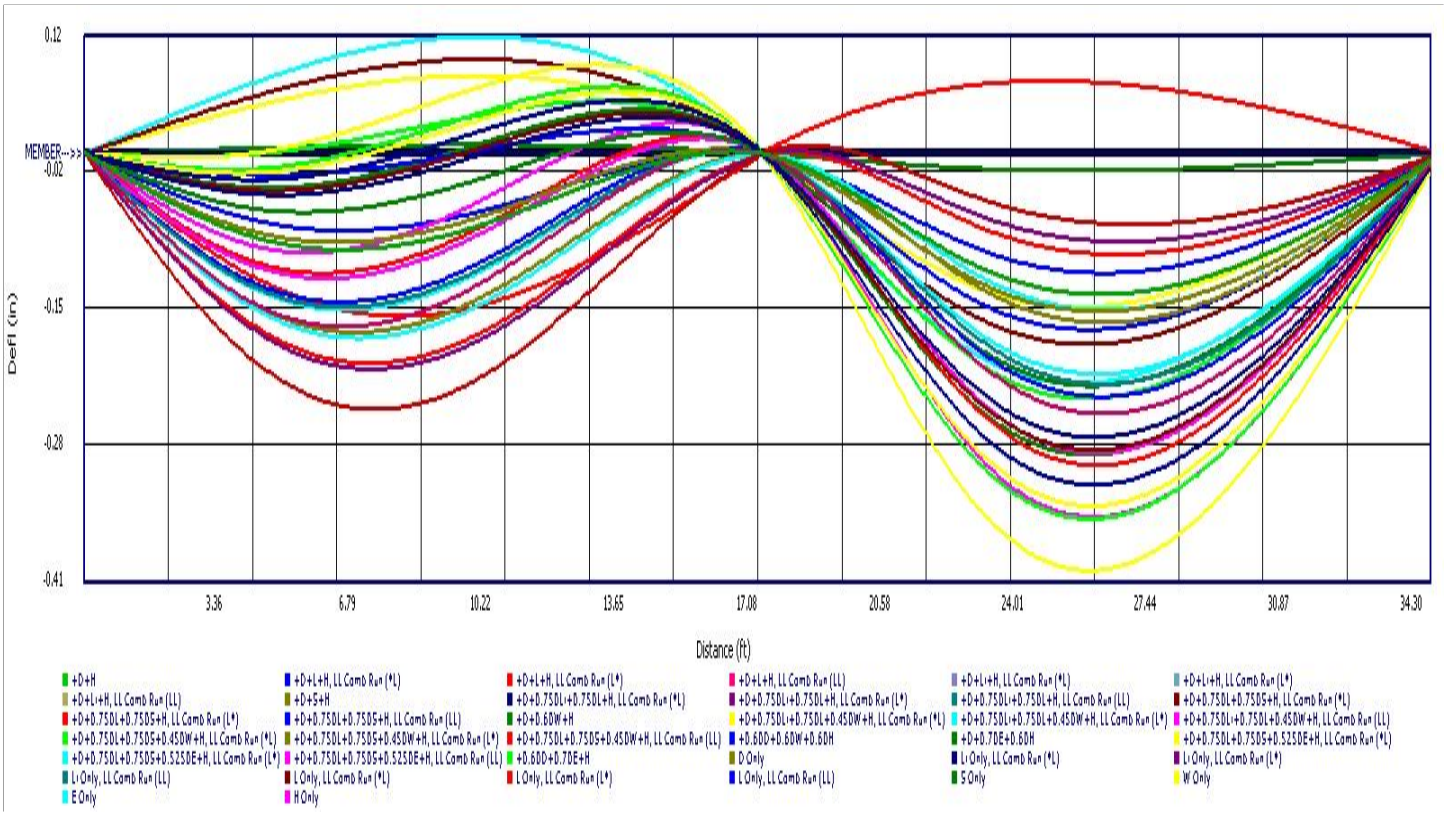


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: 1B10



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 22025 astrid building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 1 COLUMN (COL_A2.75)

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design	Wood Section Name	**5.5x9**
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Western
Overall Column Height	10.5 ft	Wood Member Type	GLB
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: AC	Exact Width	**5.50** in
Wood Grade	L2, >= 4 Laminations	Exact Depth	**9.0** in

Fb +	1,400.0 psi	Fv	230.0 psi
Fb -	1,350.0 psi	Ft	975.0 psi
Fc - Prll	1,450.0 psi	Density	pcf
Fc - Perp	470.0 psi		

Area	49.50	in^2
Ix	334.125	in^4
Iy	124.781	in^4

Incising Factors :

for Bending	0.80
for Elastic Modulus	0.95

Allow Stress Modification Factors

Cf or Cv for Bending	N/A
Cf or Cv for Compressio	N/A
Cf or Cv for Tension	N/A
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,300.0	1,300.0	1,300.0 ksi
Minimum	690.0	690.0	

Column Buckling Condition:
ABOUT X-X Axis: Lux = 10.5 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 10.5 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
COLUMNS ABOVE: Axial Load at 10.50 ft, D = 21.030, L = 13.140, S = 11.880 k
BENDING LOADS . . .
Wind: Lat. Uniform Load creating Mx-x, W = 0.040 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.8733 : 1**

Load Combination	+D+0.750L+0.750S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	39.795 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	920.61 psi

PASS Maximum Shear Stress Ratio = **0.01038 : 1**

Load Combination	+D+0.60W
Location of max.above base	0.0 ft
Applied Design Shear	5.727 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.210 k	Bottom along Y-Y	0.210 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.02546 in at 5.285 ft above base
for load combination : W Only

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

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.682	0.4774	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+L	1.000	0.635	0.7498	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+S	1.150	0.572	0.6973	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+0.750L	1.250	0.535	0.6437	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+0.750L+0.750S	1.000	0.635	0.8733	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+0.60W	1.600	0.433	0.4231	PASS	5.215 ft	0.01038	PASS	0.0 ft
+D-0.60W	1.600	0.433	0.4231	PASS	5.215 ft	0.01038	PASS	0.0 ft
+D+0.750L+0.450W	1.600	0.433	0.6214	PASS	5.215 ft	0.007782	PASS	0.0 ft
+D+0.750L-0.450W	1.600	0.433	0.6214	PASS	5.215 ft	0.007782	PASS	0.0 ft

Wood Column

Project File: 22025 astrid building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 1 COLUMN (COL_A2.75)

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
+D+0.750L+0.750S+0.450W	1.600	0.433	0.8007	PASS	5.215 ft	0.007782	PASS	0.0 ft
+D+0.750L+0.750S-0.450W	1.600	0.433	0.8007	PASS	5.215 ft	0.007782	PASS	0.0 ft
+0.60D+0.60W	1.600	0.433	0.2539	PASS	5.215 ft	0.01038	PASS	0.0 ft
+0.60D-0.60W	1.600	0.433	0.2539	PASS	5.215 ft	0.01038	PASS	0.0 ft
+0.60D	1.600	0.433	0.2539	PASS	0.0 ft	0.0	PASS	10.50 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	My - End Moments @ Base	My - End Moments @ Top	k-ft	Mx - End Moments @ Base	Mx - End Moments @ Top
D Only						21.030					
+D+L						34.170					
+D+S						32.910					
+D+0.750L						30.885					
+D+0.750L+0.750S						39.795					
+D+0.60W				0.126	0.126	21.030					
+D-0.60W				-0.126	-0.126	21.030					
+D+0.750L+0.450W				0.095	0.094	30.885					
+D+0.750L-0.450W				-0.095	-0.094	30.885					
+D+0.750L+0.750S+0.450W				0.095	0.094	39.795					
+D+0.750L+0.750S-0.450W				-0.095	-0.094	39.795					
+0.60D+0.60W				0.126	0.126	12.618					
+0.60D-0.60W				-0.126	-0.126	12.618					
+0.60D						12.618					
L Only						13.140					
S Only						11.880					
W Only				0.210	0.210						
-W				-0.210	-0.210						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.750L+0.750S	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.015 in	5.285 ft
+D-0.60W	0.0000 in	0.000ft	-0.015 in	5.285 ft
+D+0.750L+0.450W	0.0000 in	0.000ft	0.011 in	5.285 ft
+D+0.750L-0.450W	0.0000 in	0.000ft	-0.011 in	5.285 ft
+D+0.750L+0.750S+0.450W	0.0000 in	0.000ft	0.011 in	5.285 ft
+D+0.750L+0.750S-0.450W	0.0000 in	0.000ft	-0.011 in	5.285 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.015 in	5.285 ft
+0.60D-0.60W	0.0000 in	0.000ft	-0.015 in	5.285 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
L Only	0.0000 in	0.000ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.025 in	5.285 ft
-W	0.0000 in	0.000ft	-0.025 in	5.285 ft

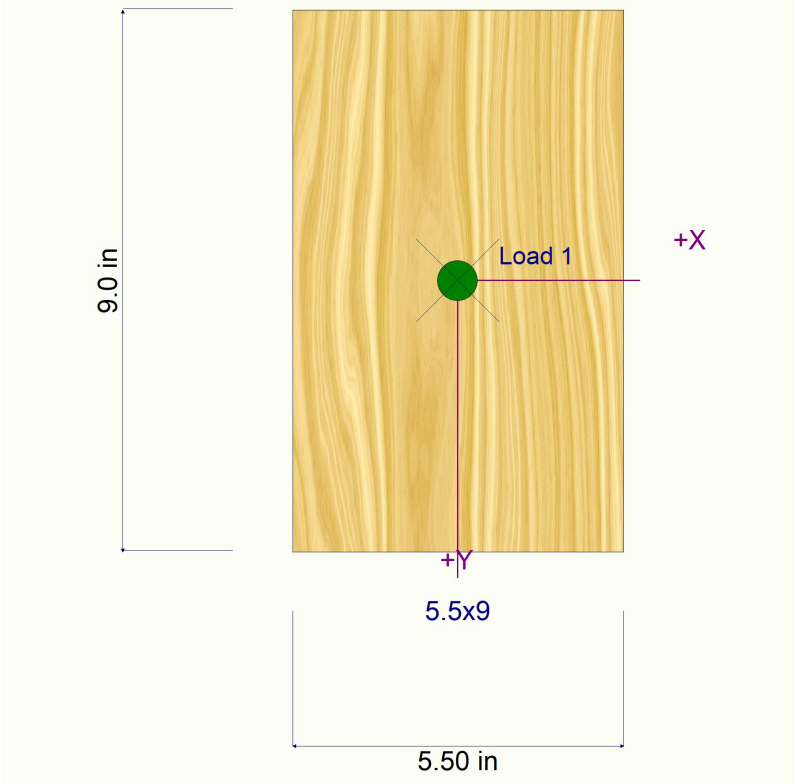
Wood Column

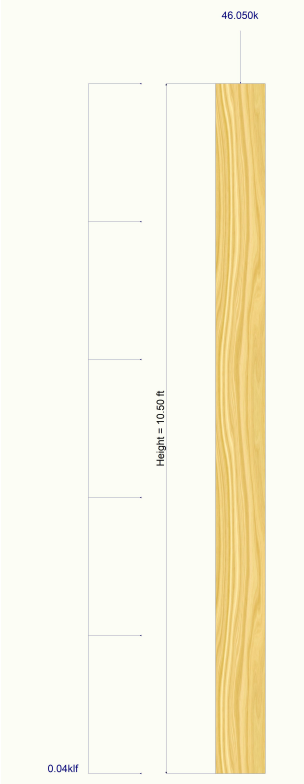
Project File: 22025 astrid building 7.ec6

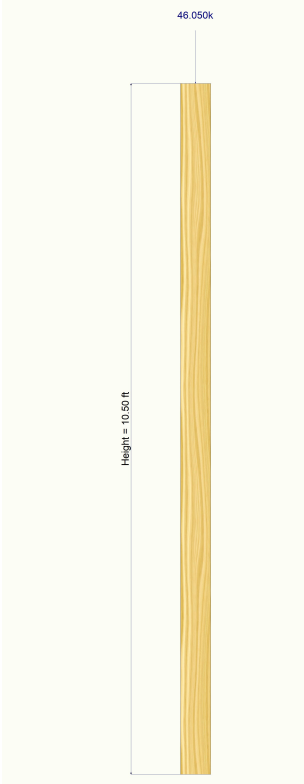
LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 1 COLUMN (COL_A2.75)

Sketches







Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 22025 astrid building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 1 COLUMN (COL_A2.5)

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design	Wood Section Name	**5.5x9**
End Fixities	Top & Bottom Pinned	Wood Grading/Manuf.	Western
Overall Column Height	10.5 ft	Wood Member Type	GLB
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: AC	Exact Width	**5.50** in
Wood Grade	L2, >= 4 Laminations	Exact Depth	**9.0** in

Fb +	1,400.0 psi	Fv	230.0 psi
Fb -	1,350.0 psi	Ft	975.0 psi
Fc - Prll	1,450.0 psi	Density	pcf
Fc - Perp	470.0 psi		

Area	49.50	in^2
Ix	334.125	in^4
Iy	124.781	in^4

Incising Factors :

for Bending	0.80
for Elastic Modulus	0.95

Allow Stress Modification Factors

Cf or Cv for Bending	N/A
Cf or Cv for Compressio	N/A
Cf or Cv for Tension	N/A
Cm : Wet Use Factor	1.0
Ct : Temperature Fact	1.0
Cfu : Flat Use Factor	1.0
Kf : Built-up columns	1.0
Use Cr : Repetitive ?	No

E : Modulus of Elasticity . . .

	x-x Bending	y-y Bending	Axial
Basic	1,300.0	1,300.0	1,300.0 ksi
Minimum	690.0	690.0	

Column Buckling Condition:
ABOUT X-X Axis: Lux = 10.5 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 10.5 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
COLUMNS ABOVE: Axial Load at 10.50 ft, D = 17.150, L = 18.0, S = 14.750 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9153 : 1**

Load Combination	+D+0.750L+0.750S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	41.713 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	920.61 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	10.50 ft
Applied Design Shear	0.0 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

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

Maximum SERVICE Load Lateral Deflections . . .

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

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

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.682	0.3893	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+L	1.000	0.635	0.7713	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+S	1.150	0.572	0.6759	PASS	10.50 ft	0.0	PASS	10.50 ft
+D+0.750L	1.250	0.535	0.6388	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+0.750L+0.750S	1.000	0.635	0.9153	PASS	0.0 ft	0.0	PASS	10.50 ft
+0.60D	1.600	0.433	0.2070	PASS	0.0 ft	0.0	PASS	10.50 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					17.150				

Wood Column

Project File: 22025 astrid building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: LOWER LEVEL 1 COLUMN (COL_A2.5)

Maximum Reactions

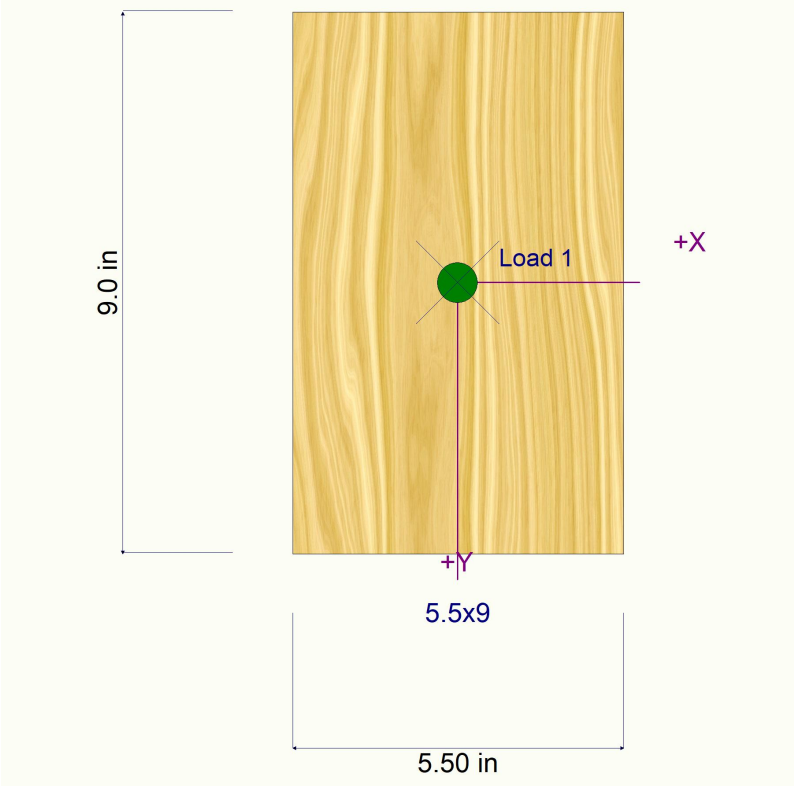
Note: Only non-zero reactions are listed.

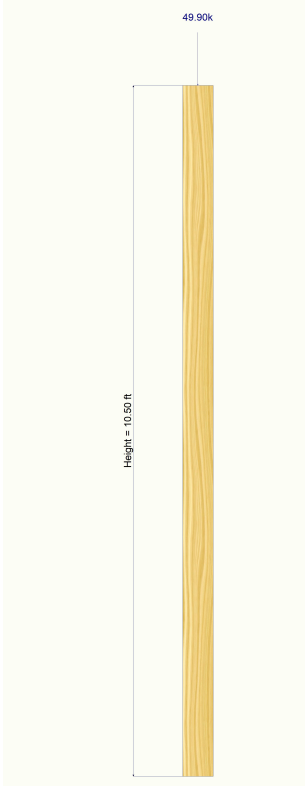
Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	My - End Moments @ Base	My - End Moments @ Top	k-ft	Mx - End Moments @ Base	Mx - End Moments @ Top
+D+L						35.150					
+D+S						31.900					
+D+0.750L						30.650					
+D+0.750L+0.750S						41.713					
+0.60D						10.290					
L Only						18.000					
S Only						14.750					

Maximum Deflections for Load Combinations

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

Sketches





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 22025 astrid building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: GRADE COLUMN (COL_A2.5)

Code References

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16
Load Combinations Used : IBC 2021

General Information

Analysis Method	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	8 ft		
(Used for non-slender calculations)			
Wood Species	GluLam Column, Species: AC		
Wood Grade	L2, >= 4 Laminations		
Fb +	1,400.0 psi	Fv	230.0 psi
Fb -	1,350.0 psi	Ft	975.0 psi
Fc - Prll	1,450.0 psi	Density	pcf
Fc - Perp	470.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,300.0	1,300.0	1,300.0 ksi
Minimum	690.0	690.0	

Wood Section Name	**5.5x9**		
Wood Grading/Manuf.	Western		
Wood Member Type	GLB		
Exact Width	**5.50** in	Allow Stress Modification Factors	
Exact Depth	**9.0** in	Cf or Cv for Bending	N/A
Area	49.50 in^2	Cf or Cv for Compressio	N/A
Ix	334.125 in^4	Cf or Cv for Tension	N/A
Iy	124.781 in^4	Cm : Wet Use Factor	1.0
Incising Factors :		Ct : Temperature Fact	1.0
for Bending	0.80	Cfu : Flat Use Factor	1.0
for Elastic Modulus	0.95	Kf : Built-up columns	1.0
		Use Cr : Repetitive ?	No

Column Buckling Condition:
ABOUT X-X Axis: Lux = 8 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 8 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 0.0 lbs * Dead Load Factor
AXIAL LOADS . . .
COLUMNS ABOVE: Axial Load at 8.0 ft, D = 21.90, L = 23.80, S = 14.750 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.8422 : 1**

Load Combination	+D+0.750L+0.750S
Governing NDS Forumla	Comp Only, fc/Fc'
Location of max.above base	0.0 ft
At maximum location values are .	
Applied Axial	50.813 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	1,218.88 psi

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	8.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	368.0 psi

Maximum SERVICE Lateral Load Reactions . .

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

Maximum SERVICE Load Lateral Deflections . . .

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

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

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Load Combination Results

Load Combination	C_D	C_P	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.900	0.866	0.3914	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+L	1.000	0.841	0.7574	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+S	1.150	0.799	0.5558	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L	1.250	0.770	0.5756	PASS	0.0 ft	0.0	PASS	8.0 ft
+D+0.750L+0.750S	1.000	0.841	0.8422	PASS	0.0 ft	0.0	PASS	8.0 ft
+0.60D	1.600	0.668	0.1713	PASS	0.0 ft	0.0	PASS	8.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	X-X Axis Reaction k @ Base	@ Top	Y-Y Axis Reaction @ Base	@ Top	Axial Reaction @ Base	My - End Moments k-ft @ Base	@ Top	Mx - End Moments @ Base	@ Top
D Only					21.900				

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: 22025 astrid building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: GRADE COLUMN (COL_A2.5)

Maximum Reactions

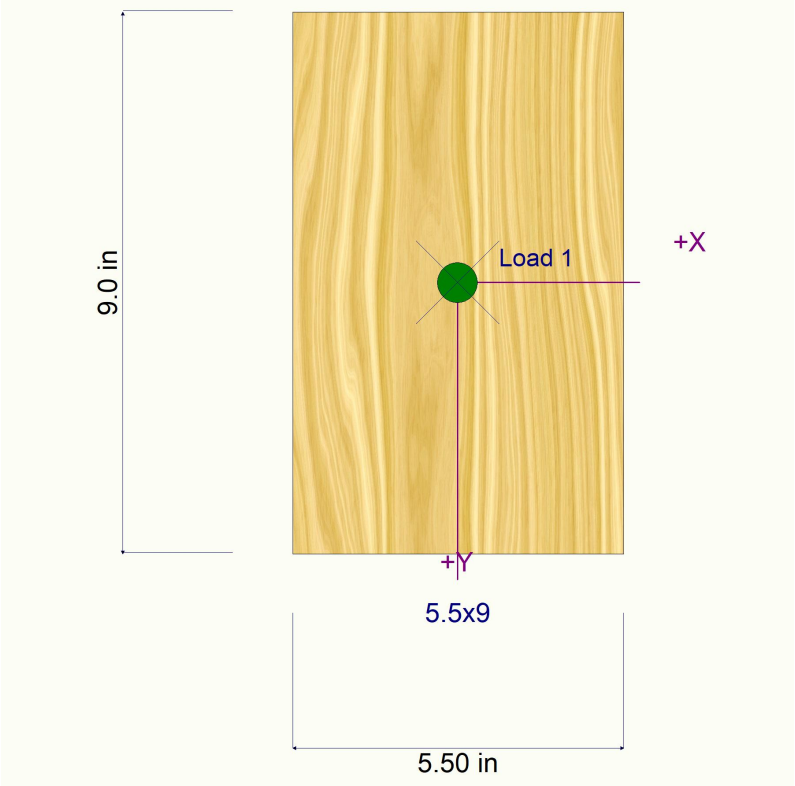
Note: Only non-zero reactions are listed.

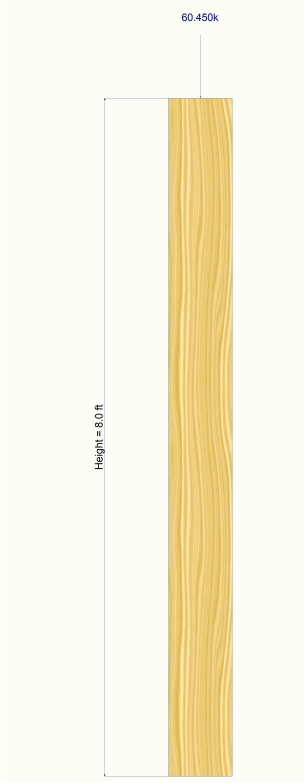
Load Combination	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	k	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Axial Reaction @ Base	My - End Moments @ Base	My - End Moments @ Top	k-ft	Mx - End Moments @ Base	Mx - End Moments @ Top
+D+L						45.700					
+D+S						36.650					
+D+0.750L						39.750					
+D+0.750L+0.750S						50.813					
+0.60D						13.140					
L Only						23.800					
S Only						14.750					

Maximum Deflections for Load Combinations

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

Sketches





3RD FLOOR (MAIN FLOOR)

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

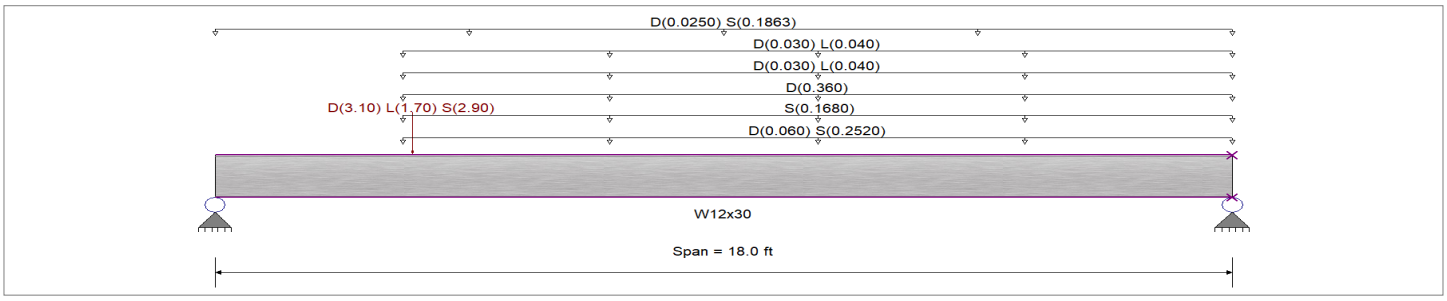
DESCRIPTION: B1

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : IBC 2021

Material Properties

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



Applied Loads

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

Beam self weight calculated and added to loading
Load for Span Number 1

Uniform Load : D = 0.020, S = 0.0840 ksf, Extent = 3.330 -->> 18.0 ft, Tributary Width = 3.0 ft, (HIGH ROOF)

Uniform Load : S = 0.1680 k/ft, Extent = 3.330 -->> 18.0 ft, Tributary Width = 1.0 ft, (ICICLE HIGH ROOF)

Uniform Load : D = 0.360 k/ft, Extent = 3.330 -->> 18.0 ft, Tributary Width = 1.0 ft, (WALL)

Uniform Load : D = 0.030, L = 0.040 k/ft, Extent = 3.330 -->> 18.0 ft, Tributary Width = 1.0 ft, (4TH FLOOR)

Uniform Load : D = 0.030, L = 0.040 k/ft, Extent = 3.330 -->> 18.0 ft, Tributary Width = 1.0 ft, (3RD FLOOR)

Uniform Load : D = 0.020, S = 0.1490 ksf, Tributary Width = 1.250 ft, (LOW ROOF)

Point Load : D = 3.10, L = 1.70, S = 2.90 k @ 3.50 ft, (b2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.507** : 1	Maximum Shear Stress Ratio =	**0.194** : 1
Section used for this span	**W12x30**	Section used for this span	**W12x30**
Ma : Applied	54.572 k-ft	Va : Applied	12.385 k
Mn / Omega : Allowable	107.535 k-ft	Vn/Omega : Allowable	63.960 k
Load Combination	+D+S	Load Combination	+D+S
		Location of maximum on span	0.000 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.246 in	Ratio =	877	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.469 in	Ratio =	460	>=240.	Span: 1 : +D+S
Max Upward Total Deflection	0 in	Ratio =	0	<240.0	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
D Only													
Dsgn. L = 18.00 ft	1	0.241	0.092	25.96		25.96	179.58	107.53	1.00	1.00	5.86	95.94	63.96
+D+L													
Dsgn. L = 18.00 ft	1	0.300	0.121	32.23		32.23	179.58	107.53	1.00	1.00	7.71	95.94	63.96
+D+S													
Dsgn. L = 18.00 ft	1	0.507	0.194	54.57		54.57	179.58	107.53	1.00	1.00	12.38	95.94	63.96

Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: B1

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios		Summary of Moment Values							Summary of Shear Values		
Segment Length	Span #	M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx	Vnx/Omega
+D+0.750L													
Dsgn. L = 18.00 ft	1	0.285	0.113	30.65		30.65	179.58	107.53	1.00	1.00	7.25	95.94	63.96
+D+0.750L+0.750S													
Dsgn. L = 18.00 ft	1	0.484	0.190	52.09		52.09	179.58	107.53	1.00	1.00	12.14	95.94	63.96
+0.60D													
Dsgn. L = 18.00 ft	1	0.145	0.055	15.57		15.57	179.58	107.53	1.00	1.00	3.52	95.94	63.96

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.4694	8.846		0.0000	0.000

Maximum Deflections for Load Combinations

Load Combination	Span	Max. Downward Defl	Location in Span	Span	Max. Upward Defl	Location in Span
D Only	1	0.2233	8.846		0.0000	0.000
+D+L	1	0.2776	8.743		0.0000	0.000
+D+S	1	0.4694	8.846		0.0000	0.000
+D+0.750L	1	0.2640	8.794		0.0000	0.000
+D+0.750L+0.750S	1	0.4485	8.794		0.0000	0.000
+0.60D	1	0.1340	8.846		0.0000	0.000
L Only	1	0.0544	8.434		0.0000	0.000
S Only	1	0.2461	8.846		0.0000	0.000

Vertical Reactions

Support notation : Far left is #: Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	12.385	11.161
Max Upward from Load Combinations	12.385	11.161
Max Upward from Load Cases	6.523	5.891
D Only	5.862	5.270
+D+L	7.709	6.296
+D+S	12.385	11.161
+D+0.750L	7.247	6.039
+D+0.750L+0.750S	12.140	10.457
+0.60D	3.517	3.162
L Only	1.848	1.026
S Only	6.523	5.891

Steel Section Properties : W12x30

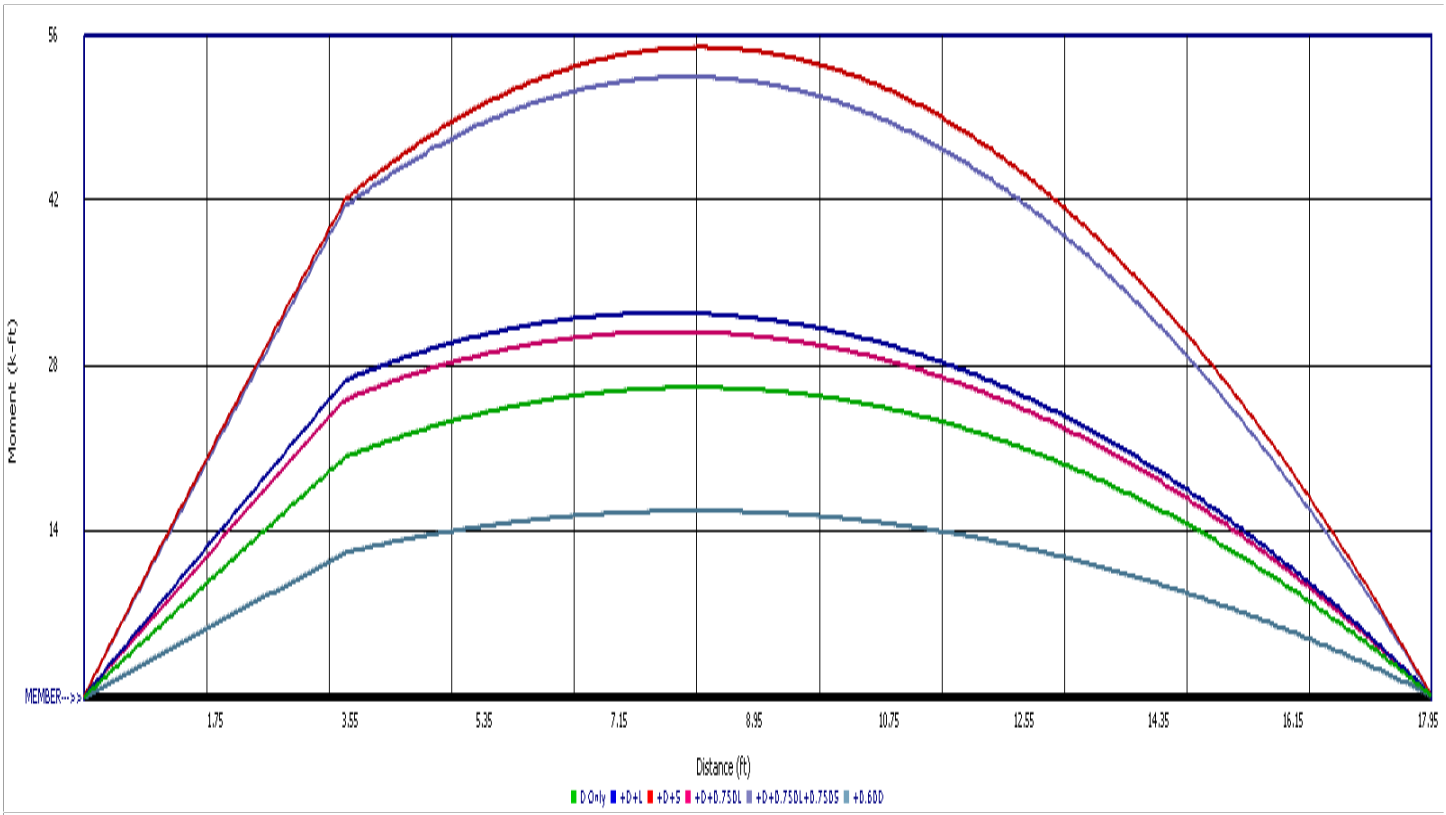
Depth	=	12.300 in	I xx	=	238.00 in^4	J	=	0.457 in^4
Web Thick	=	0.260 in	S xx		38.60 in^3	Cw	=	720.00 in^6
Flange Width	=	6.520 in	R xx	=	5.210 in			
Flange Thick	=	0.440 in	Zx	=	43.100 in^3			
Area	=	8.790 in^2	I yy	=	20.300 in^4			
Weight	=	30.000 plf	S yy	=	6.240 in^3	Wno	=	19.300 in^2
Kdesign	=	0.740 in	R yy	=	1.520 in	Sw	=	13.900 in^4
K1	=	0.750 in	Zy	=	9.560 in^3	Qf	=	8.170 in^3
rts	=	1.770 in				Qw	=	21.300 in^3
Ycg	=	6.150 in						

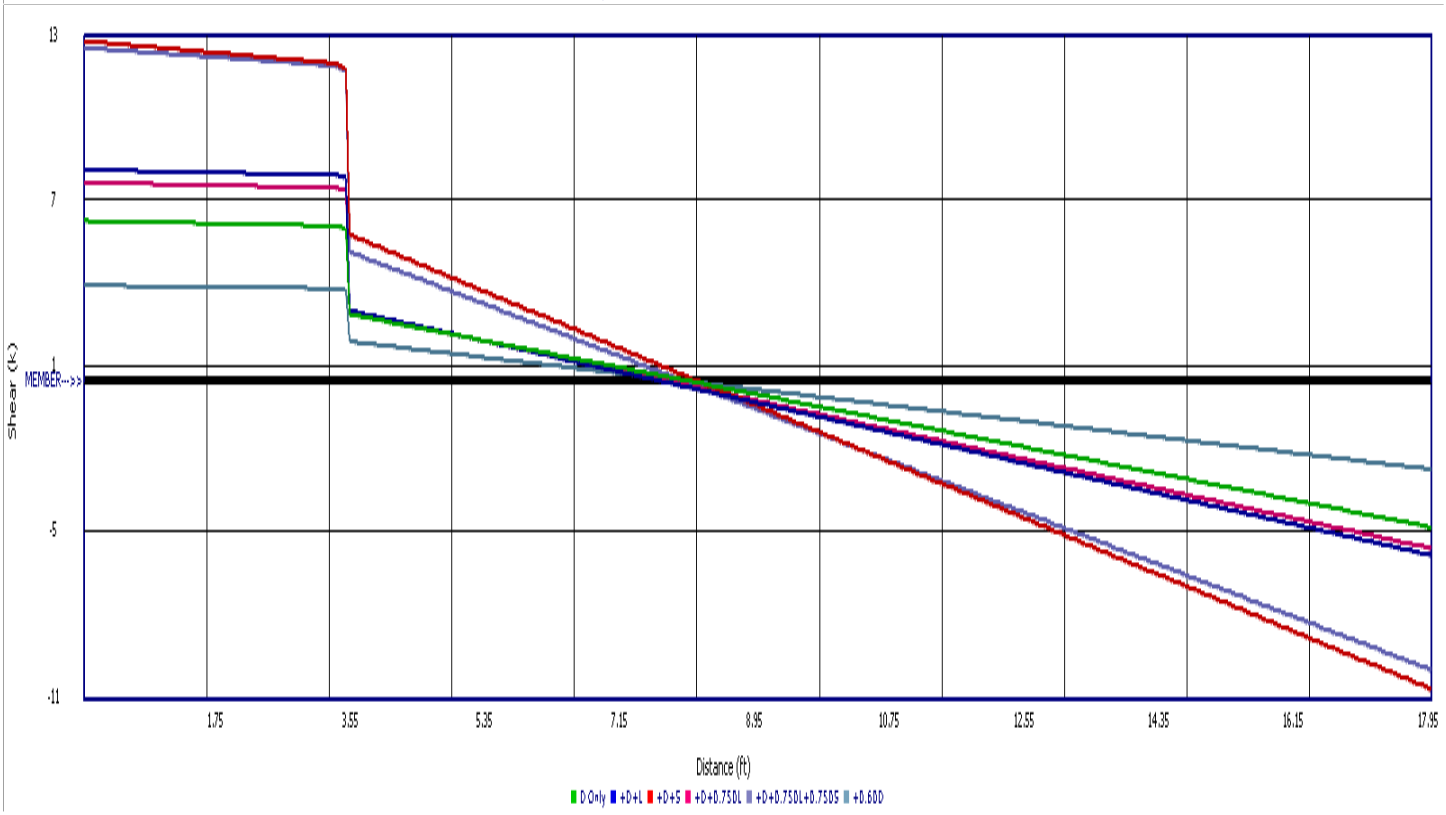
Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: B1



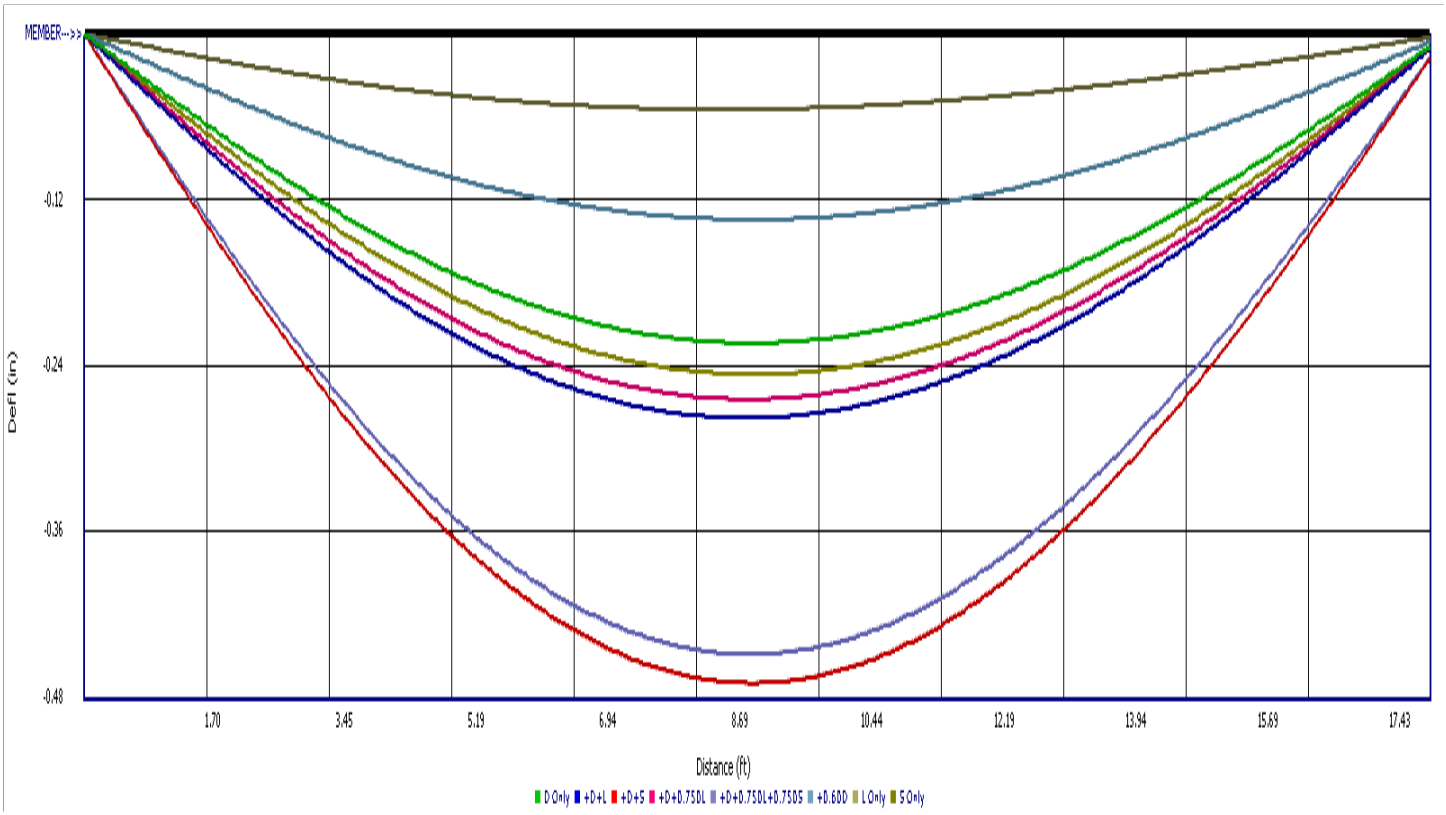


Steel Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: B1



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

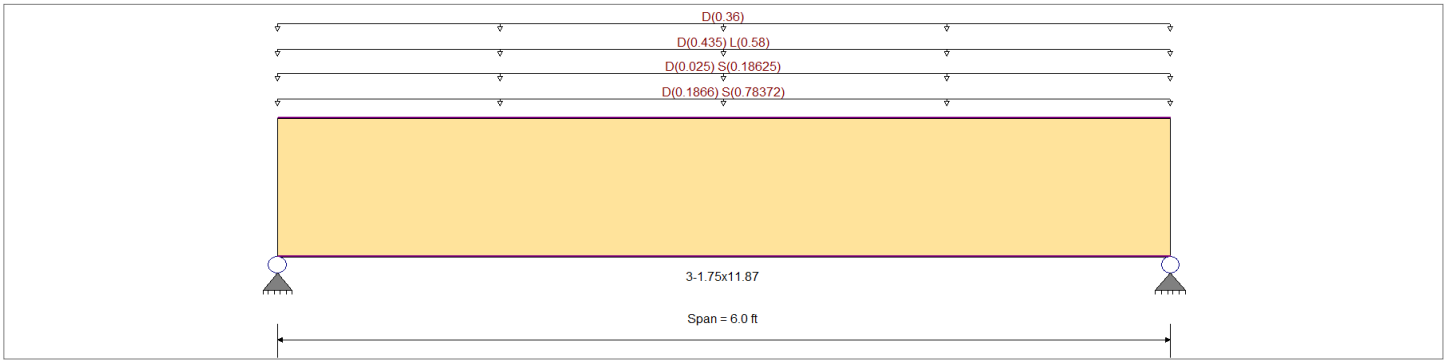
DESCRIPTION: B2

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				



Applied Loads

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

Beam self weight calculated and added to loading
Uniform Load : D = 0.020, S = 0.0840 ksf, Tributary Width = 9.330 ft, (HIGH ROOF)
Uniform Load : D = 0.020, S = 0.1490 ksf, Tributary Width = 1.250 ft, (LOW ROOF)
Uniform Load : D = 0.060, L = 0.080 ksf, Tributary Width = 7.250 ft, (FLOORS)
Uniform Load : D = 0.360 , Tributary Width = 1.0 ft, (WALLS)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	0.320 : 1	Maximum Shear Stress Ratio	=	0.323 : 1
Section used for this span		**3-1.75x11.87**	Section used for this span		**3-1.75x11.87**
fb: Actual	=	957.24 psi	fv: Actual	=	106.02 psi
F'b	=	2,994.26 psi	F'v	=	327.75 psi
Load Combination		+D+0.750L+0.750S	Load Combination		+D+0.750L+0.750S
Location of maximum on span	=	3.000 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	0.019 in	Ratio =	3708	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.044 in	Ratio =	1644	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.191	0.194	0.90	1.00	1.00	1.00	1.001	1.00	1.00	1.00	4.61	448.5	2,343.3	2.06	49.7	256.5
+D+L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.270	0.273	1.00	1.00	1.00	1.00	1.001	1.00	1.00	1.00	7.22	702.3	2,603.7	3.23	77.8	285.0
+D+0.750L					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.196	0.199	1.25	1.00	1.00	1.00	1.001	1.00	1.00	1.00	6.57	638.9	3,254.6	2.94	70.8	356.3
+D+0.750L+0.750S					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	1	0.320	0.323	1.15	1.00	1.00	1.00	1.001	1.00	1.00	1.00	9.84	957.2	2,994.3	4.41	106.0	327.8

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: B2

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
+0.60D					1.00	1.00	1.00	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 6.0 ft	**1**	0.065	0.065	1.60	1.00	1.00	1.00	1.001	1.00	1.00	1.00	2.77	269.1	4,165.9	1.24	29.8	456.0

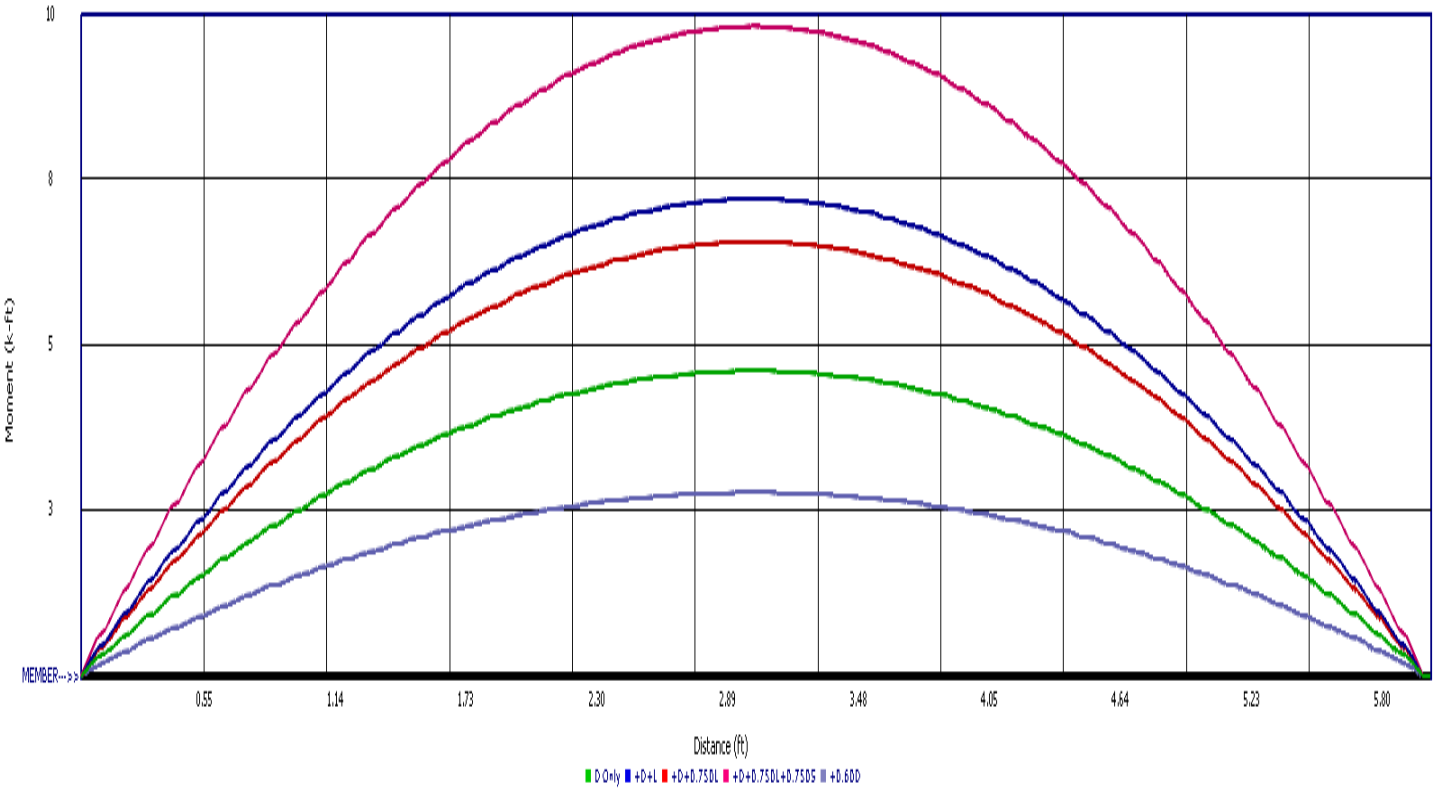
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.0438	3.022		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	6.562	6.562
Max Upward from Load Combinations	6.562	6.562
Max Upward from Load Cases	3.074	3.074
D Only	3.074	3.074
+D+L	4.814	4.814
+D+S	5.984	5.984
+D+0.750L	4.379	4.379
+D+0.750L+0.750S	6.562	6.562
+0.60D	1.845	1.845
L Only	1.740	1.740
S Only	2.910	2.910

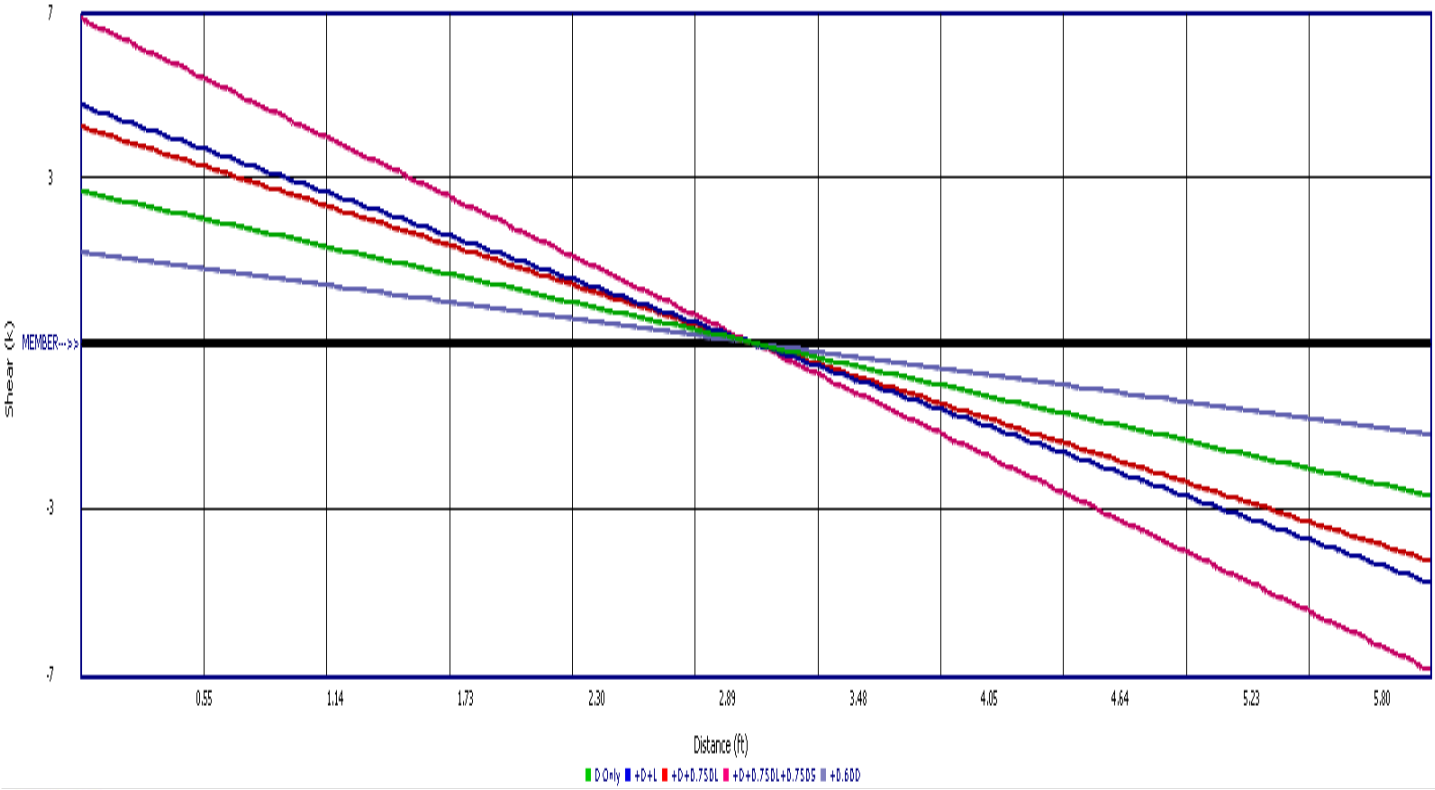


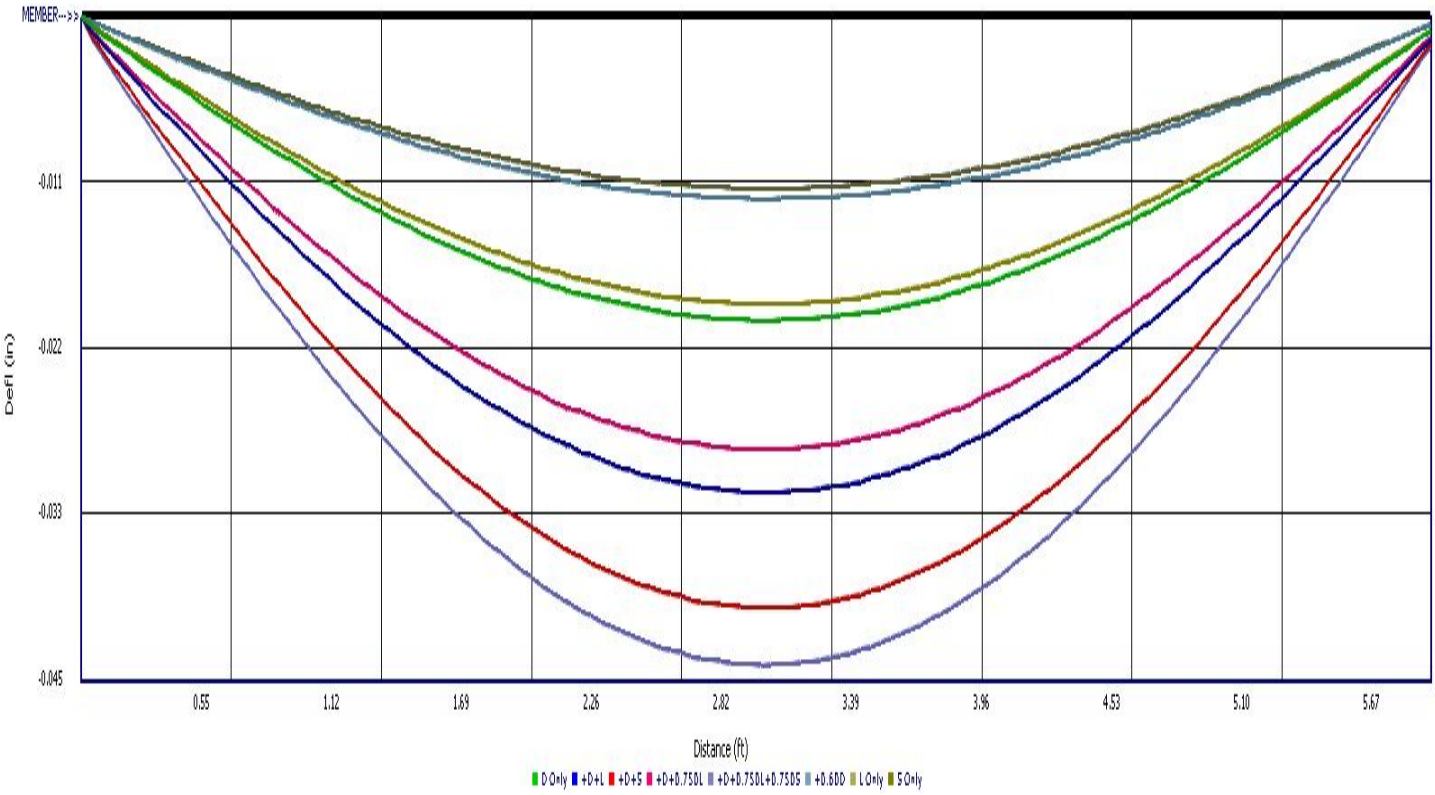
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: B2





Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

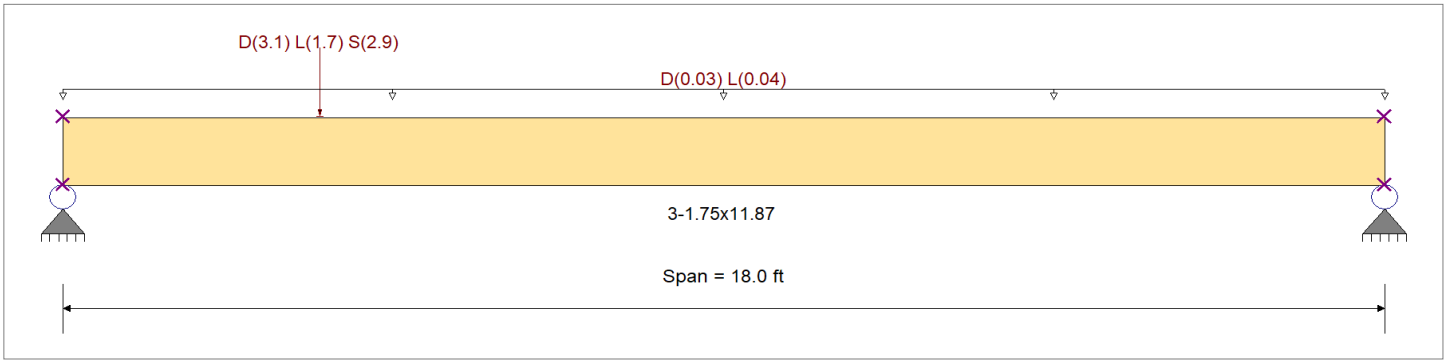
DESCRIPTION: B3

CODE REFERENCES

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

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	2,600.0 psi	*E : Modulus of Elasticity*	
Load Combination	IBC 2021	Fb -	2,600.0 psi	Ebend- xx	2,000.0 ksi
		Fc - Prll	2,510.0 psi	Eminbend - xx	1,016.54 ksi
Wood Species :	iLevel Truss Joist	Fc - Perp	750.0 psi		
Wood Grade :	MicroLam LVL 2.0 E	Fv	285.0 psi		
		Ft	1,555.0 psi	Density	42.010 pcf
Beam Bracing :	Completely Unbraced				



Applied Loads

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

Beam self weight NOT internally calculated and added
Uniform Load : D = 0.030, L = 0.040 , Tributary Width = 1.0 ft, (FLOORS)
Point Load : D = 3.10, L = 1.70, S = 2.90 k @ 3.50 ft, (B2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio	=	**0.677** : 1	Maximum Shear Stress Ratio	=	**0.428** : 1
Section used for this span		**3-1.75x11.87**	Section used for this span		**3-1.75x11.87**
fb: Actual	=	1,714.62 psi	fv: Actual	=	122.08 psi
F'b	=	2,533.77 psi	F'v	=	285.00 psi
Load Combination		+D+S	Load Combination		+D+S
Location of maximum on span	=	3.547 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	0.237 in	Ratio =	913	>=360	Span: 1 : S Only
Max Upward Transient Deflection	0 in	Ratio =	0	<360	n/a
Max Downward Total Deflection	0.630 in	Ratio =	342	>=240	Span: 1 : +D+0.750L+0.750S
Max Upward Total Deflection	0 in	Ratio =	0	<240	n/a

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
D Only														0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.403	0.257	0.90	1.00	1.00	0.98	1.001	1.00	1.00	1.00	9.48	922.0	2,289.1	2.74	65.9	256.5
+D+L					1.00	1.00	0.98	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.587	0.374	1.00	1.00	1.00	0.97	1.001	1.00	1.00	1.00	15.28	1,486.4	2,533.8	4.43	106.5	285.0
+D+S					1.00	1.00	0.97	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.677	0.428	1.00	1.00	1.00	0.97	1.001	1.00	1.00	1.00	17.63	1,714.6	2,533.8	5.07	122.1	285.0
+D+0.750L					1.00	1.00	0.97	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	1	0.430	0.270	1.25	1.00	1.00	0.96	1.001	1.00	1.00	1.00	13.83	1,345.3	3,131.8	4.01	96.4	356.3
+D+0.750L+0.750S					1.00	1.00	0.96	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: B3

Maximum Forces & Stresses for Load Combinations

Load Combination		Max Stress Ratios										Moment Values			Shear Values		
Segment Length	Span #	M	V	CD	CM	C_t	CLx	C_F	Cfu	C_i	C_r	M	fb	F'b	V	fv	F'v
Length = 18.0 ft	**1**	0.670	0.423	1.15	1.00	1.00	0.97	1.001	1.00	1.00	1.00	19.95	1,939.7	2,895.2	5.76	138.5	327.8
+0.60D					1.00	1.00	0.97	1.001	1.00	1.00	1.00			0.0	0.00	0.0	0.0
Length = 18.0 ft	**1**	0.141	0.087	1.60	1.00	1.00	0.94	1.001	1.00	1.00	1.00	5.69	553.2	3,925.1	1.64	39.5	456.0

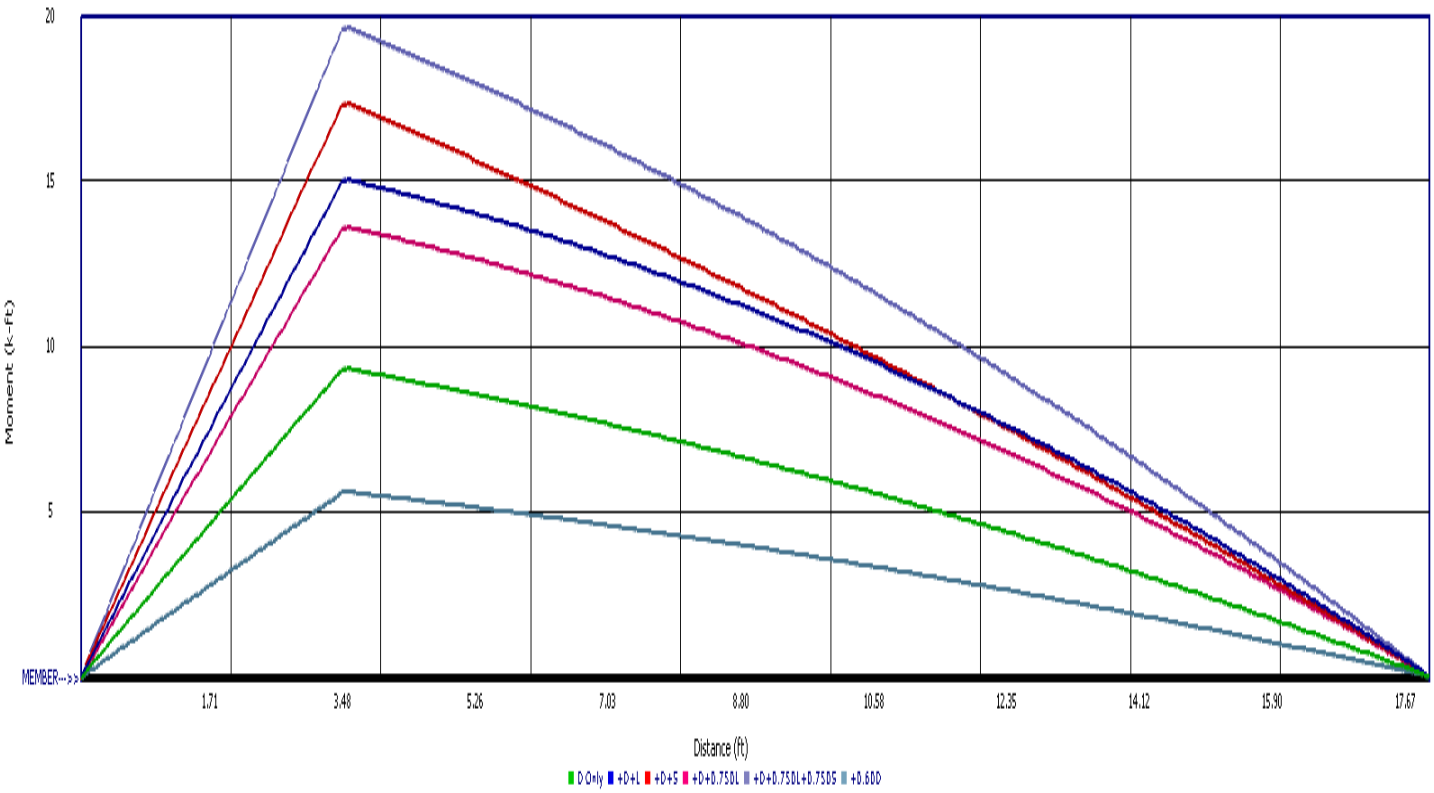
Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+0.750L+0.750S	1	0.6298	8.015		0.0000	0.000

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	5.816	1.814
Max Upward from Load Combinations	5.816	1.814
Max Upward from Load Cases	2.767	0.873
D Only	2.767	0.873
+D+L	4.497	1.563
+D+S	5.103	1.437
+D+0.750L	4.064	1.391
+D+0.750L+0.750S	5.816	1.814
+0.60D	1.660	0.524
L Only	1.729	0.691
S Only	2.336	0.564

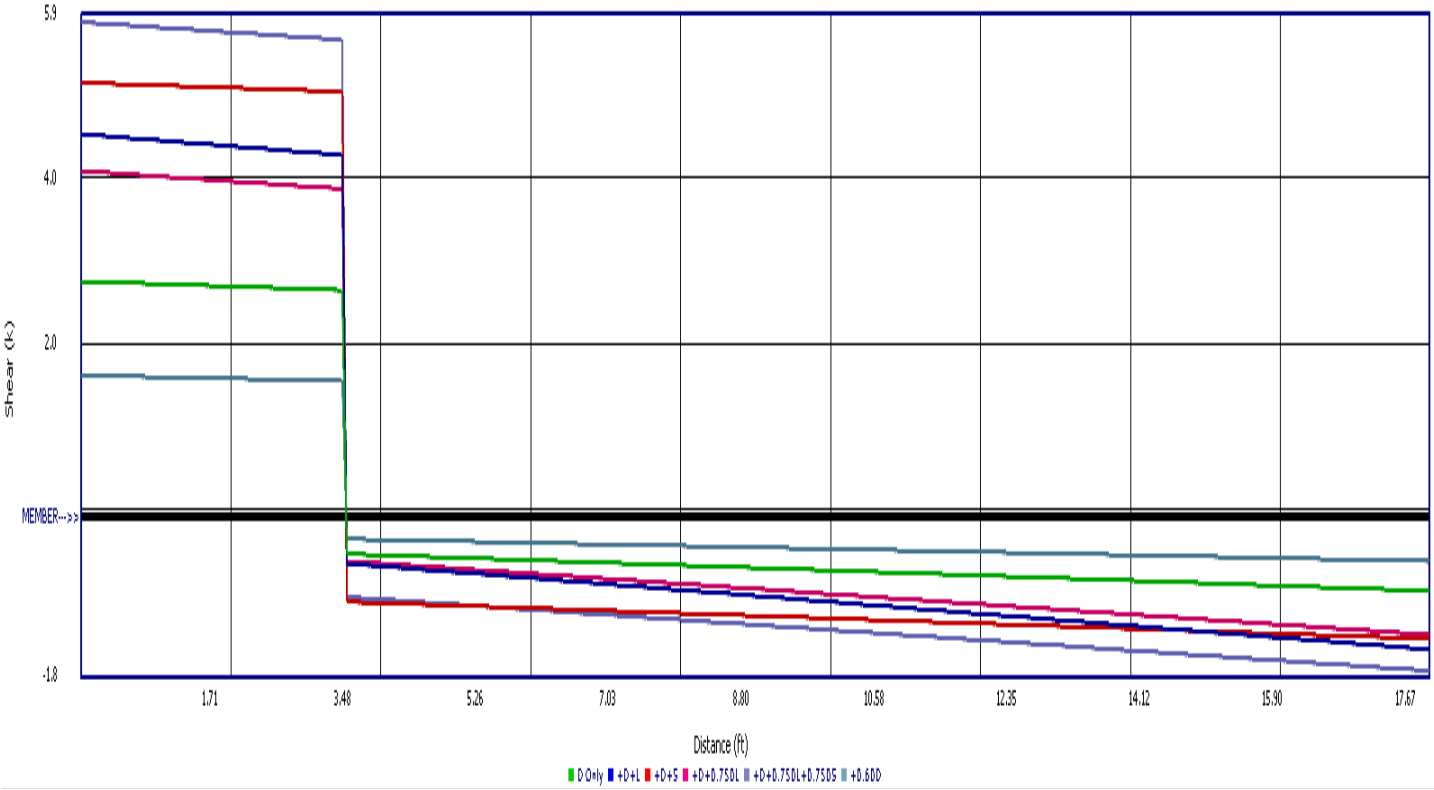


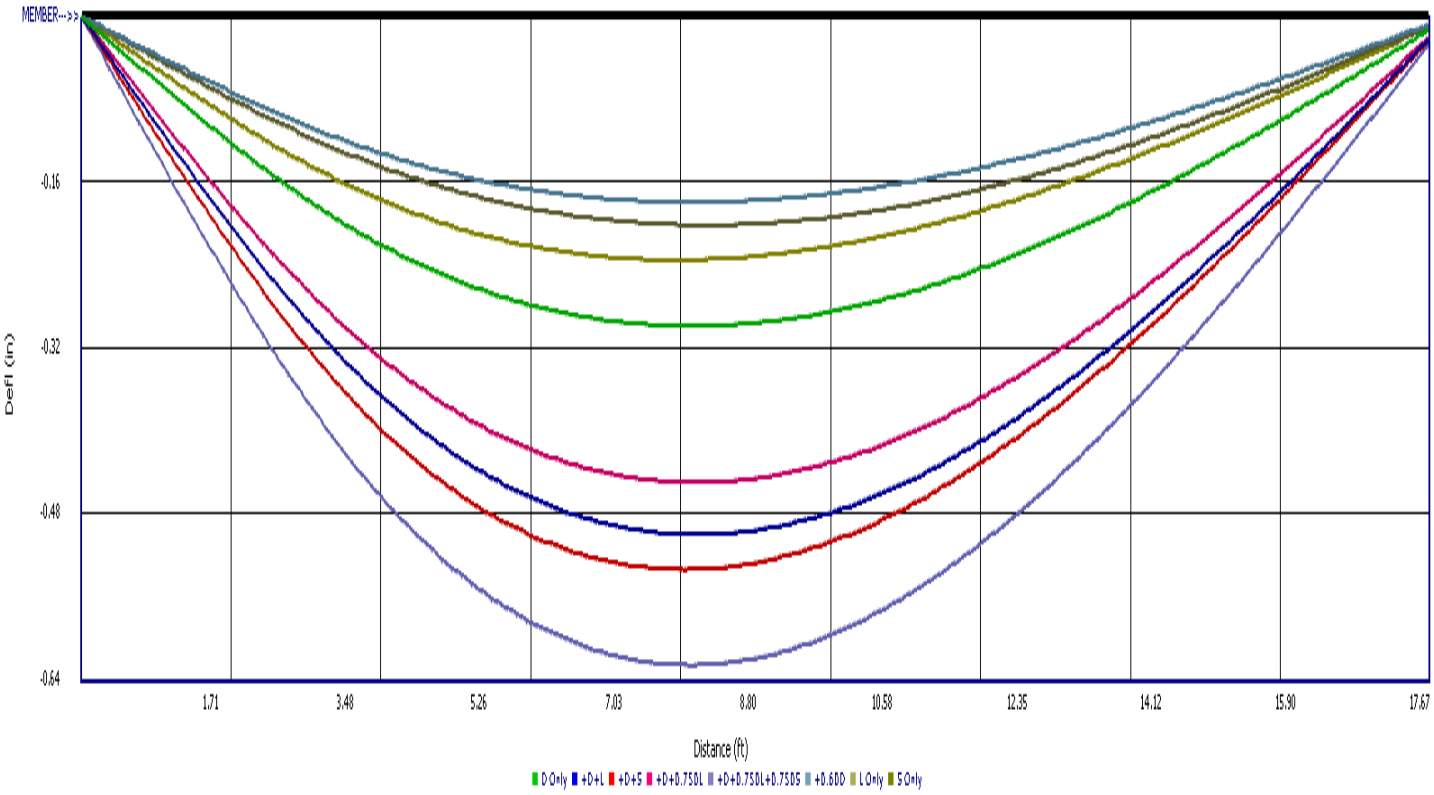
Wood Beam

Project File: 22025 Astrid Building 7.ec6

LIC# : KW-06018035, Build:20.23.08.30 JVA (c) ENERCALC INC 1983-2023

DESCRIPTION: B3





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Date: 8/30/23 Page: 1 of ____
By: JDC Chkd By: ____
Job No: 22025
Project: Astrid Bldg #7
Client: ____

☐ Preliminary ☐ Final

Determine Req'd Bm Size 4B1: Living Rm. Bm

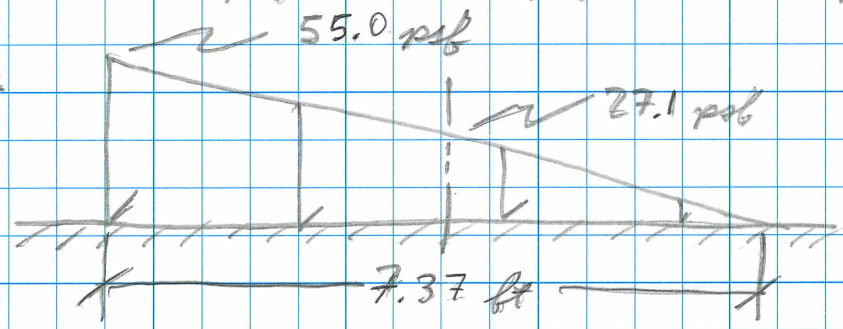
- Loads: DL = 30 psf LL = 40 psf

Trib: $\frac{19' + 16.33'}{2} = \frac{35.33'}{2} = 17.665'$

Determine Req'd Deck Framing

- Loads: DL = 62.5 psf LL = 100 psf SL = 102 psf

drifting:



– determine point loads applied to girder

$P_{DL} = 5.63k$ $P_{LL} = 8.17k$ $P_{SL} = 8.63k$

∴ Use W12×30

$P_{DL} = 5.67k$ for GLB @ ridge

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4.4.2 Nominal Flexural Strength (ACI 318)

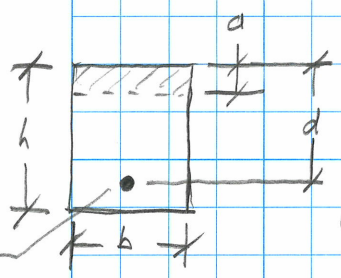
$$M_n = A_s f_y \left(d - \frac{a}{2}\right)$$

determine 'a' by setting compression in conc C equal to tension force in steel T

where $C = 0.85 f_c' b a$

$T = A_s f_y$

so: $a = \dfrac{A_s f_y}{0.85 f_c' b} = 0.706$ in.



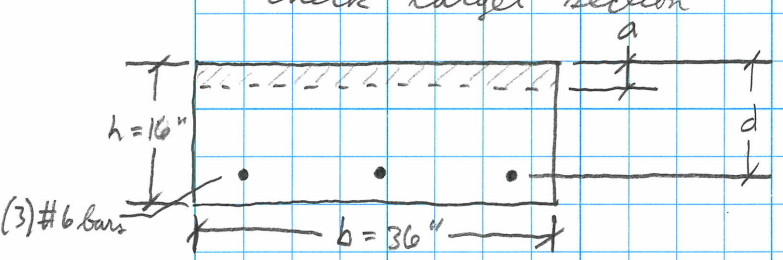
$M_n = 437.3$ k-in
$= 36.44$ k-ft

$\boxed{\phi M_n = 32.8 \text{ k-ft}}$

$b = 12''$ (bar spacing)
$h = 14''$
$d = 12.5''$
$f_y = 60$ ksi
$f_c' = 5$ ksi
$A_s = 0.6$ in^2
$\phi = 0.9$ (for flexure)
$E_s = 29{,}000$ ksi

$$\beta_1 = 0.85 - [0.05(f_c' - 4{,}000)/1{,}000] = 0.8$$

- check larger section



$A_s = (3)\,0.44 \text{ in}^2 = 1.32 \text{ in}^2$
$a = 0.51765$ in.
$d = 14.5$ in.
$M_n = 969.5$ k-in
$= 80.79$ k-ft
$\phi M_n = 72.712$ k-ft

- determine required flexural reinforcement (A_s; $A_{s,t}$ limits)

$$A_{s,req'd} = \frac{0.85 f_c' b d}{f_y}\left[1 - \sqrt{1 - \frac{2R_n}{0.85 f_c'}}\right] \qquad R_n = \frac{M_u}{\phi b d^2} \qquad \phi = 0.9$$

$M_u = 85.236$ k-ft
$= 1022.832$ k-in

$f_c' = 5000$ psi
$= 5$ ksi

$f_y = 60{,}000$ psi
$= 60$ ksi

$$A_{s,t} = \frac{0.85 \beta_1 f_c' b d}{f_y}\left(\frac{0.003}{\varepsilon_{ty} + 0.006}\right) \qquad \varepsilon_{ty} = \frac{f_y}{E_s} = 0.00207$$

- Determine Req'd Flexural Reinforcement (continued...)

$$R_n = \frac{1022.832 \text{ k-in}}{0.9(36\text{ in})(14.5\text{ in})^2} = 0.15015 \text{ ksi} \qquad 0.1422$$

$$A_{s,\,req'd} = \frac{0.85(5\text{ ksi})(36\text{ in})(14.5\text{ in})}{60\text{ ksi}}\left[1-\sqrt{1-\frac{2(0.15015\text{ ksi})}{0.85(5\text{ ksi})}}\right]$$

$$= 36.975\text{ in}^2\,[0.036] \qquad \boxed{A_{s,\,req'd} = 1.33\text{ in}^2}$$

$$A_{s,t} = \frac{0.85(0.8)(5\text{ ksi})(36\text{ in})(14.5\text{ in})}{60\text{ ksi}}\left(\frac{0.003}{0.00207+0.006}\right)$$

$$\boxed{A_{s,t} = 11\text{ in}^2}$$

$$A_{s,\,req'd} \le A_{s,t} \quad ✓ \text{ O.K.}$$

∴ use (4) #6 bars @ 10" o.c. (for 40" width section)

$$A_{s,\,provided} = 1.76\text{ in}^2$$

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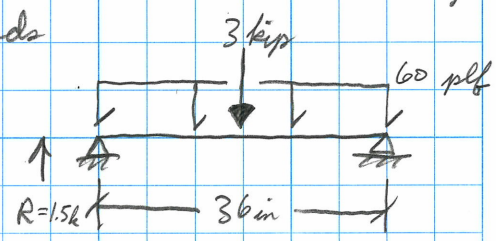
Revised Garage over Media Rm Design

- Check Max Span for 1.5C deck w/ 4" non-struct. slab

Load Determination

- DL: 4" slab above 1.5C deck $= \left(5'' + \frac{1.5''}{2}\right)\left(\frac{1\ ft}{12\ in}\right) \times 145\ \frac{lb}{ft^3} = 69.5\ psf$
  - 1.5C24 deck self-weight $= 1.3\ psf$
  - 1.5C22 deck self-weight $= 1.6\ psf$
  - ∴ use 60 psf DL
- LL: 40 psf garage load
  - (2) 3 kip point loads for car jack (in $4.5\ in^2$ area per ASCE 7-16 4.10.1)

Check 1.5C22 ga. Deck for Construction Loads



$$M_{DL} = \frac{71.1\ plf\ (5.25\ ft)^2}{8} = 245\ lb\text{-}ft$$

$$M_{LL} = \frac{10\ plf\ (5.25\ ft)^2}{8} = 34.5\ lb\text{-}ft$$

$M_u = 279.5\ lb\text{-}ft \leq \frac{M_n}{\Omega} = 447\ lb\text{-}ft$ ✓ design acceptable

$$\left.\begin{array}{l} DL_{const.} = 71.1\ psf \\ LL_{const.} = 10\ psf \end{array}\right\} \text{applied load} = 81.1\ psf$$

1.5C22 2-span deck capacity (5'-6 span)

$\frac{W_n}{\Omega} = 110\ psf$ $\qquad$ $L/240 = 110\ psf$

$L/240 = 1/4''$ defl.

Check Vert. Web Shear

$V_u = 2031\ lbf$ $\qquad$ $\frac{V_n}{\Omega} = 1551\ lbf$ ✗ design NOT acceptable for 24 ga. deck

∴ use 1.5C22 where $\frac{V_n}{\Omega} = 2654\ lbf$ ✓ design ok.

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Date: 11/7/23 Page: 7 of ____
By: JDC Chkd By: ____
Job No: 22025
Project: astrid Bldg # 7
Client: ____

☐ Preliminary ☐ Final

Astrid Deck Bms / Girders Re-design:

- bldg is type VA construction, all structure to be rated. NO exposed steel outside. Need to change to HEAVY TIMBER.

- Options for Timber
  - LVL: wet use factor not provided by NDS; must be specified by manufacturer

  - Solid-sawn Timber
    - ↳ looking at DFL #2 min. 20 × 24
    - ↳ DFL #1 min. 18 × 20
    - ↳ C_M: $F_b = 1.0$ $F_t = 1.0$ $F_v = 1.0$ $F_{c\perp} = 1.0$ $F_c = 0.91$ E & $E_{min} = 1.0$ (Table 4D NDS SUPP. pg. 46)

  - Glu-lam
    - ↳ C_M: $F_b = 0.8$ $F_t = 0.8$ $F_v = 0.875$ $F_{c\perp} = 0.53$ $F_c = 0.73$ E & $E_{min} = 0.833$ (Table 5A NDS Supp. pg 62)
    - ↳ using DF/HF gr. 24F-V5 min. 10.75 × 18
      - * alaskan yellowcedar * V13 for 2-span ($F_b = 2000$ psi)

  - PWT LVLs

→ check Glu-lam Columns instead of HSS

* check 2-span condition for girders
- full landing + 1/2 stair (100 psf) loads

Astrid Deck Bms / Girders Re-design (continued...)

See Enercalc 22025 Astrid Bldg #7 file

- Roof
  - RB3: DL = 20 psf SL = 100 psf

    ∴ use AC/AC gr. 20F-V13 Glulam 5.5 x 18 $f_b/F_b' = 0.92$

    extreme rxns: #1) 0.68D 3.12S #2) 5.05D 23.17S #3) 1.94D 8.91S

  - Col_A2.5: DL = 5.05k SL = 23.17k

    ∴ use AC/AC gr. 20F-V13 Glulam 5.5 x 6 axial + bending = 0.78

- Deck / Landing
  - 4B2 (Deck Ridge Bm) DL = 50 psf LL = 150 psf SL = 84 psf drift = 54.2 psf

    D = 4.47
    L = 12.31
    S = 11.32

    ∴ use AC/AC gr. 20F-V12 Glulam 10.75 x 21 $f_b/F_b' = 0.955$
  - 4B3 (Deck Girder, 2-span) *point & distr. loads*

    ∴ use AC/AC gr 20F-V13 Glulam 6.75 x 21 $f_b/F_b' = 0.912$

    extreme rxns: #1) 0.44D 2.1L 4.01S #2) 5.5D 15.7L 17.1S #3) 1.7D 4.5L 4S

  - Col_A2.2: [Loads from B.O.C.] @ 6.5' DL = 0.44k LL = 2.1k SL = 4.01k
    @ 18.7' DL = 0.44k LL = 2.1k SL = 4.01k
    @ 26.5' DL = 0.7k SL = 3.12k

    ∴ use AC/AC gr. 20F-V13 Glulam 6.75 x 7.5 axial + bending = 0.98

    No bracing $K_x, K_y = 1.0$

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① Clarify w/ Geotech about stiff clay w/out free water

② Create FBD / Hand calc for whole structure
↳ explore load paths
↳ base shear
↳ inherent passive soil resistance

③ Create max feasible pier, then determine max load that provides 1" defl. (capacity of 30", 24", etc.)

④ Conference call w/ arch, contractor, geotech to show challenges and options

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By: JDC Chkd By: ____
Job No: 22025
Project: Astrid Bldg #7
Client: ____

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Deck Framing

- Applied Loads
  - Dead Load
    - 5" slab (150 pcf conc) = 62.5 psf
    - 1.75 x 9.25 LVL (41 pcf) = 3.5 psf
  - Live Load
    - 40 psf x 1.5 = 60 psf stairs = 100 psf
  - Snow Load
    - $p_f = 0.7(1.0)(1.2)(1.0)\ p_g$ = 102 psf
    - $p_g = \max[(k/100)A^3, 25]$ = 85.85 psf
      where $k = 24.5$
      $A = 7.05$ (k ft)
      p_g (Routt County) = 121.11 psf
    - Drift Surcharge = 55 psf

- Fire Resistance of Exposed Wood Members - NDS Ch. 16
  - nominal char rate $\beta_n = 1.5$ in/hr *1hr fire rating
    - type VA

- Ridge Bm (4B2): 8.75 x 21 GLB
- Girder @ Deck (4B3): 5.5 x 21 GLB
- Alt Girder (4B3.1): 8.75 x 16.5 GLB

- Revit Pile update
  - change all to 18" Ø
  - make piles under elevator core 24" Ø
  - check 15' pier lateral capacity

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Date: 12/20/23 Page: 18 of
By: JDC Chkd By:
Job No: 22026
Project: Astrid Bldg # 7
Client:

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Entrance Canopy Framing

* 7½ × 11¼ from arch. DR# 1 & bts.

- 5'-0 overhang; need 10'-0 backspan
  ↳ start w/ 5'-0 backspan, find rxn
- 2x rafters w/ 5'-3 overhang, 3-span b/w beams

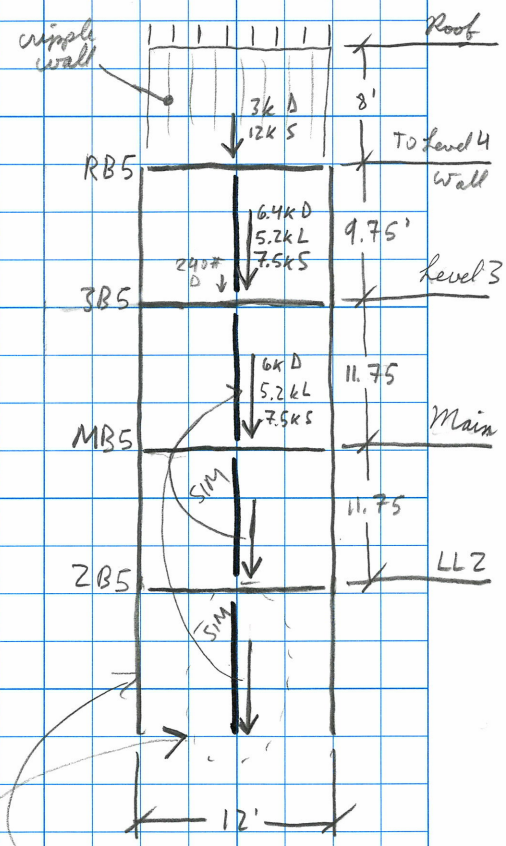
p_D = 84 psf * need in load of 168 plf along edge

- face mount hanger for bm backspan
- add to roof bm map
- typ. deck GLB hanger =
- give Hillary a call to review LPile
- compile materials for meeting
  - all correspondence w/ Geotech LPile parameters
  - LPile input parameters
    - ↳ show stiff clay
    - ↳ show weak rock

30D + 40L (interior)

- resize LVL header (rather than STL)
- resize columns (interior) to LVLs
  ↳ chase gravity from roof & 3 floors

* check deck frames around windows
* check cripple wall from roof into header
* try 7¼ LVL (up to (4))



Columns @ Deck Windows

- **Roof Loads**

11.75 LVL cripple wall @ 16" weight = 4.5 psf
↳ LVL density = 42 psf

- DL_{wall} = 4.5 psf × 8' trib
- DL_{roof} = 20 psf × (9⅛' + 8') trib
- $SL_{high\ roof}$ = 85 psf × 9⅛' trib
- $SL_{low\ roof}$ = 103 psf × 8' trib

- **Level 3 Loads**

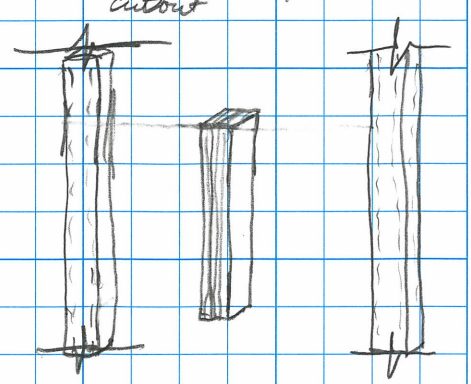
- DL_{girder} = 26 plf × (18¼ span/2) = 240 lb
- DL_{floor} = 30 psf × 9⅛' trib
- DL_{deck} = 62.5 psf × 8' trib
- LL_{floor} = 40 psf × 9⅛' trib
- LL_{deck} = 40 psf × 8' trib
- SL_{deck} = 1 klf

how many trims? (gravity)
how many hangs?
↳ make up for window cutout

Check Column as built-up LVL

- Total Load

DL = 3k + 6.4k + (3) 6k = 27.4 k
LL = (4) 5.2 k = 20.8 k
SL = 12k + (4) 7.5k = 42 k



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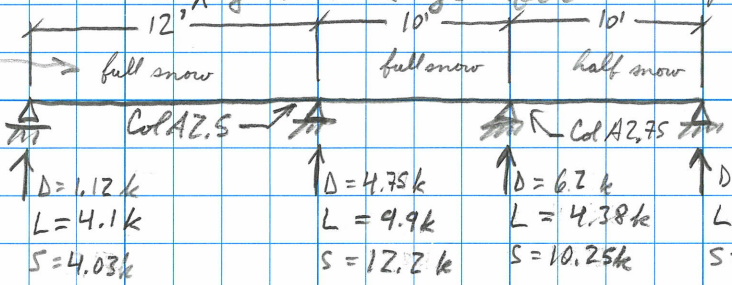
Deck Framing

DL = 62.5 psf SL = 102 psf (use for beams) LL = 60 psf (use for cols from deck)

- Fire Resistance of Exposed Wood Members - NDS Ch. 16
- nominal char rate = 1.5 in/hr

DECK

- minimum girder size for 3-span condition: 5.5x10.5 AC/AC ZOF-V13 GLB

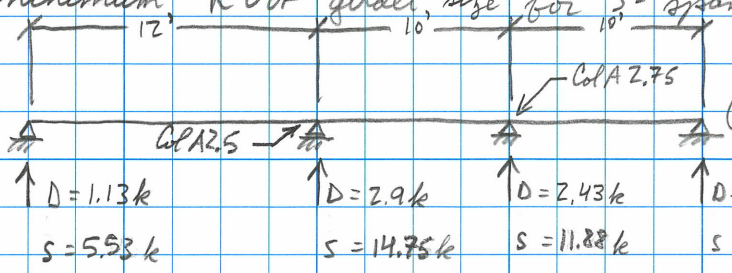


(DECK loading) ∴ use 8.75x13.5 GLB for 1-hr fire rating

- snow load on continuous beam systems per ASCE 7-16 Ch. 7.5.1
  case 1: full on exterior spans, half on others
  case 2: half on exterior spans, full on others
  case 3: all possible combos of full on (2) adjacent spans and half on all other spans (total possible combos = # spans - 1)

∴ all load combos checked for roof; case (3) governs (see above)

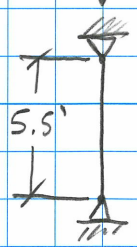
- minimum ROOF girder size for 3-span condition: 5.5x10.5 AC/AC ZOF-V13 GLB



(ROOF loading) ∴ use 8.75x13.5 GLB for 1-hr fire rating

Deck Column Design (A 2.75)

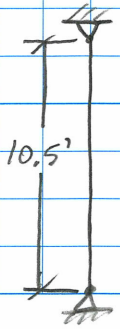
- Lower Level 1 Col_A2.75



D = 2.43k + (3)6.2 k = 21.03k
L = (3) 4.38k = 13.14k
S = 11.88k = 11.88k

∴ use

- Lower Level 2 Col_A2.75



D = 2.43k + (2)6.2 k = 14.83k
L = (2) 4.38k = 8.76k
S = = 11.88k

∴ use

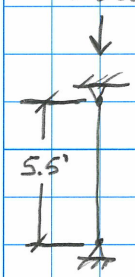
Astrid To-Do:

1) Resize deck girders / posts based on D+S loading
2) Check connections (girder hangers & crushing in wood grains)
3) Review updated soils info w/ Bryan and discuss options for retaining walls @ 2:00 pm 1/29
   ↳ update Risa 3D model w/ new lateral pressures
   ↳ review interior counterforts (needed for structural slabs)
   ↳ update Risa / Revit models with new foundation steps
   discuss w/ Bryan
4) Check geofoam (from Mark)

Deck Framing (continued...)

- Deck Column Design

- Lower Level 1 Col_A2.5

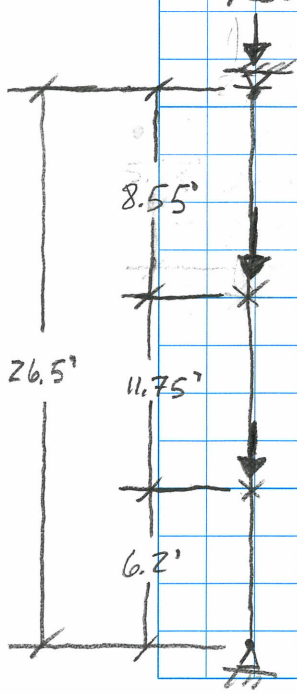


D = 2.9k + (3) 4.75k = 17.15k
L = (3) 9.9k = 29.7k
S = = 14.75k

- Lower Level 2 Col_A2.5

D = 2.9k + (2) 4.75k = 12.4k
L = (2) 9.9k = 19.8k
S = = 14.75k

- Lower Level 2 Col_A2.25



D = 1.13k
L =
S = 5.53k

D = 1.12k
L = 4.1k

D = 1.12k
L = 4.1k

- Deck Column / Bm Connection Design
  - governing load combo: D + 0.75S + 0.75L
  - governing connection @ Col - A2.5 Lower Level 1

$$17.5k + 0.75(29.7k + 14.75k) = 50.49k \text{ (ASD load)}$$

- Astrid Foundation Design
  - start bluebeam studio session w/ Chris

  - 12" dia. pier = 132 kip capacity (ASD)
  - 14" dia. pier = 175 kip
  - 16" dia. pier = 240 kip
  - 18" dia. pier = 278 kip

  - L-Pile Analysis:
    NODES TO CHECK (rxns in kip)

UNFACTORED

max(y) rxn	• N276	(x)	D = -6	L = -1.8	S = -3	E = 20.5	W = 1.5	∴ use 16" ø w/ (5) #6 bars
		(y)	D = 99.1	L = 52	S = 84.6	E = -4.6	W = -5.3	
		(z)	D = 6.7	L = 3.6	S = 3.8	E = 8.3	W = 9	
		$\sqrt{x^2+z^2}$	D = 8.1	L = 3.2	S = 3.4	E = 21.2	W = 9.1	
max(x) rxn	• N260	(x)	D = 11	L = 1.8	S = 1.3	E = 17	W = 5.1	∴ use 14" ø w/ (4) #6 bars
		(y)	38.2	5.3	4.7	4.5	4.9	
		(z)	3.1	0.5	0.6	5.6	-2.6	
		$\sqrt{x^2+z^2}$	11.4	1.9	1.4	17.7	5.7	
max(z) rxn	• N213	(x)	D = -2.4	L = -1.4	S = 0.0	E = -12.4	W = 7.5	∴ use
		(y)	64.4	24.5	38.7	6.4	-19	
		(z)	17.5	7.4	13	5.4	-3.9	
		$\sqrt{x^2+z^2}$	17.7	7.5	13	13.5	8.5	

geofoam - nothing higher than 19

Connection Design

- **Deck Girder - Post (Concealed face hanger)**
  - extreme DECK girder end rxns:

WEST	D = 1.12 k	L = 4.1 k	S = 4.03 k	ASD = 7.22 k ← GOVERNS
EAST	D = 2.17 k	L = 2.1 k	S = 3.95 k	ASD = 6.71 k

  - extreme ROOF girder end rxns:

WEST	D = 1.13 k	S = 5.53 k	ASD = 6.7 k
EAST	D = 1 k	S = 4.63 k	ASD = 5.63 k

∴ use CBH 2.37 x 9.75 (9,335 lb capacity for DF/SP)

- **Deck Girder - Post (Column Cap)**
  - extreme DECK column (Col_A 2.75 Lower Level) rxn
    D = 21.03 k L = 13.14 k S = 11.88 k ASD = 39.8 k
  - extreme DECK column (Col_A 2.5 Lower Level) rxn
    D = 17.15 k L = 29.7 k (0.8) S = 14.75 k ASD = 46.0 k ← Governs
  - determine girder bearing capacity (crushing ⊥ grain)
    $F_{c\perp}$ = 560 psi ; C_M = 1.0 C_t = 1.0 C_b = 1.0
  - determine minimum req'd bearing area

$$\frac{46{,}033 \text{ lbf}}{560 \text{ lb/in}^2} = 82.2 \text{ in}^2 \quad (\text{min } 9\tfrac{1}{2} \times 9\tfrac{1}{2} \text{ bearing area})$$

  - concealed girder - col connection (top bearing)
    8.00 x 10.5 glulam column bearing area = 84 in²
    ↳ determine utilization ratio $\left(\frac{46{,}033 \text{ lb}}{84 \text{ in}^2}\right)$ = 548 psi

$$\frac{f_c}{F_{c\perp}} = \frac{548 \text{ psi}}{560 \text{ psi}} = 97.9\%$$

∴ use 8" x 10.5" Connext T- connectors

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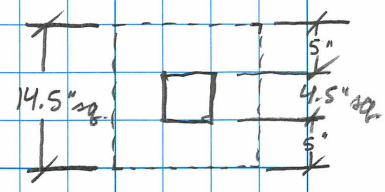
- 5" Slab on Geofoam @ Garages



- design loads
  - Dead Load

    $\frac{5''}{12''/ft}$ conc. slab × 150 psf = 63 psf

  - Live Load
    - ↳ typ. residential garage = 40 psf
    - ↳ jack load = 3000 lb acting in 4.5" × 4.5" area
  - ASD Load Combination
    - ↳ typ. garage D+L = 103 psf
    - ↳ concentrated garage load = 2055 psf = 14.3 psi

- EPS Geofoam Design Values (compressive resistance @ % deformation)
  - EPS 12
    - ↳ 1% : 2.2 psi = 317 psf
    - ↳ 5% : 5.1 psi = 734 psf
    - ↳ 10% : 5.8 psi = 835 psf
  - EPS 15
    - ↳ 1% : 3.6 psi = 518.4 psf
    - ↳ 5% : 8.0 psi = 1152 psf
    - ↳ 10% : 10.2 psi = 1469 psf
  - EPS 19
    - ↳ 1% : 5.8 psi = 835 psf
    - ↳ 5% : 13.1 psi = 1886 psf
    - ↳ 10% : 16 psi = 2304 psf
  - EPS 39
    - ↳ 1% : 15 psi = 2160 psf
  - EPS 22
    - ↳ 1% : 7.3 psi = 1051.2

- determine depth to use EPS 12 (use 30°) (use 6" slab)

$$2.2\text{ psi} = \frac{3000\text{ lbf}}{\left[(4.5\text{ in} + 12\text{ in}) + 2(\tan(30)\,d)\right]^2}$$

solve for d (depth)

$$\sqrt{\frac{2.2\text{ psi}\left[(16.5\text{ in}) + 2(\tan(30)\,d)\right]^2}{2.2\text{ psi}}} = \frac{\sqrt{\frac{3000\text{ lb}}{2.2\text{ psi}}} - 16.5\text{ in}}{2\tan(30)}$$

$$d = \frac{\sqrt{3000/2.2} - 16.5}{2\tan(30)}$$

$= 17.7$ in → use 18 in (1.5 ft)

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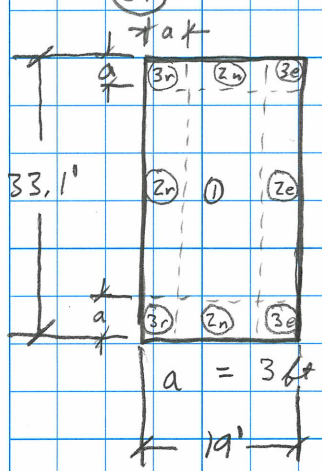
Connection Design

- Deck Girder - Post (Concealed SHERPA Hanger)

- extreme deck girder rxns: ASD = 7.22 k
- uplift: -21 psf (wind)

- roof is considered "overhang" Ch. 30 part 6
- use equation $p = q_h\left[(GC_p) - (GC_{pi})\right]$ where $GC_{pi} = \pm 0.18$
  $q_h = 31.6$ psf
- determine GC_p from Figure 30.3-2C (components & cladding)
  - effective wind area = 30.5' x 9.6' = 291.7 ft²

1 & 2e	= -1.8
2n & 2r	= -2.2
3e	= -1.7
3r	= -2.4



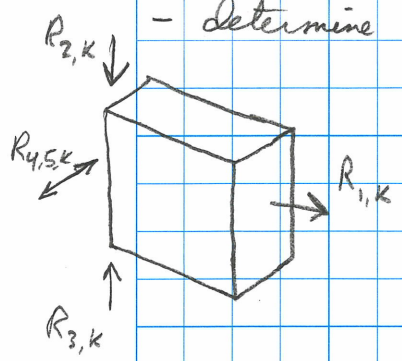
Max Uplift for Connection Design

↳ interior support D = 2.9 k W = -7.52 k
ASD uplift: 0.6D + 0.6W = -2.772 k

↳ end support D = 1.13 k W = 3.21 k
ASD uplift: 0.6D + 0.6W = -1.25 k

GLB Dimensions / Rxns (Metric) 8.75 x 13.5
222.25 mm x 342.9 mm
download = 32.12 kN uplift = 5.6 kN

- determine appropriate SHERPA hanger



∴ use M40 Sherpa connector (B60 x H170 x L14)
$R_{2,k}$ = 40.1 kN $R_{3,k}$ = 8.95 kN

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higher density foam at bottom typical

foam not great for point loads

geofoam load transfers at 45° angles

EPS 39 below, EPS 15 above?

- Call w/ BPK 2/8/24
  - need 8" ledge all around bldg
    ↳ update reinforcing schedule
    ↳ piers need to be centered
      - recheck piers for new gravity loads (thickened walls
  - check options for Sherpa connector
  - check post base connection @ 33 in² conc. columns
    ↳ beam connection as well
  - recheck column sizes for full-height @ LL1

Sherpa connections
Simpson concealed timber connect
- use either SL or LL, not both on decks
- remove drift loads likely to control

Deck Columns - @ Grade

- need to use min. 5.5 x 11.25
  + 3" + 3" (fire protection)
  = 8.75 x 15 ← available size

Deck Columns @ Lower Level 1

- need to use min. 5.5 x 9.25
  +3" +3" (fire protection
  = 8.75 x 13.5 ← available size

- determine allowable live load reduction in columns
  A_T (per floor) = 164 ft^2 K_{LL} (columns) = 4
  (3) A_T = 492 ft^2

$$L = L_0\left(0.25 + \frac{15}{\sqrt{K_{LL} A_T}}\right) \Rightarrow L = L_0(0.6) \quad \text{(lower level 1)}$$

(4) A_T = 656 ft^2

$$L = L_0(0.55) \quad \text{(grade col)}$$

CONSULTING ENGINEERS

JVA JOB NO. 22025

SECTION 4 - LATERAL ELEMENTS

Project:	Astrid Bldg 7	Date:	09/11/23	Job No.:	22025
Client:	ESA	By:	BPK	Sheet	of

ASCE 7-16

Equivalent Lateral Force Procedure

					Notes
Site Class	C		Table 20.3-1		A -> F; hard rock -> lic
S_S	0.593	g	Figures 22-1:22-8	https://as	The soils response (ac
S_1	0.103	g	Figures 22-1:22-8		The soils response (ac
F_a	1.3		Table 11.4-1		Short period site coeff
F_v	1.5		Table 11.4-2		long period site coeff
$S_{MS}=F_aS_s$	0.749	g	11.4-1		spectral response para
$S_{M1}=F_vS_1$	0.155	g	11.4-2		spectral response para
$S_{DS}=(2/3)S_{MS}$	0.499	g	11.4-3		design spectral respor
$S_{D1}=(2/3)S_{M1}$	0.103	g	11.4-4		design spectral respor
Risk Category	I or II		Table 1.5-1		
Seismic Design Category	C		Tables 11.6-1 & 11.6-2		A->F; higher risk categ
I_e	1.00		Table 1.5-2		seismic importance fa
Five stories or fewer in height?	Yes				
Basic Seismic-Force-Resisting System	light wood frame walls and steel moment frames				
R	3		Table 12.2-1		
C_T	0.020		Table 12.8-2		
x	0.75		Table 12.8-2		
h_n	50	ft			
$T_a=C_th_n^x$	0.38	seconds	12.8-7		
T_L	4.00	seconds	Figures 22-14:22-17		
C_s	0.09		12.8.1.1		
$V=C_sW$	**111**	**k**	12.8-1		

Level	Floor Area (ft^2)	Floor Weight (psf)	Wall Area (ft^2)	Wall Weight (psf)	w_x (k)
Roof	4,929	37	2112	15	214
Roof Elev core	0	0	204	100	20
4th Floor	3,738	30	3900	15	171
4th Floor Elevator Core	0	0	204	100	20
4th Floor Lower Roof	1,703	50	0	0	85
4th Floor Deck/Stair	466	70	0	0	33
4th Floor Mech Roof	274	95	0	0	26
3rd Floor	3,320	30	4770	15	171
3RD Floor Elevator Core	0	0	204	100	20
3RD Floor Lower Roof	231	50	0	0	12
3RD Floor Deck/Stair	540	70	0	0	38
2ND Floor	3,583	30	3288	15	157
2ND Floor Elevator Core	0	0	204	100	20
2ND Floor Lower Roof	43	50	0	0	2
2ND Floor Deck/Stair	540	70	0	0	38
1ST Floor	3,035	30	2796	15	133
1ST Floor Elevator Core	0	0	204	100	20
1ST Floor Deck/Stair	540	70	0	0	38
				W=	1,219 k

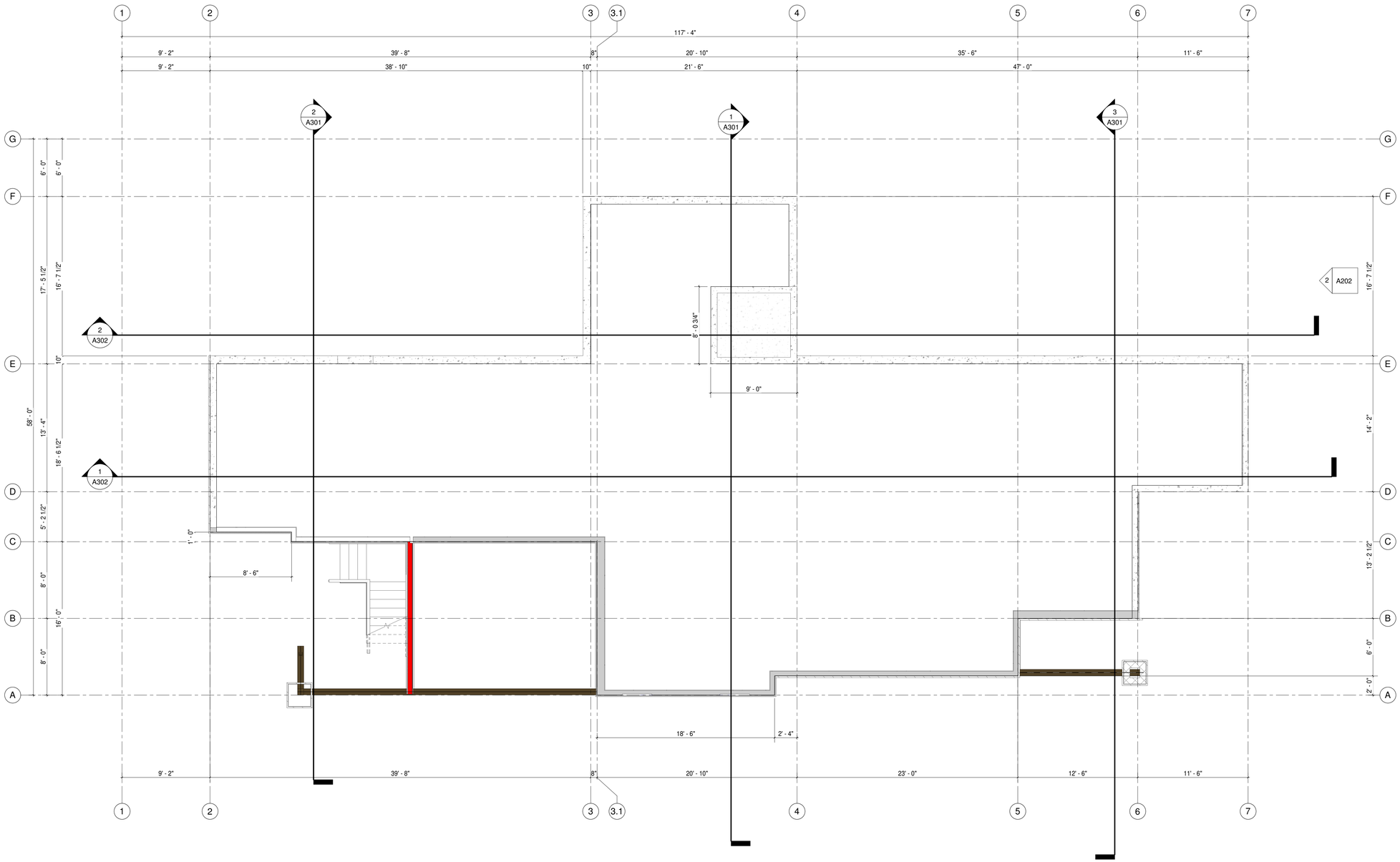
Seismic Design Base Shear	.7V	78	k		ASD	
Wind Design Base Shear		43	k		ASD	Seismic Controls

Project: Astrid Bldg 7 Date: 09/11/23 Job No.: 22025

Client: ESA By: BPK Sheet of

Vertical Distribution

Level	w_x (k)	h_x	w_xh_x	Cv_x	LRFD Fx (k)	ASD .7Fx (k)	
Roof	214	47	10,060	0.328	36.5	25.5	WIND SEISMIC
Roof Elev core	20	47	959	0.031	3.5	2.4	
4th Floor	171	35	5,972	0.195	21.7	15.2	
4th Floor Elevator Core	20	35	714	0.023	2.6	1.8	
4th Floor Lower Roof	85	35	2,980	0.097	10.8	7.6	
4th Floor Deck/Stair	33	35	1,142	0.037	4.1	2.9	
4th Floor Mech Roof	26	35	911	0.030	3.3	2.3	
3rd Floor	171	23	3,936	0.128	14.3	10.0	
3RD Floor Elevator Core	20	23	469	0.015	1.7	1.2	
3RD Floor Lower Roof	12	23	266	0.009	1.0	0.7	
3RD Floor Deck/Stair	38	23	869	0.028	3.2	2.2	
2ND Floor	157	11	1,725	0.056	6.3	4.4	
2ND Floor Elevator Core	20	11	224	0.007	0.8	0.6	
2ND Floor Lower Roof	2	11	24	0.001	0.1	0.1	
2ND Floor Deck/Stair	38	11	416	0.014	1.5	1.1	
1ST Floor Deck/Stair	38	0	0	0.000	0.0	0.0	
W=	1,065 k		30,668	1.00		77.9	



1 A100 01-FOUNDATION / CRAWLSPACE
3/16" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

PROGRESS SET (NOT FOR CONSTRUCTION)

DATE: 2023-08-01

NOTICE: DUTY OF COOPERATION

Release of these plans contemplates further cooperation among the owner, his contractor and the architect. Design and construction are complex. Although the architect and his consultants have performed their services with due care and diligence, they cannot guarantee perfection. Communication is imperfect and every contingency cannot be anticipated. Any ambiguity or discrepancy discovered by the use of these plans shall be reported immediately to the architect. Failure to notify the architect compounds misunderstanding and increases construction costs. A failure to cooperate by a simple notice to the architect shall relieve the architect from responsibility for the consequences. Changes made from the plans without consent of the architect are unauthorized and shall relieve the architect of responsibility for all consequences arriving out of such changes.

REVISIONS

No.	Description	Date

EDGEMONT/SHERMAN FOURPLEX BUILDING 7

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Job Number:	22014
Date:	7/25/2023
Drawn By:	Author
Checked By:	Checker

Project Phase
SD

Sheet Title
FOUNDATION / CRAWLSPACE PLAN

Sheet Number
A100

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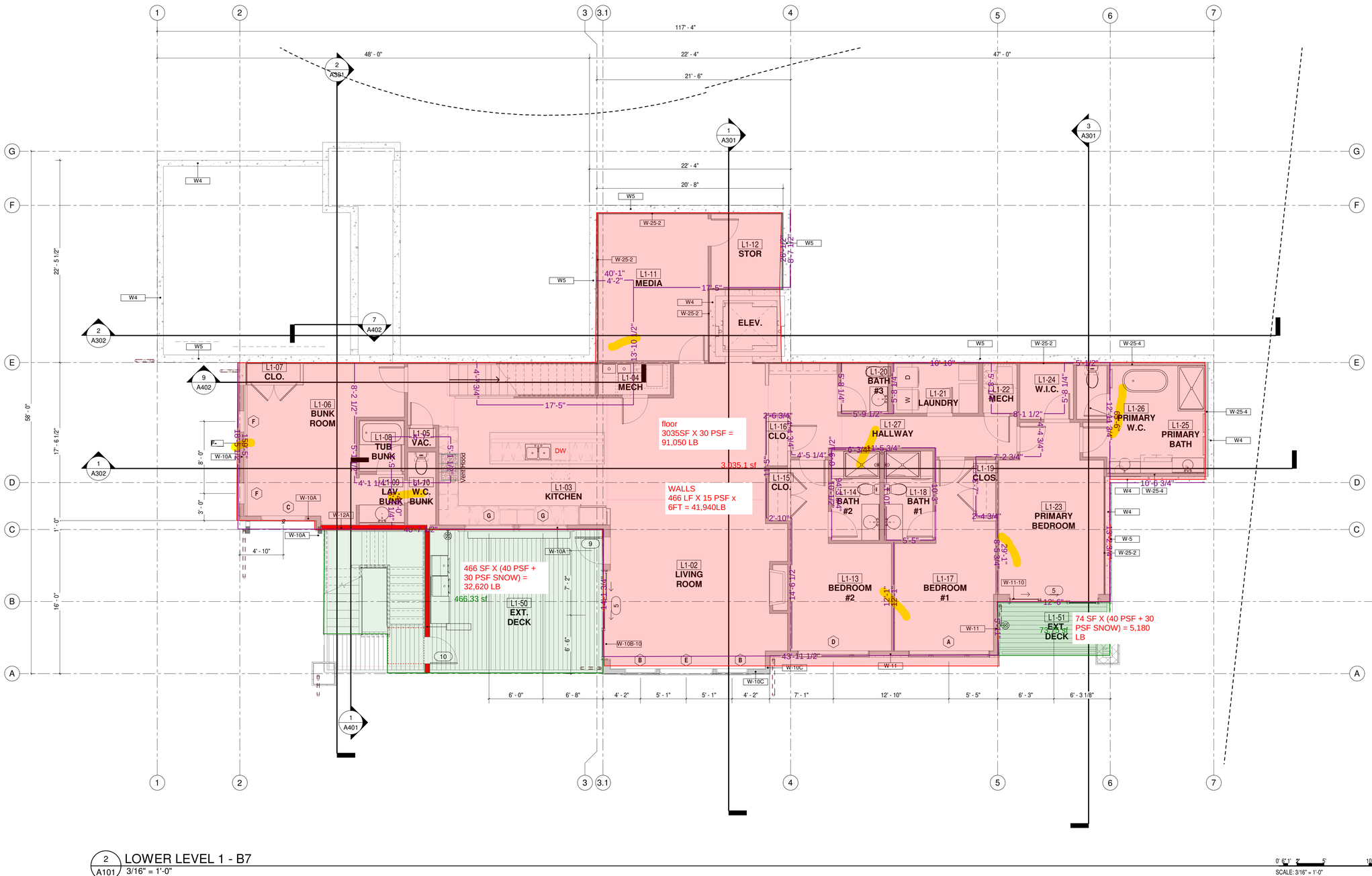

2 A101 LOWER LEVEL 1 - B7
3/16" = 1'-0"

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STEAMBOAT SPRINGS COLORADO

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Date:	7/25/2023
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Project Phase
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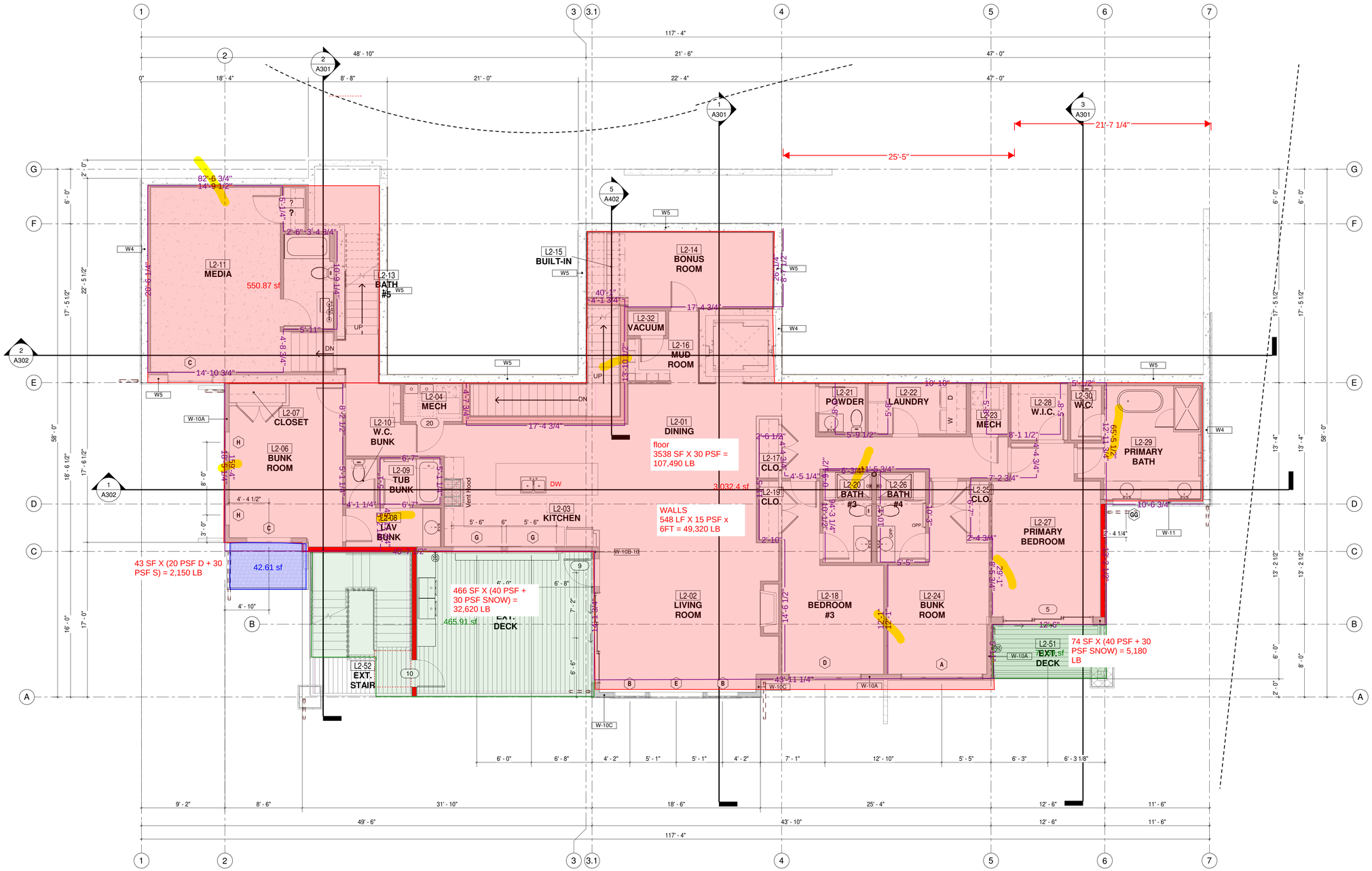
Sheet Title
LOWER LEVEL 1 PLAN

Sheet Number
A101



2 A102 LOWER LEVEL 2 - B7
3/16" = 1'-0"

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Sheet Title
LOWER LEVEL 2 PLAN

Sheet Number
A102

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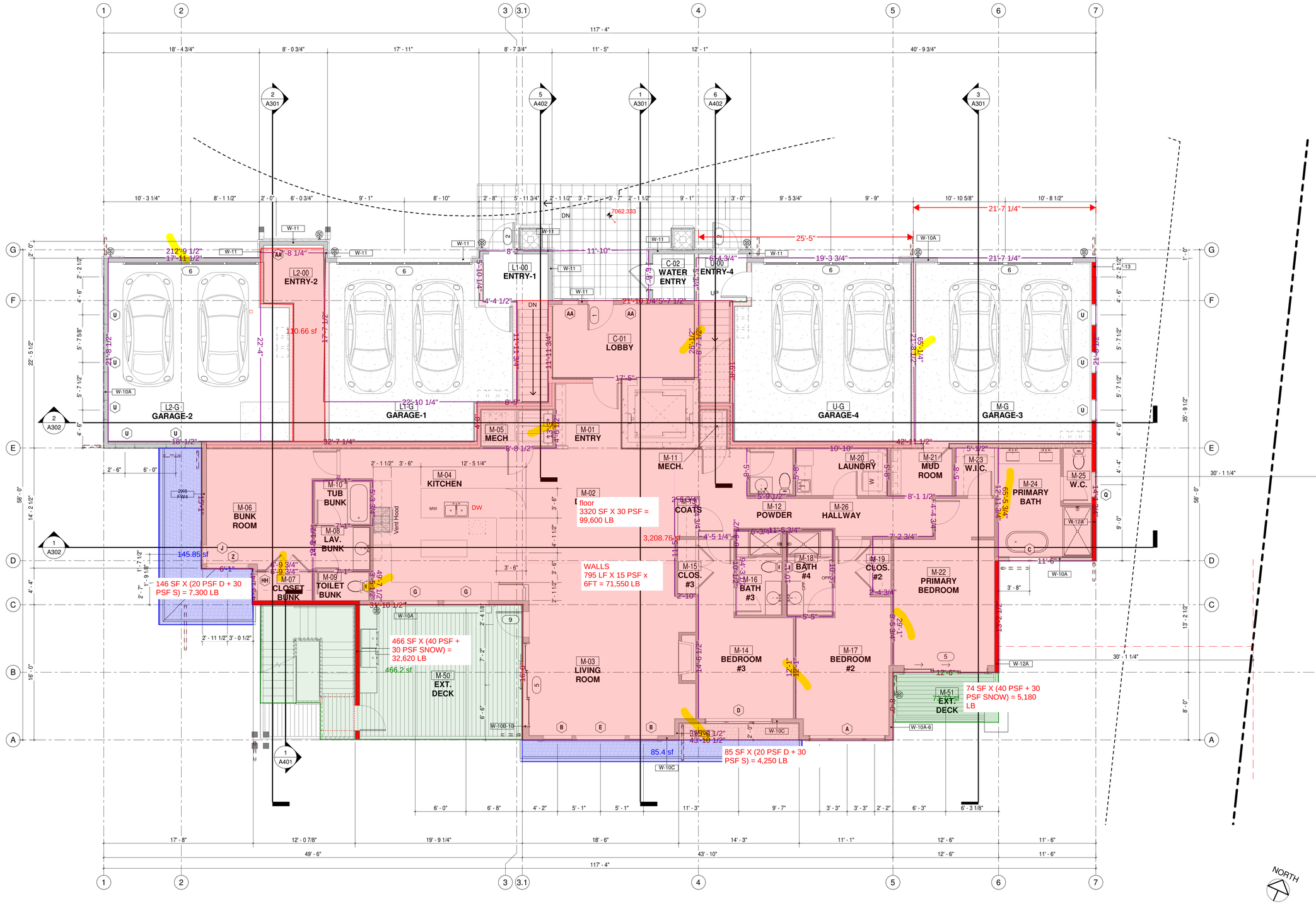

2 A103 MAIN LEVEL - B7
3/16" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

PROGRESS SET (NOT FOR CONSTRUCTION)

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REVISIONS

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EDGEMONT/SHERMAN FOURPLEX BUILDING 7

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Date:	7/25/2023
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Project Phase
SD

Sheet Title
MAIN LEVEL PLAN

Sheet Number
A103

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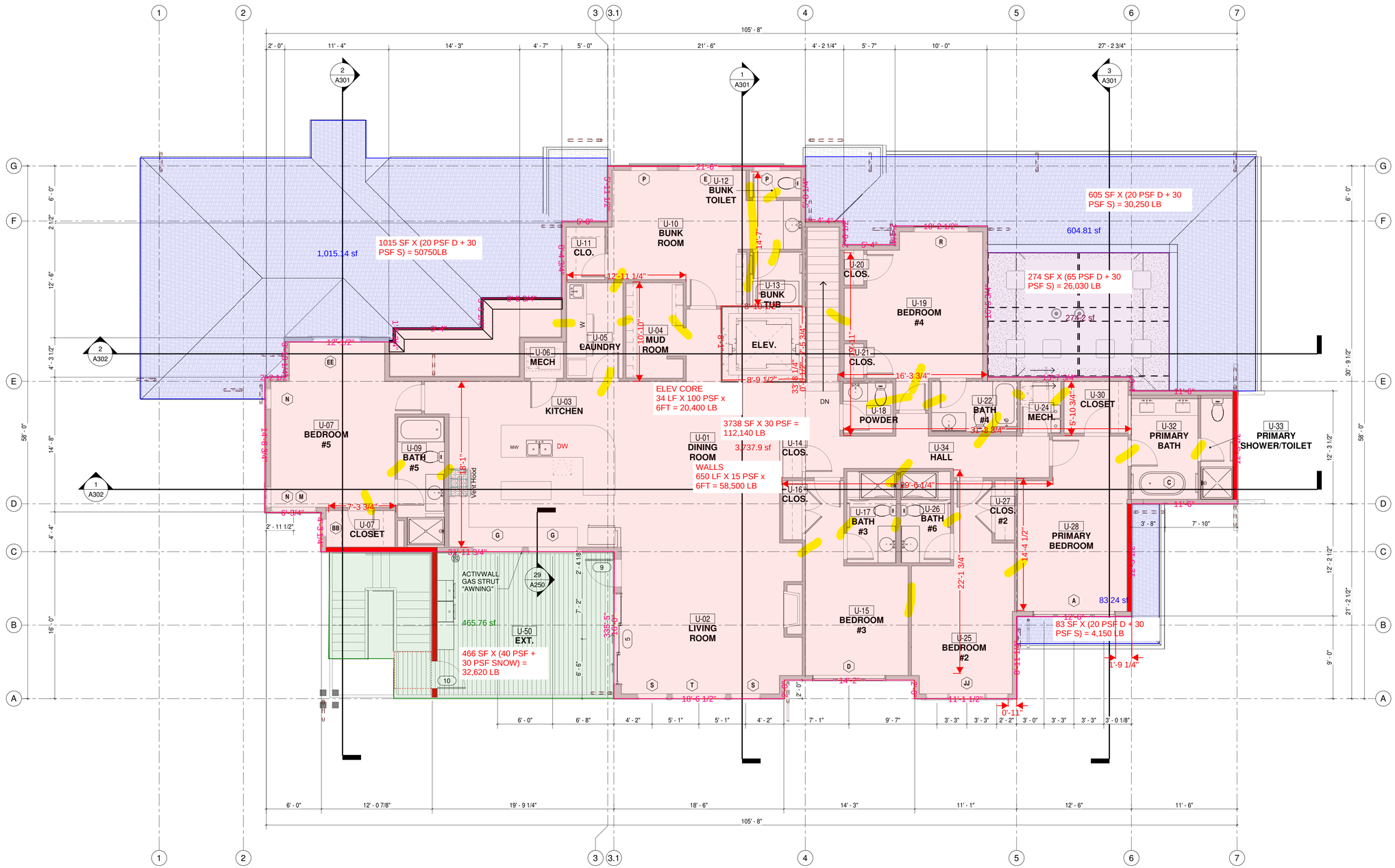

1 A104 UPPER LEVEL - B7
3/16" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

PROGRESS SET (NOT FOR CONSTRUCTION)

DATE: 2023-08-01

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EDGEMONT/SHERMAN FOURPLEX BUILDING 7

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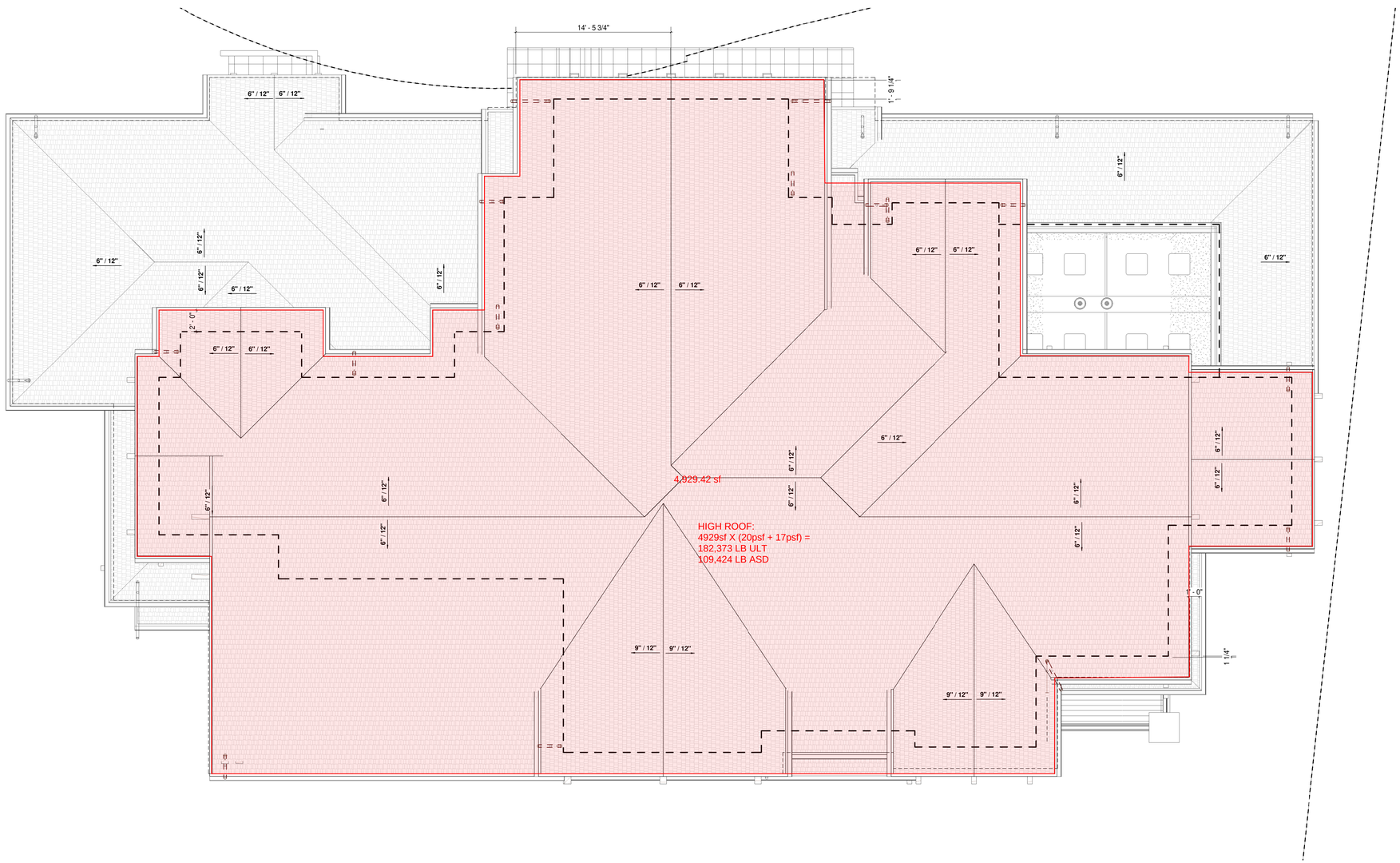
Sheet Title
UPPER LEVEL PLAN

Sheet Number
A104



1 A105 ROOF PLAN - (B7)
3/16" = 1'-0"

NORTH

0' 6" 1' 2' 5' 10' 15'
SCALE: 3/16" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

PROGRESS SET (NOT FOR CONSTRUCTION)

DATE: 2023-08-01

NOTICE: DUTY OF COOPERATION

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REVISIONS

No.	Description	Date

EDGEMONT/SHERMAN FOURPLEX BUILDING 7

STEAMBOAT SPRINGS COLORADO

ERIC SMITH ASSOCIATES, P.C.
1919 SEVENTH STREET
BOULDER, COLORADO, 80302
(303) 442-5455, (303) 442-4745 FAX

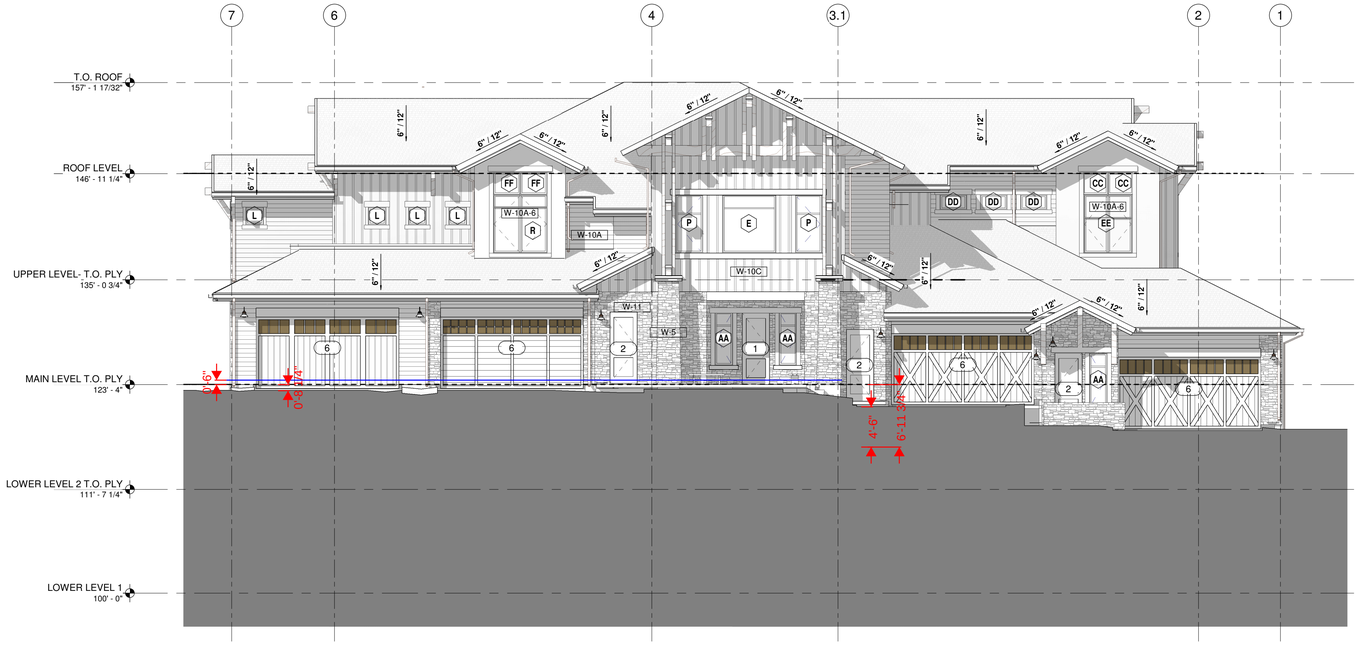
Job Number:	22014
Date:	7/25/2023
Drawn By:	ESA
Checked By:	T.J.

Project Phase
SD

Sheet Title
ROOF PLAN

Sheet Number
A105

8/9/2023 3:45:11 PM 22014 THE ASTRID CONDO B7 V22.RVT

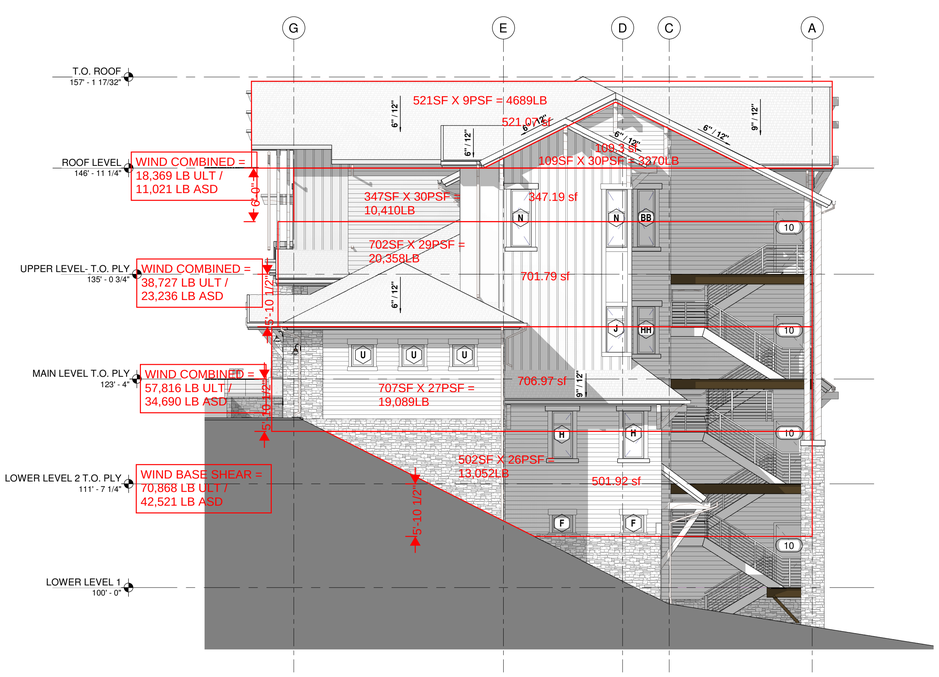


2 A201 NORTH ELEVATION - (B7)
1/8" = 1'-0"

EXTERIOR FINISH SCHEDULE			
	MATERIAL / MANUFACTURER	DESCRIPTION / COLOR	NOTES
W10A	HORIZONTAL LAP SIDING	PREFINISHED, BLACK, GAUGE 26	1,3
W10B	VERTICAL PANEL SIDING	CEDAR TEXTURE, 'AGED PEWTER'	1
W10C	VERTICAL PANEL SIDING	CEDAR TEXTURE, 'KHAKI BROWN'	1
W11	STONE VENEER	CEDAR TEXTURE, 'IRON GRAY'	1
WXX5	FLAT PANEL	T.B.D.	1
R-1	ASPHALT SHINGLE ROOFING	NATURAL SHADOW, CHARCOAL	
A	STRUCTURAL WOOD TIMBER	NATURAL CEDAR STAINED	
B	FASIA	SMOOTH FINISH	
C	PREFINISHED METAL CAP FLASHING	1 13 HOME, PREFINISHED, BLACK SAND WITH FASCIA POST	
D	1 X 6 CEDAR TRIM		
E	2 X 8 CEDAR TRIM	NATURAL CEDAR STAINED	
F	WALL MOUNTED LIGHT FIXTURE	LED, PREFINISHED BLACK	2
G	GUTTER	SHERWIN WILLIAMS 'SW7076 CYBER SPACE'	
H	WOOD SOFFIT PANEL	NATURAL CEDAR STAINED	
I	T.B.D.	BLACK POWDER COATED WAVE STYLE	
J	EXHAUST LOUVER	PAINT LOUVER AND TRIM TO MATCH SIDING	
K	T.B.D.	PAINT LOUVER AND TRIM TO MATCH SIDING	
J	PTAC UNIT		

KEYED NOTES:
1.) SEE EXTERIOR ELEVATION FOR RIB, LAP, OR REVEAL ORIENTATION.
2.) SEE ELECTRICAL FOR FIXTURE INFORMATION & POWER REQUIREMENTS.
3.) METAL TRIM, CLOSURES, AND FASTENERS TO BE INSTALLED PER MANUFACTURER'S REQUIREMENTS. FINISH TO MATCH PREFINISHED METAL PANEL COLOR AND TEXTURE.

GENERAL NOTES:
A.) ALL WINDOW GLAZING TO BE DESIGNED TO MINIMIZE EXTERIOR REFLECTIONS
B.) FINAL COLORS TO BE APPROVED BY OWNER & ARCHITECT.
C.) ALL MATERIALS TO BE INSTALLED PER MANUFACTURER'S RECOMMEDATIONS AND SPECIFICATIONS.
D.) EXTERIOR MATERIAL ALTERNATES TO BE APPROVED BY ARCHITECT & OWNER PRIOR TO ORDER & INSTALL.
E.) (T) INDICATES TEMPERED/SAFETY GLASS



1 A201 WEST ELEVATION - (B7)
1/8" = 1'-0"

WIND EAST WEST
(SEISMIC CONTROLS)

WINDOW/DOOR NOTES:

THESE WINDOW/DOOR LOCATIONS ARE BASED ON MARVIN ULTIMATE WINDOW, MARVIN ULTIMATE LIFT AND SLIDE DOOR & DOOR FRAME SIZES AND ARE SUBJECT TO CHANGE IF DIFFERENT MANUFACTURE WINDOW /DOOR DIMENSION ARE USED.

WINDOW TYPE G LOCATIONS ARE BASED ON ACTIV WALL GAS STRUT WINDOW AND ARE SUBJECT TO CHANGE IF DIFFERENT MANUFACTURE WINDOW /DOOR DIMENSION ARE USED.

EXTERIOR ELEVATION NOTES:

A. WINDOW HEAD HEIGHTS (H.H.) ARE AS FOLLOWS UNLESS NOTED OTHERWISE:
   a. FIRST LEVEL: 8'-0" OFF OF TOP OF SUB-FLOOR
   b. SECOND & THIRD FLOORS: 8'-1 1/2" OFF OF TOP OF SUB-FLOOR
B. COORD. THE TERMINATION OF STONE AT THE UNDERSIDE OF THE WINDOW SILL (WHERE INDICATED WITHIN THE EXTERIOR ELEVATIONS) WITH THE STONE CAP & WINDOW SILL FLASHING PER WINDOW MFR. SPECIFICATIONS.

FLOOR TO FLOOR ELEVATION NOTES:

1. FLOOR TO CEILING ELEVATIONS ARE BASED OFF OF A STANDARD PRECUT WOOD STUD ASSEMBLY (UNLESS OTHERWISE NOTED). TYPICAL FIRST FLOOR: ONE (1) SILL PLATE AND TWO (2) TOP PLATES FOR A TOTAL FLOOR TO CEILING HEIGHT OF 9'-1 1/8" (T.O. SLAB TO UNDERSIDE OF FLOOR). BLDG. 1 STEPS DOWN 9" ALONG GRIDLINE 4 (T.O. SLAB TO UNDERSIDE OF FLOOR = 9'-10 1/8") & BLDG. 2 STEPS DOWN 12" ALONG GRIDLINE 4 (T.O. SLAB TO UNDERSIDE OF FLOOR = 10'-1 1/8"). TYPICAL SECOND & THIRD FLOOR: TWO (2) SILL PLATES AND TWO (2) TOP PLATES FOR A TOTAL FLOOR TO CEILING HEIGHT OF 9'-2 5/8" (T.O. FLOOR SHEATHING TO UNDERSIDE OF FLOOR OR ROOF TRUSS). REFERENCE BUILDING ASSEMBLIES & STRUCTURAL CONSTRUCTION DRAWINGS FOR WALL THICKNESS, REFERENCED FIRE RESISTANCE RATED ASSEMBLY (IF APPLICABLE) AND STUD SPACING. CONTACT ARCH. & STRUCT. ENG. WITH ANY DISCREPANCY.
2. FLOOR STRUCTURE IS BASED OFF OF 3/4" WOOD SHEATHING OVER 11-7/8" I-JOISTS. ACTUAL DEPTH OF TRUSSES ARE KNOWN TO VARY BETWEEN MFR. & TYPE. FLOOR TO FLOOR ELEVATIONS SHALL BE ADJUSTED IN THE FIELD AS REQ'D BASED ON THE ACTUAL FLOOR TRUSSES BEING INSTALLED. FLOOR TO CEILING ELEVATIONS ARE TO REMAIN UNCHANGED BASED ON THE STANDARD PRE-CUT STUD ASSEMBLIES REFERENCED ABOVE. REFERENCE BUILDING ASSEMBLIES & STRUCTURAL CONSTRUCTION DRAWINGS FOR FLOOR TOPPING & SHEATHING, FLOOR STRUCTURE THICKNESS, REFERENCED FIRE RESISTANCE RATED ASSEMBLY (IF APPLICABLE) AND JOIST SPACING. CONTACT ARCH. & STRUCT. ENG. WITH ANY DISCREPANCY.

0' 2' 5' 10' 15' 25'
SCALE: 1/8" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

PROGRESS SET (NOT FOR CONSTRUCTION)

DATE: 2023-08-01

NOTICE: DUTY OF COOPERATION

Release of these plans contemplates further cooperation among the owner, his contractor and the architect. Design and construction are complex. Although the architect and his consultants have performed their services with due care and diligence, they cannot guarantee perfection. Communication is imperfect and every contingency cannot be anticipated. Any ambiguity or discrepancy discovered by the use of these plans shall be reported immediately to the architect. Failure to notify the architect compounds misunderstanding and increases construction costs. A failure to cooperate by a simple notice to the architect shall relieve the architect from responsibility for the consequences. Changes made from the plans without consent of the architect are unauthorized and shall relieve the architect of responsibility for all consequences arriving out of such changes.

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No.	Description	Date

EDGEMONT/SHERMAN FOURPLEX BUILDING 7
STEAMBOAT SPRINGS COLORADO

ERIC SMITH ASSOCIATES, P.C.
1919 SEVENTH STREET
BOULDER, COLORADO, 80302
(303) 442-5455, (303) 442-4745 FAX

Job Number:	22014
Date:	7/25/2023
Drawn By:	ESA
Checked By:	T.J.

Project Phase
SD

Sheet Title
EXTERIOR ELEVATIONS

Sheet Number
A201

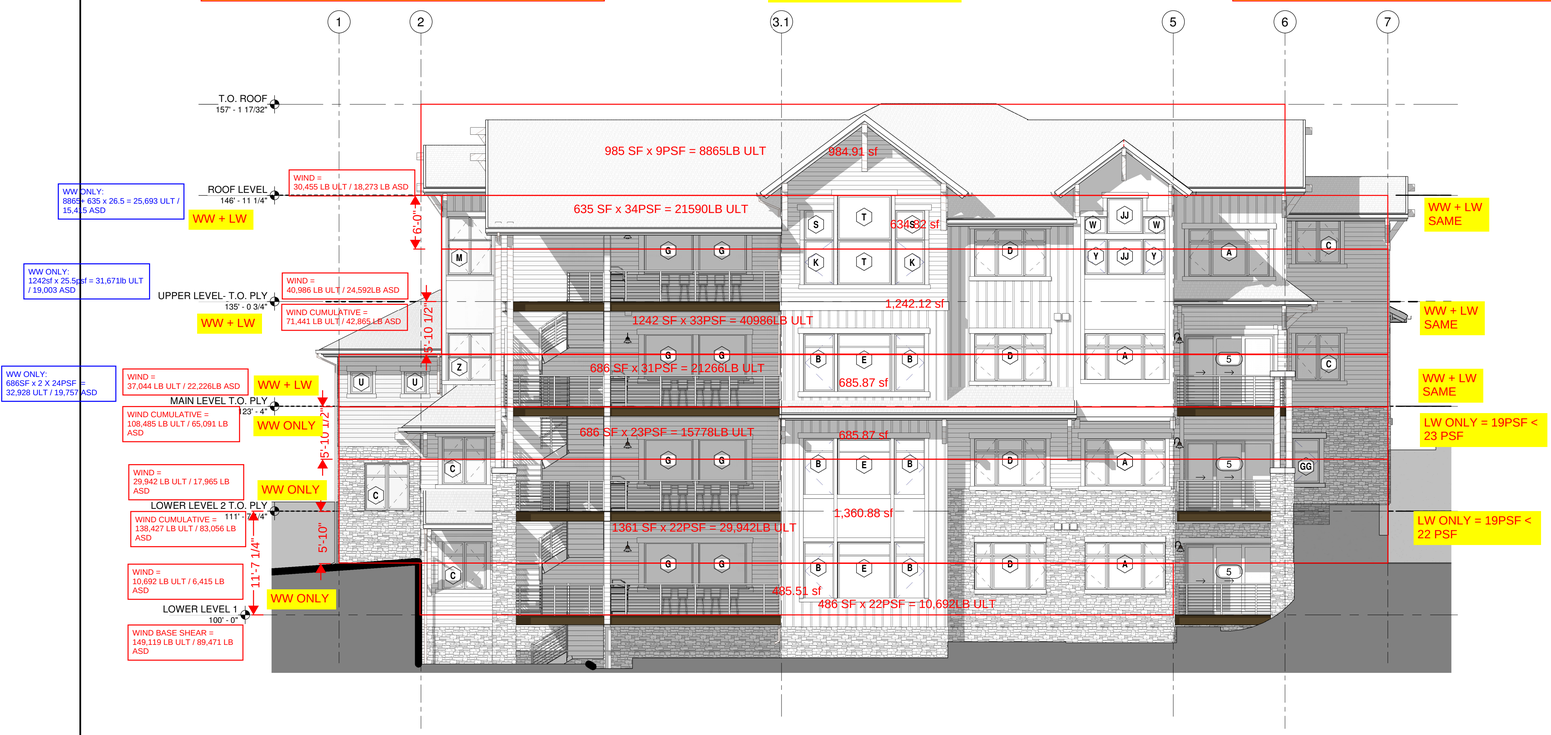
8/9/2023 3:45:37 PM 22014 THE ASTRID CONDO B7 V22.RVT

WIND SCENARIO 1 - WIND BLOWING FROM SOUTH

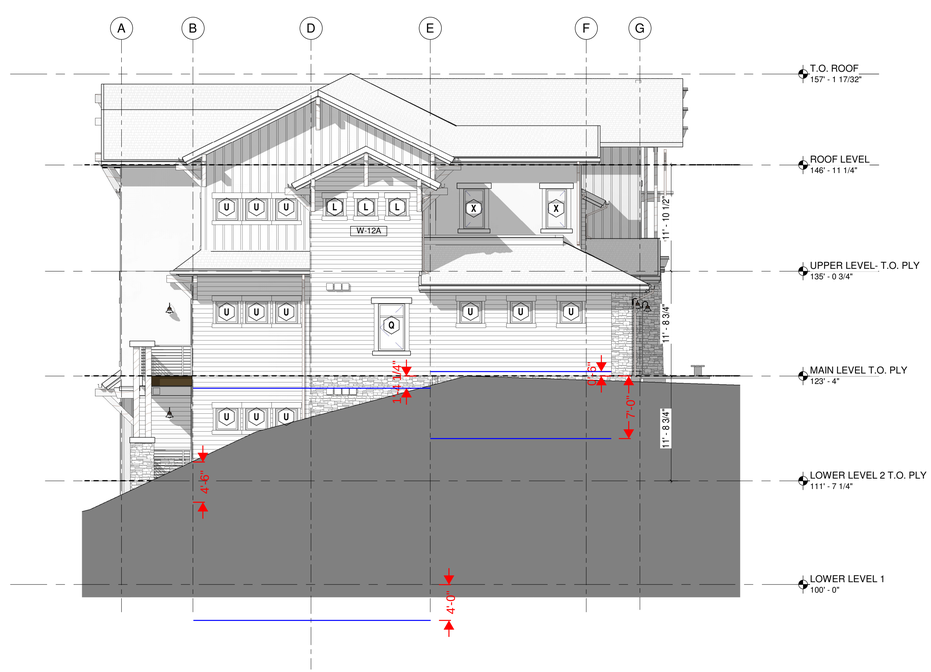
CONTROLS

WIND SCENARIO 2 - WIND BLOWING FROM NORTH

WIND NORTH SOUTH (WIND CONTROLS)



1 A202 SOUTH ELEVATION - (B7)
1/8" = 1'-0"



2 A202 EAST ELEVATION - (B7)
1/8" = 1'-0"

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No.	Description	Date

EDGEMONT/SHERMAN FOURPLEX BUILDING 7

STEAMBOAT SPRINGS COLORADO

ERIC SMITH ASSOCIATES, P.C.
1919 SEVENTH STREET
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Job Number:	22014
Date:	7/25/2023
Drawn By:	ESA
Checked By:	T.J.

Project Phase
SD

Sheet Title
EXTERIOR ELEVATION

Sheet Number
A202

DATE: 2023-08-01

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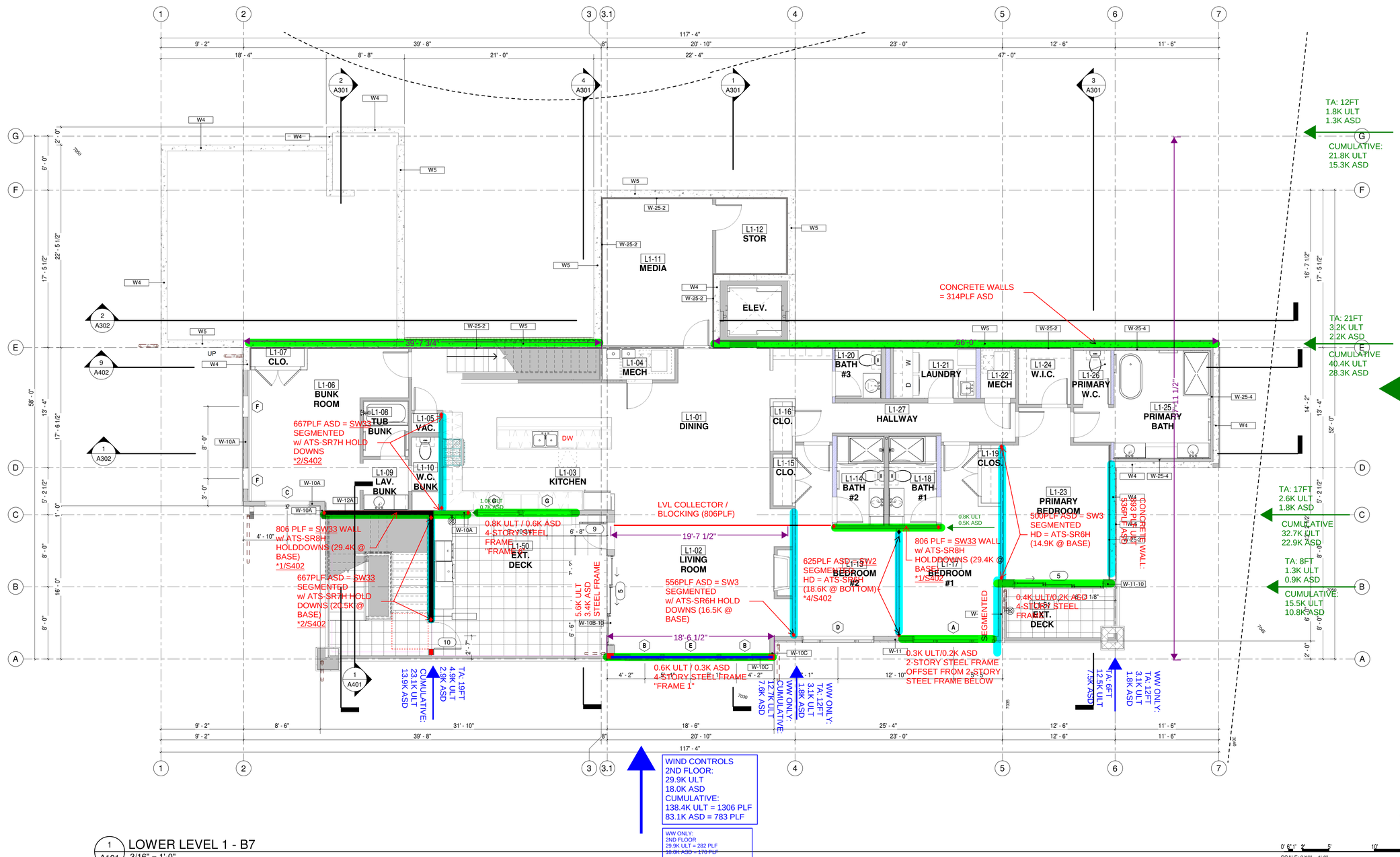
PROGRESS SET (NOT FOR CONSTRUCTION)

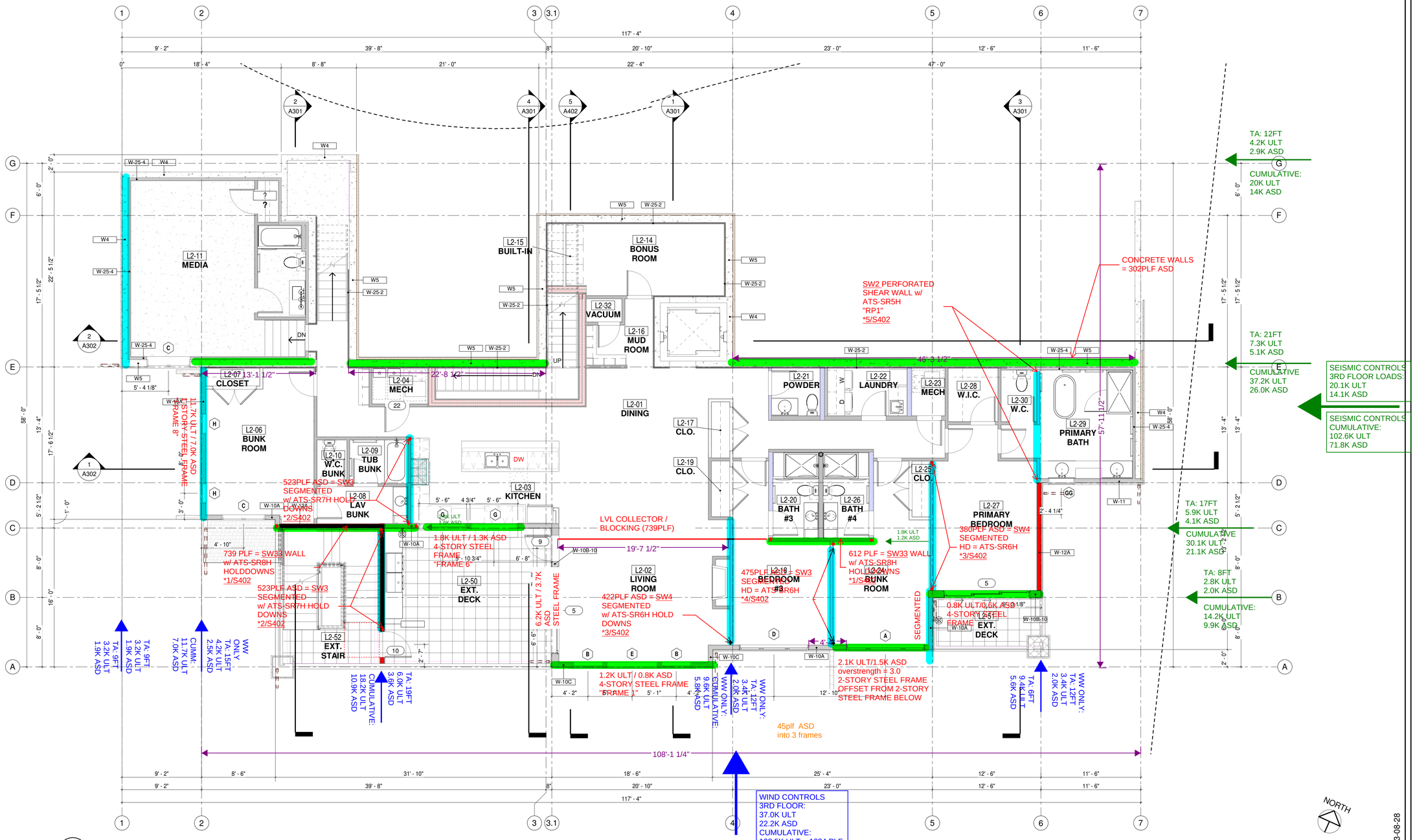


1 A101 LOWER LEVEL 1 - B7
3/16" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

9/20/2023 9:05:18 AM 22014 THE ASTRID CONDO B7 V22.RVT

DATE: 2023-08-28



1 A102 LOWER LEVEL 2 - B7
3/16" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

PROGRESS SET (NOT FOR CONSTRUCTION)

DATE: 2023-08-28

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ASTRID BUILDING 7
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BOULDER, COLORADO, 80302
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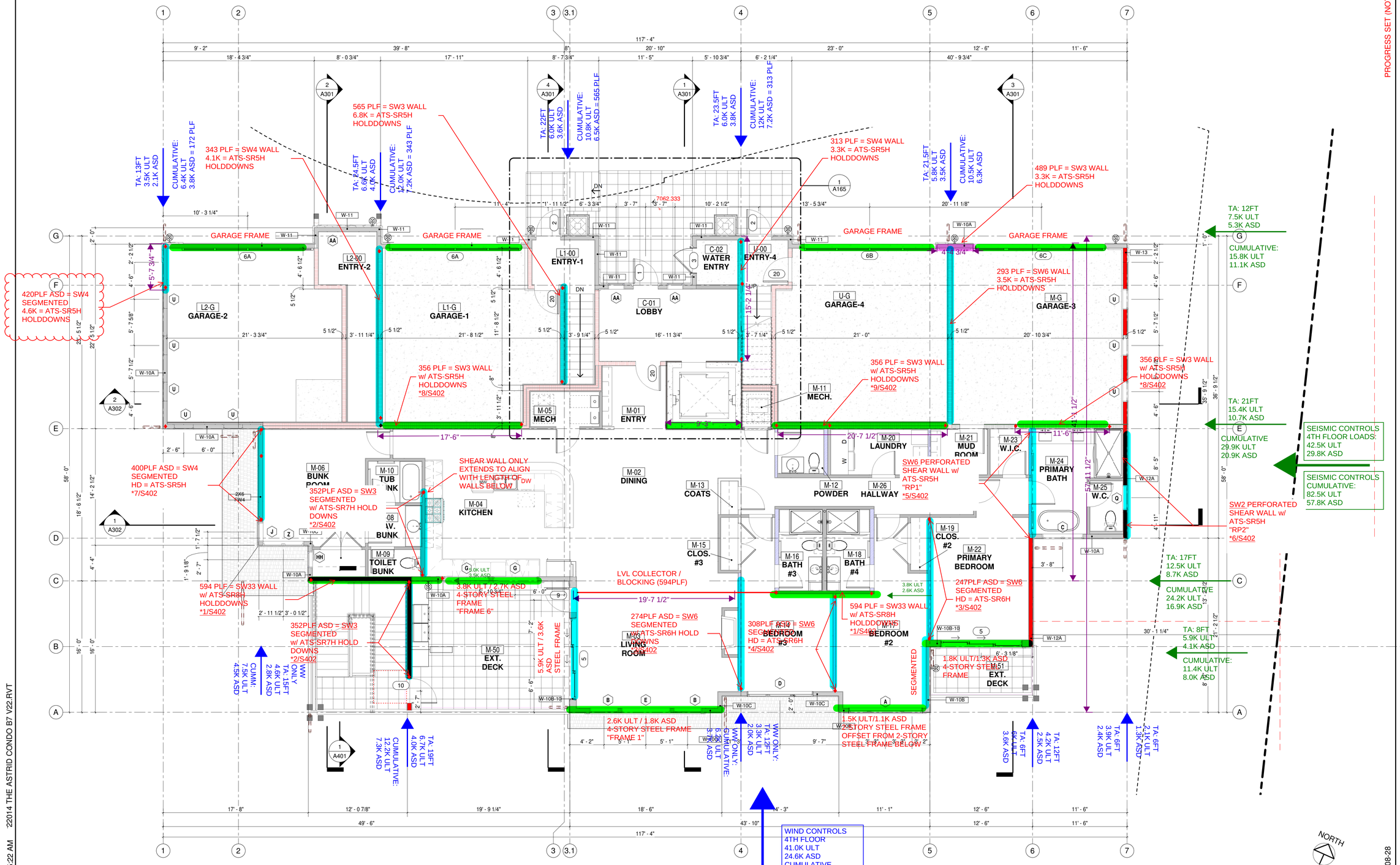
Job Number:	22014
Date:	9/20/23
Drawn By:	ESA
Checked By:	T.J.

Project Phase
SMEP COORDINATION

Sheet Title
LOWER LEVEL 2 PLAN

Sheet Number
A102



1 A103 MAIN LEVEL - B7
3/16" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

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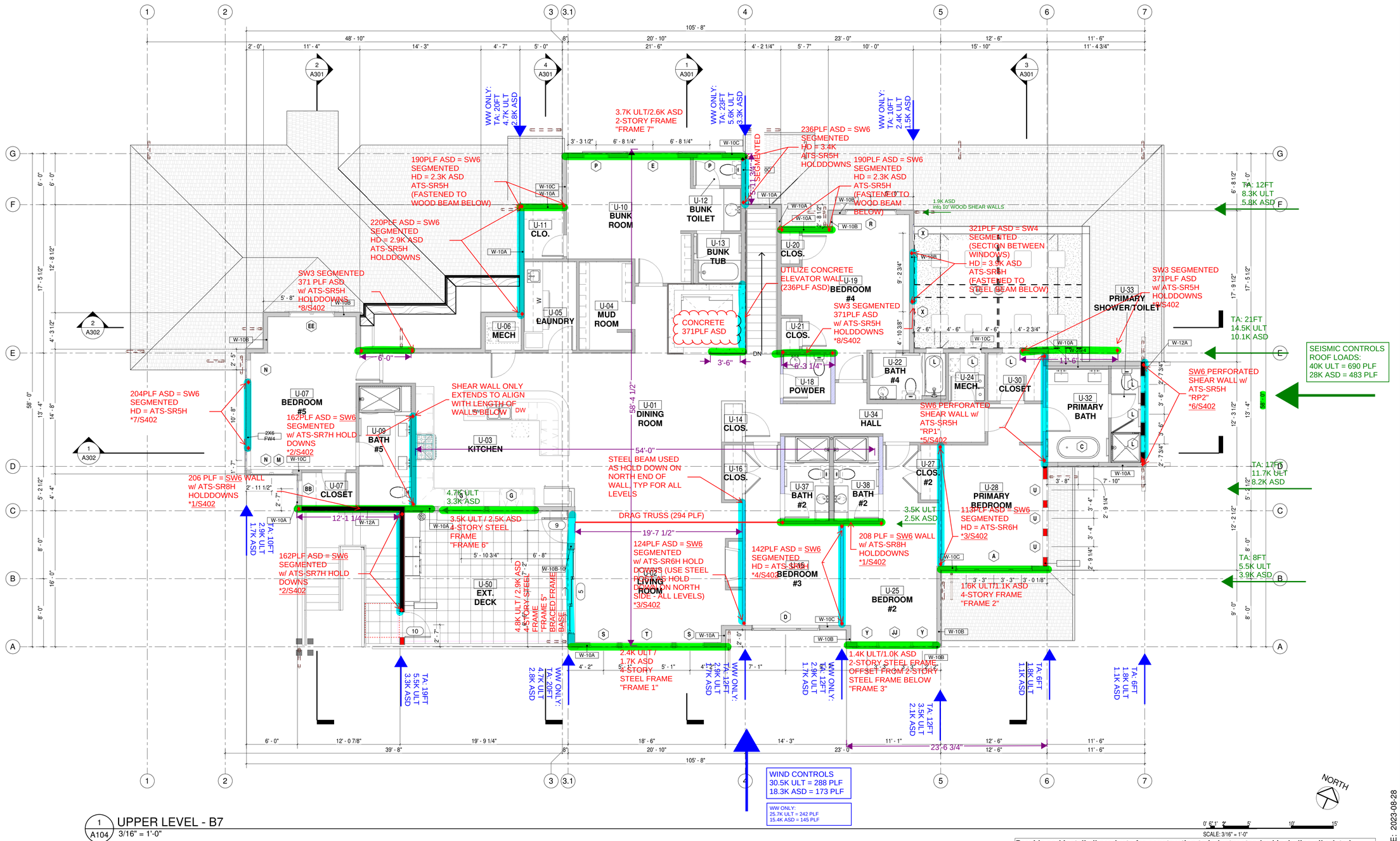
Job Number:	22014
Date:	9/20/23
Drawn By:	ESA
Checked By:	T.J.

Project Phase
SMEP COORDINATION

Sheet Title
MAIN LEVEL PLAN

Sheet Number
A103



1 A104 UPPER LEVEL - B7
3/16" = 1'-0"

Provide and install all products for construction to industry standard including all related ASTM standards and product manufacturer's installation and specification requirements.

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DATE: 2023-08-28

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Job Number:	22014
Date:	9/20/23
Drawn By:	ESA
Checked By:	T.J.

Project Phase
SMEP COORDINATION

Sheet Title
UPPER LEVEL PLAN

Sheet Number
A104

9/20/2023 9:05:24 AM 22014 THE ASTRID CONDO B7 V22.RVT

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	0	12	0	
3	N3	0	24	0	
4	N4	0	36	0	
5	N5	0	48	0	
6	N6	18	0	0	
7	N7	18	12	0	
8	N8	18	24	0	
9	N9	18	36	0	
10	N10	18	48	0	
11	N11	5.75	0	0	
12	N12	12.25	0	0	
13	N13	5.75	12	0	
14	N14	12.25	12	0	
15	N15	5.75	24	0	
16	N16	12.25	24	0	
17	N17	5.75	36	0	
18	N18	12.25	36	0	
19	N19	5.75	48	0	
20	N20	12.25	48	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N6	Reaction	Reaction	Reaction			
3	N2			Reaction			
4	N3			Reaction			
5	N4			Reaction			
6	N5			Fixed			
7	N11	Reaction	Reaction	Fixed			
8	N12	Reaction	Reaction	Fixed			
9	N7			Fixed			
10	ALL			Fixed			

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B RECT	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A500 Gr.C RND	29000	11154	0.3	0.65	0.527	46	1.4	62	1.3
7	A500 Gr.C RECT	29000	11154	0.3	0.65	0.527	50	1.4	62	1.3
8	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
9	A1085	29000	11154	0.3	0.65	0.49	50	1.4	65	1.3
10	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Cold Formed Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Fu [ksi]
1	A653 SS Gr33	29500	11346	0.3	0.65	0.49	33	45
2	A653 SS Gr50/1	29500	11346	0.3	0.65	0.49	50	65

Wood Properties

	Label	Type	Database	Species	Grade	Cm	Ci	Emod	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]
1	DF	Solid Sawn	Visually Graded	Douglas Fir-Larch	No.1			1	0.3	0.3	0.035
2	SP	Solid Sawn	Visually Graded	Southern Pine	No.1			1	0.3	0.3	0.035
3	HF	Solid Sawn	Visually Graded	Hem-Fir	No.1			1	0.3	0.3	0.035
4	SPF	Solid Sawn	Visually Graded	Spruce-Pine-fir	No.1			1	0.3	0.3	0.035
5	24F-1.8E DF Balanced	Glulam	NDS Table 5A	24F-1.8E_DF_BAL	na			1	0.3	0.3	0.035
6	24F-1.8E DF Unbalanced	Glulam	NDS Table 5A	24F-1.8E_DF_UNBAL	na			1	0.3	0.3	0.035
7	24F-1.8E SP Balanced	Glulam	NDS Table 5A	24F-1.8E_SP_BAL	na			1	0.3	0.3	0.035
8	24F-1.8E SP Unbalanced	Glulam	NDS Table 5A	24F-1.8E_SP_UNBAL	na			1	0.3	0.3	0.035
9	1.3E-1600F_VERSALAM	SCL	Boise Cascade	1.3E-1600F_VERSALAM	na			1	0.3	0.3	0.035
10	1.35E LSL_SolidStart	SCL	Louisiana Pacific	1.35E LSL_SolidStart	na			1	0.3	0.3	0.035
11	1.3E_RIGIDLAM LVL	SCL	Roseburg Forest Products	1.3E_RIGIDLAM LVL	na			1	0.3	0.3	0.035
12	2.0E_DF Parallam PSL	SCL	TrusJoist	2.0E_DF Parallam PSL	na			1	0.3	0.3	0.035
13	LVL_PRL_1.5E_2250F	Custom	N/A	LVL_PRL_1.5E_2250F	na			1	0.3	0.3	0.035
14	LVL_Microlam_1.9E_2600F	Custom	N/A	LVL_Microllam_1.9E_2600F	na			1	0.3	0.3	0.035
15	PSL_Parallam_2.0E_2900F	Custom	N/A	PSL_Parallam_2.0E_2900F	na			1	0.3	0.3	0.035
16	LSL_TimberStrand_1.55E_2325F	Custom	N/A	LSL_TimberStrand_1.55E_2325F	na			1	0.3	0.3	0.035

Concrete Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	f'c [ksi]	Lambda	Flex Steel [ksi]	Shear Steel [ksi]
1	Conc3000NW	3156	1372	0.15	0.6	0.145	3	1	60	60
2	Conc3500NW	3409	1482	0.15	0.6	0.145	3.5	1	60	60
3	Conc4000NW	3644	1584	0.15	0.6	0.145	4	1	60	60
4	Conc3000LW	2085	907	0.15	0.6	0.11	3	0.75	60	60
5	Conc3500LW	2252	979	0.15	0.6	0.11	3.5	0.75	60	60
6	Conc4000LW	2408	1047	0.15	0.6	0.11	4	0.75	60	60

Masonry Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Self Weight [k/ft³]	f'm [ksi]	Flex Steel [ksi]	Shear Steel [ksi]
1	Concrete Matl	1350	540	0.25	0.6	Custom	1.5	60	60
2	Clay Matl	1050	420	0.25	0.6	Custom	1.5	60	60
3	Gen Masonry	1050	420	0.25	0.6	0.08	1.5	60	60

Aluminum Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Table B.4	kt	Ftu [ksi]	Fty [ksi]	Fcy [ksi]	Fsu [ksi]	Ct
1	3003-H14	10100	3787.5	0.33	1.3	0.173	Table B.4-1	1	19	16	13	12	141
2	6061-T6	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	38	35	35	24	141
3	6063-T5	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	22	16	16	13	141
4	6063-T6	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	30	25	25	19	141
5	5052-H34	10200	3787.5	0.33	1.3	0.173	Table B.4-1	1	34	26	24	20	141
6	6061-T6 W	10100	3787.5	0.33	1.3	0.173	Table B.4-1	1	24	15	15	15	141

Stainless Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	n	Yield [ksi]	Fu [ksi]
1	A276 S316	28000	10780	0.3	0.93	0.5	5.6	30	75
2	A276 S321	29000	11165	0.3	0.73	0.48	5.6	65	94
3	A276 S304	28000	10780	0.3	0.93	0.49	5.6	30	75

General Materials Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Plate Methodology
1	gen_Conc3NW	3155	1372	0.15	0.6	0.145	Isotropic
2	gen_Conc4NW	3644	1584	0.15	0.6	0.145	Isotropic
3	gen_Conc3LW	2085	906	0.15	0.6	0.11	Isotropic
4	gen_Conc4LW	2408	1047	0.15	0.6	0.11	Isotropic
5	gen_Alum	10100	4077	0.3	1.29	0.173	Isotropic
6	gen_Steel	29000	11154	0.3	0.65	0.49	Isotropic
7	gen_Plywood	1800	38	0	0.3	0.035	Isotropic
8	RIGID	1e+6		0.3	0	0	Isotropic
9	gen_Ortho				0.65	0.49	Orthotropic

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	EXT COLUMN	HSS10X10X10	Column	Tube	A500 Gr.C RECT	Typical	21	304	304	498
2	INT COLUMN	HSS4X4X4	Column	Tube	A500 Gr.C RECT	Typical	3.37	7.8	7.8	12.8
3	BEAM	W14X61	Beam	Wide Flange	A992	Typical	17.9	107	640	2.19

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N1	N5	EXT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
2	M2	N6	N10	EXT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
3	M3	N2	N7	BEAM	Beam	Wide Flange	A992	Typical
4	M4	N3	N8	BEAM	Beam	Wide Flange	A992	Typical
5	M5	N4	N9	BEAM	Beam	Wide Flange	A992	Typical
6	M6	N5	N10	BEAM	Beam	Wide Flange	A992	Typical
7	M7	N11	N13	INT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
8	M8	N12	N14	INT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
9	M9	N13	N15	INT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
10	M10	N15	N17	INT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
11	M11	N17	N19	INT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
12	M12	N14	N16	INT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
13	M13	N16	N18	INT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
14	M14	N18	N20	INT COLUMN	Column	Tube	A500 Gr.C RECT	Typical

Member Advanced Data

	Label	Physical	Deflection Ratio Options	Seismic DR
1	M1	Yes	** NA **	None
2	M2	Yes	** NA **	None
3	M3	Yes	Default	None
4	M4	Yes	Default	None
5	M5	Yes	Default	None
6	M6	Yes	Default	None
7	M7	Yes	** NA **	None
8	M8	Yes	** NA **	None
9	M9	Yes	** NA **	None
10	M10	Yes	** NA **	None
11	M11	Yes	** NA **	None
12	M12	Yes	** NA **	None
13	M13	Yes	** NA **	None
14	M14	Yes	** NA **	None

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lcomp top [ft]	Channel Conn.	a [ft]	Function
1	M1	EXT COLUMN	48	Lbyy	N/A	N/A	Lateral
2	M2	EXT COLUMN	48	Lbyy	N/A	N/A	Lateral
3	M3	BEAM	18	Lbyy	N/A	N/A	Lateral
4	M4	BEAM	18	Lbyy	N/A	N/A	Lateral
5	M5	BEAM	18	Lbyy	N/A	N/A	Lateral
6	M6	BEAM	18	Lbyy	N/A	N/A	Lateral
7	M7	INT COLUMN	12	Lbyy	N/A	N/A	Lateral
8	M8	INT COLUMN	12	Lbyy	N/A	N/A	Lateral
9	M9	INT COLUMN	12	Lbyy	N/A	N/A	Lateral
10	M10	INT COLUMN	12	Lbyy	N/A	N/A	Lateral
11	M11	INT COLUMN	12	Lbyy	N/A	N/A	Lateral
12	M12	INT COLUMN	12	Lbyy	N/A	N/A	Lateral
13	M13	INT COLUMN	12	Lbyy	N/A	N/A	Lateral
14	M14	INT COLUMN	12	Lbyy	N/A	N/A	Lateral

Member RISAConnection Properties

	Label	Shape	Start Conn	End Conn	Start Release	End Release
1	M1	HSS10X10X10	None	None	Fixed	Fixed
2	M2	HSS10X10X10	None	None	Fixed	Fixed
3	M3	W14X61	None	None	Fixed	Fixed
4	M4	W14X61	None	None	Fixed	Fixed
5	M5	W14X61	None	None	Fixed	Fixed
6	M6	W14X61	None	None	Fixed	Fixed
7	M7	HSS4X4X4	None	None	Fixed	Fixed
8	M8	HSS4X4X4	None	None	Fixed	Fixed
9	M9	HSS4X4X4	None	None	Fixed	Fixed
10	M10	HSS4X4X4	None	None	Fixed	Fixed
11	M11	HSS4X4X4	None	None	Fixed	Fixed
12	M12	HSS4X4X4	None	None	Fixed	Fixed
13	M13	HSS4X4X4	None	None	Fixed	Fixed
14	M14	HSS4X4X4	None	None	Fixed	Fixed

Design Size and Code Check Parameters

	Label	Max Axial/Bending Chk	Max Shear Chk
1	Typical	1	1

Deflection Design

	Label	LC	Ratio	LC	Ratio	LC	Ratio
1	Typical	None	N/A	None	N/A	None	N/A

Node Loads and Enforced Displacements (BLC 5 : Eh)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N10	L	X	-2.4
2	N9	L	X	-2.6
3	N8	L	X	-1.2
4	N7	L	X	-0.6

Member Point Loads

No Data to Print...

Member Distributed Loads (BLC 1 : DEAD)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M6	Y	-0.08	-0.08	0	%100
2	M5	Y	-0.46	-0.46	0	%100
3	M4	Y	-0.42	-0.42	0	%100
4	M3	Y	-0.42	-0.42	0	%100

Member Distributed Loads (BLC 2 : LIVE)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M5	Y	-0.32	-0.32	0	%100
2	M4	Y	-0.32	-0.32	0	%100
3	M3	Y	-0.32	-0.32	0	%100

Member Distributed Loads (BLC 3 : SNOW)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M6	Y	-0.336	-0.336	0	%100
2	M4	Y	-0.336	-0.336	0	%100

Member Distributed Loads (BLC 4 : Ev)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M6	Y	-0.02	-0.02	0	%100
2	M5	Y	-0.05	-0.05	0	%100
3	M4	Y	-0.04	-0.04	0	%100
4	M3	Y	-0.04	-0.04	0	%100

Basic Load Cases

	BLC Description	Category	Nodal	Distributed
1	DEAD	DL		4
2	LIVE	LL		3
3	SNOW	SL		2
4	Ev	ELY		4
5	Eh	ELX	4	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	D	Yes	Y	DL	1														
2	D+L	Yes	Y	DL	1	LL	1												
3	D+Lr	Yes	Y	DL	1			RLL	1										
4	D+S	Yes	Y	DL	1					SL	1								
5	D+R	Yes	Y	DL	1							RL	1						
6	D+0.75L+0.75Lr	Yes	Y	DL	1	LL	0.75	RLL	0.75										
7	D+0.75L+0.75S	Yes	Y	DL	1	LL	0.75			SL	0.75								
8	D+0.75L+0.75R	Yes	Y	DL	1	LL	0.75					RL	0.75						
9	D+(0.6W)	Yes	Y	DL	1									WL	0.6				
10	D+0.75L+0.75(0.6W)+0.75Lr	Yes	Y	DL	1	LL	0.75	RLL	0.75					WL	0.45				
11	D+0.75L+0.75(0.6W)+0.75S	Yes	Y	DL	1	LL	0.75			SL	0.75			WL	0.45				

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
12	D+0.75L+0.75(0.6W)+0.75R	Yes	Y	DL	1	LL	0.75					RL	0.75	WL	0.45				
13	0.6D+0.6W	Yes	Y	DL	0.6									WL	0.6				
14	D+0.7Ev+0.7Eh	Yes	Y	DL	1											ELX	0.7	ELY	0.7
15	D+.525Ev+0.525Eh+0.75L+0.75S	Yes	Y	DL	1	LL	0.75			SL	0.75					ELX	0.525	ELY	0.525
16	0.6D-0.7Ev+0.7Eh	Yes	Y	DL	0.6											ELX	0.7	ELY	-0.7

Load Combination Design

	Description	Service	Hot Rolled	Cold Formed	Wood	Concrete	Masonry	Aluminum	Stainless	Connection
1	D		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	D+L		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	D+Lr		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	D+S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	D+R		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	D+0.75L+0.75Lr		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	D+0.75L+0.75S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	D+0.75L+0.75R		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	D+(0.6W)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	D+0.75L+0.75(0.6W)+0.75Lr		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	D+0.75L+0.75(0.6W)+0.75S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12	D+0.75L+0.75(0.6W)+0.75R		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13	0.6D+0.6W		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14	D+0.7Ev+0.7Eh		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15	D+.525Ev+0.525Eh+0.75L+0.75S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16	0.6D-0.7Ev+0.7Eh		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	3.993	14	22.483	15	0	16	0	16	0	16	-0.127	13
2		min	0.051	13	4.595	13	0	1	0	1	0	1	-27.279	14
3	N6	max	0.759	16	14.719	11	0	16	0	16	0	16	0	16
4		min	-0.147	7	-4.754	16	0	1	0	1	0	1	0	1
5	N2	max	0	16	0	16	0	16	0	16	0	16	0	16
6		min	0	1	0	1	0	1	0	1	0	1	0	1
7	N3	max	0	16	0	16	0	16	0	16	0	16	0	16
8		min	0	1	0	1	0	1	0	1	0	1	0	1
9	N4	max	0	16	0	16	0	16	0	16	0	16	0	16
10		min	0	1	0	1	0	1	0	1	0	1	0	1
11	N11	max	0.043	16	8.76	11	NC	NC	0	16	0	16	0	16
12		min	0.001	13	-1.252	16	NC	NC	0	1	0	1	0	1
13	N12	max	0.026	16	11.118	15	NC	NC	0	16	0	16	0	16
14		min	-0.003	7	2.842	13	NC	NC	0	1	0	1	0	1
15	Totals:	max	4.76	14	48.29	15	0	16						
16		min	0	13	13.014	16	0	1						

Envelope Node Displacements

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N1	max	0	13	0	13	0	16	0	16	0	16	0	14
2		min	0	14	0	15	0	1	0	1	0	1	0	13
3	N2	max	0.004	11	-0.001	13	0	16	0	16	0	16	7.893e-4	16
4		min	-0.202	14	-0.007	15	0	1	0	1	0	1	-1.264e-4	7
5	N3	max	0.004	11	-0.002	13	0	16	0	16	0	16	6.053e-4	16
6		min	-0.378	14	-0.011	15	0	1	0	1	0	1	-1.848e-4	7

Envelope Node Displacements (Continued)

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
7	N4	max	0.004	11	-0.003	13	0	16	0	16	0	16	4.311e-4	16
8		min	-0.52	14	-0.014	15	0	1	0	1	0	1	-1.847e-4	7
9	N5	max	0.005	11	-0.003	13	0	16	0	16	0	16	2.071e-4	16
10		min	-0.602	14	-0.015	15	0	1	0	1	0	1	-2.406e-4	7
11	N6	max	0	11	0	16	0	16	0	16	0	16	1.768e-3	16
12		min	0	16	0	7	0	1	0	1	0	1	-9.841e-5	7
13	N7	max	0.004	11	0.001	16	0	16	0	16	0	16	7.073e-4	14
14		min	-0.203	14	-0.004	7	0	1	0	1	0	1	4.066e-5	13
15	N8	max	0.004	11	0.002	16	0	16	0	16	0	16	7.628e-4	14
16		min	-0.378	14	-0.008	7	0	1	0	1	0	1	5.496e-5	13
17	N9	max	0.004	11	0.002	16	0	16	0	16	0	16	5.881e-4	14
18		min	-0.52	14	-0.01	7	0	1	0	1	0	1	6.1e-5	13
19	N10	max	0.004	11	0.002	16	0	16	0	16	0	16	4.411e-4	15
20		min	-0.602	14	-0.011	7	0	1	0	1	0	1	6.615e-5	13
21	N11	max	0	13	0	16	0	16	0	16	0	16	2.185e-3	14
22		min	0	16	0	7	0	1	0	1	0	1	5.599e-6	13
23	N12	max	0	11	0	13	0	16	0	16	0	16	2.132e-3	16
24		min	0	16	0	15	0	1	0	1	0	1	-9.887e-5	7
25	N13	max	0.004	11	0.002	16	0	16	0	16	0	16	-3.833e-5	13
26		min	-0.202	14	-0.016	7	0	1	0	1	0	1	-1.923e-4	15
27	N14	max	0.004	11	-0.005	13	0	16	0	16	0	16	1.171e-4	11
28		min	-0.202	14	-0.02	15	0	1	0	1	0	1	-5.195e-5	16
29	N15	max	0.004	11	0	16	0	16	0	16	0	16	-5.844e-5	13
30		min	-0.378	14	-0.027	7	0	1	0	1	0	1	-2.432e-4	15
31	N16	max	0.004	11	-0.008	13	0	16	0	16	0	16	1.891e-4	11
32		min	-0.378	14	-0.032	15	0	1	0	1	0	1	-2.682e-5	16
33	N17	max	0.004	11	-0.003	16	0	16	0	16	0	16	-6.554e-5	13
34		min	-0.52	14	-0.031	7	0	1	0	1	0	1	-2.412e-4	15
35	N18	max	0.004	11	-0.01	13	0	16	0	16	0	16	2.082e-4	11
36		min	-0.52	14	-0.035	15	0	1	0	1	0	1	1.439e-5	16
37	N19	max	0.004	11	-0.005	16	0	16	0	16	0	16	-4.995e-5	16
38		min	-0.602	14	-0.031	7	0	1	0	1	0	1	-2.009e-4	15
39	N20	max	0.004	11	-0.009	13	0	16	0	16	0	16	1.93e-4	11
40		min	-0.602	14	-0.034	15	0	1	0	1	0	1	3.888e-5	16

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1	M1	1	max	22.483	15	-0.051	13	0	16	0	16	0	16	-0.127	13
2			min	4.595	13	-4.033	14	0	1	0	1	0	1	-27.279	14
3		2	max	22.483	15	-0.191	13	0	16	0	16	0	16	21.12	14
4			min	4.595	13	-4.033	14	0	1	0	1	0	1	-3.367	7
5		3	max	15.673	15	-0.229	13	0	16	0	16	0	16	14.124	14
6			min	3.531	13	-2.22	14	0	1	0	1	0	1	-4.353	7
7		4	max	8.817	15	-0.249	13	0	16	0	16	0	16	13.079	14
8			min	2.183	13	-2.056	14	0	1	0	1	0	1	-4.75	7
9		5	max	3.019	15	-0.249	13	0	16	0	16	0	16	9.508	15
10			min	0.685	13	-1.432	15	0	1	0	1	0	1	1.512	13
11	M2	1	max	14.719	11	0.147	11	0	16	0	16	0	16	0	16
12			min	-4.754	16	-0.749	16	0	1	0	1	0	1	0	1
13		2	max	14.719	11	0.6	11	0	16	0	16	0	16	3.334	11
14			min	-4.754	16	-2.049	16	0	1	0	1	0	1	-12.472	16
15		3	max	11.674	11	0.725	11	0	16	0	16	0	16	12.121	16
16			min	-2.206	16	-2.049	16	0	1	0	1	0	1	1.347	13
17		4	max	7.101	11	0.83	11	0	16	0	16	0	16	9.432	16
18			min	0.253	16	-1.449	16	0	1	0	1	0	1	1.47	13

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
19		5	max	2.742	11	0.83	11	0	16	0	16	0	16	4.362	16
20			min	0.253	16	-0.579	16	0	1	0	1	0	1	-5.206	7
21	M3	1	max	1.908	16	6.824	14	0	16	0	16	0	16	33.634	14
22			min	-0.454	7	1.064	13	0	1	0	1	0	1	1.579	13
23		2	max	1.908	16	4.833	16	0	16	0	16	0	16	8.016	16
24			min	-0.454	7	-0.235	2	0	1	0	1	0	1	-1.995	7
25		3	max	1.815	16	1.206	14	0	16	0	16	0	16	-1.623	16
26			min	-0.467	7	-0.004	7	0	1	0	1	0	1	-5.123	15
27		4	max	1.714	16	3.611	14	0	16	0	16	0	16	-0.634	13
28			min	-0.454	7	-0.222	4	0	1	0	1	0	1	-8.334	14
29		5	max	1.714	16	2.548	16	0	16	0	16	0	16	5.1	11
30			min	-0.454	7	-3.152	2	0	1	0	1	0	1	-21.456	16
31	M4	1	max	0.188	16	6.856	15	0	16	0	16	0	16	25.719	14
32			min	-0.125	7	1.348	13	0	1	0	1	0	1	2.541	13
33		2	max	0.188	16	3.257	14	0	16	0	16	0	16	7.389	16
34			min	-0.125	7	0.214	13	0	1	0	1	0	1	-3.149	7
35		3	max	0.214	16	1.822	14	0	16	0	16	0	16	-1.802	16
36			min	-0.13	7	-0.005	7	0	1	0	1	0	1	-7.648	15
37		4	max	0.236	16	2.966	16	0	16	0	16	0	16	-0.964	13
38			min	-0.125	7	-0.555	2	0	1	0	1	0	1	-9.916	14
39		5	max	0.236	16	1.958	16	0	16	0	16	0	16	8.22	11
40			min	-0.125	7	-4.573	7	0	1	0	1	0	1	-20.083	16
41	M5	1	max	0.857	16	5.799	15	0	16	0	16	0	16	20.129	15
42			min	-0.131	4	1.499	13	0	1	0	1	0	1	2.866	13
43		2	max	0.857	16	2.53	15	0	16	0	16	0	16	5.588	16
44			min	-0.131	4	0.257	13	0	1	0	1	0	1	-3.434	7
45		3	max	0.902	16	1.629	14	0	16	0	16	0	16	-2.108	16
46			min	-0.132	4	-0.002	7	0	1	0	1	0	1	-8.004	15
47		4	max	0.949	16	1.585	16	0	16	0	16	0	16	-1.079	13
48			min	-0.131	4	-1.217	4	0	1	0	1	0	1	-8.36	15
49		5	max	0.949	16	0.5	16	0	16	0	16	0	16	9.104	11
50			min	-0.131	4	-4.359	7	0	1	0	1	0	1	-12.015	16
51	M6	1	max	1.43	15	3.019	15	0	16	0	16	0	16	9.508	15
52			min	0.249	13	0.685	13	0	1	0	1	0	1	1.512	13
53		2	max	1.43	15	1.478	15	0	16	0	16	0	16	3.43	16
54			min	0.249	13	0.469	13	0	1	0	1	0	1	-3.779	7
55		3	max	1.497	15	1.327	14	0	16	0	16	0	16	-1.469	16
56			min	0.255	13	-0.001	7	0	1	0	1	0	1	-6.847	15
57		4	max	1.522	15	-0.1	16	0	16	0	16	0	16	-1.081	13
58			min	0.249	13	-1.37	2	0	1	0	1	0	1	-7.089	15
59		5	max	1.522	15	-0.253	16	0	16	0	16	0	16	5.206	11
60			min	0.249	13	-2.743	7	0	1	0	1	0	1	-4.362	16
61	M7	1	max	8.76	11	-0.001	13	0	16	0	16	0	16	0	16
62			min	-1.252	16	-0.041	14	0	1	0	1	0	1	0	1
63		2	max	8.76	11	-0.001	13	0	16	0	16	0	16	0.123	14
64			min	-1.252	16	-0.041	14	0	1	0	1	0	1	0.002	13
65		3	max	8.76	11	-0.001	13	0	16	0	16	0	16	0.246	14
66			min	-1.252	16	-0.041	14	0	1	0	1	0	1	0.005	13
67		4	max	8.76	11	-0.001	13	0	16	0	16	0	16	0.369	14
68			min	-1.252	16	-0.041	14	0	1	0	1	0	1	0.007	13
69		5	max	8.76	11	-0.001	13	0	16	0	16	0	16	0.492	14
70			min	-1.252	16	-0.041	14	0	1	0	1	0	1	0.009	13
71	M8	1	max	11.118	15	0.004	11	0	16	0	16	0	16	0	16
72			min	2.842	13	-0.038	16	0	1	0	1	0	1	0	1
73		2	max	11.118	15	0.004	11	0	16	0	16	0	16	0.114	16

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
74			min	2.842	13	-0.038	16	0	1	0	1	0	1	-0.011	7
75		3	max	11.118	15	0.004	11	0	16	0	16	0	16	0.229	16
76			min	2.842	13	-0.038	16	0	1	0	1	0	1	-0.023	7
77		4	max	11.118	15	0.004	11	0	16	0	16	0	16	0.343	16
78			min	2.842	13	-0.038	16	0	1	0	1	0	1	-0.034	7
79		5	max	11.118	15	0.004	11	0	16	0	16	0	16	0.457	16
80			min	2.842	13	-0.038	16	0	1	0	1	0	1	-0.045	7
81	M9	1	max	5.942	15	-0.005	13	0	16	0	16	0	16	-0.028	13
82			min	1.373	16	-0.144	14	0	1	0	1	0	1	-0.865	14
83		2	max	5.942	15	-0.005	13	0	16	0	16	0	16	-0.013	13
84			min	1.373	16	-0.144	14	0	1	0	1	0	1	-0.432	14
85		3	max	5.942	15	-0.005	13	0	16	0	16	0	16	0.008	11
86			min	1.373	16	-0.144	14	0	1	0	1	0	1	-0.001	16
87		4	max	5.942	15	-0.005	13	0	16	0	16	0	16	0.433	14
88			min	1.373	16	-0.144	14	0	1	0	1	0	1	0.017	13
89		5	max	5.942	15	-0.005	13	0	16	0	16	0	16	0.866	14
90			min	1.373	16	-0.144	14	0	1	0	1	0	1	0.032	13
91	M10	1	max	3.028	15	-0.006	13	0	16	0	16	0	16	-0.038	13
92			min	0.732	13	-0.12	14	0	1	0	1	0	1	-0.72	14
93		2	max	3.028	15	-0.006	13	0	16	0	16	0	16	-0.019	13
94			min	0.732	13	-0.12	14	0	1	0	1	0	1	-0.361	14
95		3	max	3.028	15	-0.006	13	0	16	0	16	0	16	0.002	11
96			min	0.732	13	-0.12	14	0	1	0	1	0	1	-0.002	16
97		4	max	3.028	15	-0.006	13	0	16	0	16	0	16	0.358	14
98			min	0.732	13	-0.12	14	0	1	0	1	0	1	0.02	13
99		5	max	3.028	15	-0.006	13	0	16	0	16	0	16	0.717	14
100			min	0.732	13	-0.12	14	0	1	0	1	0	1	0.039	13
101	M11	1	max	1.063	15	-0.006	13	0	16	0	16	0	16	-0.039	13
102			min	-1.012	2	-0.073	14	0	1	0	1	0	1	-0.44	14
103		2	max	1.063	15	-0.006	13	0	16	0	16	0	16	-0.02	13
104			min	-1.012	2	-0.073	14	0	1	0	1	0	1	-0.223	14
105		3	max	1.063	15	-0.006	13	0	16	0	16	0	16	0	4
106			min	-1.012	2	-0.073	14	0	1	0	1	0	1	-0.005	14
107		4	max	1.063	15	-0.006	13	0	16	0	16	0	16	0.212	14
108			min	-1.012	2	-0.073	14	0	1	0	1	0	1	0.018	13
109		5	max	1.063	15	-0.006	13	0	16	0	16	0	16	0.43	14
110			min	-1.012	2	-0.073	14	0	1	0	1	0	1	0.037	13
111	M12	1	max	6.366	15	0.016	11	0	16	0	16	0	16	0.089	11
112			min	1.657	13	-0.13	16	0	1	0	1	0	1	-0.784	16
113		2	max	6.366	15	0.016	11	0	16	0	16	0	16	0.041	11
114			min	1.657	13	-0.13	16	0	1	0	1	0	1	-0.393	16
115		3	max	6.366	15	0.016	11	0	16	0	16	0	16	-0.002	13
116			min	1.657	13	-0.13	16	0	1	0	1	0	1	-0.008	15
117		4	max	6.366	15	0.016	11	0	16	0	16	0	16	0.388	16
118			min	1.657	13	-0.13	16	0	1	0	1	0	1	-0.056	7
119		5	max	6.366	15	0.016	11	0	16	0	16	0	16	0.779	16
120			min	1.657	13	-0.13	16	0	1	0	1	0	1	-0.104	7
121	M13	1	max	2.19	11	0.021	11	0	16	0	16	0	16	0.122	11
122			min	-0.226	16	-0.103	16	0	1	0	1	0	1	-0.625	16
123		2	max	2.19	11	0.021	11	0	16	0	16	0	16	0.06	11
124			min	-0.226	16	-0.103	16	0	1	0	1	0	1	-0.315	16
125		3	max	2.19	11	0.021	11	0	16	0	16	0	16	-0.001	13
126			min	-0.226	16	-0.103	16	0	1	0	1	0	1	-0.005	14
127		4	max	2.19	11	0.021	11	0	16	0	16	0	16	0.306	16
128			min	-0.226	16	-0.103	16	0	1	0	1	0	1	-0.064	7

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
129		5	max	2.19	11	0.021	11	0	16	0	16	0	16	0.617	16
130			min	-0.226	16	-0.103	16	0	1	0	1	0	1	-0.126	7
131	M14	1	max	1.058	4	0.021	11	0	16	0	16	0	16	0.127	11
132			min	-1.422	14	-0.056	16	0	1	0	1	0	1	-0.341	16
133		2	max	1.058	4	0.021	11	0	16	0	16	0	16	0.064	11
134			min	-1.422	14	-0.056	16	0	1	0	1	0	1	-0.172	16
135		3	max	1.058	4	0.021	11	0	16	0	16	0	16	0.003	2
136			min	-1.422	14	-0.056	16	0	1	0	1	0	1	-0.003	16
137		4	max	1.058	4	0.021	11	0	16	0	16	0	16	0.167	16
138			min	-1.422	14	-0.056	16	0	1	0	1	0	1	-0.061	7
139		5	max	1.058	4	0.021	11	0	16	0	16	0	16	0.336	16
140			min	-1.422	14	-0.056	16	0	1	0	1	0	1	-0.123	7

Envelope Maximum Member Section Forces

	Member		Axial[k]	Loc[ft]	LC	y Shear[k]	Loc[ft]	LC	z Shear[k]	Loc[ft]	LC	Torque[k-ft]	Loc[ft]	LC	y-y Moment[k-ft]	Loc[ft]	LC	z-z Moment[k-ft]	Loc[ft]	LC
1	M1	max	22.483	12	15	-0.051	11.5	13	0	48	16	0	48	16	0	48	16	21.12	12	14
2		min	0.685	36.5	13	-4.033	0	14	0	0	1	0	0	1	0	0	1	-27.279	0	14
3	M2	max	14.719	12	11	0.83	48	11	0	48	16	0	48	16	0	48	16	12.121	24	16
4		min	-4.754	0	16	-2.049	12	16	0	0	1	0	0	1	0	0	1	-12.472	12	16
5	M3	max	1.908	5.625	16	6.824	0	14	0	18	16	0	18	16	0	18	16	33.634	0	14
6		min	-0.467	5.813	7	-3.152	18	2	0	0	1	0	0	1	0	0	1	-21.456	18	16
7	M4	max	0.236	18	16	6.856	0	15	0	18	16	0	18	16	0	18	16	25.719	0	14
8		min	-0.13	5.813	7	-4.573	18	7	0	0	1	0	0	1	0	0	1	-20.083	18	16
9	M5	max	0.949	18	16	5.799	0	15	0	18	16	0	18	16	0	18	16	20.129	0	15
10		min	-0.132	5.813	4	-4.359	18	7	0	0	1	0	0	1	0	0	1	-12.015	18	16
11	M6	max	1.522	18	15	3.019	0	15	0	18	16	0	18	16	0	18	16	9.508	0	15
12		min	0.249	12.375	13	-2.743	18	7	0	0	1	0	0	1	0	0	1	-8.304	12	15
13	M7	max	8.76	12	11	-0.001	12	13	0	12	16	0	12	16	0	12	16	0.492	12	14
14		min	-1.252	0	16	-0.041	0	14	0	0	1	0	0	1	0	0	1	0	0	1
15	M8	max	11.118	12	15	0.004	12	11	0	12	16	0	12	16	0	12	16	0.457	12	16
16		min	2.842	0	13	-0.038	0	16	0	0	1	0	0	1	0	0	1	-0.045	12	7
17	M9	max	5.942	12	15	-0.005	12	13	0	12	16	0	12	16	0	12	16	0.866	12	14
18		min	1.373	0	16	-0.144	0	14	0	0	1	0	0	1	0	0	1	-0.865	0	14
19	M10	max	3.028	12	15	-0.006	12	13	0	12	16	0	12	16	0	12	16	0.717	12	14
20		min	0.732	0	13	-0.12	0	14	0	0	1	0	0	1	0	0	1	-0.72	0	14
21	M11	max	1.063	12	15	-0.006	12	13	0	12	16	0	12	16	0	12	16	0.43	12	14
22		min	-1.012	0	2	-0.073	0	14	0	0	1	0	0	1	0	0	1	-0.44	0	14
23	M12	max	6.366	12	15	0.016	12	11	0	12	16	0	12	16	0	12	16	0.779	12	16
24		min	1.657	0	13	-0.13	0	16	0	0	1	0	0	1	0	0	1	-0.784	0	16
25	M13	max	2.19	12	11	0.021	12	11	0	12	16	0	12	16	0	12	16	0.617	12	16
26		min	-0.226	0	16	-0.103	0	16	0	0	1	0	0	1	0	0	1	-0.625	0	16
27	M14	max	1.058	12	4	0.021	12	11	0	12	16	0	12	16	0	12	16	0.336	12	16
28		min	-1.422	0	14	-0.056	0	16	0	0	1	0	0	1	0	0	1	-0.341	0	16

Envelope Member End Reactions

	Member	Member End		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1	M1	I	max	22.483	15	-0.051	13	0	16	0	16	0	16	-0.127	13
2			min	4.595	13	-4.033	14	0	1	0	1	0	1	-27.279	14
3		J	max	3.019	15	-0.249	13	0	16	0	16	0	16	9.508	15
4			min	0.685	13	-1.432	15	0	1	0	1	0	1	1.512	13
5	M2	I	max	14.719	11	0.147	11	0	16	0	16	0	16	0	16
6			min	-4.754	16	-0.749	16	0	1	0	1	0	1	0	1
7		J	max	2.742	11	0.83	11	0	16	0	16	0	16	4.362	16

Envelope Member End Reactions (Continued)

	Member	Member End		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
8			min	0.253	16	-0.579	16	0	1	0	1	0	1	-5.206	7
9	M3	I	max	1.908	16	6.824	14	0	16	0	16	0	16	33.634	14
10			min	-0.454	7	1.064	13	0	1	0	1	0	1	1.579	13
11		J	max	1.714	16	2.548	16	0	16	0	16	0	16	5.1	11
12			min	-0.454	7	-3.152	2	0	1	0	1	0	1	-21.456	16
13	M4	I	max	0.188	16	6.856	15	0	16	0	16	0	16	25.719	14
14			min	-0.125	7	1.348	13	0	1	0	1	0	1	2.541	13
15		J	max	0.236	16	1.958	16	0	16	0	16	0	16	8.22	11
16			min	-0.125	7	-4.573	7	0	1	0	1	0	1	-20.083	16
17	M5	I	max	0.857	16	5.799	15	0	16	0	16	0	16	20.129	15
18			min	-0.131	4	1.499	13	0	1	0	1	0	1	2.866	13
19		J	max	0.949	16	0.5	16	0	16	0	16	0	16	9.104	11
20			min	-0.131	4	-4.359	7	0	1	0	1	0	1	-12.015	16
21	M6	I	max	1.43	15	3.019	15	0	16	0	16	0	16	9.508	15
22			min	0.249	13	0.685	13	0	1	0	1	0	1	1.512	13
23		J	max	1.522	15	-0.253	16	0	16	0	16	0	16	5.206	11
24			min	0.249	13	-2.743	7	0	1	0	1	0	1	-4.362	16
25	M7	I	max	8.76	11	-0.001	13	0	16	0	16	0	16	0	16
26			min	-1.252	16	-0.041	14	0	1	0	1	0	1	0	1
27		J	max	8.76	11	-0.001	13	0	16	0	16	0	16	0.492	14
28			min	-1.252	16	-0.041	14	0	1	0	1	0	1	0.009	13
29	M8	I	max	11.118	15	0.004	11	0	16	0	16	0	16	0	16
30			min	2.842	13	-0.038	16	0	1	0	1	0	1	0	1
31		J	max	11.118	15	0.004	11	0	16	0	16	0	16	0.457	16
32			min	2.842	13	-0.038	16	0	1	0	1	0	1	-0.045	7
33	M9	I	max	5.942	15	-0.005	13	0	16	0	16	0	16	-0.028	13
34			min	1.373	16	-0.144	14	0	1	0	1	0	1	-0.865	14
35		J	max	5.942	15	-0.005	13	0	16	0	16	0	16	0.866	14
36			min	1.373	16	-0.144	14	0	1	0	1	0	1	0.032	13
37	M10	I	max	3.028	15	-0.006	13	0	16	0	16	0	16	-0.038	13
38			min	0.732	13	-0.12	14	0	1	0	1	0	1	-0.72	14
39		J	max	3.028	15	-0.006	13	0	16	0	16	0	16	0.717	14
40			min	0.732	13	-0.12	14	0	1	0	1	0	1	0.039	13
41	M11	I	max	1.063	15	-0.006	13	0	16	0	16	0	16	-0.039	13
42			min	-1.012	2	-0.073	14	0	1	0	1	0	1	-0.44	14
43		J	max	1.063	15	-0.006	13	0	16	0	16	0	16	0.43	14
44			min	-1.012	2	-0.073	14	0	1	0	1	0	1	0.037	13
45	M12	I	max	6.366	15	0.016	11	0	16	0	16	0	16	0.089	11
46			min	1.657	13	-0.13	16	0	1	0	1	0	1	-0.784	16
47		J	max	6.366	15	0.016	11	0	16	0	16	0	16	0.779	16
48			min	1.657	13	-0.13	16	0	1	0	1	0	1	-0.104	7
49	M13	I	max	2.19	11	0.021	11	0	16	0	16	0	16	0.122	11
50			min	-0.226	16	-0.103	16	0	1	0	1	0	1	-0.625	16
51		J	max	2.19	11	0.021	11	0	16	0	16	0	16	0.617	16
52			min	-0.226	16	-0.103	16	0	1	0	1	0	1	-0.126	7
53	M14	I	max	1.058	4	0.021	11	0	16	0	16	0	16	0.127	11
54			min	-1.422	14	-0.056	16	0	1	0	1	0	1	-0.341	16
55		J	max	1.058	4	0.021	11	0	16	0	16	0	16	0.336	16
56			min	-1.422	14	-0.056	16	0	1	0	1	0	1	-0.123	7

Envelope Member Torsion Stresses

	Member	Sec		Torque[k-ft]	LC	Torsion Shear[ksi]	LC	y-y Warp Shear[ksi]	LC	z-z Warp Shear[ksi]	LC	z-Top Warp Bend[ksi]	LC	z-Bot Warp Bend[ksi]	LC
1	M1	1	max	0	16	0	16	NC		NC		NC		NC	
2			min	0	1	0	1	NC		NC		NC		NC	
3		2	max	0	16	0	16	NC		NC		NC		NC	

Envelope Member Torsion Stresses (Continued)

	Member	Sec		Torque[k-ft]	LC	Torsion Shear[ksi]	LC	y-y Warp Shear[ksi]	LC	z-z Warp Shear[ksi]	LC	z-Top Warp Bend[ksi]	LC	z-Bot Warp Bend[ksi]	LC
4			min	0	1	0	1	NC		NC		NC		NC	
5		3	max	0	16	0	16	NC		NC		NC		NC	
6			min	0	1	0	1	NC		NC		NC		NC	
7		4	max	0	16	0	16	NC		NC		NC		NC	
8			min	0	1	0	1	NC		NC		NC		NC	
9		5	max	0	16	0	16	NC		NC		NC		NC	
10			min	0	1	0	1	NC		NC		NC		NC	
11	M2	1	max	0	16	0	16	NC		NC		NC		NC	
12			min	0	1	0	1	NC		NC		NC		NC	
13		2	max	0	16	0	16	NC		NC		NC		NC	
14			min	0	1	0	1	NC		NC		NC		NC	
15		3	max	0	16	0	16	NC		NC		NC		NC	
16			min	0	1	0	1	NC		NC		NC		NC	
17		4	max	0	16	0	16	NC		NC		NC		NC	
18			min	0	1	0	1	NC		NC		NC		NC	
19		5	max	0	16	0	16	NC		NC		NC		NC	
20			min	0	1	0	1	NC		NC		NC		NC	
21	M3	1	max	0	16	0	16	0	16	0	16	0	16	0	16
22			min	0	1	0	1	0	1	0	1	0	1	0	1
23		2	max	0	16	0	16	0	16	0	16	0	16	0	16
24			min	0	1	0	1	0	1	0	1	0	1	0	1
25		3	max	0	16	0	16	0	16	0	16	0	16	0	16
26			min	0	1	0	1	0	1	0	1	0	1	0	1
27		4	max	0	16	0	16	0	16	0	16	0	16	0	16
28			min	0	1	0	1	0	1	0	1	0	1	0	1
29		5	max	0	16	0	16	0	16	0	16	0	16	0	16
30			min	0	1	0	1	0	1	0	1	0	1	0	1
31	M4	1	max	0	16	0	16	0	16	0	16	0	16	0	16
32			min	0	1	0	1	0	1	0	1	0	1	0	1
33		2	max	0	16	0	16	0	16	0	16	0	16	0	16
34			min	0	1	0	1	0	1	0	1	0	1	0	1
35		3	max	0	16	0	16	0	16	0	16	0	16	0	16
36			min	0	1	0	1	0	1	0	1	0	1	0	1
37		4	max	0	16	0	16	0	16	0	16	0	16	0	16
38			min	0	1	0	1	0	1	0	1	0	1	0	1
39		5	max	0	16	0	16	0	16	0	16	0	16	0	16
40			min	0	1	0	1	0	1	0	1	0	1	0	1
41	M5	1	max	0	16	0	16	0	16	0	16	0	16	0	16
42			min	0	1	0	1	0	1	0	1	0	1	0	1
43		2	max	0	16	0	16	0	16	0	16	0	16	0	16
44			min	0	1	0	1	0	1	0	1	0	1	0	1
45		3	max	0	16	0	16	0	16	0	16	0	16	0	16
46			min	0	1	0	1	0	1	0	1	0	1	0	1
47		4	max	0	16	0	16	0	16	0	16	0	16	0	16
48			min	0	1	0	1	0	1	0	1	0	1	0	1
49		5	max	0	16	0	16	0	16	0	16	0	16	0	16
50			min	0	1	0	1	0	1	0	1	0	1	0	1
51	M6	1	max	0	16	0	16	0	16	0	16	0	16	0	16
52			min	0	1	0	1	0	1	0	1	0	1	0	1
53		2	max	0	16	0	16	0	16	0	16	0	16	0	16
54			min	0	1	0	1	0	1	0	1	0	1	0	1
55		3	max	0	16	0	16	0	16	0	16	0	16	0	16
56			min	0	1	0	1	0	1	0	1	0	1	0	1
57		4	max	0	16	0	16	0	16	0	16	0	16	0	16
58			min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Torsion Stresses (Continued)

	Member	Sec		Torque[k-ft]	LC	Torsion Shear[ksi]	LC	y-y Warp Shear[ksi]	LC	z-z Warp Shear[ksi]	LC	z-Top Warp Bend[ksi]	LC	z-Bot Warp Bend[ksi]	LC
59		5	max	0	16	0	16	0	16	0	16	0	16	0	16
60			min	0	1	0	1	0	1	0	1	0	1	0	1
61	M7	1	max	0	16	0	16	NC		NC		NC		NC	
62			min	0	1	0	1	NC		NC		NC		NC	
63		2	max	0	16	0	16	NC		NC		NC		NC	
64			min	0	1	0	1	NC		NC		NC		NC	
65		3	max	0	16	0	16	NC		NC		NC		NC	
66			min	0	1	0	1	NC		NC		NC		NC	
67		4	max	0	16	0	16	NC		NC		NC		NC	
68			min	0	1	0	1	NC		NC		NC		NC	
69		5	max	0	16	0	16	NC		NC		NC		NC	
70			min	0	1	0	1	NC		NC		NC		NC	
71	M8	1	max	0	16	0	16	NC		NC		NC		NC	
72			min	0	1	0	1	NC		NC		NC		NC	
73		2	max	0	16	0	16	NC		NC		NC		NC	
74			min	0	1	0	1	NC		NC		NC		NC	
75		3	max	0	16	0	16	NC		NC		NC		NC	
76			min	0	1	0	1	NC		NC		NC		NC	
77		4	max	0	16	0	16	NC		NC		NC		NC	
78			min	0	1	0	1	NC		NC		NC		NC	
79		5	max	0	16	0	16	NC		NC		NC		NC	
80			min	0	1	0	1	NC		NC		NC		NC	
81	M9	1	max	0	16	0	16	NC		NC		NC		NC	
82			min	0	1	0	1	NC		NC		NC		NC	
83		2	max	0	16	0	16	NC		NC		NC		NC	
84			min	0	1	0	1	NC		NC		NC		NC	
85		3	max	0	16	0	16	NC		NC		NC		NC	
86			min	0	1	0	1	NC		NC		NC		NC	
87		4	max	0	16	0	16	NC		NC		NC		NC	
88			min	0	1	0	1	NC		NC		NC		NC	
89		5	max	0	16	0	16	NC		NC		NC		NC	
90			min	0	1	0	1	NC		NC		NC		NC	
91	M10	1	max	0	16	0	16	NC		NC		NC		NC	
92			min	0	1	0	1	NC		NC		NC		NC	
93		2	max	0	16	0	16	NC		NC		NC		NC	
94			min	0	1	0	1	NC		NC		NC		NC	
95		3	max	0	16	0	16	NC		NC		NC		NC	
96			min	0	1	0	1	NC		NC		NC		NC	
97		4	max	0	16	0	16	NC		NC		NC		NC	
98			min	0	1	0	1	NC		NC		NC		NC	
99		5	max	0	16	0	16	NC		NC		NC		NC	
100			min	0	1	0	1	NC		NC		NC		NC	
101	M11	1	max	0	16	0	16	NC		NC		NC		NC	
102			min	0	1	0	1	NC		NC		NC		NC	
103		2	max	0	16	0	16	NC		NC		NC		NC	
104			min	0	1	0	1	NC		NC		NC		NC	
105		3	max	0	16	0	16	NC		NC		NC		NC	
106			min	0	1	0	1	NC		NC		NC		NC	
107		4	max	0	16	0	16	NC		NC		NC		NC	
108			min	0	1	0	1	NC		NC		NC		NC	
109		5	max	0	16	0	16	NC		NC		NC		NC	
110			min	0	1	0	1	NC		NC		NC		NC	
111	M12	1	max	0	16	0	16	NC		NC		NC		NC	
112			min	0	1	0	1	NC		NC		NC		NC	
113		2	max	0	16	0	16	NC		NC		NC		NC	

Envelope Member Torsion Stresses (Continued)

	Member	Sec		Torque[k-ft]	LC	Torsion Shear[ksi]	LC	y-y Warp Shear[ksi]	LC	z-z Warp Shear[ksi]	LC	z-Top Warp Bend[ksi]	LC	z-Bot Warp Bend[ksi]	LC
114			min	0	1	0	1	NC		NC		NC		NC	
115		3	max	0	16	0	16	NC		NC		NC		NC	
116			min	0	1	0	1	NC		NC		NC		NC	
117		4	max	0	16	0	16	NC		NC		NC		NC	
118			min	0	1	0	1	NC		NC		NC		NC	
119		5	max	0	16	0	16	NC		NC		NC		NC	
120			min	0	1	0	1	NC		NC		NC		NC	
121	M13	1	max	0	16	0	16	NC		NC		NC		NC	
122			min	0	1	0	1	NC		NC		NC		NC	
123		2	max	0	16	0	16	NC		NC		NC		NC	
124			min	0	1	0	1	NC		NC		NC		NC	
125		3	max	0	16	0	16	NC		NC		NC		NC	
126			min	0	1	0	1	NC		NC		NC		NC	
127		4	max	0	16	0	16	NC		NC		NC		NC	
128			min	0	1	0	1	NC		NC		NC		NC	
129		5	max	0	16	0	16	NC		NC		NC		NC	
130			min	0	1	0	1	NC		NC		NC		NC	
131	M14	1	max	0	16	0	16	NC		NC		NC		NC	
132			min	0	1	0	1	NC		NC		NC		NC	
133		2	max	0	16	0	16	NC		NC		NC		NC	
134			min	0	1	0	1	NC		NC		NC		NC	
135		3	max	0	16	0	16	NC		NC		NC		NC	
136			min	0	1	0	1	NC		NC		NC		NC	
137		4	max	0	16	0	16	NC		NC		NC		NC	
138			min	0	1	0	1	NC		NC		NC		NC	
139		5	max	0	16	0	16	NC		NC		NC		NC	
140			min	0	1	0	1	NC		NC		NC		NC	

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
1	M1	1	max	1.071	15	-0.005	13	0	16	5.384	14	-0.025	13	0	16	0	16
2			min	0.219	13	-0.42	14	0	1	0.025	13	-5.384	14	0	1	0	1
3		2	max	1.071	15	-0.02	13	0	16	0.664	11	4.169	14	0	16	0	16
4			min	0.219	13	-0.42	14	0	1	-4.169	14	-0.664	7	0	1	0	1
5		3	max	0.746	15	-0.024	13	0	16	0.859	11	2.788	14	0	16	0	16
6			min	0.168	13	-0.231	14	0	1	-2.788	14	-0.859	7	0	1	0	1
7		4	max	0.42	15	-0.026	13	0	16	0.937	11	2.581	14	0	16	0	16
8			min	0.104	13	-0.214	14	0	1	-2.581	14	-0.937	7	0	1	0	1
9		5	max	0.144	15	-0.026	13	0	16	-0.298	13	1.877	15	0	16	0	16
10			min	0.033	13	-0.149	15	0	1	-1.877	15	0.298	13	0	1	0	1
11	M2	1	max	0.701	11	0.015	11	0	16	0	16	0	16	0	16	0	16
12			min	-0.226	16	-0.078	16	0	1	0	1	0	1	0	1	0	1
13		2	max	0.701	11	0.063	11	0	16	2.462	16	0.658	11	0	16	0	16
14			min	-0.226	16	-0.214	16	0	1	-0.658	7	-2.462	16	0	1	0	1
15		3	max	0.556	11	0.076	11	0	16	-0.266	13	2.392	16	0	16	0	16
16			min	-0.105	16	-0.214	16	0	1	-2.392	16	0.266	13	0	1	0	1
17		4	max	0.338	11	0.086	11	0	16	-0.29	13	1.862	16	0	16	0	16
18			min	0.012	16	-0.151	16	0	1	-1.862	16	0.29	13	0	1	0	1
19		5	max	0.131	11	0.086	11	0	16	1.028	11	0.861	16	0	16	0	16
20			min	0.012	16	-0.06	16	0	1	-0.861	16	-1.028	7	0	1	0	1
21	M3	1	max	0.107	16	1.309	14	0	16	-0.206	13	4.383	14	0	16	0	16
22			min	-0.025	7	0.204	13	0	1	-4.383	14	0.206	13	0	1	0	1
23		2	max	0.107	16	0.927	16	0	16	0.26	11	1.045	16	0	16	0	16
24			min	-0.025	7	-0.045	2	0	1	-1.045	16	-0.26	7	0	1	0	1
25		3	max	0.101	16	0.231	14	0	16	0.668	15	-0.212	16	0	16	0	16

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
26			min	-0.026	7	-0.001	7	0	1	0.212	16	-0.668	15	0	1	0	1
27		4	max	0.096	16	0.693	14	0	16	1.086	14	-0.083	13	0	16	0	16
28			min	-0.025	7	-0.043	4	0	1	0.083	13	-1.086	14	0	1	0	1
29		5	max	0.096	16	0.489	16	0	16	2.796	16	0.665	11	0	16	0	16
30			min	-0.025	7	-0.605	2	0	1	-0.665	7	-2.796	16	0	1	0	1
31	M4	1	max	0.011	16	1.315	15	0	16	-0.331	13	3.352	14	0	16	0	16
32			min	-0.007	7	0.259	13	0	1	-3.352	14	0.331	13	0	1	0	1
33		2	max	0.011	16	0.625	14	0	16	0.41	11	0.963	16	0	16	0	16
34			min	-0.007	7	0.041	13	0	1	-0.963	16	-0.41	7	0	1	0	1
35		3	max	0.012	16	0.35	14	0	16	0.997	15	-0.235	16	0	16	0	16
36			min	-0.007	7	-0.001	7	0	1	0.235	16	-0.997	15	0	1	0	1
37		4	max	0.013	16	0.569	16	0	16	1.292	14	-0.126	13	0	16	0	16
38			min	-0.007	7	-0.107	2	0	1	0.126	13	-1.292	14	0	1	0	1
39		5	max	0.013	16	0.376	16	0	16	2.617	16	1.071	11	0	16	0	16
40			min	-0.007	7	-0.877	7	0	1	-1.071	7	-2.617	16	0	1	0	1
41	M5	1	max	0.048	16	1.112	15	0	16	-0.373	13	2.623	15	0	16	0	16
42			min	-0.007	4	0.287	13	0	1	-2.623	15	0.373	13	0	1	0	1
43		2	max	0.048	16	0.485	15	0	16	0.447	11	0.728	16	0	16	0	16
44			min	-0.007	4	0.049	13	0	1	-0.728	16	-0.447	7	0	1	0	1
45		3	max	0.05	16	0.312	14	0	16	1.043	15	-0.275	16	0	16	0	16
46			min	-0.007	4	0	7	0	1	0.275	16	-1.043	15	0	1	0	1
47		4	max	0.053	16	0.304	16	0	16	1.089	15	-0.141	13	0	16	0	16
48			min	-0.007	4	-0.233	4	0	1	0.141	13	-1.089	15	0	1	0	1
49		5	max	0.053	16	0.096	16	0	16	1.566	16	1.186	11	0	16	0	16
50			min	-0.007	4	-0.836	7	0	1	-1.186	7	-1.566	16	0	1	0	1
51	M6	1	max	0.08	15	0.579	15	0	16	-0.197	13	1.239	15	0	16	0	16
52			min	0.014	13	0.131	13	0	1	-1.239	15	0.197	13	0	1	0	1
53		2	max	0.08	15	0.284	15	0	16	0.492	11	0.447	16	0	16	0	16
54			min	0.014	13	0.09	13	0	1	-0.447	16	-0.492	7	0	1	0	1
55		3	max	0.084	15	0.255	14	0	16	0.892	15	-0.191	16	0	16	0	16
56			min	0.014	13	0	7	0	1	0.191	16	-0.892	15	0	1	0	1
57		4	max	0.085	15	-0.019	16	0	16	0.924	15	-0.141	13	0	16	0	16
58			min	0.014	13	-0.263	2	0	1	0.141	13	-0.924	15	0	1	0	1
59		5	max	0.085	15	-0.049	16	0	16	0.568	16	0.678	11	0	16	0	16
60			min	0.014	13	-0.526	7	0	1	-0.678	7	-0.568	16	0	1	0	1
61	M7	1	max	2.6	11	0	13	0	16	0	16	0	16	0	16	0	16
62			min	-0.371	16	-0.027	14	0	1	0	1	0	1	0	1	0	1
63		2	max	2.6	11	0	13	0	16	-0.007	13	0.379	14	0	16	0	16
64			min	-0.371	16	-0.027	14	0	1	-0.379	14	0.007	13	0	1	0	1
65		3	max	2.6	11	0	13	0	16	-0.014	13	0.757	14	0	16	0	16
66			min	-0.371	16	-0.027	14	0	1	-0.757	14	0.014	13	0	1	0	1
67		4	max	2.6	11	0	13	0	16	-0.021	13	1.136	14	0	16	0	16
68			min	-0.371	16	-0.027	14	0	1	-1.136	14	0.021	13	0	1	0	1
69		5	max	2.6	11	0	13	0	16	-0.028	13	1.514	14	0	16	0	16
70			min	-0.371	16	-0.027	14	0	1	-1.514	14	0.028	13	0	1	0	1
71	M8	1	max	3.299	15	0.002	11	0	16	0	16	0	16	0	16	0	16
72			min	0.843	13	-0.025	16	0	1	0	1	0	1	0	1	0	1
73		2	max	3.299	15	0.002	11	0	16	0.035	11	0.352	16	0	16	0	16
74			min	0.843	13	-0.025	16	0	1	-0.352	16	-0.035	7	0	1	0	1
75		3	max	3.299	15	0.002	11	0	16	0.07	11	0.704	16	0	16	0	16
76			min	0.843	13	-0.025	16	0	1	-0.704	16	-0.07	7	0	1	0	1
77		4	max	3.299	15	0.002	11	0	16	0.104	11	1.055	16	0	16	0	16
78			min	0.843	13	-0.025	16	0	1	-1.055	16	-0.104	7	0	1	0	1
79		5	max	3.299	15	0.002	11	0	16	0.139	11	1.407	16	0	16	0	16
80			min	0.843	13	-0.025	16	0	1	-1.407	16	-0.139	7	0	1	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
81	M9	1	max	1.763	15	-0.003	13	0	16	2.66	14	-0.085	13	0	16	0	16
82			min	0.407	16	-0.094	14	0	1	0.085	13	-2.66	14	0	1	0	1
83		2	max	1.763	15	-0.003	13	0	16	1.329	14	-0.039	13	0	16	0	16
84			min	0.407	16	-0.094	14	0	1	0.039	13	-1.329	14	0	1	0	1
85		3	max	1.763	15	-0.003	13	0	16	0.004	16	0.024	11	0	16	0	16
86			min	0.407	16	-0.094	14	0	1	-0.024	7	-0.004	16	0	1	0	1
87		4	max	1.763	15	-0.003	13	0	16	-0.052	13	1.332	14	0	16	0	16
88			min	0.407	16	-0.094	14	0	1	-1.332	14	0.052	13	0	1	0	1
89		5	max	1.763	15	-0.003	13	0	16	-0.098	13	2.663	14	0	16	0	16
90			min	0.407	16	-0.094	14	0	1	-2.663	14	0.098	13	0	1	0	1
91	M10	1	max	0.898	15	-0.004	13	0	16	2.217	14	-0.117	13	0	16	0	16
92			min	0.217	13	-0.078	14	0	1	0.117	13	-2.217	14	0	1	0	1
93		2	max	0.898	15	-0.004	13	0	16	1.111	14	-0.057	13	0	16	0	16
94			min	0.217	13	-0.078	14	0	1	0.057	13	-1.111	14	0	1	0	1
95		3	max	0.898	15	-0.004	13	0	16	0.008	16	0.006	11	0	16	0	16
96			min	0.217	13	-0.078	14	0	1	-0.006	7	-0.008	16	0	1	0	1
97		4	max	0.898	15	-0.004	13	0	16	-0.062	13	1.101	14	0	16	0	16
98			min	0.217	13	-0.078	14	0	1	-1.101	14	0.062	13	0	1	0	1
99		5	max	0.898	15	-0.004	13	0	16	-0.121	13	2.206	14	0	16	0	16
100			min	0.217	13	-0.078	14	0	1	-2.206	14	0.121	13	0	1	0	1
101	M11	1	max	0.315	15	-0.004	13	0	16	1.355	14	-0.119	13	0	16	0	16
102			min	-0.3	2	-0.047	14	0	1	0.119	13	-1.355	14	0	1	0	1
103		2	max	0.315	15	-0.004	13	0	16	0.686	14	-0.061	13	0	16	0	16
104			min	-0.3	2	-0.047	14	0	1	0.061	13	-0.686	14	0	1	0	1
105		3	max	0.315	15	-0.004	13	0	16	0.016	14	0	4	0	16	0	16
106			min	-0.3	2	-0.047	14	0	1	0	4	-0.016	14	0	1	0	1
107		4	max	0.315	15	-0.004	13	0	16	-0.055	13	0.653	14	0	16	0	16
108			min	-0.3	2	-0.047	14	0	1	-0.653	14	0.055	13	0	1	0	1
109		5	max	0.315	15	-0.004	13	0	16	-0.113	13	1.323	14	0	16	0	16
110			min	-0.3	2	-0.047	14	0	1	-1.323	14	0.113	13	0	1	0	1
111	M12	1	max	1.889	15	0.011	11	0	16	2.412	16	0.275	11	0	16	0	16
112			min	0.492	13	-0.085	16	0	1	-0.275	7	-2.412	16	0	1	0	1
113		2	max	1.889	15	0.011	11	0	16	1.21	16	0.126	11	0	16	0	16
114			min	0.492	13	-0.085	16	0	1	-0.126	7	-1.21	16	0	1	0	1
115		3	max	1.889	15	0.011	11	0	16	0.026	15	-0.006	13	0	16	0	16
116			min	0.492	13	-0.085	16	0	1	0.006	13	-0.026	15	0	1	0	1
117		4	max	1.889	15	0.011	11	0	16	0.172	11	1.194	16	0	16	0	16
118			min	0.492	13	-0.085	16	0	1	-1.194	16	-0.172	7	0	1	0	1
119		5	max	1.889	15	0.011	11	0	16	0.322	11	2.395	16	0	16	0	16
120			min	0.492	13	-0.085	16	0	1	-2.395	16	-0.322	7	0	1	0	1
121	M13	1	max	0.65	11	0.013	11	0	16	1.924	16	0.376	11	0	16	0	16
122			min	-0.067	16	-0.067	16	0	1	-0.376	7	-1.924	16	0	1	0	1
123		2	max	0.65	11	0.013	11	0	16	0.968	16	0.185	11	0	16	0	16
124			min	-0.067	16	-0.067	16	0	1	-0.185	7	-0.968	16	0	1	0	1
125		3	max	0.65	11	0.013	11	0	16	0.016	14	-0.002	13	0	16	0	16
126			min	-0.067	16	-0.067	16	0	1	0.002	13	-0.016	14	0	1	0	1
127		4	max	0.65	11	0.013	11	0	16	0.197	11	0.942	16	0	16	0	16
128			min	-0.067	16	-0.067	16	0	1	-0.942	16	-0.197	7	0	1	0	1
129		5	max	0.65	11	0.013	11	0	16	0.389	11	1.897	16	0	16	0	16
130			min	-0.067	16	-0.067	16	0	1	-1.897	16	-0.389	7	0	1	0	1
131	M14	1	max	0.314	4	0.014	11	0	16	1.049	16	0.39	11	0	16	0	16
132			min	-0.422	14	-0.037	16	0	1	-0.39	7	-1.049	16	0	1	0	1
133		2	max	0.314	4	0.014	11	0	16	0.528	16	0.197	11	0	16	0	16
134			min	-0.422	14	-0.037	16	0	1	-0.197	7	-0.528	16	0	1	0	1
135		3	max	0.314	4	0.014	11	0	16	0.008	16	0.011	2	0	16	0	16

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
136			min	-0.422	14	-0.037	16	0	1	-0.011	2	-0.008	16	0	1	0	1
137		4	max	0.314	4	0.014	11	0	16	0.187	11	0.512	16	0	16	0	16
138			min	-0.422	14	-0.037	16	0	1	-0.512	16	-0.187	7	0	1	0	1
139		5	max	0.314	4	0.014	11	0	16	0.38	11	1.033	16	0	16	0	16
140			min	-0.422	14	-0.037	16	0	1	-1.033	16	-0.38	7	0	1	0	1

Envelope Member Section Deflections - Service

No Data to Print...

Envelope Member Section Deflections - Strength

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [rad]	LC	(n) L/y' Ratio	LC	(n) L/z' Ratio	LC
1	M1	1	max	0	16	0	16	0	16	0	16	NC	16	NC	16
2			min	0	1	0	1	0	1	0	1	NC	1	NC	1
3		2	max	-0.001	13	0.202	14	0	16	0	16	NC	16	NC	16
4			min	-0.007	15	-0.004	7	0	1	0	1	NC	1	NC	1
5		3	max	-0.002	13	0.378	14	0	16	0	16	NC	15	NC	16
6			min	-0.011	15	-0.004	7	0	1	0	1	7513.417	14	NC	1
7		4	max	-0.003	13	0.52	14	0	16	0	16	NC	15	NC	16
8			min	-0.014	15	-0.004	7	0	1	0	1	8395.52	14	NC	1
9		5	max	-0.003	13	0.602	14	0	16	0	16	NC	16	NC	16
10			min	-0.015	15	-0.005	7	0	1	0	1	NC	1	NC	1
11	M2	1	max	0	16	0	16	0	16	0	16	NC	16	NC	16
12			min	0	1	0	1	0	1	0	1	NC	1	NC	1
13		2	max	0.001	16	0.203	14	0	16	0	16	NC	16	NC	16
14			min	-0.004	7	-0.004	7	0	1	0	1	NC	1	NC	1
15		3	max	0.002	16	0.378	14	0	16	0	16	NC	15	NC	16
16			min	-0.008	7	-0.004	7	0	1	0	1	7537.268	14	NC	1
17		4	max	0.002	16	0.52	14	0	16	0	16	NC	15	NC	16
18			min	-0.01	7	-0.004	7	0	1	0	1	8400.792	14	NC	1
19		5	max	0.002	16	0.602	14	0	16	0	16	NC	16	NC	16
20			min	-0.011	7	-0.004	7	0	1	0	1	NC	1	NC	1
21	M3	1	max	0.004	11	-0.001	13	0	16	0	16	NC	16	NC	16
22			min	-0.202	14	-0.007	15	0	1	0	1	NC	1	NC	1
23		2	max	0.004	11	0.005	16	0	16	0	16	NC	16	NC	16
24			min	-0.202	14	-0.014	7	0	1	0	1	NC	1	NC	1
25		3	max	0.004	11	-0.005	16	0	16	0	16	NC	16	NC	16
26			min	-0.202	14	-0.019	7	0	1	0	1	NC	1	NC	1
27		4	max	0.004	11	-0.005	13	0	16	0	16	NC	16	NC	16
28			min	-0.203	14	-0.02	15	0	1	0	1	NC	1	NC	1
29		5	max	0.004	11	0.001	16	0	16	0	16	NC	16	NC	16
30			min	-0.203	14	-0.004	7	0	1	0	1	NC	1	NC	1
31	M4	1	max	0.004	11	-0.002	13	0	16	0	16	NC	16	NC	16
32			min	-0.378	14	-0.011	15	0	1	0	1	NC	1	NC	1
33		2	max	0.004	11	0.002	16	0	16	0	16	NC	16	NC	16
34			min	-0.378	14	-0.023	7	0	1	0	1	NC	1	NC	1
35		3	max	0.004	11	-0.008	16	0	16	0	16	NC	16	NC	16
36			min	-0.378	14	-0.031	15	0	1	0	1	9245.52	15	NC	1
37		4	max	0.004	11	-0.007	13	0	16	0	16	NC	16	NC	16
38			min	-0.378	14	-0.03	15	0	1	0	1	9347.647	15	NC	1
39		5	max	0.004	11	0.002	16	0	16	0	16	NC	16	NC	16
40			min	-0.378	14	-0.008	7	0	1	0	1	NC	1	NC	1
41	M5	1	max	0.004	11	-0.003	13	0	16	0	16	NC	16	NC	16
42			min	-0.52	14	-0.014	15	0	1	0	1	NC	1	NC	1
43		2	max	0.004	11	-0.001	16	0	16	0	16	NC	16	NC	16

Envelope Member Section Deflections - Strength (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [rad]	LC	(n) L/y' Ratio	LC	(n) L/z' Ratio	LC
44			min	-0.52	14	-0.027	7	0	1	0	1	NC	1	NC	1
45		3	max	0.004	11	-0.009	16	0	16	0	16	NC	16	NC	16
46			min	-0.52	14	-0.036	15	0	1	0	1	8355.587	15	NC	1
47		4	max	0.004	11	-0.008	13	0	16	0	16	NC	16	NC	16
48			min	-0.52	14	-0.031	15	0	1	0	1	9367.862	15	NC	1
49		5	max	0.004	11	0.002	16	0	16	0	16	NC	16	NC	16
50			min	-0.52	14	-0.01	7	0	1	0	1	NC	1	NC	1
51	M6	1	max	0.005	11	-0.003	13	0	16	0	16	NC	16	NC	16
52			min	-0.602	14	-0.015	15	0	1	0	1	NC	1	NC	1
53		2	max	0.004	11	-0.004	16	0	16	0	16	NC	16	NC	16
54			min	-0.602	14	-0.027	7	0	1	0	1	NC	1	NC	1
55		3	max	0.004	11	-0.008	16	0	16	0	16	NC	16	NC	16
56			min	-0.602	14	-0.036	15	0	1	0	1	8630.403	15	NC	1
57		4	max	0.004	11	-0.008	13	0	16	0	16	NC	16	NC	16
58			min	-0.602	14	-0.03	15	0	1	0	1	NC	1	NC	1
59		5	max	0.004	11	0.002	16	0	16	0	16	NC	16	NC	16
60			min	-0.602	14	-0.011	7	0	1	0	1	NC	1	NC	1
61	M7	1	max	0	16	0	16	0	16	0	16	NC	16	NC	16
62			min	0	1	0	1	0	1	0	1	NC	1	NC	1
63		2	max	0.001	16	0.077	14	0	16	0	16	NC	13	NC	16
64			min	-0.004	7	0	13	0	1	0	1	5447.846	14	NC	1
65		3	max	0.001	16	0.143	14	0	16	0	16	NC	13	NC	16
66			min	-0.008	7	0	13	0	1	0	1	3404.904	14	NC	1
67		4	max	0.002	16	0.189	14	0	16	0	16	NC	13	NC	16
68			min	-0.012	7	-0.001	2	0	1	0	1	3891.319	14	NC	1
69		5	max	0.002	16	0.202	14	0	16	0	16	NC	16	NC	16
70			min	-0.016	7	-0.004	7	0	1	0	1	NC	1	NC	1
71	M8	1	max	0	16	0	16	0	16	0	16	NC	16	NC	16
72			min	0	1	0	1	0	1	0	1	NC	1	NC	1
73		2	max	-0.001	13	0.075	16	0	16	0	16	NC	13	NC	16
74			min	-0.005	15	-0.003	7	0	1	0	1	5862.285	16	NC	1
75		3	max	-0.003	13	0.141	16	0	16	0	16	NC	13	NC	16
76			min	-0.01	15	-0.006	7	0	1	0	1	3663.928	16	NC	1
77		4	max	-0.004	13	0.186	16	0	16	0	16	NC	13	NC	16
78			min	-0.015	15	-0.006	7	0	1	0	1	4187.346	16	NC	1
79		5	max	-0.005	13	0.202	14	0	16	0	16	NC	16	NC	16
80			min	-0.02	15	-0.004	7	0	1	0	1	NC	1	NC	1
81	M9	1	max	0.002	16	0.202	14	0	16	0	16	NC	16	NC	16
82			min	-0.016	7	-0.004	7	0	1	0	1	NC	1	NC	1
83		2	max	0.002	16	0.228	16	0	16	0	16	NC	13	NC	16
84			min	-0.019	7	-0.005	2	0	1	0	1	5633.02	16	NC	1
85		3	max	0.001	16	0.29	14	0	16	0	16	NC	15	NC	16
86			min	-0.021	7	-0.003	2	0	1	0	1	1653.168	16	NC	1
87		4	max	0	16	0.352	14	0	16	0	16	NC	13	NC	16
88			min	-0.024	7	-0.001	2	0	1	0	1	967.924	16	NC	1
89		5	max	0	16	0.378	14	0	16	0	16	NC	15	NC	16
90			min	-0.027	7	-0.004	7	0	1	0	1	824.228	16	NC	1
91	M10	1	max	0	16	0.378	14	0	16	0	16	NC	16	NC	16
92			min	-0.027	7	-0.004	7	0	1	0	1	NC	1	NC	1
93		2	max	-0.001	16	0.398	14	0	16	0	16	NC	15	NC	16
94			min	-0.028	7	-0.007	7	0	1	0	1	7001.339	16	NC	1
95		3	max	-0.002	16	0.448	14	0	16	0	16	NC	13	NC	16
96			min	-0.029	7	-0.004	2	0	1	0	1	2029.647	14	NC	1
97		4	max	-0.002	16	0.5	14	0	16	0	16	NC	13	NC	16
98			min	-0.03	7	-0.002	2	0	1	0	1	1179.495	14	NC	1

Envelope Member Section Deflections - Strength (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [rad]	LC	(n) L/y' Ratio	LC	(n) L/z' Ratio	LC
99		5	max	-0.003	16	0.52	14	0	16	0	16	NC	13	NC	16
100			min	-0.031	7	-0.004	7	0	1	0	1	1010.629	14	NC	1
101	M11	1	max	-0.003	16	0.52	14	0	16	0	16	NC	16	NC	16
102			min	-0.031	7	-0.004	7	0	1	0	1	NC	1	NC	1
103		2	max	-0.004	16	0.53	14	0	16	0	16	NC	16	NC	16
104			min	-0.031	7	-0.007	7	0	1	0	1	NC	1	NC	1
105		3	max	-0.004	16	0.56	14	0	16	0	16	NC	13	NC	16
106			min	-0.031	7	-0.005	2	0	1	0	1	3587.401	16	NC	1
107		4	max	-0.004	16	0.59	14	0	16	0	16	NC	13	NC	16
108			min	-0.031	7	-0.003	2	0	1	0	1	2054.502	14	NC	1
109		5	max	-0.005	16	0.602	14	0	16	0	16	NC	13	NC	16
110			min	-0.031	7	-0.004	7	0	1	0	1	1758.616	14	NC	1
111	M12	1	max	-0.005	13	0.202	14	0	16	0	16	NC	16	NC	16
112			min	-0.02	15	-0.004	7	0	1	0	1	NC	1	NC	1
113		2	max	-0.006	13	0.229	14	0	16	0	16	NC	13	NC	16
114			min	-0.023	15	-0.003	7	0	1	0	1	5348.386	14	NC	1
115		3	max	-0.007	13	0.289	14	0	16	0	16	NC	13	NC	16
116			min	-0.026	15	-0.005	7	0	1	0	1	1659.834	14	NC	1
117		4	max	-0.008	13	0.35	16	0	16	0	16	NC	13	NC	16
118			min	-0.029	15	-0.007	7	0	1	0	1	977.926	16	NC	1
119		5	max	-0.008	13	0.378	14	0	16	0	16	NC	13	NC	16
120			min	-0.032	15	-0.004	7	0	1	0	1	822.448	14	NC	1
121	M13	1	max	-0.008	13	0.378	14	0	16	0	16	NC	16	NC	16
122			min	-0.032	15	-0.004	7	0	1	0	1	NC	1	NC	1
123		2	max	-0.009	13	0.4	14	0	16	0	16	NC	13	NC	16
124			min	-0.033	15	-0.002	2	0	1	0	1	6433.077	14	NC	1
125		3	max	-0.009	13	0.448	14	0	16	0	16	NC	13	NC	16
126			min	-0.034	15	-0.005	7	0	1	0	1	2044.708	14	NC	1
127		4	max	-0.009	13	0.496	14	0	16	0	16	NC	13	NC	16
128			min	-0.034	15	-0.007	7	0	1	0	1	1205.508	16	NC	1
129		5	max	-0.01	13	0.52	14	0	16	0	16	NC	13	NC	16
130			min	-0.035	15	-0.004	7	0	1	0	1	1009.693	14	NC	1
131	M14	1	max	-0.01	13	0.52	14	0	16	0	16	NC	16	NC	16
132			min	-0.035	15	-0.004	7	0	1	0	1	NC	1	NC	1
133		2	max	-0.01	13	0.534	14	0	16	0	16	NC	16	NC	16
134			min	-0.035	15	-0.002	2	0	1	0	1	NC	1	NC	1
135		3	max	-0.009	13	0.561	14	0	16	0	16	NC	13	NC	16
136			min	-0.035	15	-0.004	7	0	1	0	1	3539.82	14	NC	1
137		4	max	-0.009	13	0.588	14	0	16	0	16	NC	13	NC	16
138			min	-0.035	15	-0.007	7	0	1	0	1	2108.491	16	NC	1
139		5	max	-0.009	13	0.602	14	0	16	0	16	NC	13	NC	16
140			min	-0.034	15	-0.004	7	0	1	0	1	1756.966	14	NC	1

Envelope Beam Deflections

	Member Label	Span		Location [ft]	y' [in]	(n) L'/y' Ratio	LC
1	M3	1	max	0.188	0.001	NC	15
2		1	min	2.438	0.008	8663	16
3		2	max	7.875	-0.001	NC	14
4		2	min	5.813	0	NC	1
5		3	max	12.563	-0.001	NC	15
6		3	min	12.375	0	NC	1
7	M4	1	max	0.188	0.001	NC	14
8		1	min	0	0	NC	1
9		2	max	10.688	-0.001	NC	16
10		2	min	5.813	0	NC	1

Envelope Beam Deflections (Continued)

	Member Label	Span		Location [ft]	y' [in]	(n) L'/y' Ratio	LC
11		3	max	17.625	-0.001	NC	15
12		3	min	12.375	0	NC	1
13	M5	1	max	5.25	0.001	NC	16
14		1	min	0	0	NC	1
15		2	max	11.625	-0.001	NC	14
16		2	min	5.813	0	NC	1
17		3	max	17.438	-0.001	NC	15
18		3	min	12.375	0	NC	1
19	M6	1	max	3.75	0.001	NC	15
20		1	min	0	0	NC	1
21		2	max	9.938	-0.001	NC	13
22		2	min	5.813	0	NC	1
23		3	max	17.25	-0.001	NC	14
24		3	min	12.375	0	NC	1

Envelope Beam Deflection Checks

No Data to Print...

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
1	M1	HSS10X10X10	0.215	0	14	0.023	12	y	14	137.724	628.743	182.635	182.635	1.5	H1-1b
2	M2	HSS10X10X10	0.107	12	11	0.012	24	y	16	137.724	628.743	182.635	182.635	1.191	H1-1b*
3	M3	W14X61	0.135	0	14	0.065	0	y	14	302.873	535.928	81.836	254.491	2.92	H1-1b
4	M4	W14X61	0.101	0	14	0.066	0	y	15	302.873	535.928	81.836	254.491	2.488	H1-1b
5	M5	W14X61	0.08	0	15	0.056	0	y	15	302.873	535.928	81.836	254.491	2.255	H1-1b
6	M6	W14X61	0.04	0	15	0.029	0	y	15	302.873	535.928	81.836	254.491	1.6	H1-1b
7	M7	HSS4X4X4	0.167	12	11	0.001	12	y	14	52.408	100.898	11.702	11.702	1.667	H1-1b*
8	M8	HSS4X4X4	0.236	12	15	0.001	12	y	16	52.408	100.898	11.702	11.702	1.667	H1-1a
9	M9	HSS4X4X4	0.118	12	15	0.005	12	y	14	52.408	100.898	11.702	11.702	2.27	H1-1b
10	M10	HSS4X4X4	0.084	0	14	0.004	12	y	14	52.408	100.898	11.702	11.702	2.272	H1-1b
11	M11	HSS4X4X4	0.045	0	15	0.003	12	y	14	52.408	100.898	11.702	11.702	2.268	H1-1b
12	M12	HSS4X4X4	0.121	12	15	0.005	12	y	16	52.408	100.898	11.702	11.702	2.266	H1-1b*
13	M13	HSS4X4X4	0.056	0	14	0.004	12	y	16	52.408	100.898	11.702	11.702	2.269	H1-1b
14	M14	HSS4X4X4	0.035	0	16	0.002	12	y	16	52.408	100.898	11.702	11.702	2.27	H1-1b

Connection Design Rules

	Label	Conn Type	Type	Beam Conn	Col/Girder Conn	Eccentricity
1	Col/Bm Single Angle Shear	Shear	Column/Beam Clip Single Angle Shear	Bolted	Bolted	1.5
2	Col/Bm Double Angle Shear	Shear	Column/Beam Clip Double Angle Shear	Bolted	Bolted	0
3	Col/Bm Two Side Clip Angle Shear	Shear	Column/Beam Clip Double Angle (Both Side) Shear	Bolted	Bolted	N/A
4	Col/Bm End Plate Shear	Shear	Column/Beam End-Plate Shear	N/A	Bolted	N/A
5	Col/Bm Shear Tab Shear	Shear	Column/Beam Shear Tab Shear	Bolted	N/A	0
6	Girder/Bm Single Angle Shear	Shear	Girder/Beam Clip Single Angle Shear	Bolted	Bolted	N/A
7	Girder/Bm Double Angle Shear	Shear	Girder/Beam Clip Double Angle Shear	Bolted	Bolted	N/A
8	Grd/Bm Two Side Clip Angle Shear	Shear	Girder/Beam Clip Double Angle (Both Side) Shear	Bolted	Bolted	N/A
9	Girder/Bm End Plate Shear	Shear	Girder/Beam End-Plate Shear	N/A	Bolted	N/A
10	Girder/Bm Shear Tab Shear	Shear	Girder/Beam Shear Tab Shear	Bolted	N/A	N/A
11	Beam Shear Splice	Shear	Beam Shear Tab Splice	Bolted	N/A	N/A
12	Column Shear Splice	Shear	Column Shear Tab Splice	N/A	Bolted	N/A
13	Col/Bm Ext. End Plate Moment	Moment	Column/Beam Extended End-Plate Moment	N/A	N/A	N/A
14	Col/Bm PartExt. End Plate Moment	Moment	Column/Beam Partially Extended End-Plate Moment (Tension side)	N/A	N/A	N/A
15	Col/Bm Flush End Plate Moment	Moment	Column/Beam Flush End-Plate Moment	N/A	N/A	N/A
16	Col/Bm Flange Plate Moment	Moment	Column/Beam Flange Plate Moment	Bolted	N/A	N/A

Connection Design Rules (Continued)

	Label	Conn Type	Type	Beam Conn	Col/Girder Conn	Eccentricity
17	Col/Bm Direct Weld Moment	Moment	Column/Beam Direct Weld Moment	Bolted	N/A	N/A
18	Col/Bm Seismic Moment	Moment	Column/Beam Seismic Moment	N/A	N/A	N/A
19	Beam Moment Plate Splice	Moment	Beam Moment Plate Splice	Bolted	N/A	N/A
20	Column Moment Plate Splice	Moment	Column Moment Plate Splice	N/A	N/A	N/A
21	Beam Direct Weld Moment Splice	Moment	Beam Direct Weld Splice	Bolted	N/A	N/A
22	Col Direct Weld Moment Splice	Moment	Column Direct Weld Splice	N/A	Bolted	N/A
23	Bm Ext. End Plate Moment Splice	Moment	Beam Extended End Plate Splice	Bolted	N/A	N/A
24	Col Ext. End Plate Moment Splice	Moment	Column Extended End Plate Splice	N/A	Bolted	N/A
25	Diagonal Vertical Brace	Brace	Diagonal Vertical Brace	N/A	N/A	N/A
26	Chevron Vertical Brace	Brace	Chevron Vertical Brace	N/A	N/A	N/A
27	Seismic Diagonal Brace	Brace	Diagonal Brace Seismic	N/A	N/A	N/A
28	Seismic Chevron Brace	Brace	Chevron Brace Seismic	N/A	N/A	N/A
29	Knee Brace	Brace	Knee Brace	N/A	N/A	N/A
30	Single Column Base Plate	Baseplate	Single Column Baseplate	N/A	N/A	N/A
31	Base Plate with Vertical Brace	Baseplate	Brace to Column Base Plate	N/A	N/A	N/A
32	HSS Truss Connection	Truss	HSS T-Connection	N/A	N/A	N/A

Frame / HR Seismic Design Rule

	Label	Frame Type	Column Ductility	Column Overstrength	Beam Ductility	Connection	Beam Overstrength	Z Factor	Hinge Location [in]	Brace Ductility	Brace Overstrength	KL/r
1	OCBF	OCBF	Minimal	Yes	Minimal	Other/None				Minimal		
2	SCBF	SCBF	High	Yes	High	Other/None	Yes			High		Yes
3	OMF	OMF	Minimal	Yes	Minimal	BUEEP			12	N/A		
4	IMF	IMF	Moderate	Yes	Moderate	BFP			12	N/A		
5	SMF-RBS	SMF	High	Yes	High	RBS		0.685	14.625	N/A		
6	SMF-KaiserB	SMF	High	Yes	High	KBB-B			12	N/A		
7	SMF-KaiserW	SMF	High	Yes	High	KBB-W			12	N/A		
8	SMF-BSEEP	SMF	High	Yes	High	BSEEP			12	N/A		
9	SMF-WUF-W	SMF	High	Yes	High	WUF-W				N/A		

Concrete Wall Seismic Design Rule

	Label	Wall Type	Diagonal Bar Size
1	SDR_Conc1	Ordinary	N/A

Masonry Wall Seismic Design Rule

	Label	Wall Types	Special Boundary Elements	1.5x Shear ASD
1	Ordinary	Ordinary		
2	Intermediate	Intermediate		
3	Special	Special	Yes	Yes

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	0	12	0	
3	N3	0	20	0	
4	N4	0	25	0	
5	N6	10.25	0	0	
6	N7	10.25	12	0	
7	N8	10.25	20	0	
8	N9	10.25	25	0	
9	FRAME 3	0	-2	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]
1	N1	Reaction	Reaction	Reaction
2	N6	Reaction	Reaction	Reaction
3	N2			Reaction
4	N3			Reaction
5	N4			Reaction
6	N7			Fixed
7	ALL			Fixed

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B RECT	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A500 Gr.C RND	29000	11154	0.3	0.65	0.527	46	1.4	62	1.3
7	A500 Gr.C RECT	29000	11154	0.3	0.65	0.527	50	1.4	62	1.3
8	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
9	A1085	29000	11154	0.3	0.65	0.49	50	1.4	65	1.3
10	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Cold Formed Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Fu [ksi]
1	A653 SS Gr33	29500	11346	0.3	0.65	0.49	33	45
2	A653 SS Gr50/1	29500	11346	0.3	0.65	0.49	50	65

Wood Properties

	Label	Type	Database	Species	Grade	Cm	Ci	Emod	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]
1	DF	Solid Sawn	Visually Graded	Douglas Fir-Larch	No.1			1	0.3	0.3	0.035
2	SP	Solid Sawn	Visually Graded	Southern Pine	No.1			1	0.3	0.3	0.035
3	HF	Solid Sawn	Visually Graded	Hem-Fir	No.1			1	0.3	0.3	0.035
4	SPF	Solid Sawn	Visually Graded	Spruce-Pine-fir	No.1			1	0.3	0.3	0.035
5	24F-1.8E DF Balanced	Glulam	NDS Table 5A	24F-1.8E_DF_BAL	na			1	0.3	0.3	0.035
6	24F-1.8E DF Unbalanced	Glulam	NDS Table 5A	24F-1.8E_DF_UNBAL	na			1	0.3	0.3	0.035
7	24F-1.8E SP Balanced	Glulam	NDS Table 5A	24F-1.8E_SP_BAL	na			1	0.3	0.3	0.035
8	24F-1.8E SP Unbalanced	Glulam	NDS Table 5A	24F-1.8E_SP_UNBAL	na			1	0.3	0.3	0.035
9	1.3E-1600F_VERSALAM	SCL	Boise Cascade	1.3E-1600F_VERSALAM	na			1	0.3	0.3	0.035

Wood Properties (Continued)

	Label	Type	Database	Species	Grade	Cm	Ci	Emod	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]
10	1.35E LSL_SolidStart	SCL	Louisiana Pacific	1.35E LSL_SolidStart	na			1	0.3	0.3	0.035
11	1.3E_RIGIDLAM LVL	SCL	Roseburg Forest Products	1.3E_RIGIDLAM LVL	na			1	0.3	0.3	0.035
12	2.0E_DF Parallam PSL	SCL	TrusJoist	2.0E_DF Parallam PSL	na			1	0.3	0.3	0.035
13	LVL_PRL_1.5E_2250F	Custom	N/A	LVL_PRL_1.5E_2250F	na			1	0.3	0.3	0.035
14	LVL_Microlam_1.9E_2600F	Custom	N/A	LVL_Microllam_1.9E_2600F	na			1	0.3	0.3	0.035
15	PSL_Parallam_2.0E_2900F	Custom	N/A	PSL_Parallam_2.0E_2900F	na			1	0.3	0.3	0.035
16	LSL_TimberStrand_1.55E_2325F	Custom	N/A	LSL_TimberStrand_1.55E_2325F	na			1	0.3	0.3	0.035

Concrete Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	f'c [ksi]	Lambda	Flex Steel [ksi]	Shear Steel [ksi]
1	Conc3000NW	3156	1372	0.15	0.6	0.145	3	1	60	60
2	Conc3500NW	3409	1482	0.15	0.6	0.145	3.5	1	60	60
3	Conc4000NW	3644	1584	0.15	0.6	0.145	4	1	60	60
4	Conc3000LW	2085	907	0.15	0.6	0.11	3	0.75	60	60
5	Conc3500LW	2252	979	0.15	0.6	0.11	3.5	0.75	60	60
6	Conc4000LW	2408	1047	0.15	0.6	0.11	4	0.75	60	60

Masonry Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Self Weight [k/ft³]	f'm [ksi]	Flex Steel [ksi]	Shear Steel [ksi]
1	Concrete Matl	1350	540	0.25	0.6	Custom	1.5	60	60
2	Clay Matl	1050	420	0.25	0.6	Custom	1.5	60	60
3	Gen Masonry	1050	420	0.25	0.6	0.08	1.5	60	60

Aluminum Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Table B.4	kt	Ftu [ksi]	Fty [ksi]	Fcy [ksi]	Fsu [ksi]	Ct
1	3003-H14	10100	3787.5	0.33	1.3	0.173	Table B.4-1	1	19	16	13	12	141
2	6061-T6	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	38	35	35	24	141
3	6063-T5	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	22	16	16	13	141
4	6063-T6	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	30	25	25	19	141
5	5052-H34	10200	3787.5	0.33	1.3	0.173	Table B.4-1	1	34	26	24	20	141
6	6061-T6 W	10100	3787.5	0.33	1.3	0.173	Table B.4-1	1	24	15	15	15	141

Stainless Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	n	Yield [ksi]	Fu [ksi]
1	A276 S316	28000	10780	0.3	0.93	0.5	5.6	30	75
2	A276 S321	29000	11165	0.3	0.73	0.48	5.6	65	94
3	A276 S304	28000	10780	0.3	0.93	0.49	5.6	30	75

General Materials Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Plate Methodology
1	gen_Conc3NW	3155	1372	0.15	0.6	0.145	Isotropic
2	gen_Conc4NW	3644	1584	0.15	0.6	0.145	Isotropic
3	gen_Conc3LW	2085	906	0.15	0.6	0.11	Isotropic
4	gen_Conc4LW	2408	1047	0.15	0.6	0.11	Isotropic
5	gen_Alum	10100	4077	0.3	1.29	0.173	Isotropic
6	gen_Steel	29000	11154	0.3	0.65	0.49	Isotropic
7	gen_Plywood	1800	38	0	0.3	0.035	Isotropic
8	RIGID	1e+6		0.3	0	0	Isotropic
9	gen_Ortho				0.65	0.49	Orthotropic

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	EXT COLUMN	HSS8X6X8	Column	Tube	A500 Gr.C RECT	Typical	11.6	62.5	98.2	127
2	INT COLUMN	HSS4X4X5	Column	Tube	A500 Gr.C RECT	Typical	4.1	9.14	9.14	15.3
3	W BEAM	W10X30	Beam	Wide Flange	A992	Typical	8.84	16.7	170	0.622
4	HSS BEAM	HSS6X5X4	Beam	Tube	A500 Gr.C RECT	Typical	4.77	18.7	24.7	34.2

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N1	N4	EXT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
2	M2	N6	N9	EXT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
3	M3	N2	N7	W BEAM	Beam	Wide Flange	A992	Typical
4	M4	N3	N8	HSS BEAM	Beam	Tube	A500 Gr.C RECT	Typical
5	M5	N4	N9	W BEAM	Beam	Wide Flange	A992	Typical

Member Advanced Data

	Label	Physical	Deflection Ratio Options	Seismic DR
1	M1	Yes	** NA **	None
2	M2	Yes	** NA **	None
3	M3	Yes	Default	None
4	M4	Yes	Default	None
5	M5	Yes	Default	None

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lcomp top [ft]	Channel Conn.	a [ft]	Function
1	M1	EXT COLUMN	25	Lbyy	N/A	N/A	Lateral
2	M2	EXT COLUMN	25	Lbyy	N/A	N/A	Lateral
3	M3	W BEAM	10.25	Lbyy	N/A	N/A	Lateral
4	M4	HSS BEAM	10.25	Lbyy	N/A	N/A	Lateral
5	M5	W BEAM	10.25	Lbyy	N/A	N/A	Lateral

Member RISAConnection Properties

	Label	Shape	Start Conn	End Conn	Start Release	End Release
1	M1	HSS8X6X8	None	None	Fixed	Fixed
2	M2	HSS8X6X8	None	None	Fixed	Fixed
3	M3	W10X30	None	None	Fixed	Fixed
4	M4	HSS6X5X4	None	None	Fixed	Fixed
5	M5	W10X30	None	None	Fixed	Fixed

Design Size and Code Check Parameters

	Label	Max Axial/Bending Chk	Max Shear Chk
1	Typical	1	1

Deflection Design

	Label	LC	Ratio	LC	Ratio	LC	Ratio
1	Typical	None	N/A	None	N/A	None	N/A

Node Loads and Enforced Displacements (BLC 5 : Eh)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N9	L	X	-1.4
2	N7	L	X	-1.5

Member Point Loads

No Data to Print...

Member Distributed Loads (BLC 1 : DEAD)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M5	Y	-0.06	-0.06	0	%100
2	M4	Y	-0.075	-0.075	0	%100
3	M3	Y	-0.15	-0.15	0	%100

Member Distributed Loads (BLC 2 : LIVE)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M3	Y	-0.04	-0.04	0	%100

Member Distributed Loads (BLC 3 : SNOW)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M5	Y	-0.25	-0.25	0	%100

Member Distributed Loads (BLC 4 : Ev)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M5	Y	-0.05	-0.05	0	%100
2	M3	Y	-0.04	-0.04	0	%100

Basic Load Cases

	BLC Description	Category	Nodal	Distributed
1	DEAD	DL		3
2	LIVE	LL		1
3	SNOW	SL		1
4	Ev	ELY		2
5	Eh	ELX	2	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	D	Yes	Y	DL	1														
2	D+L	Yes	Y	DL	1	LL	1												
3	D+Lr	Yes	Y	DL	1			RLL	1										
4	D+S	Yes	Y	DL	1					SL	1								
5	D+R	Yes	Y	DL	1							RL	1						
6	D+0.75L+0.75Lr	Yes	Y	DL	1	LL	0.75	RLL	0.75										
7	D+0.75L+0.75S	Yes	Y	DL	1	LL	0.75			SL	0.75								
8	D+0.75L+0.75R	Yes	Y	DL	1	LL	0.75					RL	0.75						
9	D+(0.6W)	Yes	Y	DL	1									WL	0.6				
10	D+0.75L+0.75(0.6W)+0.75Lr	Yes	Y	DL	1	LL	0.75	RLL	0.75					WL	0.45				
11	D+0.75L+0.75(0.6W)+0.75S	Yes	Y	DL	1	LL	0.75			SL	0.75			WL	0.45				

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
12	D+0.75L+0.75(0.6W)+0.75R	Yes	Y	DL	1	LL	0.75					RL	0.75	WL	0.45				
13	0.6D+0.6W	Yes	Y	DL	0.6									WL	0.6				
14	D+0.7Ev+0.7Eh	Yes	Y	DL	1											ELX	0.7	ELY	0.7
15	D+.525Ev+0.525Eh+0.75L+0.75S	Yes	Y	DL	1	LL	0.75			SL	0.75					ELX	0.525	ELY	0.525
16	0.6D-0.7Ev+0.7Eh	Yes	Y	DL	0.6											ELX	0.7	ELY	-0.7

Load Combination Design

	Description	Service	Hot Rolled	Cold Formed	Wood	Concrete	Masonry	Aluminum	Stainless	Connection
1	D		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	D+L		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	D+Lr		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	D+S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	D+R		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	D+0.75L+0.75Lr		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	D+0.75L+0.75S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	D+0.75L+0.75R		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	D+(0.6W)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	D+0.75L+0.75(0.6W)+0.75Lr		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	D+0.75L+0.75(0.6W)+0.75S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
12	D+0.75L+0.75(0.6W)+0.75R		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13	0.6D+0.6W		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14	D+0.7Ev+0.7Eh		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15	D+.525Ev+0.525Eh+0.75L+0.75S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16	0.6D-0.7Ev+0.7Eh		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	1.02	14	5.569	15	0	16	0	16	0	16	0	16
2		min	0.015	13	0.876	13	0	1	0	1	0	1	0	1
3	N6	max	1.03	16	2.742	4	0	16	0	16	0	16	0	16
4		min	-0.032	2	-3.075	16	0	1	0	1	0	1	0	1
5	N2	max	0	16	0	16	0	16	0	16	0	16	0	16
6		min	0	1	0	1	0	1	0	1	0	1	0	1
7	N3	max	0	16	0	16	0	16	0	16	0	16	0	16
8		min	0	1	0	1	0	1	0	1	0	1	0	1
9	N4	max	0	16	0	16	0	16	0	16	0	16	0	16
10		min	0	1	0	1	0	1	0	1	0	1	0	1
11	Totals:	max	2.03	16	5.635	15	0	16						
12		min	0	7	1.107	16	0	1						

Envelope Node Displacements

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N9	max	0	13	0.002	16	0	16	0	16	0	16	3.389e-4	15
2		min	-0.731	14	-0.003	4	0	1	0	1	0	1	1.657e-5	13
3	N4	max	0	4	-0.001	13	0	16	0	16	0	16	2.468e-4	16
4		min	-0.731	14	-0.004	15	0	1	0	1	0	1	-1.725e-4	4
5	N3	max	0	2	-0.001	13	0	16	0	16	0	16	8.031e-4	14
6		min	-0.695	14	-0.004	15	0	1	0	1	0	1	-1.202e-5	1
7	N8	max	0	4	0.002	16	0	16	0	16	0	16	8.21e-4	16
8		min	-0.695	14	-0.002	4	0	1	0	1	0	1	-2.508e-5	4
9	N7	max	0	2	0.002	16	0	16	0	16	0	16	1.076e-3	14
10		min	-0.593	14	-0.001	4	0	1	0	1	0	1	4.495e-5	13

Envelope Node Displacements (Continued)

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
11	N2	max	0	13	0	13	0	16	0	16	0	16	9.516e-4	16
12		min	-0.592	14	-0.003	15	0	1	0	1	0	1	-9.67e-5	2
13	N6	max	0	2	0	16	0	16	0	16	0	16	5.615e-3	14
14		min	0	16	0	4	0	1	0	1	0	1	-4.806e-5	2
15	N1	max	0	13	0	13	0	16	0	16	0	16	5.702e-3	14
16		min	0	14	0	15	0	1	0	1	0	1	2.236e-5	13
17	FRAME 3	max	0	16	0	16	0	16	0	16	0	16	0	16
18		min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1	M1	1	max	5.569	15	-0.015	13	0	16	0	16	0	16	0	16
2			min	0.876	13	-1.056	14	0	1	0	1	0	1	0	1
3		2	max	5.569	15	-0.015	13	0	16	0	16	0	16	6.6	14
4			min	0.876	13	-1.056	14	0	1	0	1	0	1	0.092	13
5		3	max	2.488	15	-0.074	13	0	16	0	16	0	16	-0.333	13
6			min	0.415	13	-0.63	14	0	1	0	1	0	1	-2.023	14
7		4	max	2.488	15	-0.074	13	0	16	0	16	0	16	1.917	14
8			min	0.415	13	-0.63	14	0	1	0	1	0	1	0.026	4
9		5	max	1.844	15	-0.079	13	0	16	0	16	0	16	3.833	15
10			min	0.184	13	-0.77	15	0	1	0	1	0	1	0.227	13
11	M2	1	max	2.742	4	0.032	2	0	16	0	16	0	16	0	16
12			min	-3.075	16	-1.01	16	0	1	0	1	0	1	0	1
13		2	max	2.742	4	0.032	2	0	16	0	16	0	16	6.311	16
14			min	-3.075	16	-1.01	16	0	1	0	1	0	1	-0.199	2
15		3	max	1.973	4	0.147	2	0	16	0	16	0	16	0.691	2
16			min	-0.693	16	-0.424	16	0	1	0	1	0	1	-1.116	16
17		4	max	1.973	4	0.147	2	0	16	0	16	0	16	1.535	16
18			min	-0.693	16	-0.424	16	0	1	0	1	0	1	-0.228	2
19		5	max	1.589	4	0.467	4	0	16	0	16	0	16	2.977	16
20			min	-0.58	16	-0.458	16	0	1	0	1	0	1	-1.792	4
21	M3	1	max	0.446	16	3.631	14	0	16	0	16	0	16	15.01	14
22			min	-0.115	2	0.461	13	0	1	0	1	0	1	0.548	13
23		2	max	0.446	16	3.175	14	0	16	0	16	0	16	6.703	16
24			min	-0.115	2	0.231	13	0	1	0	1	0	1	-0.725	2
25		3	max	0.446	16	2.719	14	0	16	0	16	0	16	-0.42	16
26			min	-0.115	2	0	1	0	1	0	1	0	1	-1.455	15
27		4	max	0.446	16	2.541	16	0	16	0	16	0	16	-0.339	13
28			min	-0.115	2	-0.487	2	0	1	0	1	0	1	-7.644	14
29		5	max	0.446	16	2.383	16	0	16	0	16	0	16	1.147	2
30			min	-0.115	2	-0.974	2	0	1	0	1	0	1	-13.445	16
31	M4	1	max	0.033	16	0.729	14	0	16	0	16	0	16	2.419	14
32			min	-0.381	4	0.231	13	0	1	0	1	0	1	0.388	13
33		2	max	0.033	16	0.537	14	0	16	0	16	0	16	0.818	16
34			min	-0.381	4	0.115	13	0	1	0	1	0	1	-0.091	1
35		3	max	0.033	16	0.344	14	0	16	0	16	0	16	-0.203	13
36			min	-0.381	4	0	1	0	1	0	1	0	1	-0.338	1
37		4	max	0.033	16	0.228	16	0	16	0	16	0	16	-0.055	13
38			min	-0.381	4	-0.192	4	0	1	0	1	0	1	-0.968	14
39		5	max	0.033	16	0.113	16	0	16	0	16	0	16	0.676	4
40			min	-0.381	4	-0.384	4	0	1	0	1	0	1	-1.378	16
41	M5	1	max	0.769	15	1.844	15	0	16	0	16	0	16	3.833	15
42			min	0.079	13	0.184	13	0	1	0	1	0	1	0.227	13
43		2	max	0.769	15	1.143	15	0	16	0	16	0	16	1.51	16
44			min	0.079	13	0.092	13	0	1	0	1	0	1	-1.261	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
45		3	max	0.769	15	0.586	14	0	16	0	16	0	16	0.008	16
46			min	0.079	13	0	1	0	1	0	1	0	1	-2.279	4
47		4	max	0.769	15	0.582	16	0	16	0	16	0	16	-0.128	13
48			min	0.079	13	-0.794	4	0	1	0	1	0	1	-2.256	15
49		5	max	0.769	15	0.58	16	0	16	0	16	0	16	1.792	4
50			min	0.079	13	-1.589	4	0	1	0	1	0	1	-2.977	16

Envelope Maximum Member Section Forces

	Member		Axial[k]	Loc[ft]	LC	y Shear[k]	Loc[ft]	LC	z Shear[k]	Loc[ft]	LC	Torque[k-ft]	Loc[ft]	LC	y-y Moment[k-ft]	Loc[ft]	LC	z-z Moment[k-ft]	Loc[ft]	LC
1	M1	max	5.569	11.979	15	-0.015	11.979	13	0	25	16	0	25	16	0	25	16	12.651	11.979	14
2		min	0.184	20.052	13	-1.056	0	14	0	0	1	0	0	1	0	0	1	-2.187	12.24	14
3	M2	max	2.742	11.979	4	0.467	25	4	0	25	16	0	25	16	0	25	16	12.096	11.979	16
4		min	-3.075	0	16	-1.01	0	16	0	0	1	0	0	1	0	0	1	-1.792	25	4
5	M3	max	0.446	10.25	16	3.631	0	14	0	10.25	16	0	10.25	16	0	10.25	16	15.01	0	14
6		min	-0.115	0	2	-0.974	10.25	2	0	0	1	0	0	1	0	0	1	-13.445	10.25	16
7	M4	max	0.033	10.25	16	0.729	0	14	0	10.25	16	0	10.25	16	0	10.25	16	2.419	0	14
8		min	-0.381	0	4	-0.384	10.25	4	0	0	1	0	0	1	0	0	1	-1.378	10.25	16
9	M5	max	0.769	10.25	15	1.844	0	15	0	10.25	16	0	10.25	16	0	10.25	16	3.833	0	15
10		min	0.079	0	13	-1.589	10.25	4	0	0	1	0	0	1	0	0	1	-2.977	10.25	16

Envelope Member End Reactions

	Member	Member End		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1	M1	I	max	5.569	15	-0.015	13	0	16	0	16	0	16	0	16
2			min	0.876	13	-1.056	14	0	1	0	1	0	1	0	1
3		J	max	1.844	15	-0.079	13	0	16	0	16	0	16	3.833	15
4			min	0.184	13	-0.77	15	0	1	0	1	0	1	0.227	13
5	M2	I	max	2.742	4	0.032	2	0	16	0	16	0	16	0	16
6			min	-3.075	16	-1.01	16	0	1	0	1	0	1	0	1
7		J	max	1.589	4	0.467	4	0	16	0	16	0	16	2.977	16
8			min	-0.58	16	-0.458	16	0	1	0	1	0	1	-1.792	4
9	M3	I	max	0.446	16	3.631	14	0	16	0	16	0	16	15.01	14
10			min	-0.115	2	0.461	13	0	1	0	1	0	1	0.548	13
11		J	max	0.446	16	2.383	16	0	16	0	16	0	16	1.147	2
12			min	-0.115	2	-0.974	2	0	1	0	1	0	1	-13.445	16
13	M4	I	max	0.033	16	0.729	14	0	16	0	16	0	16	2.419	14
14			min	-0.381	4	0.231	13	0	1	0	1	0	1	0.388	13
15		J	max	0.033	16	0.113	16	0	16	0	16	0	16	0.676	4
16			min	-0.381	4	-0.384	4	0	1	0	1	0	1	-1.378	16
17	M5	I	max	0.769	15	1.844	15	0	16	0	16	0	16	3.833	15
18			min	0.079	13	0.184	13	0	1	0	1	0	1	0.227	13
19		J	max	0.769	15	0.58	16	0	16	0	16	0	16	1.792	4
20			min	0.079	13	-1.589	4	0	1	0	1	0	1	-2.977	16

Envelope Member Torsion Stresses

	Member	Sec		Torque[k-ft]	LC	Torsion Shear[ksi]	LC	y-y Warp Shear[ksi]	LC	z-z Warp Shear[ksi]	LC	z-Top Warp Bend[ksi]	LC	z-Bot Warp Bend[ksi]	LC
1	M1	1	max	0	16	0	16	NC		NC		NC		NC	
2			min	0	1	0	1	NC		NC		NC		NC	
3		2	max	0	16	0	16	NC		NC		NC		NC	
4			min	0	1	0	1	NC		NC		NC		NC	
5		3	max	0	16	0	16	NC		NC		NC		NC	
6			min	0	1	0	1	NC		NC		NC		NC	
7		4	max	0	16	0	16	NC		NC		NC		NC	

Envelope Member Torsion Stresses (Continued)

	Member	Sec		Torque[k-ft]	LC	Torsion Shear[ksi]	LC	y-y Warp Shear[ksi]	LC	z-z Warp Shear[ksi]	LC	z-Top Warp Bend[ksi]	LC	z-Bot Warp Bend[ksi]	LC
8			min	0	1	0	1	NC		NC		NC		NC	
9		5	max	0	16	0	16	NC		NC		NC		NC	
10			min	0	1	0	1	NC		NC		NC		NC	
11	M2	1	max	0	16	0	16	NC		NC		NC		NC	
12			min	0	1	0	1	NC		NC		NC		NC	
13		2	max	0	16	0	16	NC		NC		NC		NC	
14			min	0	1	0	1	NC		NC		NC		NC	
15		3	max	0	16	0	16	NC		NC		NC		NC	
16			min	0	1	0	1	NC		NC		NC		NC	
17		4	max	0	16	0	16	NC		NC		NC		NC	
18			min	0	1	0	1	NC		NC		NC		NC	
19		5	max	0	16	0	16	NC		NC		NC		NC	
20			min	0	1	0	1	NC		NC		NC		NC	
21	M3	1	max	0	16	0	16	0	16	0	16	0	16	0	16
22			min	0	1	0	1	0	1	0	1	0	1	0	1
23		2	max	0	16	0	16	0	16	0	16	0	16	0	16
24			min	0	1	0	1	0	1	0	1	0	1	0	1
25		3	max	0	16	0	16	0	16	0	16	0	16	0	16
26			min	0	1	0	1	0	1	0	1	0	1	0	1
27		4	max	0	16	0	16	0	16	0	16	0	16	0	16
28			min	0	1	0	1	0	1	0	1	0	1	0	1
29		5	max	0	16	0	16	0	16	0	16	0	16	0	16
30			min	0	1	0	1	0	1	0	1	0	1	0	1
31	M4	1	max	0	16	0	16	NC		NC		NC		NC	
32			min	0	1	0	1	NC		NC		NC		NC	
33		2	max	0	16	0	16	NC		NC		NC		NC	
34			min	0	1	0	1	NC		NC		NC		NC	
35		3	max	0	16	0	16	NC		NC		NC		NC	
36			min	0	1	0	1	NC		NC		NC		NC	
37		4	max	0	16	0	16	NC		NC		NC		NC	
38			min	0	1	0	1	NC		NC		NC		NC	
39		5	max	0	16	0	16	NC		NC		NC		NC	
40			min	0	1	0	1	NC		NC		NC		NC	
41	M5	1	max	0	16	0	16	0	16	0	16	0	16	0	16
42			min	0	1	0	1	0	1	0	1	0	1	0	1
43		2	max	0	16	0	16	0	16	0	16	0	16	0	16
44			min	0	1	0	1	0	1	0	1	0	1	0	1
45		3	max	0	16	0	16	0	16	0	16	0	16	0	16
46			min	0	1	0	1	0	1	0	1	0	1	0	1
47		4	max	0	16	0	16	0	16	0	16	0	16	0	16
48			min	0	1	0	1	0	1	0	1	0	1	0	1
49		5	max	0	16	0	16	0	16	0	16	0	16	0	16
50			min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
1	M1	1	max	0.48	15	-0.002	13	0	16	0	16	0	16	0	16	0	16
2			min	0.076	13	-0.172	14	0	1	0	1	0	1	0	1	0	1
3		2	max	0.48	15	-0.002	13	0	16	-0.045	13	3.226	14	0	16	0	16
4			min	0.076	13	-0.172	14	0	1	-3.226	14	0.045	13	0	1	0	1
5		3	max	0.214	15	-0.012	13	0	16	0.989	14	-0.163	13	0	16	0	16
6			min	0.036	13	-0.103	14	0	1	0.163	13	-0.989	14	0	1	0	1
7		4	max	0.214	15	-0.012	13	0	16	-0.013	4	0.937	14	0	16	0	16
8			min	0.036	13	-0.103	14	0	1	-0.937	14	0.013	4	0	1	0	1
9		5	max	0.159	15	-0.013	13	0	16	-0.111	13	1.874	15	0	16	0	16

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
10			min	0.016	13	-0.125	15	0	1	-1.874	15	0.111	13	0	1	0	1
11	M2	1	max	0.236	4	0.005	2	0	16	0	16	0	16	0	16	0	16
12			min	-0.265	16	-0.164	16	0	1	0	1	0	1	0	1	0	1
13		2	max	0.236	4	0.005	2	0	16	0.097	2	3.085	16	0	16	0	16
14			min	-0.265	16	-0.164	16	0	1	-3.085	16	-0.097	2	0	1	0	1
15		3	max	0.17	4	0.024	2	0	16	0.545	16	0.338	2	0	16	0	16
16			min	-0.06	16	-0.069	16	0	1	-0.338	2	-0.545	16	0	1	0	1
17		4	max	0.17	4	0.024	2	0	16	0.112	2	0.75	16	0	16	0	16
18			min	-0.06	16	-0.069	16	0	1	-0.75	16	-0.112	2	0	1	0	1
19		5	max	0.137	4	0.076	4	0	16	0.876	4	1.455	16	0	16	0	16
20			min	-0.05	16	-0.075	16	0	1	-1.455	16	-0.876	4	0	1	0	1
21	M3	1	max	0.05	16	1.153	14	0	16	-0.203	13	5.563	14	0	16	0	16
22			min	-0.013	2	0.146	13	0	1	-5.563	14	0.203	13	0	1	0	1
23		2	max	0.05	16	1.008	14	0	16	0.269	2	2.484	16	0	16	0	16
24			min	-0.013	2	0.073	13	0	1	-2.484	16	-0.269	2	0	1	0	1
25		3	max	0.05	16	0.863	14	0	16	0.539	15	-0.156	16	0	16	0	16
26			min	-0.013	2	0	1	0	1	0.156	16	-0.539	15	0	1	0	1
27		4	max	0.05	16	0.807	16	0	16	2.833	14	-0.126	13	0	16	0	16
28			min	-0.013	2	-0.155	2	0	1	0.126	13	-2.833	14	0	1	0	1
29		5	max	0.05	16	0.756	16	0	16	4.983	16	0.425	2	0	16	0	16
30			min	-0.013	2	-0.309	2	0	1	-0.425	2	-4.983	16	0	1	0	1
31	M4	1	max	0.007	16	0.295	14	0	16	-0.566	13	3.525	14	0	16	0	16
32			min	-0.08	4	0.093	13	0	1	-3.525	14	0.566	13	0	1	0	1
33		2	max	0.007	16	0.217	14	0	16	0.133	9	1.192	16	0	16	0	16
34			min	-0.08	4	0.047	13	0	1	-1.192	16	-0.133	1	0	1	0	1
35		3	max	0.007	16	0.139	14	0	16	0.492	9	-0.295	13	0	16	0	16
36			min	-0.08	4	0	1	0	1	0.295	13	-0.492	1	0	1	0	1
37		4	max	0.007	16	0.092	16	0	16	1.411	14	-0.08	13	0	16	0	16
38			min	-0.08	4	-0.078	4	0	1	0.08	13	-1.411	14	0	1	0	1
39		5	max	0.007	16	0.046	16	0	16	2.008	16	0.985	4	0	16	0	16
40			min	-0.08	4	-0.156	4	0	1	-0.985	4	-2.008	16	0	1	0	1
41	M5	1	max	0.087	15	0.585	15	0	16	-0.084	13	1.42	15	0	16	0	16
42			min	0.009	13	0.059	13	0	1	-1.42	15	0.084	13	0	1	0	1
43		2	max	0.087	15	0.363	15	0	16	0.467	4	0.56	16	0	16	0	16
44			min	0.009	13	0.029	13	0	1	-0.56	16	-0.467	4	0	1	0	1
45		3	max	0.087	15	0.186	14	0	16	0.845	4	0.003	16	0	16	0	16
46			min	0.009	13	0	1	0	1	-0.003	16	-0.845	4	0	1	0	1
47		4	max	0.087	15	0.185	16	0	16	0.836	15	-0.047	13	0	16	0	16
48			min	0.009	13	-0.252	4	0	1	0.047	13	-0.836	15	0	1	0	1
49		5	max	0.087	15	0.184	16	0	16	1.103	16	0.664	4	0	16	0	16
50			min	0.009	13	-0.504	4	0	1	-0.664	4	-1.103	16	0	1	0	1

Envelope Member Section Deflections - Service

No Data to Print...

Envelope Member Section Deflections - Strength

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [rad]	LC	(n) L/y' Ratio	LC	(n) L/z' Ratio	LC
1	M1	1	max	0	16	0	16	0	16	0	16	NC	16	NC	16
2			min	0	1	0	1	0	1	0	1	NC	1	NC	1
3		2	max	0	13	0.396	14	0	16	0	16	NC	13	NC	16
4			min	-0.002	15	0.001	13	0	1	0	1	1405.751	14	NC	1
5		3	max	0	13	0.598	14	0	16	0	16	NC	13	NC	16
6			min	-0.003	15	0	7	0	1	0	1	1289.448	14	NC	1
7		4	max	-0.001	13	0.682	14	0	16	0	16	NC	13	NC	16

Envelope Member Section Deflections - Strength (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [rad]	LC	(n) L/y' Ratio	LC	(n) L/z' Ratio	LC
8			min	-0.004	15	0	7	0	1	0	1	2247.987	14	NC	1
9		5	max	-0.001	13	0.731	14	0	16	0	16	NC	16	NC	16
10			min	-0.004	15	0	4	0	1	0	1	NC	1	NC	1
11	M2	1	max	0	16	0	16	0	16	0	16	NC	16	NC	16
12			min	0	1	0	1	0	1	0	1	NC	1	NC	1
13		2	max	0.001	16	0.391	14	0	16	0	16	NC	13	NC	16
14			min	-0.001	4	-0.003	2	0	1	0	1	1438.349	14	NC	1
15		3	max	0.002	16	0.599	14	0	16	0	16	NC	13	NC	16
16			min	-0.002	4	0	13	0	1	0	1	1284.119	14	NC	1
17		4	max	0.002	16	0.682	14	0	16	0	16	NC	13	NC	16
18			min	-0.002	4	0	13	0	1	0	1	2248.211	14	NC	1
19		5	max	0.002	16	0.731	14	0	16	0	16	NC	16	NC	16
20			min	-0.003	4	0	13	0	1	0	1	NC	1	NC	1
21	M3	1	max	0	13	0	13	0	16	0	16	NC	16	NC	16
22			min	-0.592	14	-0.003	15	0	1	0	1	NC	1	NC	1
23		2	max	0	13	0.008	16	0	16	0	16	NC	16	NC	16
24			min	-0.593	14	-0.005	7	0	1	0	1	NC	1	NC	1
25		3	max	0	13	-0.002	16	0	16	0	16	NC	16	NC	16
26			min	-0.593	14	-0.007	15	0	1	0	1	NC	1	NC	1
27		4	max	0	2	-0.002	13	0	16	0	16	NC	16	NC	16
28			min	-0.593	14	-0.013	14	0	1	0	1	9205.175	14	NC	1
29		5	max	0	2	0.002	16	0	16	0	16	NC	16	NC	16
30			min	-0.593	14	-0.001	4	0	1	0	1	NC	1	NC	1
31	M4	1	max	0	2	-0.001	13	0	16	0	16	NC	16	NC	16
32			min	-0.695	14	-0.004	15	0	1	0	1	NC	1	NC	1
33		2	max	0	2	0.005	16	0	16	0	16	NC	16	NC	16
34			min	-0.695	14	-0.005	4	0	1	0	1	NC	1	NC	1
35		3	max	0	13	-0.005	13	0	16	0	16	NC	16	NC	16
36			min	-0.695	14	-0.008	14	0	1	0	1	NC	1	NC	1
37		4	max	0	4	-0.003	13	0	16	0	16	NC	16	NC	16
38			min	-0.695	14	-0.013	14	0	1	0	1	9840.729	14	NC	1
39		5	max	0	4	0.002	16	0	16	0	16	NC	16	NC	16
40			min	-0.695	14	-0.002	4	0	1	0	1	NC	1	NC	1
41	M5	1	max	0	4	-0.001	13	0	16	0	16	NC	16	NC	16
42			min	-0.731	14	-0.004	15	0	1	0	1	NC	1	NC	1
43		2	max	0	4	0.001	16	0	16	0	16	NC	16	NC	16
44			min	-0.731	14	-0.009	4	0	1	0	1	NC	1	NC	1
45		3	max	0	13	0	16	0	16	0	16	NC	16	NC	16
46			min	-0.731	14	-0.012	4	0	1	0	1	NC	1	NC	1
47		4	max	0	13	-0.001	16	0	16	0	16	NC	16	NC	16
48			min	-0.731	14	-0.009	4	0	1	0	1	NC	1	NC	1
49		5	max	0	13	0.002	16	0	16	0	16	NC	16	NC	16
50			min	-0.731	14	-0.003	4	0	1	0	1	NC	1	NC	1

Envelope Beam Deflections

	Member Label	Span		Location [ft]	y' [in]	(n) L'/y' Ratio	LC
1	M3	1	max	9.289	-0.001	NC	9
2		1	min	7.688	-0.013	9205	14
3	M4	1	max	1.068	-0.001	NC	12
4		1	min	7.367	-0.013	9757	14
5	M5	1	max	2.349	-0.001	NC	2
6		1	min	0	0	NC	1

Envelope Beam Deflection Checks

No Data to Print...

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
1	M1	HSS8X6X8	0.192	11.979	14	0.01	11.979	y	14	104.38	347.305	62.126	76.098	2.423	H1-1b
2	M2	HSS8X6X8	0.163	11.979	16	0.009	11.979	y	16	104.38	347.305	62.126	76.098	2.596	H1-1b
3	M3	W10X30	0.166	0	14	0.058	0	y	14	147.368	264.671	22.056	91.317	2.224	H1-1b
4	M4	HSS6X5X4	0.098	0	14	0.016	0	y	14	107.703	142.814	21.756	24.626	2.386	H1-1b
5	M5	W10X30	0.045	0	15	0.029	0	y	15	147.368	264.671	22.056	91.317	1.959	H1-1b

Connection Design Rules

	Label	Conn Type	Type	Beam Conn	Col/Girder Conn	Eccentricity
1	Col/Bm Single Angle Shear	Shear	Column/Beam Clip Single Angle Shear	Bolted	Bolted	1.5
2	Col/Bm Double Angle Shear	Shear	Column/Beam Clip Double Angle Shear	Bolted	Bolted	0
3	Col/Bm Two Side Clip Angle Shear	Shear	Column/Beam Clip Double Angle (Both Side) Shear	Bolted	Bolted	N/A
4	Col/Bm End Plate Shear	Shear	Column/Beam End-Plate Shear	N/A	Bolted	N/A
5	Col/Bm Shear Tab Shear	Shear	Column/Beam Shear Tab Shear	Bolted	N/A	0
6	Girder/Bm Single Angle Shear	Shear	Girder/Beam Clip Single Angle Shear	Bolted	Bolted	N/A
7	Girder/Bm Double Angle Shear	Shear	Girder/Beam Clip Double Angle Shear	Bolted	Bolted	N/A
8	Grd/Bm Two Side Clip Angle Shear	Shear	Girder/Beam Clip Double Angle (Both Side) Shear	Bolted	Bolted	N/A
9	Girder/Bm End Plate Shear	Shear	Girder/Beam End-Plate Shear	N/A	Bolted	N/A
10	Girder/Bm Shear Tab Shear	Shear	Girder/Beam Shear Tab Shear	Bolted	N/A	N/A
11	Beam Shear Splice	Shear	Beam Shear Tab Splice	Bolted	N/A	N/A
12	Column Shear Splice	Shear	Column Shear Tab Splice	N/A	Bolted	N/A
13	Col/Bm Ext. End Plate Moment	Moment	Column/Beam Extended End-Plate Moment	N/A	N/A	N/A
14	Col/Bm PartExt. End Plate Moment	Moment	Column/Beam Partially Extended End-Plate Moment (Tension side)	N/A	N/A	N/A
15	Col/Bm Flush End Plate Moment	Moment	Column/Beam Flush End-Plate Moment	N/A	N/A	N/A
16	Col/Bm Flange Plate Moment	Moment	Column/Beam Flange Plate Moment	Bolted	N/A	N/A
17	Col/Bm Direct Weld Moment	Moment	Column/Beam Direct Weld Moment	Bolted	N/A	N/A
18	Col/Bm Seismic Moment	Moment	Column/Beam Seismic Moment	N/A	N/A	N/A
19	Beam Moment Plate Splice	Moment	Beam Moment Plate Splice	Bolted	N/A	N/A
20	Column Moment Plate Splice	Moment	Column Moment Plate Splice	N/A	N/A	N/A
21	Beam Direct Weld Moment Splice	Moment	Beam Direct Weld Splice	Bolted	N/A	N/A
22	Col Direct Weld Moment Splice	Moment	Column Direct Weld Splice	N/A	Bolted	N/A
23	Bm Ext. End Plate Moment Splice	Moment	Beam Extended End Plate Splice	Bolted	N/A	N/A
24	Col Ext. End Plate Moment Splice	Moment	Column Extended End Plate Splice	N/A	Bolted	N/A
25	Diagonal Vertical Brace	Brace	Diagonal Vertical Brace	N/A	N/A	N/A
26	Chevron Vertical Brace	Brace	Chevron Vertical Brace	N/A	N/A	N/A
27	Seismic Diagonal Brace	Brace	Diagonal Brace Seismic	N/A	N/A	N/A
28	Seismic Chevron Brace	Brace	Chevron Brace Seismic	N/A	N/A	N/A
29	Knee Brace	Brace	Knee Brace	N/A	N/A	N/A
30	Single Column Base Plate	Baseplate	Single Column Baseplate	N/A	N/A	N/A
31	Base Plate with Vertical Brace	Baseplate	Brace to Column Base Plate	N/A	N/A	N/A
32	HSS Truss Connection	Truss	HSS T-Connection	N/A	N/A	N/A

Frame / HR Seismic Design Rule

	Label	Frame Type	Column Ductility	Column Overstrength	Beam Ductility	Connection	Beam Overstrength	Z Factor	Hinge Location [in]	Brace Ductility	Brace Overstrength	KL/r
1	OCBF	OCBF	Minimal	Yes	Minimal	Other/None				Minimal		
2	SCBF	SCBF	High	Yes	High	Other/None	Yes			High		Yes
3	OMF	OMF	Minimal	Yes	Minimal	BUEEP			12	N/A		
4	IMF	IMF	Moderate	Yes	Moderate	BFP			12	N/A		
5	SMF-RBS	SMF	High	Yes	High	RBS		0.685	14.625	N/A		
6	SMF-KaiserB	SMF	High	Yes	High	KBB-B			12	N/A		

Frame / HR Seismic Design Rule (Continued)

	Label	Frame Type	Column Ductility	Column Overstrength	Beam Ductility	Connection	Beam Overstrength	Z Factor	Hinge Location [in]	Brace Ductility	Brace Overstrength	KL/r
7	SMF-KaiserW	SMF	High	Yes	High	KBB-W			12	N/A		
8	SMF-BSEEP	SMF	High	Yes	High	BSEEP			12	N/A		
9	SMF-WUF-W	SMF	High	Yes	High	WUF-W				N/A		

Concrete Wall Seismic Design Rule

	Label	Wall Type	Diagonal Bar Size
1	SDR_Conc1	Ordinary	N/A

Masonry Wall Seismic Design Rule

	Label	Wall Types	Special Boundary Elements	1.5x Shear ASD
1	Ordinary	Ordinary		
2	Intermediate	Intermediate		
3	Special	Special	Yes	Yes

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N2	0	12	0	
3	N3	0	24	0	
4	N4	0	36	0	
5	N5	0	47	0	
6	N6	16	0	0	
7	N7	16	12	0	
8	N8	16	24	0	
9	N9	16	36	0	
10	N10	16	47	0	

Node Boundary Conditions

	Node Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot [k-ft/rad]	Y Rot [k-ft/rad]	Z Rot [k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N6	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N2			Reaction			
4	N3			Reaction			
5	N4			Reaction			
6	N5			Fixed			
7	N7			Fixed			
8	ALL			Fixed			

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Ry	Fu [ksi]	Rt
1	A992	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	0.3	0.65	0.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	0.3	0.65	0.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	0.3	0.65	0.527	42	1.4	58	1.3
5	A500 Gr.B RECT	29000	11154	0.3	0.65	0.527	46	1.4	58	1.3
6	A500 Gr.C RND	29000	11154	0.3	0.65	0.527	46	1.4	62	1.3
7	A500 Gr.C RECT	29000	11154	0.3	0.65	0.527	50	1.4	62	1.3
8	A53 Gr.B	29000	11154	0.3	0.65	0.49	35	1.6	60	1.2
9	A1085	29000	11154	0.3	0.65	0.49	50	1.4	65	1.3
10	A913 Gr.65	29000	11154	0.3	0.65	0.49	65	1.1	80	1.1

Cold Formed Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Yield [ksi]	Fu [ksi]
1	A653 SS Gr33	29500	11346	0.3	0.65	0.49	33	45
2	A653 SS Gr50/1	29500	11346	0.3	0.65	0.49	50	65

Wood Properties

	Label	Type	Database	Species	Grade	Cm	Ci	Emod	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]
1	DF	Solid Sawn	Visually Graded	Douglas Fir-Larch	No.1			1	0.3	0.3	0.035
2	SP	Solid Sawn	Visually Graded	Southern Pine	No.1			1	0.3	0.3	0.035
3	HF	Solid Sawn	Visually Graded	Hem-Fir	No.1			1	0.3	0.3	0.035
4	SPF	Solid Sawn	Visually Graded	Spruce-Pine-fir	No.1			1	0.3	0.3	0.035
5	24F-1.8E DF Balanced	Glulam	NDS Table 5A	24F-1.8E_DF_BAL	na			1	0.3	0.3	0.035
6	24F-1.8E DF Unbalanced	Glulam	NDS Table 5A	24F-1.8E_DF_UNBAL	na			1	0.3	0.3	0.035
7	24F-1.8E SP Balanced	Glulam	NDS Table 5A	24F-1.8E_SP_BAL	na			1	0.3	0.3	0.035

Wood Properties (Continued)

	Label	Type	Database	Species	Grade	Cm	Ci	Emod	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]
8	24F-1.8E SP Unbalanced	Glulam	NDS Table 5A	24F-1.8E SP UNBAL	na			1	0.3	0.3	0.035
9	1.3E-1600F_VERSALAM	SCL	Boise Cascade	1.3E-1600F_VERSALAM	na			1	0.3	0.3	0.035
10	1.35E LSL SolidStart	SCL	Louisiana Pacific	1.35E LSL SolidStart	na			1	0.3	0.3	0.035
11	1.3E_RIGIDLAM LVL	SCL	Roseburg Forest Products	1.3E_RIGIDLAM LVL	na			1	0.3	0.3	0.035
12	2.0E DF Parallam PSL	SCL	TrusJoist	2.0E DF Parallam PSL	na			1	0.3	0.3	0.035
13	LVL PRL 1.5E 2250F	Custom	N/A	LVL PRL 1.5E 2250F	na			1	0.3	0.3	0.035
14	LVL_Microlam_1.9E_2600F	Custom	N/A	LVL_Microllam_1.9E_2600F	na			1	0.3	0.3	0.035
15	PSL_Parallam_2.0E_2900F	Custom	N/A	PSL_Parallam_2.0E_2900F	na			1	0.3	0.3	0.035
16	LSL_TimberStrand_1.55E_2325F	Custom	N/A	LSL_TimberStrand_1.55E_2325F	na			1	0.3	0.3	0.035

Concrete Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	f'c [ksi]	Lambda	Flex Steel [ksi]	Shear Steel [ksi]
1	Conc3000NW	3156	1372	0.15	0.6	0.145	3	1	60	60
2	Conc3500NW	3409	1482	0.15	0.6	0.145	3.5	1	60	60
3	Conc4000NW	3644	1584	0.15	0.6	0.145	4	1	60	60
4	Conc3000LW	2085	907	0.15	0.6	0.11	3	0.75	60	60
5	Conc3500LW	2252	979	0.15	0.6	0.11	3.5	0.75	60	60
6	Conc4000LW	2408	1047	0.15	0.6	0.11	4	0.75	60	60

Masonry Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Self Weight [k/ft³]	f'm [ksi]	Flex Steel [ksi]	Shear Steel [ksi]
1	Concrete Matl	1350	540	0.25	0.6	Custom	1.5	60	60
2	Clay Matl	1050	420	0.25	0.6	Custom	1.5	60	60
3	Gen Masonry	1050	420	0.25	0.6	0.08	1.5	60	60

Aluminum Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Table B.4	kt	Ftu [ksi]	Fty [ksi]	Fcy [ksi]	Fsu [ksi]	Ct
1	3003-H14	10100	3787.5	0.33	1.3	0.173	Table B.4-1	1	19	16	13	12	141
2	6061-T6	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	38	35	35	24	141
3	6063-T5	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	22	16	16	13	141
4	6063-T6	10100	3787.5	0.33	1.3	0.173	Table B.4-2	1	30	25	25	19	141
5	5052-H34	10200	3787.5	0.33	1.3	0.173	Table B.4-1	1	34	26	24	20	141
6	6061-T6 W	10100	3787.5	0.33	1.3	0.173	Table B.4-1	1	24	15	15	15	141

Stainless Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	n	Yield [ksi]	Fu [ksi]
1	A276 S316	28000	10780	0.3	0.93	0.5	5.6	30	75
2	A276 S321	29000	11165	0.3	0.73	0.48	5.6	65	94
3	A276 S304	28000	10780	0.3	0.93	0.49	5.6	30	75

General Materials Properties

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Plate Methodology
1	gen_Conc3NW	3155	1372	0.15	0.6	0.145	Isotropic
2	gen_Conc4NW	3644	1584	0.15	0.6	0.145	Isotropic
3	gen_Conc3LW	2085	906	0.15	0.6	0.11	Isotropic
4	gen_Conc4LW	2408	1047	0.15	0.6	0.11	Isotropic
5	gen_Alum	10100	4077	0.3	1.29	0.173	Isotropic
6	gen_Steel	29000	11154	0.3	0.65	0.49	Isotropic
7	gen_Plywood	1800	38	0	0.3	0.035	Isotropic

General Materials Properties (Continued)

	Label	E [ksi]	G [ksi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [k/ft³]	Plate Methodology
8	RIGID	1e+6		0.3	0	0	Isotropic
9	gen_Ortho				0.65	0.49	Orthotropic

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	EXT COLUMN	HSS10X10X10	Column	Tube	A500 Gr.C RECT	Typical	21	304	304	498
2	INT COLUMN	HSS4X4X8	Column	Tube	A500 Gr.C RECT	Typical	6.02	11.9	11.9	21
3	BEAM	W14X61	Beam	Wide Flange	A992	Typical	17.9	107	640	2.19

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N1	N5	HSS14X10X10	Column	Tube	A500 Gr.C RECT	Typical
2	M2	N6	N10	EXT COLUMN	Column	Tube	A500 Gr.C RECT	Typical
3	M3	N2	N7	BEAM	Beam	Wide Flange	A992	Typical
4	M4	N3	N8	BEAM	Beam	Wide Flange	A992	Typical
5	M5	N4	N9	BEAM	Beam	Wide Flange	A992	Typical
6	M6	N5	N10	BEAM	Beam	Wide Flange	A992	Typical

Member Advanced Data

	Label	Physical	Deflection Ratio Options	Seismic DR
1	M1	Yes	** NA **	None
2	M2	Yes	** NA **	None
3	M3	Yes	Default	None
4	M4	Yes	Default	None
5	M5	Yes	Default	None
6	M6	Yes	Default	None

Hot Rolled Steel Design Parameters

	Label	Shape	Length [ft]	Lcomp top [ft]	Channel Conn.	a [ft]	Function
1	M1	HSS14X10X10	47	Lbyy	N/A	N/A	Lateral
2	M2	EXT COLUMN	47	Lbyy	N/A	N/A	Lateral
3	M3	BEAM	16	Lbyy	N/A	N/A	Lateral
4	M4	BEAM	16	Lbyy	N/A	N/A	Lateral
5	M5	BEAM	16	Lbyy	N/A	N/A	Lateral
6	M6	BEAM	16	Lbyy	N/A	N/A	Lateral

Member RISAConnection Properties

	Label	Shape	Start Conn	End Conn	Start Release	End Release
1	M1	HSS14X10X10	None	None	Fixed	Fixed
2	M2	HSS10X10X10	None	None	Fixed	Fixed
3	M3	W14X61	None	None	Fixed	Fixed
4	M4	W14X61	None	None	Fixed	Fixed
5	M5	W14X61	None	None	Fixed	Fixed
6	M6	W14X61	None	None	Fixed	Fixed

Design Size and Code Check Parameters

	Label	Max Axial/Bending Chk	Max Shear Chk
1	Typical	1	1

Deflection Design

	Label	LC	Ratio	LC	Ratio	LC	Ratio
1	Typical	None	N/A	None	N/A	None	N/A

Node Loads and Enforced Displacements (BLC 1 : DEAD)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N5	L	Y	-1.8
2	N4	L	Y	-5.1
3	N3	L	Y	-5.1
4	N3	L	Y	-5.1
5	N9	L	Y	-0.6
6	N8	L	Y	-0.6
7	N7	L	Y	-0.6

Node Loads and Enforced Displacements (BLC 2 : LIVE)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N4	L	Y	-3.7
2	N3	L	Y	-3.7
3	N2	L	Y	-3.7
4	N9	L	Y	-0.8
5	N8	L	Y	-0.8
6	N7	L	Y	-0.8

Node Loads and Enforced Displacements (BLC 3 : SNOW)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N5	L	Y	-7.6

Node Loads and Enforced Displacements (BLC 6 : WIND)

	Node Label	L, D, M	Direction	Magnitude [(k, k-ft), (in, rad), (k*s²/ft, k*s²*ft)]
1	N10	L	X	-4.8
2	N9	L	X	-5.9
3	N8	L	X	-6.2
4	N7	L	X	-5.6

Member Point Loads

No Data to Print...

Member Distributed Loads (BLC 1 : DEAD)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M6	Y	-0.25	-0.25	0	%100
2	M5	Y	-2.75	-2.75	0	%100
3	M4	Y	-2.9	-2.9	0	%100
4	M3	Y	-2.9	-2.9	0	%100

Member Distributed Loads (BLC 2 : LIVE)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M5	Y	-1.58	-1.58	0	%100
2	M4	Y	-1.58	-1.58	0	%100
3	M3	Y	-1.58	-1.58	0	%100

Member Distributed Loads (BLC 3 : SNOW)

	Member Label	Direction	Start Magnitude [k/ft, F, ksf, k-ft/ft]	End Magnitude [k/ft, F, ksf, k-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M6	Y	-1.05	-1.05	0	%100

Basic Load Cases

	BLC Description	Category	Nodal	Distributed
1	DEAD	DL	7	4
2	LIVE	LL	6	3
3	SNOW	SL	1	1
4	Ev	ELY		
5	Eh	ELX		
6	WIND	WL	4	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	D	Yes	Y	DL	1														
2	D+L	Yes	Y	DL	1	LL	1												
3	D+Lr	Yes	Y	DL	1			RLL	1										
4	D+S	Yes	Y	DL	1					SL	1								
5	D+R	Yes	Y	DL	1							RL	1						
6	D+0.75L+0.75Lr	Yes	Y	DL	1	LL	0.75	RLL	0.75										
7	D+0.75L+0.75S	Yes	Y	DL	1	LL	0.75			SL	0.75								
8	D+0.75L+0.75R	Yes	Y	DL	1	LL	0.75					RL	0.75						
9	D+(0.6W)	Yes	Y	DL	1									WL	0.6				
10	D+0.75L+0.75(0.6W)+0.75Lr	Yes	Y	DL	1	LL	0.75	RLL	0.75					WL	0.45				
11	D+0.75L+0.75(0.6W)+0.75S	Yes	Y	DL	1	LL	0.75			SL	0.75			WL	0.45				
12	D+0.75L+0.75(0.6W)+0.75R	Yes	Y	DL	1	LL	0.75					RL	0.75	WL	0.45				
13	0.6D+0.6W	Yes	Y	DL	0.6									WL	0.6				
14	D+0.7Ev+0.7Eh	Yes	Y	DL	1											ELX	0.7	ELY	0.7
15	D+.525Ev+0.525Eh+0.75L+0.75S	Yes	Y	DL	1	LL	0.75			SL	0.75					ELX	0.525	ELY	0.525
16	0.6D-0.7Ev+0.7Eh	Yes	Y	DL	0.6											ELX	0.7	ELY	-0.7

Load Combination Design

	Description	Service	Hot Rolled	Cold Formed	Wood	Concrete	Masonry	Aluminum	Stainless	Connection
1	D		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	D+L		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	D+Lr		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	D+S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	D+R		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	D+0.75L+0.75Lr		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
7	D+0.75L+0.75S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	D+0.75L+0.75R		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
9	D+(0.6W)		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	D+0.75L+0.75(0.6W)+0.75Lr		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11	D+0.75L+0.75(0.6W)+0.75S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Load Combination Design (Continued)

	Description	Service	Hot Rolled	Cold Formed	Wood	Concrete	Masonry	Aluminum	Stainless	Connection
12	D+0.75L+0.75(0.6W)+0.75R		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
13	0.6D+0.6W		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
14	D+0.7Ev+0.7Eh		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
15	D+.525Ev+0.525Eh+0.75L+0.75S		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
16	0.6D-0.7Ev+0.7Eh		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Envelope Node Reactions

	Node Label		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N1	max	10.904	9	150.677	11	0	16	0	16	0	16	-4.269	16
2		min	1.531	16	52.626	16	0	1	0	1	0	1	-78.371	9
3	N6	max	3.631	13	112.298	2	0	16	0	16	0	16	17.699	2
4		min	-3.941	2	24.864	13	0	1	0	1	0	1	-30.227	13
5	N2	max	0	16	0	16	0	16	0	16	0	16	0	16
6		min	0	1	0	1	0	1	0	1	0	1	0	1
7	N3	max	0	16	0	16	0	16	0	16	0	16	0	16
8		min	0	1	0	1	0	1	0	1	0	1	0	1
9	N4	max	0	16	0	16	0	16	0	16	0	16	0	16
10		min	0	1	0	1	0	1	0	1	0	1	0	1
11	Totals:	max	13.5	13	249.04	2	0	16						
12		min	0	2	95.82	13	0	1						

Envelope Node Displacements

	Node Label		X [in]	LC	Y [in]	LC	Z [in]	LC	X Rotation [rad]	LC	Y Rotation [rad]	LC	Z Rotation [rad]	LC
1	N1	max	0	16	0	16	0	16	0	16	0	16	0	9
2		min	0	9	0	11	0	1	0	1	0	1	0	16
3	N2	max	0.035	2	-0.013	16	0	16	0	16	0	16	1.518e-3	13
4		min	-0.276	13	-0.036	11	0	1	0	1	0	1	-1.373e-3	2
5	N3	max	0.103	2	-0.022	16	0	16	0	16	0	16	1.24e-3	13
6		min	-0.612	13	-0.063	11	0	1	0	1	0	1	-1.174e-3	2
7	N4	max	0.168	2	-0.026	16	0	16	0	16	0	16	5.213e-4	13
8		min	-0.84	13	-0.077	11	0	1	0	1	0	1	-1.306e-3	2
9	N5	max	0.197	2	-0.027	16	0	16	0	16	0	16	5.639e-4	9
10		min	-0.946	13	-0.081	11	0	1	0	1	0	1	-5.119e-4	4
11	N6	max	0	2	0	13	0	16	0	16	0	16	0	13
12		min	0	13	0	2	0	1	0	1	0	1	0	2
13	N7	max	0.036	2	-0.007	13	0	16	0	16	0	16	2.453e-3	11
14		min	-0.276	13	-0.033	2	0	1	0	1	0	1	5.942e-4	16
15	N8	max	0.103	2	-0.013	13	0	16	0	16	0	16	2.023e-3	11
16		min	-0.613	13	-0.055	2	0	1	0	1	0	1	4.544e-4	16
17	N9	max	0.167	2	-0.016	13	0	16	0	16	0	16	1.936e-3	12
18		min	-0.842	13	-0.067	2	0	1	0	1	0	1	5.6e-4	16
19	N10	max	0.195	2	-0.016	13	0	16	0	16	0	16	5.521e-4	4
20		min	-0.947	13	-0.069	7	0	1	0	1	0	1	-3.432e-4	2

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1	M1	1	max	150.677	11	-1.523	16	0	16	0	16	0	16	-4.269	16
2			min	52.626	16	-11.223	9	0	1	0	1	0	1	-78.371	9
3		2	max	150.677	11	-1.523	16	0	16	0	16	0	16	55.427	12
4			min	52.626	16	-11.223	9	0	1	0	1	0	1	13.628	16
5		3	max	109.214	11	-2.729	16	0	16	0	16	0	16	60.303	11
6			min	38.558	16	-10.783	11	0	1	0	1	0	1	14.315	16

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
7		4	max	58.895	11	-2.639	16	0	16	0	16	0	16	52.908	12
8			min	18.53	16	-8.936	10	0	1	0	1	0	1	14.189	16
9		5	max	19.73	4	-1.474	16	0	16	0	16	0	16	26.355	11
10			min	2.132	16	-5.587	11	0	1	0	1	0	1	2.833	16
11	M2	1	max	112.298	2	3.986	2	0	16	0	16	0	16	17.699	2
12			min	24.864	13	-3.707	13	0	1	0	1	0	1	-30.227	13
13		2	max	112.298	2	3.986	2	0	16	0	16	0	16	13.331	13
14			min	24.864	13	-3.707	13	0	1	0	1	0	1	-29.137	2
15		3	max	75.395	2	7.092	2	0	16	0	16	0	16	12.448	13
16			min	18.047	13	-2.052	13	0	1	0	1	0	1	-37.473	2
17		4	max	41.029	15	6.936	2	0	16	0	16	0	16	3.282	13
18			min	9.834	13	-0.356	13	0	1	0	1	0	1	-37.809	2
19		5	max	10.47	4	4.585	15	0	16	0	16	0	16	5.177	13
20			min	-0.081	13	-0.07	13	0	1	0	1	0	1	-21.439	4
21	M3	1	max	1.714	13	38.687	11	0	16	0	16	0	16	121.658	11
22			min	-3.094	2	14.068	16	0	1	0	1	0	1	31.072	16
23		2	max	1.714	13	22.347	11	0	16	0	16	0	16	22.387	13
24			min	-3.094	2	7.108	16	0	1	0	1	0	1	-29.266	2
25		3	max	1.714	13	7.669	9	0	16	0	16	0	16	-21.386	13
26			min	-3.094	2	0.148	16	0	1	0	1	0	1	-66.452	2
27		4	max	1.714	13	0.503	13	0	16	0	16	0	16	-12.464	16
28			min	-3.094	2	-17.583	2	0	1	0	1	0	1	-48.471	11
29		5	max	1.714	13	-6.457	13	0	16	0	16	0	16	74.214	2
30			min	-3.094	2	-35.503	2	0	1	0	1	0	1	-25.411	13
31	M4	1	max	2.131	9	37.344	11	0	16	0	16	0	16	112.979	11
32			min	0.096	16	13.908	16	0	1	0	1	0	1	31.176	16
33		2	max	2.131	9	21.004	11	0	16	0	16	0	16	16.841	13
34			min	0.096	16	6.948	16	0	1	0	1	0	1	-27.232	2
35		3	max	2.131	9	6.136	9	0	16	0	16	0	16	-21.343	13
36			min	0.096	16	-0.079	2	0	1	0	1	0	1	-62.755	2
37		4	max	2.131	9	-0.894	13	0	16	0	16	0	16	-10.439	16
38			min	0.096	16	-17.999	2	0	1	0	1	0	1	-41.024	11
39		5	max	2.131	9	-7.854	13	0	16	0	16	0	16	81.239	2
40			min	0.096	16	-35.919	2	0	1	0	1	0	1	-14.193	13
41	M5	1	max	4.511	12	35.022	2	0	16	0	16	0	16	93.076	11
42			min	0.076	4	13.339	16	0	1	0	1	0	1	29.546	16
43		2	max	4.511	12	18.76	12	0	16	0	16	0	16	4.997	13
44			min	0.076	4	6.739	16	0	1	0	1	0	1	-28.043	2
45		3	max	4.511	12	3.764	9	0	16	0	16	0	16	-22.781	13
46			min	0.076	4	0.027	4	0	1	0	1	0	1	-64.21	2
47		4	max	4.511	12	-2.955	13	0	16	0	16	0	16	-11.717	16
48			min	0.076	4	-16.938	2	0	1	0	1	0	1	-37.704	10
49		5	max	4.511	12	-9.555	13	0	16	0	16	0	16	71.296	2
50			min	0.076	4	-34.258	2	0	1	0	1	0	1	0.862	13
51	M6	1	max	5.576	11	10.33	4	0	16	0	16	0	16	26.355	11
52			min	1.474	16	1.052	16	0	1	0	1	0	1	2.833	16
53		2	max	5.576	11	5.13	4	0	16	0	16	0	16	6.589	13
54			min	1.474	16	0.452	16	0	1	0	1	0	1	-10.605	4
55		3	max	5.576	11	1.28	13	0	16	0	16	0	16	0.931	12
56			min	1.474	16	-0.417	2	0	1	0	1	0	1	-20.724	4
57		4	max	5.576	11	0.68	13	0	16	0	16	0	16	4.29	2
58			min	1.474	16	-5.27	4	0	1	0	1	0	1	-10.042	4
59		5	max	5.576	11	0.08	13	0	16	0	16	0	16	21.439	4
60			min	1.474	16	-10.47	4	0	1	0	1	0	1	-5.177	13

Envelope Maximum Member Section Forces

	Member		Axial[k]	Loc[ft]	LC	y Shear[k]	Loc[ft]	LC	z Shear[k]	Loc[ft]	LC	Torque[k-ft]	Loc[ft]	LC	y-y Moment[k-ft]	Loc[ft]	LC	z-z Moment[k-ft]	Loc[ft]	LC
1	M1	max	150.677	11.75	11	-1.474	47	16	0	47	16	0	47	16	0	47	16	65.583	23.99	11
2		min	2.132	36.229	16	-11.223	0	9	0	0	1	0	0	1	0	0	1	-78.371	0	9
3	M2	max	112.298	11.75	2	7.092	23.99	2	0	47	16	0	47	16	0	47	16	42.381	12.24	2
4		min	-0.081	36.229	13	-3.707	0	13	0	0	1	0	0	1	0	0	1	-41.205	35.74	2
5	M3	max	1.714	16	13	38.687	0	11	0	16	16	0	16	16	0	16	16	121.658	0	11
6		min	-3.094	0	2	-35.503	16	2	0	0	1	0	0	1	0	0	1	-66.452	8	2
7	M4	max	2.131	16	9	37.344	0	11	0	16	16	0	16	16	0	16	16	112.979	0	11
8		min	0.096	0	16	-35.919	16	2	0	0	1	0	0	1	0	0	1	-62.755	8	2
9	M5	max	4.511	16	12	35.022	0	2	0	16	16	0	16	16	0	16	16	93.076	0	11
10		min	0.076	0	4	-34.258	16	2	0	0	1	0	0	1	0	0	1	-64.213	8.167	2
11	M6	max	5.576	16	11	10.33	0	4	0	16	16	0	16	16	0	16	16	26.355	0	11
12		min	1.474	0	16	-10.47	16	4	0	0	1	0	0	1	0	0	1	-20.724	8	4

Envelope Member End Reactions

	Member	Member End		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[k-ft]	LC	y-y Moment[k-ft]	LC	z-z Moment[k-ft]	LC
1	M1	I	max	150.677	11	-1.523	16	0	16	0	16	0	16	-4.269	16
2			min	52.626	16	-11.223	9	0	1	0	1	0	1	-78.371	9
3		J	max	19.73	4	-1.474	16	0	16	0	16	0	16	26.355	11
4			min	2.132	16	-5.587	11	0	1	0	1	0	1	2.833	16
5	M2	I	max	112.298	2	3.986	2	0	16	0	16	0	16	17.699	2
6			min	24.864	13	-3.707	13	0	1	0	1	0	1	-30.227	13
7		J	max	10.47	4	4.585	15	0	16	0	16	0	16	5.177	13
8			min	-0.081	13	-0.07	13	0	1	0	1	0	1	-21.439	4
9	M3	I	max	1.714	13	38.687	11	0	16	0	16	0	16	121.658	11
10			min	-3.094	2	14.068	16	0	1	0	1	0	1	31.072	16
11		J	max	1.714	13	-6.457	13	0	16	0	16	0	16	74.214	2
12			min	-3.094	2	-35.503	2	0	1	0	1	0	1	-25.411	13
13	M4	I	max	2.131	9	37.344	11	0	16	0	16	0	16	112.979	11
14			min	0.096	16	13.908	16	0	1	0	1	0	1	31.176	16
15		J	max	2.131	9	-7.854	13	0	16	0	16	0	16	81.239	2
16			min	0.096	16	-35.919	2	0	1	0	1	0	1	-14.193	13
17	M5	I	max	4.511	12	35.022	2	0	16	0	16	0	16	93.076	11
18			min	0.076	4	13.339	16	0	1	0	1	0	1	29.546	16
19		J	max	4.511	12	-9.555	13	0	16	0	16	0	16	71.296	2
20			min	0.076	4	-34.258	2	0	1	0	1	0	1	0.862	13
21	M6	I	max	5.576	11	10.33	4	0	16	0	16	0	16	26.355	11
22			min	1.474	16	1.052	16	0	1	0	1	0	1	2.833	16
23		J	max	5.576	11	0.08	13	0	16	0	16	0	16	21.439	4
24			min	1.474	16	-10.47	4	0	1	0	1	0	1	-5.177	13

Envelope Member Torsion Stresses

	Member	Sec		Torque[k-ft]	LC	Torsion Shear[ksi]	LC	y-y Warp Shear[ksi]	LC	z-z Warp Shear[ksi]	LC	z-Top Warp Bend[ksi]	LC	z-Bot Warp Bend[ksi]	LC
1	M1	1	max	0	16	0	16	NC		NC		NC		NC	
2			min	0	1	0	1	NC		NC		NC		NC	
3		2	max	0	16	0	16	NC		NC		NC		NC	
4			min	0	1	0	1	NC		NC		NC		NC	
5		3	max	0	16	0	16	NC		NC		NC		NC	
6			min	0	1	0	1	NC		NC		NC		NC	
7		4	max	0	16	0	16	NC		NC		NC		NC	
8			min	0	1	0	1	NC		NC		NC		NC	
9		5	max	0	16	0	16	NC		NC		NC		NC	
10			min	0	1	0	1	NC		NC		NC		NC	

Envelope Member Torsion Stresses (Continued)

	Member	Sec		Torque[k-ft]	LC	Torsion Shear[ksi]	LC	y-y Warp Shear[ksi]	LC	z-z Warp Shear[ksi]	LC	z-Top Warp Bend[ksi]	LC	z-Bot Warp Bend[ksi]	LC
11	M2	1	max	0	16	0	16	NC		NC		NC		NC	
12			min	0	1	0	1	NC		NC		NC		NC	
13		2	max	0	16	0	16	NC		NC		NC		NC	
14			min	0	1	0	1	NC		NC		NC		NC	
15		3	max	0	16	0	16	NC		NC		NC		NC	
16			min	0	1	0	1	NC		NC		NC		NC	
17		4	max	0	16	0	16	NC		NC		NC		NC	
18			min	0	1	0	1	NC		NC		NC		NC	
19		5	max	0	16	0	16	NC		NC		NC		NC	
20			min	0	1	0	1	NC		NC		NC		NC	
21	M3	1	max	0	16	0	16	0	16	0	16	0	16	0	16
22			min	0	1	0	1	0	1	0	1	0	1	0	1
23		2	max	0	16	0	16	0	16	0	16	0	16	0	16
24			min	0	1	0	1	0	1	0	1	0	1	0	1
25		3	max	0	16	0	16	0	16	0	16	0	16	0	16
26			min	0	1	0	1	0	1	0	1	0	1	0	1
27		4	max	0	16	0	16	0	16	0	16	0	16	0	16
28			min	0	1	0	1	0	1	0	1	0	1	0	1
29		5	max	0	16	0	16	0	16	0	16	0	16	0	16
30			min	0	1	0	1	0	1	0	1	0	1	0	1
31	M4	1	max	0	16	0	16	0	16	0	16	0	16	0	16
32			min	0	1	0	1	0	1	0	1	0	1	0	1
33		2	max	0	16	0	16	0	16	0	16	0	16	0	16
34			min	0	1	0	1	0	1	0	1	0	1	0	1
35		3	max	0	16	0	16	0	16	0	16	0	16	0	16
36			min	0	1	0	1	0	1	0	1	0	1	0	1
37		4	max	0	16	0	16	0	16	0	16	0	16	0	16
38			min	0	1	0	1	0	1	0	1	0	1	0	1
39		5	max	0	16	0	16	0	16	0	16	0	16	0	16
40			min	0	1	0	1	0	1	0	1	0	1	0	1
41	M5	1	max	0	16	0	16	0	16	0	16	0	16	0	16
42			min	0	1	0	1	0	1	0	1	0	1	0	1
43		2	max	0	16	0	16	0	16	0	16	0	16	0	16
44			min	0	1	0	1	0	1	0	1	0	1	0	1
45		3	max	0	16	0	16	0	16	0	16	0	16	0	16
46			min	0	1	0	1	0	1	0	1	0	1	0	1
47		4	max	0	16	0	16	0	16	0	16	0	16	0	16
48			min	0	1	0	1	0	1	0	1	0	1	0	1
49		5	max	0	16	0	16	0	16	0	16	0	16	0	16
50			min	0	1	0	1	0	1	0	1	0	1	0	1
51	M6	1	max	0	16	0	16	0	16	0	16	0	16	0	16
52			min	0	1	0	1	0	1	0	1	0	1	0	1
53		2	max	0	16	0	16	0	16	0	16	0	16	0	16
54			min	0	1	0	1	0	1	0	1	0	1	0	1
55		3	max	0	16	0	16	0	16	0	16	0	16	0	16
56			min	0	1	0	1	0	1	0	1	0	1	0	1
57		4	max	0	16	0	16	0	16	0	16	0	16	0	16
58			min	0	1	0	1	0	1	0	1	0	1	0	1
59		5	max	0	16	0	16	0	16	0	16	0	16	0	16
60			min	0	1	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Stresses

	Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
1	M1	1	max	5.863	11	-0.107	16	0	16	9.582	9	-0.522	16	0	16	0	16
2			min	2.048	16	-0.788	9	0	1	0.522	16	-9.582	9	0	1	0	1

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
3		2	max	5.863	11	-0.107	16	0	16	-1.666	16	6.777	12	0	16	0	16
4			min	2.048	16	-0.788	9	0	1	-6.777	10	1.666	16	0	1	0	1
5		3	max	4.25	11	-0.192	16	0	16	-1.75	16	7.373	11	0	16	0	16
6			min	1.5	16	-0.757	11	0	1	-7.373	11	1.75	16	0	1	0	1
7		4	max	2.292	11	-0.185	16	0	16	-1.735	16	6.469	12	0	16	0	16
8			min	0.721	16	-0.627	10	0	1	-6.469	10	1.735	16	0	1	0	1
9		5	max	0.768	4	-0.103	16	0	16	-0.346	16	3.222	11	0	16	0	16
10			min	0.083	16	-0.392	11	0	1	-3.222	11	0.346	16	0	1	0	1
11	M2	1	max	5.348	2	0.415	2	0	16	5.966	13	3.493	2	0	16	0	16
12			min	1.184	13	-0.386	13	0	1	-3.493	2	-5.966	13	0	1	0	1
13		2	max	5.348	2	0.415	2	0	16	5.751	2	2.631	13	0	16	0	16
14			min	1.184	13	-0.386	13	0	1	-2.631	13	-5.751	2	0	1	0	1
15		3	max	3.59	2	0.739	2	0	16	7.396	2	2.457	13	0	16	0	16
16			min	0.859	13	-0.214	13	0	1	-2.457	13	-7.396	2	0	1	0	1
17		4	max	1.954	15	0.723	2	0	16	7.462	2	0.648	13	0	16	0	16
18			min	0.468	13	-0.037	13	0	1	-0.648	13	-7.462	2	0	1	0	1
19		5	max	0.499	4	0.478	15	0	16	4.231	4	1.022	13	0	16	0	16
20			min	-0.004	13	-0.007	13	0	1	-1.022	13	-4.231	4	0	1	0	1
21	M3	1	max	0.096	13	7.422	11	0	16	-4.049	16	15.854	11	0	16	0	16
22			min	-0.173	2	2.699	16	0	1	-15.854	11	4.049	16	0	1	0	1
23		2	max	0.096	13	4.287	11	0	16	3.814	2	2.917	13	0	16	0	16
24			min	-0.173	2	1.364	16	0	1	-2.917	13	-3.814	2	0	1	0	1
25		3	max	0.096	13	1.471	9	0	16	8.66	2	-2.787	13	0	16	0	16
26			min	-0.173	2	0.028	16	0	1	2.787	13	-8.66	2	0	1	0	1
27		4	max	0.096	13	0.097	13	0	16	6.316	11	-1.624	16	0	16	0	16
28			min	-0.173	2	-3.373	2	0	1	1.624	16	-6.316	11	0	1	0	1
29		5	max	0.096	13	-1.239	13	0	16	3.311	13	9.671	2	0	16	0	16
30			min	-0.173	2	-6.811	2	0	1	-9.671	2	-3.311	13	0	1	0	1
31	M4	1	max	0.119	9	7.164	11	0	16	-4.063	16	14.723	11	0	16	0	16
32			min	0.005	16	2.668	16	0	1	-14.723	11	4.063	16	0	1	0	1
33		2	max	0.119	9	4.029	11	0	16	3.549	2	2.195	13	0	16	0	16
34			min	0.005	16	1.333	16	0	1	-2.195	13	-3.549	2	0	1	0	1
35		3	max	0.119	9	1.177	9	0	16	8.178	2	-2.781	13	0	16	0	16
36			min	0.005	16	-0.015	2	0	1	2.781	13	-8.178	2	0	1	0	1
37		4	max	0.119	9	-0.171	13	0	16	5.346	11	-1.36	16	0	16	0	16
38			min	0.005	16	-3.453	2	0	1	1.36	16	-5.346	11	0	1	0	1
39		5	max	0.119	9	-1.507	13	0	16	1.85	13	10.586	2	0	16	0	16
40			min	0.005	16	-6.891	2	0	1	-10.586	2	-1.85	13	0	1	0	1
41	M5	1	max	0.252	12	6.719	2	0	16	-3.85	16	12.129	11	0	16	0	16
42			min	0.004	4	2.559	16	0	1	-12.129	11	3.85	16	0	1	0	1
43		2	max	0.252	12	3.599	12	0	16	3.654	2	0.651	13	0	16	0	16
44			min	0.004	4	1.293	16	0	1	-0.651	13	-3.654	2	0	1	0	1
45		3	max	0.252	12	0.722	9	0	16	8.367	2	-2.969	13	0	16	0	16
46			min	0.004	4	0.005	4	0	1	2.969	13	-8.367	2	0	1	0	1
47		4	max	0.252	12	-0.567	13	0	16	4.913	12	-1.527	16	0	16	0	16
48			min	0.004	4	-3.25	2	0	1	1.527	16	-4.913	10	0	1	0	1
49		5	max	0.252	12	-1.833	13	0	16	-0.112	13	9.291	2	0	16	0	16
50			min	0.004	4	-6.572	2	0	1	-9.291	2	0.112	13	0	1	0	1
51	M6	1	max	0.311	11	1.982	4	0	16	-0.369	16	3.434	11	0	16	0	16
52			min	0.082	16	0.202	16	0	1	-3.434	11	0.369	16	0	1	0	1
53		2	max	0.311	11	0.984	4	0	16	1.382	4	0.859	13	0	16	0	16
54			min	0.082	16	0.087	16	0	1	-0.859	13	-1.382	4	0	1	0	1
55		3	max	0.311	11	0.246	13	0	16	2.701	4	0.121	12	0	16	0	16
56			min	0.082	16	-0.08	2	0	1	-0.121	10	-2.701	4	0	1	0	1
57		4	max	0.311	11	0.131	13	0	16	1.309	4	0.559	2	0	16	0	16

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[ksi]	LC	y Shear[ksi]	LC	z Shear[ksi]	LC	y-Top[ksi]	LC	y-Bot[ksi]	LC	z-Top[ksi]	LC	z-Bot[ksi]	LC
58			min	0.082	16	-1.011	4	0	1	-0.559	2	-1.309	4	0	1	0	1
59		5	max	0.311	11	0.015	13	0	16	0.675	13	2.794	4	0	16	0	16
60			min	0.082	16	-2.009	4	0	1	-2.794	4	-0.675	13	0	1	0	1

Envelope Member Section Deflections - Service

No Data to Print...

Envelope Member Section Deflections - Strength

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [rad]	LC	(n) L/y' Ratio	LC	(n) L/z' Ratio	LC
1	M1	1	max	0	16	0	16	0	16	0	16	NC	16	NC	16
2			min	0	1	0	1	0	1	0	1	NC	1	NC	1
3		2	max	-0.012	16	0.271	13	0	16	0	16	NC	16	NC	16
4			min	-0.036	11	-0.031	2	0	1	0	1	NC	1	NC	1
5		3	max	-0.022	16	0.603	13	0	16	0	16	NC	16	NC	16
6			min	-0.062	11	-0.097	2	0	1	0	1	4214.123	9	NC	1
7		4	max	-0.026	16	0.834	13	0	16	0	16	9553.871	16	NC	16
8			min	-0.076	11	-0.158	2	0	1	0	1	3562.035	2	NC	1
9		5	max	-0.027	16	0.946	13	0	16	0	16	NC	13	NC	16
10			min	-0.081	11	-0.197	2	0	1	0	1	2866.775	2	NC	1
11	M2	1	max	0	16	0	16	0	16	0	16	NC	16	NC	16
12			min	0	1	0	1	0	1	0	1	NC	1	NC	1
13		2	max	-0.007	13	0.27	13	0	16	0	16	NC	16	NC	16
14			min	-0.033	2	-0.04	2	0	1	0	1	NC	1	NC	1
15		3	max	-0.012	13	0.602	13	0	16	0	16	NC	16	NC	16
16			min	-0.055	2	-0.108	2	0	1	0	1	4376.77	9	NC	1
17		4	max	-0.015	13	0.829	13	0	16	0	16	NC	16	NC	16
18			min	-0.066	2	-0.177	2	0	1	0	1	4746.834	13	NC	1
19		5	max	-0.016	13	0.947	13	0	16	0	16	NC	16	NC	16
20			min	-0.069	7	-0.195	2	0	1	0	1	NC	1	NC	1
21	M3	1	max	0.035	2	-0.013	16	0	16	0	16	NC	16	NC	16
22			min	-0.276	13	-0.036	11	0	1	0	1	NC	1	NC	1
23		2	max	0.035	2	-0.014	13	0	16	0	16	NC	13	NC	16
24			min	-0.276	13	-0.134	2	0	1	0	1	1902.233	2	NC	1
25		3	max	0.035	2	-0.057	13	0	16	0	16	4258.76	13	NC	16
26			min	-0.276	13	-0.192	2	0	1	0	1	1211.389	2	NC	1
27		4	max	0.036	2	-0.053	16	0	16	0	16	4777.192	16	NC	16
28			min	-0.276	13	-0.137	2	0	1	0	1	1813.107	10	NC	1
29		5	max	0.036	2	-0.007	13	0	16	0	16	NC	16	NC	16
30			min	-0.276	13	-0.033	2	0	1	0	1	NC	1	NC	1
31	M4	1	max	0.103	2	-0.022	16	0	16	0	16	NC	16	NC	16
32			min	-0.612	13	-0.063	11	0	1	0	1	NC	1	NC	1
33		2	max	0.103	2	-0.03	13	0	16	0	16	NC	13	NC	16
34			min	-0.612	13	-0.148	2	0	1	0	1	2083.423	2	NC	1
35		3	max	0.103	2	-0.066	13	0	16	0	16	4273.719	13	NC	16
36			min	-0.612	13	-0.201	2	0	1	0	1	1326.64	2	NC	1
37		4	max	0.103	2	-0.057	16	0	16	0	16	5374.017	16	NC	16
38			min	-0.613	13	-0.147	2	0	1	0	1	2019.731	11	NC	1
39		5	max	0.103	2	-0.013	13	0	16	0	16	NC	16	NC	16
40			min	-0.613	13	-0.055	2	0	1	0	1	NC	1	NC	1
41	M5	1	max	0.168	2	-0.026	16	0	16	0	16	NC	16	NC	16
42			min	-0.84	13	-0.077	11	0	1	0	1	NC	1	NC	1
43		2	max	0.168	2	-0.049	13	0	16	0	16	9931.055	13	NC	16
44			min	-0.84	13	-0.165	2	0	1	0	1	1973.371	2	NC	1
45		3	max	0.168	2	-0.077	13	0	16	0	16	3687.493	13	NC	16

Envelope Member Section Deflections - Strength (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [rad]	LC	(n) L/y' Ratio	LC	(n) L/z' Ratio	LC
46			min	-0.841	13	-0.22	2	0	1	0	1	1253.889	2	NC	1
47		4	max	0.167	2	-0.064	16	0	16	0	16	5074.146	16	NC	16
48			min	-0.841	13	-0.167	2	0	1	0	1	1917.337	2	NC	1
49		5	max	0.167	2	-0.016	13	0	16	0	16	NC	16	NC	16
50			min	-0.842	13	-0.067	2	0	1	0	1	NC	1	NC	1
51	M6	1	max	0.197	2	-0.027	16	0	16	0	16	NC	16	NC	16
52			min	-0.946	13	-0.081	11	0	1	0	1	NC	1	NC	1
53		2	max	0.196	2	-0.022	13	0	16	0	16	NC	16	NC	16
54			min	-0.946	13	-0.095	7	0	1	0	1	5657.357	4	NC	1
55		3	max	0.196	2	-0.022	13	0	16	0	16	NC	16	NC	16
56			min	-0.947	13	-0.108	4	0	1	0	1	3738.539	4	NC	1
57		4	max	0.195	2	-0.022	13	0	16	0	16	NC	16	NC	16
58			min	-0.947	13	-0.09	7	0	1	0	1	5745.998	4	NC	1
59		5	max	0.195	2	-0.016	13	0	16	0	16	NC	16	NC	16
60			min	-0.947	13	-0.069	7	0	1	0	1	NC	1	NC	1

Envelope Beam Deflections

	Member Label	Span		Location [ft]	y' [in]	(n) L'/y' Ratio	LC
1	M3	1	max	0.167	-0.001	NC	16
2		1	min	8	-0.158	1211	2
3	M4	1	max	0.5	-0.001	NC	12
4		1	min	8	-0.145	1326	2
5	M5	1	max	0.333	0.001	NC	13
6		1	min	8	-0.153	1253	2
7	M6	1	max	14.667	0.001	NC	16
8		1	min	8	-0.051	3738	4

Envelope Beam Deflection Checks

No Data to Print...

Envelope AISC 15TH (360-16): ASD Member Steel Code Checks

	Member	Shape	Code Check	Loc[ft]	LC	Shear Check	Loc[ft]	Dir	LC	Pnc/om [k]	Pnt/om [k]	Mnyy/om [k-ft]	Mnzz/om [k-ft]	Cb	Eqn
1	M1	HSS14X10X10	0.975	0	11	0.044	11.75	y	9	192.317	769.461	237.275	299.401	1.13	H1-1a
2	M2	HSS10X10X10	0.924	11.75	2	0.041	23.99	y	2	143.647	628.743	182.635	182.635	1.16	H1-1a
3	M3	W14X61	0.479	0	11	0.371	0	y	11	341.411	535.928	81.836	254.491	2.239	H1-1b
4	M4	W14X61	0.447	0	11	0.358	0	y	11	341.411	535.928	81.836	254.491	2.217	H1-1b
5	M5	W14X61	0.372	0	12	0.336	0	y	2	341.411	535.928	81.836	254.491	1.891	H1-1b
6	M6	W14X61	0.112	0	11	0.1	16	y	4	341.411	535.928	81.836	254.491	2.162	H1-1b

Connection Design Rules

	Label	Conn Type	Type	Beam Conn	Col/Girder Conn	Eccentricity
1	Col/Bm Single Angle Shear	Shear	Column/Beam Clip Single Angle Shear	Bolted	Bolted	1.5
2	Col/Bm Double Angle Shear	Shear	Column/Beam Clip Double Angle Shear	Bolted	Bolted	0
3	Col/Bm Two Side Clip Angle Shear	Shear	Column/Beam Clip Double Angle (Both Side) Shear	Bolted	Bolted	N/A
4	Col/Bm End Plate Shear	Shear	Column/Beam End-Plate Shear	N/A	Bolted	N/A
5	Col/Bm Shear Tab Shear	Shear	Column/Beam Shear Tab Shear	Bolted	N/A	0
6	Girder/Bm Single Angle Shear	Shear	Girder/Beam Clip Single Angle Shear	Bolted	Bolted	N/A
7	Girder/Bm Double Angle Shear	Shear	Girder/Beam Clip Double Angle Shear	Bolted	Bolted	N/A
8	Grd/Bm Two Side Clip Angle Shear	Shear	Girder/Beam Clip Double Angle (Both Side) Shear	Bolted	Bolted	N/A
9	Girder/Bm End Plate Shear	Shear	Girder/Beam End-Plate Shear	N/A	Bolted	N/A
10	Girder/Bm Shear Tab Shear	Shear	Girder/Beam Shear Tab Shear	Bolted	N/A	N/A

Connection Design Rules (Continued)

	Label	Conn Type	Type	Beam Conn	Col/Girder Conn	Eccentricity
11	Beam Shear Splice	Shear	Beam Shear Tab Splice	Bolted	N/A	N/A
12	Column Shear Splice	Shear	Column Shear Tab Splice	N/A	Bolted	N/A
13	Col/Bm Ext. End Plate Moment	Moment	Column/Beam Extended End-Plate Moment	N/A	N/A	N/A
14	Col/Bm PartExt. End Plate Moment	Moment	Column/Beam Partially Extended End-Plate Moment (Tension side)	N/A	N/A	N/A
15	Col/Bm Flush End Plate Moment	Moment	Column/Beam Flush End-Plate Moment	N/A	N/A	N/A
16	Col/Bm Flange Plate Moment	Moment	Column/Beam Flange Plate Moment	Bolted	N/A	N/A
17	Col/Bm Direct Weld Moment	Moment	Column/Beam Direct Weld Moment	Bolted	N/A	N/A
18	Col/Bm Seismic Moment	Moment	Column/Beam Seismic Moment	N/A	N/A	N/A
19	Beam Moment Plate Splice	Moment	Beam Moment Plate Splice	Bolted	N/A	N/A
20	Column Moment Plate Splice	Moment	Column Moment Plate Splice	N/A	N/A	N/A
21	Beam Direct Weld Moment Splice	Moment	Beam Direct Weld Splice	Bolted	N/A	N/A
22	Col Direct Weld Moment Splice	Moment	Column Direct Weld Splice	N/A	Bolted	N/A
23	Bm Ext. End Plate Moment Splice	Moment	Beam Extended End Plate Splice	Bolted	N/A	N/A
24	Col Ext. End Plate Moment Splice	Moment	Column Extended End Plate Splice	N/A	Bolted	N/A
25	Diagonal Vertical Brace	Brace	Diagonal Vertical Brace	N/A	N/A	N/A
26	Chevron Vertical Brace	Brace	Chevron Vertical Brace	N/A	N/A	N/A
27	Seismic Diagonal Brace	Brace	Diagonal Brace Seismic	N/A	N/A	N/A
28	Seismic Chevron Brace	Brace	Chevron Brace Seismic	N/A	N/A	N/A
29	Knee Brace	Brace	Knee Brace	N/A	N/A	N/A
30	Single Column Base Plate	Baseplate	Single Column Baseplate	N/A	N/A	N/A
31	Base Plate with Vertical Brace	Baseplate	Brace to Column Base Plate	N/A	N/A	N/A
32	HSS Truss Connection	Truss	HSS T-Connection	N/A	N/A	N/A

Frame / HR Seismic Design Rule

	Label	Frame Type	Column Ductility	Column Overstrength	Beam Ductility	Connection	Beam Overstrength	Z Factor	Hinge Location [in]	Brace Ductility	Brace Overstrength	KL/r
1	OCBF	OCBF	Minimal	Yes	Minimal	Other/None				Minimal		
2	SCBF	SCBF	High	Yes	High	Other/None	Yes			High		Yes
3	OMF	OMF	Minimal	Yes	Minimal	BUEEP			12	N/A		
4	IMF	IMF	Moderate	Yes	Moderate	BFP			12	N/A		
5	SMF-RBS	SMF	High	Yes	High	RBS		0.685	14.625	N/A		
6	SMF-KaiserB	SMF	High	Yes	High	KBB-B			12	N/A		
7	SMF-KaiserW	SMF	High	Yes	High	KBB-W			12	N/A		
8	SMF-BSEEP	SMF	High	Yes	High	BSEEP			12	N/A		
9	SMF-WUF-W	SMF	High	Yes	High	WUF-W				N/A		

Concrete Wall Seismic Design Rule

	Label	Wall Type	Diagonal Bar Size
1	SDR_Conc1	Ordinary	N/A

Masonry Wall Seismic Design Rule

	Label	Wall Types	Special Boundary Elements	1.5x Shear ASD
1	Ordinary	Ordinary		
2	Intermediate	Intermediate		
3	Special	Special	Yes	Yes

WOOD SHEAR WALL DESIGN (NDS)

In accordance with NDS2018 and SDPWS2021 allowable stress design and the perforated shear wall method

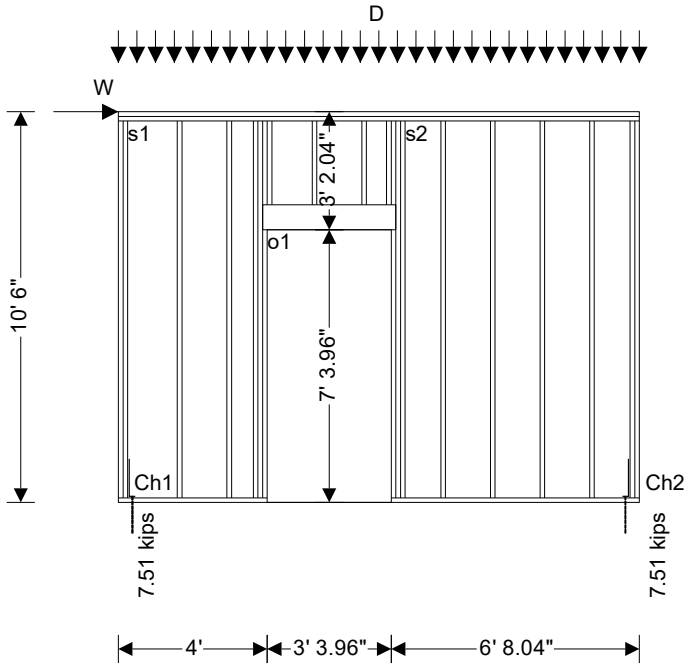
Tedds calculation version 1.2.10

Panel details

Structural wood panel sheathing on one side

Panel height — h = **10.5** ft

Panel length — b = **14** ft



Panel opening details

Width of opening — w_{o1} = **3.33** ft

Height of opening — h_{o1} = **7.33** ft

Height to underside of lintel over opening — l_{o1} = **7.33** ft

Position of opening — P_{o1} = **4** ft

Total area of wall — $A = h \times b - w_{o1} \times h_{o1}$ = **122.591** ft^2

Panel construction

Nominal stud size — 2" x 6"

Dressed stud size — 1.5" x 5.5"

Cross-sectional area of studs — A_s = **8.25** in^2

Stud spacing — s = **16** in

Nominal end post size — 2 x 2" x 6"

Dressed end post size — 2 x 1.5" x 5.5"

Cross-sectional area of end posts — A_e = **16.5** in^2

Hole diameter — Dia = **1** in

Net cross-sectional area of end posts — A_{en} = **13.5** in^2

Nominal collector size — 2 x 2" x 6"

Dressed collector size	2 x 1.5" x 5.5"
Service condition	Dry
Temperature	100 degF or less
Anchor location	Inside face
Anchor offset	e_{anchor} = **0** in
Vertical anchor stiffness	k_a = **30000** lb/in

From NDS Supplement Table 4B - Reference design values for visually graded Southern Pine dimension lumber (2" - 4" thick)

Species, grade and size classification	Southern Pine, stud grade, 5"-6" wide
Specific gravity	G = **0.55**
Tension parallel to grain	F_t = **350** lb/in^2
Compression parallel to grain	F_c = **800** lb/in^2
Compression perpendicular to grain	F_{c_perp} = **565** lb/in^2
Modulus of elasticity	E = **1300000** lb/in^2
Minimum modulus of elasticity	E_{min} = **470000** lb/in^2

Sheathing details

Sheathing material	7/16" wood panel oriented strandboard sheathing
Fastener type	8d common nails at 2"centers

From SDPWS Table 4.3A Nominal Unit Shear Capacities for Wood-Frame Shear Walls - Wood-based Panels

Nominal unit shear capacity	v_n = min(1790 plf, 2435 plf) = **1790** lb/ft
Apparent shear wall shear stiffness	G_a = **42** kips/in

Loading details

Dead load acting on top of panel	D = **300** lb/ft
Self weight of panel	S_{wt} = **12** lb/ft^2
In plane wind load acting at head of panel	W = **9400** lbs
Wind load serviceability factor	f_{Wserv} = **0.60**

From IBC 2018 cl.1605.3.1 Basic load combinations

Load combination no.1	D + 0.6W
Load combination no.2	D + 0.7E
Load combination no.3	D + 0.45W + 0.75L_f + 0.75(L_r or S or R)
Load combination no.4	D + 0.525E + 0.75L_f + 0.75S
Load combination no.5	0.6D + 0.6W
Load combination no.6	0.6D + 0.7E

Adjustment factors

Load duration factor – Table 2.3.2	C_D = **1.60**
Size factor for tension – Table 4B	C_{Ft} = **1.00**
Size factor for compression – Table 4B	C_{Fc} = **1.00**
Wet service factor for tension – Table 4B	C_{Mt} = **1.00**
Wet service factor for compression – Table 4B	C_{Mc} = **1.00**
Wet service factor for modulus of elasticity – Table 4B	C_{ME} = **1.00**
Temperature factor for tension – Table 2.3.3	C_{tt} = **1.00**
Temperature factor for compression – Table 2.3.3	C_{tc} = **1.00**

Temperature factor for modulus of elasticity – Table 2.3.3	
	C_{tE} = **1.00**
Incising factor – cl.4.3.8	C_i = **1.00**
Buckling stiffness factor – cl.4.4.2	C_T = **1.00**
Bearing area factor - cl. 3.10.4	C_b = **1.0**
Adjusted modulus of elasticity	$E_{min}' = E_{min} \times C_{ME} \times C_{tE} \times C_i \times C_T$ = **470000** psi
Critical buckling design value	$F_{cE} = 0.822 \times E_{min}' / (h / d)^2$ = **736** psi
Reference compression design value	$F_c^* = F_c \times C_D \times C_{Mc} \times C_{tc} \times C_{Fc} \times C_i$ = **1280** psi
For sawn lumber	c = **0.8**
Column stability factor – eqn.3.7-1	$C_P = (1 + (F_{cE} / F_c^*)) / (2 \times c) - \sqrt{([(1 + (F_{cE} / F_c^*)) / (2 \times c)]^2 - (F_{cE} / F_c^*) / c)}$ = **0.48**

From SDPWS Table 4.3.3 Maximum Shear Wall Aspect Ratios

Maximum shear wall aspect ratio	3.5
Perforated wall length	b_1 = **4** ft
Shear wall aspect ratio	h / b_1 = **2.625**
Perforated wall length	b_2 = **6.67** ft
Shear wall aspect ratio	h / b_2 = **1.574**

Shear capacity adjustment factor – cl.4.3.5.6

Sum of perforated shear wall segment lengths	$\Sigma b_i = b_1 \times 2 \times b_1 / h + b_2$ = **9.718** ft
Total area of wall	$A_{wall} = b \times h$ = **147** ft^2
Total area of openings	$A_o = w_{o1} \times h_{o1}$ = **24.41** ft^2
Total full height sheathed area	$A_{fhs} = h \times (b_1 + b_2)$ = **112.03** ft^2
Shear capacity adjustment factor (eqn. 4.3-6)	$C_o = \min(A_{wall} / (3 \times A_o + A_{fhs}), 1.0)$ = **0.793**

Perforated shear wall capacity

Maximum shear force under wind loading	$V_{w\_max} = 0.6 \times W$ = **5.64** kips
Shear capacity for wind loading	$V_w = v_w \times C_o \times \Sigma b_i / 2.0$ = **6.901** kips
	V_{w_max} / V_w = **0.817**
	PASS - Shear capacity for wind load exceeds maximum shear force

Chord capacity for chords 1 and 2

Load combination 5

Shear force for maximum tension	$V = 0.6 \times W$ = **5.64** kips
Axial force for maximum tension	$P = (0.6 \times (D + S_{wt} \times h)) \times s / 2$ = **0.17** kips
Maximum tensile force in chord	$T = V \times h / (C_o \times \Sigma b_i) - P$ = **7.510** kips
Maximum applied tensile stress	$f_t = T / A_{en}$ = **556** lb/in^2
Design tensile stress	$F_t' = F_t \times C_D \times C_{Mt} \times C_{tt} \times C_{Ft} \times C_i$ = **560** lb/in^2
	f_t / F_t' = **0.993**
	PASS - Design tensile stress exceeds maximum applied tensile stress

Load combination 1

Shear force for maximum compression	$V = 0.6 \times W$ = **5.64** kips
Axial force for maximum compression	$P = ((D + S_{wt} \times h)) \times s / 2$ = **0.284** kips
Maximum compressive force in chord	$C = V \times h / (C_o \times \Sigma b_i) + P$ = **7.964** kips
Maximum applied compressive stress	$f_c = C / A_e$ = **483** lb/in^2
Design compressive stress	$F_c' = F_c \times C_D \times C_{Mc} \times C_{tc} \times C_{Fc} \times C_i \times C_P$ = **620** lb/in^2

f_c / F_c' = **0.779**

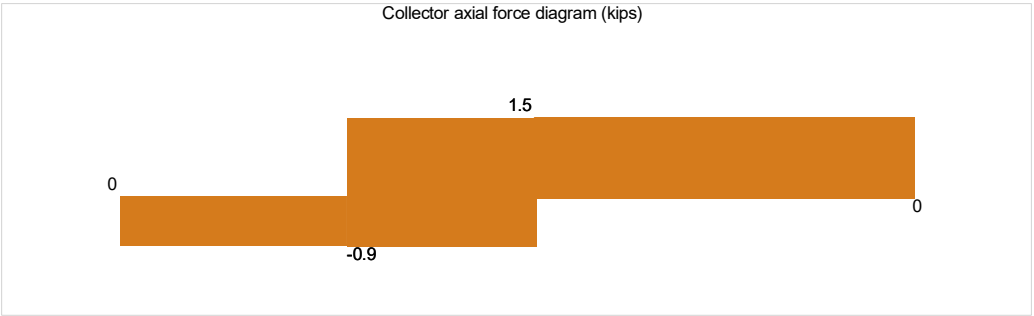
PASS - Design compressive stress exceeds maximum applied compressive stress

Design bearing compr. stress, bottom plate — $F_{c\_perp}' = F_{c\_perp} \times C_{Mc} \times C_{tc} \times C_i \times C_b$ = **565** lb/in^2

f_c / F_{c_perp}' = **0.854**

PASS - Design bearing compressive stress exceeds maximum applied bearing compressive stress

Collector capacity



Maximum shear force on wall	$V_{max} = V_{w\_max}$ = **5.64** kips
Uniform shear applied to wall	$v_a = V_{max} / (C_o \times \Sigma b_i)$ = **731.5** plf
Shear resisted by wall segments	$v_b = v_a \times b / (b_1 + b_2)$ = **959.7** plf
Maximum force in collector	P_{coll} = **1.523** kips
Maximum applied tensile stress	$f_t = P_{coll} / (2 \times A_s)$ = **92** lb/in^2
Design tensile stress	$F_t' = F_t \times C_D \times C_{Mt} \times C_{tt} \times C_{Ft} \times C_i$ = **560** lb/in^2
	f_t / F_t' = **0.165**
	PASS - Design tensile stress exceeds maximum applied tensile stress
Maximum applied compressive stress	$f_c = P_{coll} / (2 \times A_s)$ = **92** lb/in^2
Column stability factor	C_P = **1.00**
Design compressive stress	$F_c' = F_c \times C_D \times C_{Mc} \times C_{tc} \times C_{Fc} \times C_i \times C_P$ = **1280** lb/in^2
	f_c / F_c' = **0.072**

PASS - Design compressive stress exceeds maximum applied compressive stress

Hold down force

Chord 1	T_1 = **7.51** kips
Chord 2	T_2 = **7.51** kips

Wind load deflection

Design shear force	$V_{\delta w} = f_{Wserv} \times W$ = **5.64** kips
Deflection limit	Δ_{w_allow}= h / 400 = **0.315** in
Induced unit shear	$v_{\delta w\_max} = V_{\delta w} / (C_o \times \Sigma b_i)$ = **731.45** lb/ft
Anchor tension force	T_δ = max(0 kips,$v_{\delta w\_max} \times h - 0.6 \times (D + S_{wt} \times h) \times s / 2$) = **7.510** kips
Chord compression force	C_δ = max(0 kips,$v_{\delta w\_max} \times h + 0.6 \times (D + S_{wt} \times h) \times s / 2$) = **7.851** kips
Vertical elongation at anchor	$\Delta_T = T_\delta / k_a$ = **0.250** in
Vertical compression at chord	Δ_C = 0.04 in $\times C_\delta / (A_e \times F_{c\_perp})$ = **0.034** in

Total vertical deflection

$\Delta_a = (\Delta_T + \Delta_C) \times (b / b_{eff})$ = **0.292** in

Shear wall deflection – Eqn. 4.3-1

$\delta_{sww} = 2 \times v_{\delta w\_max} \times h^3 / (3 \times E \times A_e \times \Sigma b_i) + v_{\delta w\_max} \times h / (G_a) + h \times \Delta_a / \Sigma b_i$ = **0.531** in

$\delta_{sww} / \Delta_{w\_allow}$ = **1.685**

FAIL - Shear wall deflection exceeds deflection limit

WOOD SHEAR WALL DESIGN (NDS)

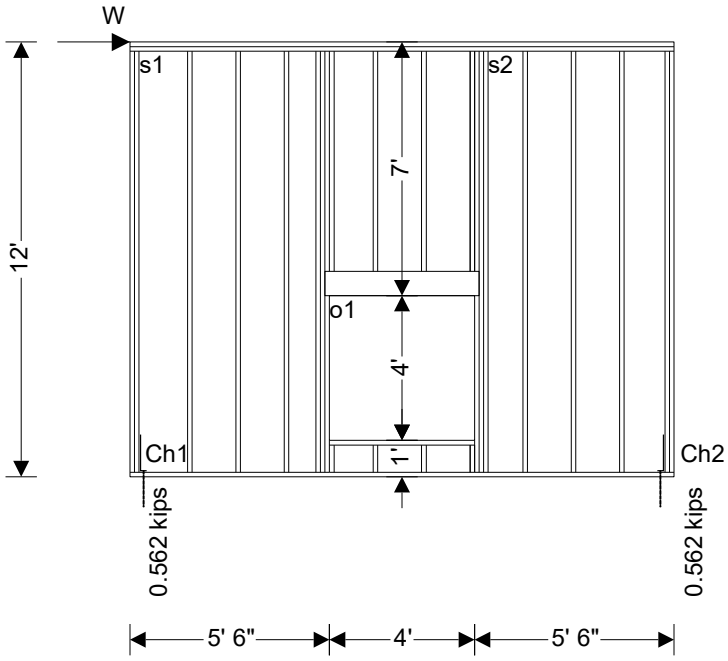
In accordance with NDS2018 and SDPWS2021 allowable stress design and the perforated shear wall method

Tedds calculation version 1.2.10

Panel details

Structural wood panel sheathing on one side

Panel height	h = **12** ft
Panel length	b = **15** ft



Panel opening details

Width of opening	w_{o1} = **4** ft
Height of opening	h_{o1} = **4** ft
Height to underside of lintel over opening	l_{o1} = **5** ft
Position of opening	P_{o1} = **5.5** ft
Total area of wall	$A = h \times b - w_{o1} \times h_{o1}$ = **164** ft^2

Panel construction

Nominal stud size	2" x 6"
Dressed stud size	1.5" x 5.5"
Cross-sectional area of studs	A_s = **8.25** in^2
Stud spacing	s = **16** in
Nominal end post size	2 x 2" x 6"
Dressed end post size	2 x 1.5" x 5.5"
Cross-sectional area of end posts	A_e = **16.5** in^2
Hole diameter	Dia = **1** in
Net cross-sectional area of end posts	A_{en} = **13.5** in^2
Nominal collector size	2 x 2" x 6"
Dressed collector size	2 x 1.5" x 5.5"

Service condition	Dry
Temperature	100 degF or less
Anchor location	Inside face
Anchor offset	e_{anchor} = **6** in
Vertical anchor stiffness	k_a = **30000** lb/in

From NDS Supplement Table 4A - Reference design values for visually graded dimension lumber (2" - 4" thick)

Species, grade and size classification	Douglas Fir-Larch, stud grade, 2" & wider
Specific gravity	G = **0.50**
Tension parallel to grain	F_t = **450** lb/in^2
Compression parallel to grain	F_c = **850** lb/in^2
Compression perpendicular to grain	F_{c_perp} = **625** lb/in^2
Modulus of elasticity	E = **1400000** lb/in^2
Minimum modulus of elasticity	E_{min} = **510000** lb/in^2

Sheathing details

Sheathing material	7/16" wood panel oriented strandboard sheathing
Fastener type	8d common nails at 3"centers

From SDPWS Table 4.3A Nominal Unit Shear Capacities for Wood-Frame Shear Walls - Wood-based Panels

Nominal unit shear capacity	v_n = min(1370 plf, 2435 plf) = **1370** lb/ft
Apparent shear wall shear stiffness	G_a = **28** kips/in

Loading details

Self weight of panel	S_{wt} = **12** lb/ft^2
In plane wind load acting at head of panel	W = **1695** lbs
Wind load serviceability factor	f_{Wserv} = **0.60**

From IBC 2018 cl.1605.3.1 Basic load combinations

Load combination no.1	D + 0.6W
Load combination no.2	D + 0.7E
Load combination no.3	D + 0.45W + 0.75L_f + 0.75(L_r or S or R)
Load combination no.4	D + 0.525E + 0.75L_f + 0.75S
Load combination no.5	0.6D + 0.6W
Load combination no.6	0.6D + 0.7E

Adjustment factors

Load duration factor – Table 2.3.2	C_D = **1.60**
Size factor for tension – Table 4A	C_{Ft} = **1.00**
Size factor for compression – Table 4A	C_{Fc} = **1.00**
Wet service factor for tension – Table 4A	C_{Mt} = **1.00**
Wet service factor for compression – Table 4A	C_{Mc} = **1.00**
Wet service factor for modulus of elasticity – Table 4A	C_{ME} = **1.00**
Temperature factor for tension – Table 2.3.3	C_{tt} = **1.00**
Temperature factor for compression – Table 2.3.3	C_{tc} = **1.00**
Temperature factor for modulus of elasticity – Table 2.3.3	C_{tE} = **1.00**
Incising factor – cl.4.3.8	C_i = **1.00**

Buckling stiffness factor – cl.4.4.2	C_T = **1.00**
Bearing area factor - cl. 3.10.4	C_b = **1.0**
Adjusted modulus of elasticity	$E_{min}' = E_{min} \times C_{ME} \times C_{tE} \times C_i \times C_T$ = **510000** psi
Critical buckling design value	$F_{cE} = 0.822 \times E_{min}' / (h / d)^2$ = **612** psi
Reference compression design value	$F_c^* = F_c \times C_D \times C_{Mc} \times C_{tc} \times C_{Fc} \times C_i$ = **1360** psi
For sawn lumber	c = **0.8**
Column stability factor – eqn.3.7-1	$C_P = (1 + (F_{cE} / F_c^*)) / (2 \times c) - \sqrt{([(1 + (F_{cE} / F_c^*)) / (2 \times c)]^2 - (F_{cE} / F_c^*) / c)}$ = **0.40**

From SDPWS Table 4.3.3 Maximum Shear Wall Aspect Ratios

Maximum shear wall aspect ratio	3.5
Perforated wall length	b_1 = **5.5** ft
Shear wall aspect ratio	h / b_1 = **2.182**
Perforated wall length	b_2 = **5.5** ft
Shear wall aspect ratio	h / b_2 = **2.182**

Shear capacity adjustment factor – cl.4.3.5.6

Sum of perforated shear wall segment lengths	$\Sigma b_i = b_1 \times 2 \times b_1 / h + b_2 \times 2 \times b_2 / h$ = **10.083** ft
Total area of wall	$A_{wall} = b \times h$ = **180** ft^2
Total area of openings	$A_o = w_{o1} \times h_{o1}$ = **16** ft^2
Total full height sheathed area	$A_{fhs} = h \times (b_1 + b_2)$ = **132** ft^2
Shear capacity adjustment factor (eqn. 4.3-6)	$C_o = \min(A_{wall} / (3 \times A_o + A_{fhs}), 1.0)$ = **1**

Perforated shear wall capacity

Maximum shear force under wind loading	$V_{w\_max} = 0.6 \times W$ = **1.017** kips
Shear capacity for wind loading	$V_w = v_w \times C_o \times \Sigma b_i / 2.0$ = **6.907** kips
	V_{w_max} / V_w = **0.147**
	PASS - Shear capacity for wind load exceeds maximum shear force

Chord capacity for chords 1 and 2

Load combination 5

Shear force for maximum tension	$V = 0.6 \times W$ = **1.017** kips
Axial force for maximum tension	$P = (0.6 \times S_{wt} \times h) \times b / 2$ = **0.648** kips
Maximum tensile force in chord	$T = V \times h / (C_o \times \Sigma b_i) - P$ = **0.562** kips
Maximum applied tensile stress	$f_t = T / A_{en}$ = **42** lb/in^2
Design tensile stress	$F_t' = F_t \times C_D \times C_{Mt} \times C_{tt} \times C_{Ft} \times C_i$ = **720** lb/in^2
	f_t / F_t' = **0.058**
	PASS - Design tensile stress exceeds maximum applied tensile stress

Load combination 1

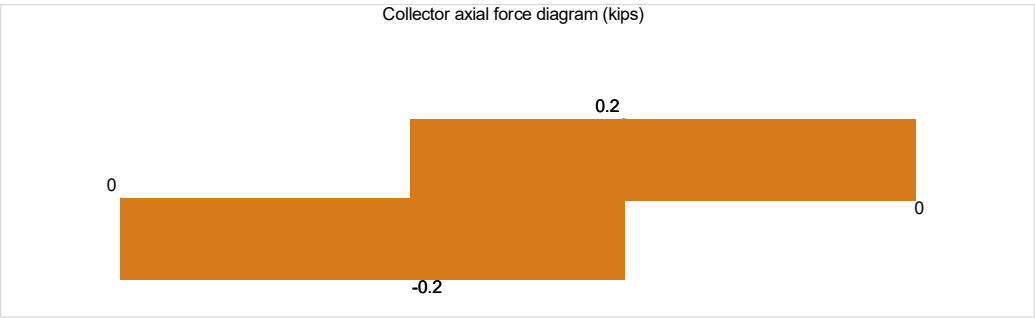
Shear force for maximum compression	$V = 0.6 \times W$ = **1.017** kips
Axial force for maximum compression	$P = (S_{wt} \times h) \times s / 2$ = **0.096** kips
Maximum compressive force in chord	$C = V \times h / (C_o \times \Sigma b_i) + P$ = **1.306** kips
Maximum applied compressive stress	$f_c = C / A_e$ = **79** lb/in^2
Design compressive stress	$F_c' = F_c \times C_D \times C_{Mc} \times C_{tc} \times C_{Fc} \times C_i \times C_P$ = **540** lb/in^2
	f_c / F_c' = **0.147**
	PASS - Design compressive stress exceeds maximum applied compressive stress

Design bearing compr. stress, bottom plate $F_{c\_perp}' = F_{c\_perp} \times C_{Mc} \times C_{tc} \times C_i \times C_b$ = **625** lb/in^2

f_c / F_{c_perp}' = **0.127**

PASS - Design bearing compressive stress exceeds maximum applied bearing compressive stress

Collector capacity



Maximum shear force on wall $V_{max} = V_{w\_max}$ = **1.017** kips

Uniform shear applied to wall $v_a = V_{max} / (C_o \times \Sigma b_i)$ = **100.9** plf

Shear resisted by wall segments $v_b = v_a \times b / (b_1 + b_2)$ = **137.5** plf

Maximum force in collector P_{coll} = **0.202** kips

Maximum applied tensile stress $f_t = P_{coll} / (2 \times A_s)$ = **12** lb/in^2

Design tensile stress $F_t' = F_t \times C_D \times C_{Mt} \times C_{tt} \times C_{Ft} \times C_i$ = **720** lb/in^2

f_t / F_t' = **0.017**

PASS - Design tensile stress exceeds maximum applied tensile stress

Maximum applied compressive stress $f_c = P_{coll} / (2 \times A_s)$ = **12** lb/in^2

Column stability factor C_P = **1.00**

Design compressive stress $F_c' = F_c \times C_D \times C_{Mc} \times C_{tc} \times C_{Fc} \times C_i \times C_P$ = **1360** lb/in^2

f_c / F_c' = **0.009**

PASS - Design compressive stress exceeds maximum applied compressive stress

Hold down force

Chord 1 T_1 = **0.562** kips

Chord 2 T_2 = **0.562** kips

Wind load deflection

Design shear force $V_{\delta w} = f_{Wserv} \times W$ = **1.017** kips

Deflection limit Δ_{w_allow}= h / 400 = **0.36** in

Induced unit shear $v_{\delta w\_max} = V_{\delta w} / (C_o \times \Sigma b_i)$ = **100.86** lb/ft

Anchor tension force T_δ = max(0 kips,$v_{\delta w\_max} \times h$ - 0.6 × (D + $S_{wt} \times h$) × b / 2) = **0.562** kips

Chord compression force C_δ = max(0 kips,$v_{\delta w\_max} \times h$ + 0.6 × (D + $S_{wt} \times h$) × b / 2) = **1.858** kips

Vertical elongation at anchor $\Delta_T = T_\delta / k_a$ = **0.019** in

Vertical compression at chord Δ_C = 0.04 in × $C_\delta / (A_e \times F_{c\_perp})$ = **0.007** in

Total vertical deflection $\Delta_a = (\Delta_T + \Delta_C) \times (b / b_{eff})$ = **0.028** in

Shear wall deflection – Eqn. 4.3-1

$\delta_{sww} = 2 \times v_{\delta w\_max} \times h^3 / (3 \times E \times A_e \times \Sigma b_i) + v_{\delta w\_max} \times h / (G_a) + h \times \Delta_a / \Sigma b_i =$ **0.082** in

$\delta_{sww} / \Delta_{w\_allow} =$ **0.228**

PASS - Shear wall deflection is less than deflection limit

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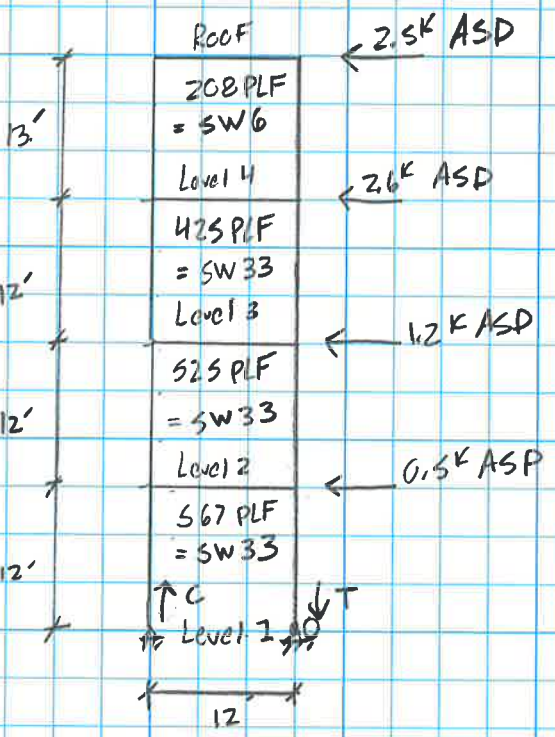
Date: 3/25/24 Page: 1 of
By: BPK Chkd By:
Job No: 22025
Project: Astrid Bldg 7
Client: ESA

☐ Preliminary ☐ Final

WOOD SHEAR WALLS

=> Grid Line C



Tension in HD @ Ea. Level

- Level 4-Roof:

ΣM_o: $2.5^K \times 13' - C \times 12' = 0$

$T = C = 2.7^K$

- Level 3-4

ΣM_o: $2.5^K \times 25' + 2.6^K \times 12' - C \times 12' = 0$

$T = C = 7.8^K$

- Level 2-3

ΣM_o: $2.5^K \times 37' + 2.6^K \times 24' + 1.2^K \times 12' - C \times 12' = 0$

$T = C = 14.1^K$

- Level 1-2: ΣM_o: $2.5' \times 49' + 2.6' \times 36' + 1.2^K \times 24' + 0.5^K \times 12' - C \times 12' = 0$

$\boxed{T = C = 20.9^K}$

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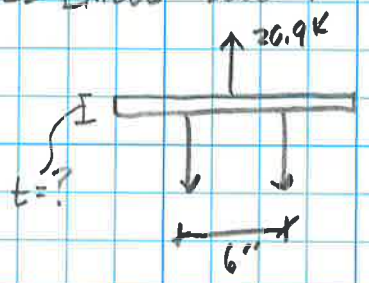
ATS System Check

⇒ BPS Base PL

- 0.229" × 3" × 3" PL w/ 3/16" Fillet weld on all 4 sides ~ 10" long
- Capacity of weld: $\phi R_n = 0.75(0.6 \times 70\,ksi)\left(\frac{3/16}{\sqrt{2}}\right)(10") = 27.8^K$
- Demand on weld = $20.9^K < 27.8^K$ ✓ OK
- Capacity of base PL: $\phi R_n = 0.67[0.6 \times 36\,ksi \times (0.229" \times 10")] = 33.1^K$
- Demand on PL = $20.9^K < 33.1^K$ ✓ OK

⇒ Embed Base PL



$M_{max} = \frac{PL}{4} = \frac{20.9^K \times 6"}{4} = 31.4$ in-K

$F_b = \frac{M}{S}$ $S = \frac{bh^2}{6}$

$\phi F_b = 0.6 \times 36\,ksi = 21.6\,ksi$

$\frac{21.6\,ksi}{1} = \frac{31.4\,in\text{-}K}{\frac{6" \times h^2}{6}}$ $h = 1.21" \Rightarrow 1\frac{1}{4}"$ PL req'd

JVA JOB NO. 22025

SECTION 5 - MISCELLANEOUS AND SPECIAL STRUCTURES

Project____22025_____ STUD WALL CALCULATION Page_____
Job #_____ typ 2x6 stud @ roof level 2/26/2024
Location_____ 2:01 PM

WALL STUDS for Douglas Fir Larch

WALL DESIGN CONDITIONS		
Wall Load =	1628	lb/ft
Wind Load =	23	lb/ft^2
Height =	12	ft

ALLOWABLE DESIGN VALUES				
Grade	F_C	$F_{C\perp}$	F_b	E
-	$[lb/in^2]$	$[lb/in^2]$	$[lb/in^2]$	$[lb/in^2]$
Stud	850	625	700	1.4E+06
No. 2	1350	625	900	1.6E+06
Standard	1400	625	575	1.4E+06

SECTION PROPERTIES			
Size	A	S	I
-	$[in^2]$	$[in^3]$	$[in^4]$
2x4	5.25	3.06	5.36
2x6	8.25	7.65	20.80
2x8	10.88	13.14	47.63

ADJUSTMENT FACTORS	
Axial	Bending
C_D = 1.15	C_D = 1.60
Other 1.00	C_r = 1.15
Other 1.00	C_L/Other 1.50

SIZE FACTOR, C_F (Axial for compression only)			
Size	Grade	Axial	Bending
2 x 4	Stud	1.05	1.1
	No. 2	1.15	1.5
	Standard	1.0	1.0
2 x 6	Stud	1.0	1.0
	No. 2	1.1	1.3
	Standard	1.0	1.0
2 x 8	Stud	1.05	1.2
	No. 2	1.05	1.2
	Standard	1.0	1.0

COLUMN STABILITY FRACTOR, C_P		
K_{cE} =	0.3	(0.3 Visual, 0.418 Glue Lam)
c =	0.8	(0.8 Sawn Lumber, 0.9 Glue Lam)
Size	Grade	Axial
2 x 4	Stud	0.2282
	No. 2	0.1533
	Standard	0.1489
2 x 6	Stud	0.5165
	No. 2	0.3674
	Standard	0.3444
2 x 8	Stud	0.7035
	No. 2	0.5832
	Standard	0.5368

RESULTS

Spacing	Stud Grade			No. 2			Standard Grade		
[in o.c.]	2 x 4	2 x 6	2 x 8	2 x 4	2 x 6	2 x 8	2 x 4	2 x 6	2 x 8
8	3.83	0.35	0.14	1.64	0.21	0.10	4.83	0.40	0.19
12	-	0.65	0.23	-	0.38	0.17	-	0.73	0.31
16	-	1.06	0.34	-	0.61	0.25	-	1.18	0.44
19.2	-	1.50	0.45	-	0.84	0.32	-	1.67	0.57
24	-	2.50	0.63	-	1.32	0.44	-	2.81	0.78

Note: If - appears in the cell then the stud fails due to axial load alone and may not be considered.

WALL STUDS for Microllam along Grid Line C (Deck)

WALL DESIGN CONDITIONS		
Wall Load =	2767	lb/ft
Wind Load =	23	lb/ft^2
Height =	13	ft

ALLOWABLE DESIGN VALUES				
Grade	F_C	$F_{C\perp}$	F_b	E
-	$[lb/in^2]$	$[lb/in^2]$	$[lb/in^2]$	$[lb/in^2]$
Microllam	2510	750	2600	1.9E+06
1.3 LSL	1400	680	1700	1.3E+06
1.5 LSL	1950	750	2250	1.5E+06

SECTION PROPERTIES				
Size	A	S	I	
-	$[in^2]$	$[in^3]$	$[in^4]$	
5 1/2	9.63	8.82	24.26	1 3/4 ML
7 1/4	12.69	15.33	55.57	1 3/4 ML
9 1/2	16.63	26.32	125.03	1 3/4 ML
3 1/2	5.25	3.06	5.36	1 1/2 LSL
5 1/2	8.25	7.56	20.80	1 1/2 LSL
7 1/4	10.88	13.14	47.63	1 1/2 LSL

ADJUSTMENT FACTORS	
Axial	Bending
C_D = 1.15	C_D = 1.60
Other 1.00	C_r = 1.00
Other 1.00	C_L/Other 1.00

SIZE FACTOR, C_F (Axial for compression only)			
Size	Grade	Axial	Bending
5 1/2	Microllam	1.0	1.0
	1.3 LSL	1.0	1.0
	1.5 LSL	1.0	1.0
7 1/4	Microllam	1.0	1.0
	1.3 LSL	1.0	1.0
	1.5 LSL	1.0	1.0
9 1/2	Microllam	1.0	1.0
	1.3 LSL	1.0	1.0
	1.5 LSL	1.0	1.0

COLUMN STABILITY FRACTOR, C_P		
K_{cE} =	0.418	(0.3 Visual, 0.418 Glue Lam)
c =	0.9	(0.8 Sawn Lumber, 0.9 Glue Lam)
Size	Grade	Axial
5 1/2	Microllam	0.1363
	1.3 LSL	0.1666
	1.5 LSL	0.1385
7 1/4	Microllam	0.3262
	1.3 LSL	0.3939
	1.5 LSL	0.3311
9 1/2	Microllam	0.5333
	1.3 LSL	0.6249
	1.5 LSL	0.5404

RESULTS

Spacing	Microllam			1.3 LSL			1.5 LSL		
[in o.c.]	5 1/2	7 1/4	9 1/2	3 1/2	5 1/2	-	-	-	7 1/4
8	0.44	0.10	0.04	1.72	0.41	0.16	1.28	0.29	0.11
12	1.10	0.17	0.07	3.86	0.84	0.27	2.88	0.58	0.20
16	6.09	0.27	0.10	6.87	1.62	0.42	5.12	1.03	0.30
19.2	1.37	0.36	0.13	9.89	2.92	0.56	7.37	1.62	0.39
24	2.13	0.54	0.18	15.45	1.12	0.83	11.52	3.89	0.57

Note: Delfection is not checked by this spreadsheet.

Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	TYP WALL EMBED PLATE	Date:	2/26/2024
Fastening point:			

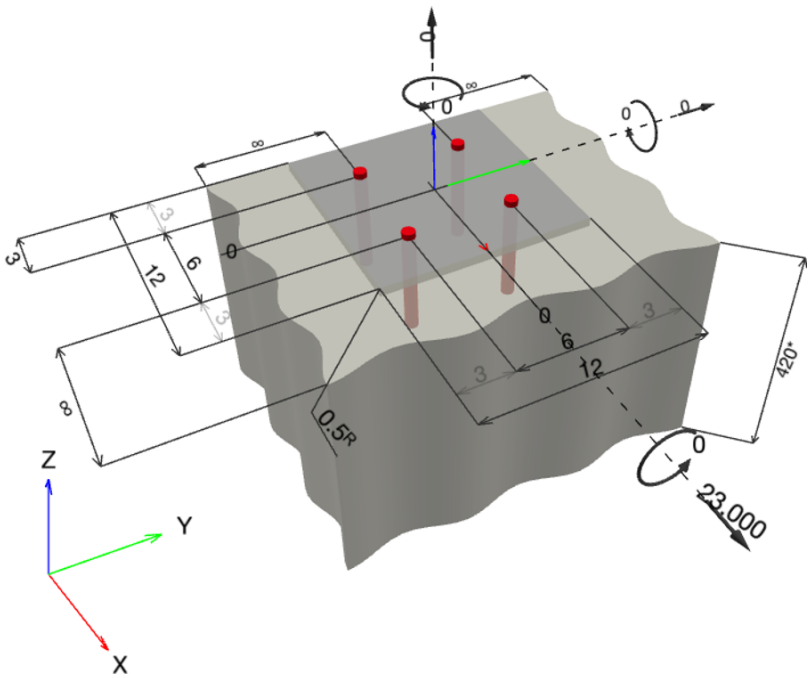
Specifier's comments:

1 Input data

Anchor type and diameter:	**AWS D1.1 GR. B 3/4**
Item number:	not available
Effective embedment depth:	h_{ef} = 6.000 in.
Material:	
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-19 / CIP
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.500 in.
Anchor plate[R] :	l_x x l_y x t = 12.000 in. x 12.000 in. x 0.500 in.; (Recommended plate thickness: not calculated)
Profile:	no profile
Base material:	cracked concrete, 4000, f_c' = 4,000 psi; h = 420.000 in.
Reinforcement:	tension: not present, shear: not present;
	edge reinforcement: none or < No. 4 bar

[R] - The anchor calculation is based on a rigid anchor plate assumption.

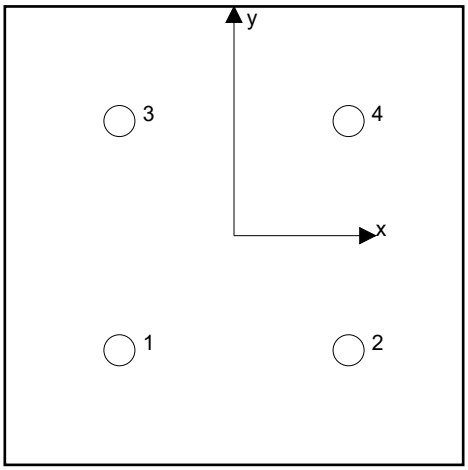
Geometry [in.] & Loading [lb, in.lb]



1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 0; V_x = 23,000; V_y = 0; M_x = 0; M_y = 0; M_z = 0;	no	70

2 Load case/Resulting anchor forces



Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	0	5,750	5,750	0
2	0	5,750	5,750	0
3	0	5,750	5,750	0
4	0	5,750	5,750	0

max. concrete compressive strain: - [‰]
max. concrete compressive stress: - [psi]
resulting tension force in (x/y)=(0.000/0.000): 0 [lb]
resulting compression force in (x/y)=(0.000/0.000): 0 [lb]

Anchor forces are calculated based on the assumption of a rigid anchor plate.

3 Tension load

	Load N_{ua} [lb]	Capacity ϕ N_n [lb]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	N/A	N/A	N/A	N/A
Pullout Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	N/A	N/A	N/A	N/A
Concrete Side-Face Blowout, direction **	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (anchors in tension)

4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	5,750	18,674	31	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	23,000	33,314	70	OK
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (relevant anchors)

4.1 Steel Strength

$V_{sa} = A_{se,V} f_{uta}$ ACI 318-19 Eq. (17.7.1.2a)

$\phi V_{steel} \geq V_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,V}$ [in.^{2}]	f_{uta} [psi]
0.44	65,000

Calculations

V_{sa} [lb]
28,730

Results

V_{sa} [lb]	ϕ_{steel}	ϕ V_{sa} [lb]	V_{ua} [lb]
28,730	0.650	18,674	5,750

4.2 Pryout Strength

$V_{cpg} = k_{cp} \left[\left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ec,N} \; \psi_{ed,N} \; \psi_{c,N} \; \psi_{cp,N} \; N_b \right]$ ACI 318-19 Eq. (17.7.3.1b)

$\phi \; V_{cpg} \geq V_{ua}$ ACI 318-19 Table 17.5.2

A_{Nc} see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)

$A_{Nc0} = 9 \, h_{ef}^2$ ACI 318-19 Eq. (17.6.2.1.4)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2 \, e'_N}{3 \, h_{ef}}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.3.1)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.4.1b)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.6.1b)

$N_b = k_c \; \lambda_a \; \sqrt{f'_c} \; h_{ef}^{1.5}$ ACI 318-19 Eq. (17.6.2.2.1)

Variables

k_{cp}	h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]
2	6.000	0.000	0.000	3.000

$\psi_{c,N}$	c_{ac} [in.]	k_c	λ_a	f'_c [psi]
1.000	∞	24	1.000	4,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
432.00	324.00	1.000	1.000	0.800	1.000	22,308

Results

V_{cpg} [lb]	$\phi_{concrete}$	$\phi \; V_{cpg}$ [lb]	V_{ua} [lb]
47,591	0.700	33,314	23,000

5 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/

Fastening meets the design criteria!

6 Installation data

Profile: no profile

Hole diameter in the fixture: d_f = 0.812 in.

Plate thickness (input): 0.500 in.

Recommended plate thickness: not calculated

Anchor type and diameter: AWS D1.1 GR. B 3/4

Item number: not available

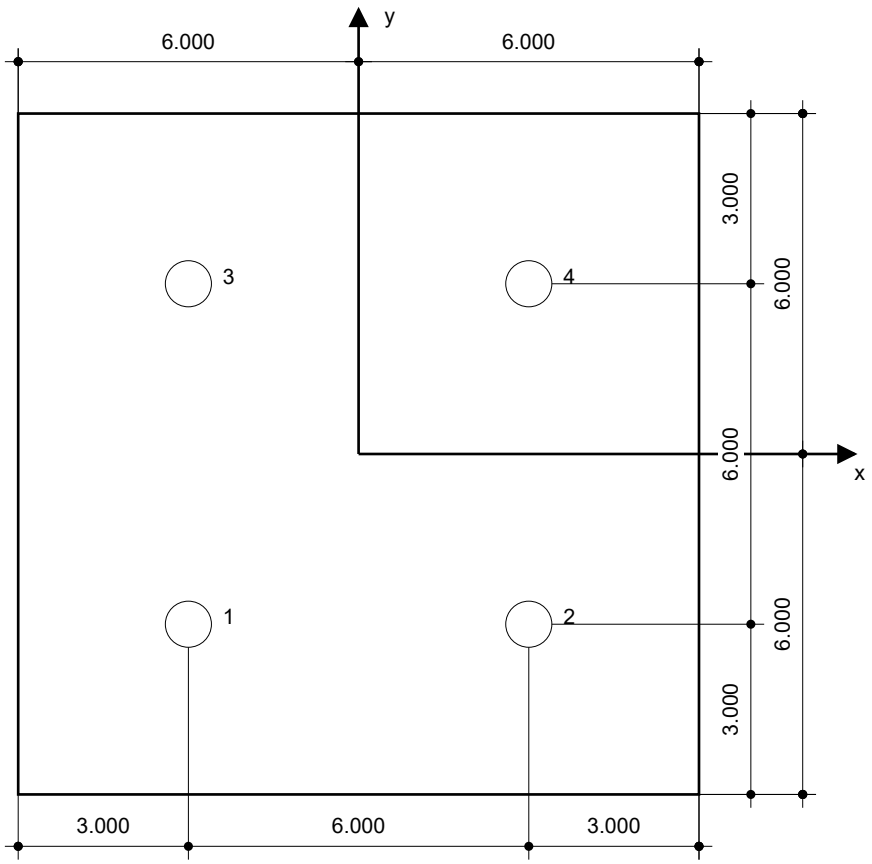
Maximum installation torque: -

Hole diameter in the base material: - in.

Hole depth in the base material: 6.000 in.

Minimum thickness of the base material: 6.875 in.

Hilti AWS welded headed stud anchor with 6 in embedment, 3/4, Steel galvanized, installation per instruction for use



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-3.000	-3.000	3.000	-	-	-
2	3.000	-3.000	9.000	-	-	-
3	-3.000	3.000	3.000	-	-	-
4	3.000	3.000	9.000	-	-	-

7 Remarks; Your Cooperation Duties

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Company:		Page:	1
Address:		Specifier:	
Phone I Fax:	|	E-Mail:	
Design:	ATS 01/02 ANCHOR	Date:	2/26/2024
Fastening point:			

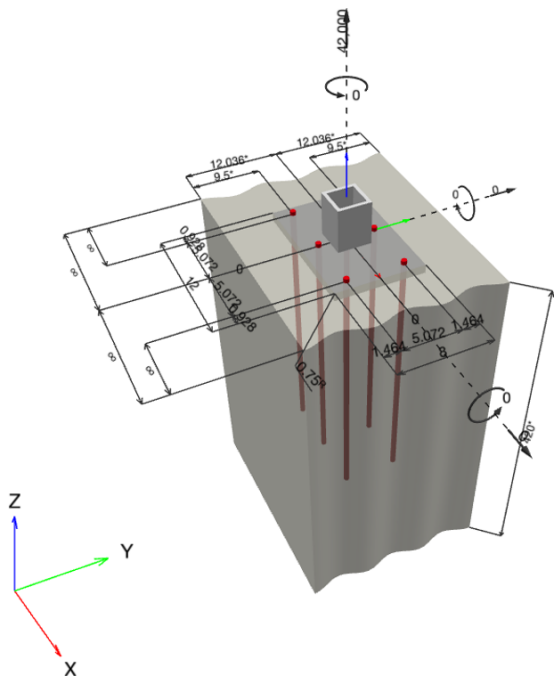
Specifier's comments:

1 Input data

Anchor type and diameter:	**AWS D1.1 GR. B 1/2**
Item number:	not available
Effective embedment depth:	h_{ef} = 24.000 in.
Material:	
Evaluation Service Report:	Hilti Technical Data
Issued I Valid:	- | -
Proof:	Design Method ACI 318-19 / CIP
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.750 in.
Anchor plate[R] :	l_x x l_y x t = 12.000 in. x 8.000 in. x 0.750 in.; (Recommended plate thickness: not calculated)
Profile:	Square HSS (AISC), HSS3X3X.3125; (L x W x T) = 3.000 in. x 3.000 in. x 0.312 in.
Base material:	cracked concrete, 4000, f_c' = 4,000 psi; h = 420.000 in.
Reinforcement:	tension: not present, shear: not present;
	edge reinforcement: > No. 4 bar with stirrups

[R] - The anchor calculation is based on a rigid anchor plate assumption.

Geometry [in.] & Loading [lb, in.lb]



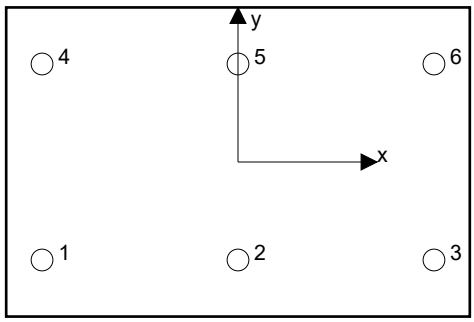
1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 42,000; V_x = 0; V_y = 0; M_x = 0; M_y = 0; M_z = 0;	no	100

2 Load case/Resulting anchor forces

Anchor reactions [lb]
Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	7,000	0	0	0
2	7,000	0	0	0
3	7,000	0	0	0
4	7,000	0	0	0
5	7,000	0	0	0
6	7,000	0	0	0



max. concrete compressive strain: - [‰]
max. concrete compressive stress: - [psi]
resulting tension force in (x/y)=(0.000/0.000): 0 [lb]
resulting compression force in (x/y)=(0.000/0.000): 0 [lb]

Anchor forces are calculated based on the assumption of a rigid anchor plate.

3 Tension load

	Load N_{ua} [lb]	Capacity ϕ N_n [lb]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	7,000	9,555	74	OK
Pullout Strength*	7,000	13,194	54	OK
Concrete Breakout Failure**	42,000	42,039	100	OK
Concrete Side-Face Blowout, direction y-**	21,000	60,836	35	OK

* highest loaded anchor **anchor group (anchors in tension)

3.1 Steel Strength

$N_{sa} = A_{se,N}\, f_{uta}$ ACI 318-19 Eq. (17.6.1.2)

$\phi\ N_{sa} \geq N_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,N}$ [in.^{2}]	f_{uta} [psi]
0.20	65,000

Calculations

N_{sa} [lb]
12,740

Results

N_{sa} [lb]	ϕ_{steel}	$\phi\ N_{sa}$ [lb]	N_{ua} [lb]
12,740	0.750	9,555	7,000

3.2 Pullout Strength

$N_{pN} = \psi_{c,p}\, N_p$ ACI 318-19 Eq. (17.6.3.1)

$N_p = 8\, A_{brg}\, f'_c$ ACI 318-19 Eq. (17.6.3.2.2a)

$\phi\ N_{pN} \geq N_{ua}$ ACI 318-19 Table 17.5.2

Variables

$\psi_{c,p}$	A_{brg} [in.^{2}]	λ_a	f'_c [psi]
1.000	0.59	1.000	4,000

Calculations

N_p [lb]
18,848

Results

N_{pn} [lb]	$\phi_{concrete}$	$\phi\ N_{pn}$ [lb]	N_{ua} [lb]
18,848	0.700	13,194	7,000

3.3 Concrete Breakout Failure

$N_{cbg} = \left(\frac{A_{Nc}}{A_{Nc0}}\right) \psi_{ec,N}\ \psi_{ed,N}\ \psi_{c,N}\ \psi_{cp,N}\ N_b$ — ACI 318-19 Eq. (17.6.2.1b)

$\phi\ N_{cbg} \geq N_{ua}$ — ACI 318-19 Table 17.5.2

A_{Nc} see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)

$A_{Nc0} = 9\ h_{ef}^2$ — ACI 318-19 Eq. (17.6.2.1.4)

$\psi_{ec,N} = \left(\frac{1}{1 + \frac{2\ e'_N}{3\ h_{ef}}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.2.3.1)

$\psi_{ed,N} = 0.7 + 0.3\left(\frac{c_{a,min}}{1.5h_{ef}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.2.4.1b)

$\psi_{cp,N} = \text{MAX}\left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5h_{ef}}{c_{ac}}\right) \leq 1.0$ — ACI 318-19 Eq. (17.6.2.6.1b)

$N_b = 16\ \lambda_a\ \sqrt{f'_c}\ h_{ef}^{5/3}$ — ACI 318-19 Eq. (17.6.2.2.3)

Variables

h_{ef} [in.]	$e_{c1,N}$ [in.]	$e_{c2,N}$ [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
24.000	0.000	0.000	9.500	1.000

c_{ac} [in.]	k_c	λ_a	f'_c [psi]
-	16	1.000	4,000

Calculations

A_{Nc} [in.^{2}]	A_{Nc0} [in.^{2}]	$\psi_{ec1,N}$	$\psi_{ec2,N}$	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
1,977.38	5,184.00	1.000	1.000	0.779	1.000	202,070

Results

N_{cbg} [lb]	$\phi_{concrete}$	$\phi\ N_{cbg}$ [lb]	N_{ua} [lb]
60,056	0.700	42,039	42,000

3.4 Concrete Side-Face Blowout, direction y-

$N_{sb} = 160\, c_{a1} \sqrt{A_{brg}}\, \lambda_a \sqrt{f'_c}$ ACI 318-19 Eq. (17.6.4.1)

$N_{sbg} = \alpha_{group} N_{sb}$ ACI 318-19 Eq. (17.6.4.2)

$\phi\, N_{sbg} \geq N_{ua}$ ACI 318-19 Table 17.5.2

$\alpha_{group} = \left(1 + \frac{s}{6\, c_{a1}}\right)$ see ACI 318-19, Section 17.6.4.2, Eq. (17.6.4.2)

Variables

c_{a1} [in.]	c_{a2} [in.]	A_{brg} [in.^{2}]	λ_a	f'_c [psi]	s [in.]
9.500	-	0.59	1.000	4,000	10.144

Calculations

α_{group}	N_{sb} [lb]
1.178	73,779

Results

N_{sbg} [lb]	$\phi_{concrete}$	$\phi\, N_{sbg}$ [lb]	$N_{ua,edge}$ [lb]
86,909	0.700	60,836	21,000

4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	N/A	N/A	N/A	N/A
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength*	N/A	N/A	N/A	N/A
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (relevant anchors)

5 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/

Fastening meets the design criteria!

6 Installation data

Profile: Square HSS (AISC), HSS3X3X.3125; (L x W x T) = 3.000 in. x 3.000 in. x 0.312 in.

Hole diameter in the fixture: d_f = 0.562 in.

Plate thickness (input): 0.750 in.

Recommended plate thickness: not calculated

Anchor type and diameter: AWS D1.1 GR. B 1/2

Item number: not available

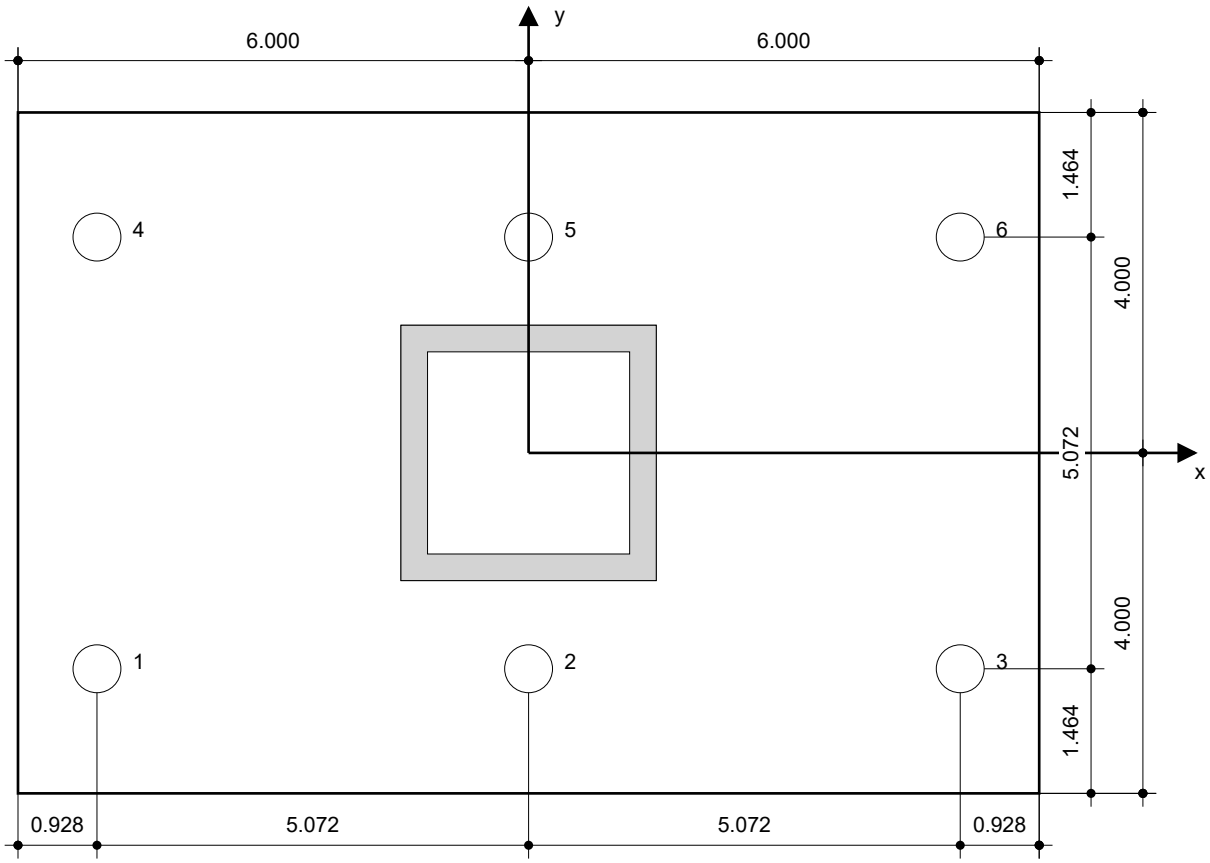
Maximum installation torque: -

Hole diameter in the base material: - in.

Hole depth in the base material: 24.000 in.

Minimum thickness of the base material: 24.813 in.

Hilti AWS welded headed stud anchor with 24 in embedment, 1/2, Steel galvanized, installation per instruction for use



Coordinates Anchor [in.]

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	-5.072	-2.536	-	-	9.500	14.572
2	0.000	-2.536	-	-	9.500	14.572
3	5.072	-2.536	-	-	9.500	14.572
4	-5.072	2.536	-	-	14.572	9.500
5	0.000	2.536	-	-	14.572	9.500
6	5.072	2.536	-	-	14.572	9.500

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