



9719 South Dixie Hwy., Unit #2
Miami, FL 33156

Ph: 305.609.3652
CA 28548

STRUCTURAL CALCULATIONS
per Revision 5

FOR

Huber Khomiak Residence
12020 SW 77th Ave
Pinecrest, FL 33156

prepared by:
Thomas Moe
PE 63863

THOMAS MOE
Digitally signed
by THOMAS
MOE
Date: 2023.01.05
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STRUCTURAL CONSULTING

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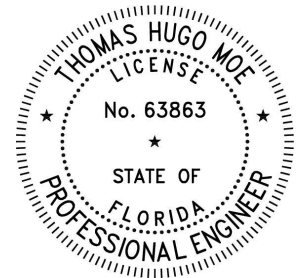
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Huber Khomiak Residence

12020 SW 77th Ave
Pinecrest, FL 33156

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Thomas Moe
PE 63863

DESIGN OF COMPOSITE STEEL BEAMS AT UPPER ROOF

UPPER ROOF LOADING

$$w_{t_{\text{roof\_slab}}} := \gamma_{\text{concrete}} \cdot (6 \cdot \text{in})$$

$$DL_r := 25 \cdot \text{psf}$$

$$LL_r := 30 \cdot \text{psf}$$

$$w_{t_{\text{roof\_slab}}} = 72.5 \cdot \text{psf}$$

$$\text{trib}_{r1} := \frac{(13.9 \cdot \text{ft} + 10.75 \cdot \text{ft})}{2}$$

$$\text{trib}_{r2\_3} := \frac{(10.75 \cdot \text{ft} + 10.75 \cdot \text{ft})}{2}$$

$$\text{trib}_{r4} := \frac{(10.75 \cdot \text{ft} + 12.4 \cdot \text{ft})}{2}$$

$$\text{trib}_{r1} = 12.32 \text{ ft}$$

$$\text{trib}_{r2\_3} = 10.75 \text{ ft}$$

$$\text{trib}_{r4} = 11.57 \text{ ft}$$

ROOF DEAD LOADS

$$w_{DLr1} := \text{trib}_{r1} \cdot (DL_r + w_{t_{\text{roof\_slab}}})$$

$$w_{DLr2\_3} := \text{trib}_{r2\_3} \cdot (DL_r + w_{t_{\text{roof\_slab}}})$$

$$w_{DLr4} := \text{trib}_{r4} \cdot (DL_r + w_{t_{\text{roof\_slab}}})$$

$$w_{DLr1} = 1.2 \cdot \frac{\text{k}}{\text{ft}}$$

$$w_{DLr2\_3} = 1.05 \cdot \frac{\text{k}}{\text{ft}}$$

$$w_{DLr4} = 1.13 \cdot \frac{\text{k}}{\text{ft}}$$

ROOF LIVE LOADS

$$w_{Lr1} := \text{trib}_{r1} \cdot LL_r$$

$$w_{Lr2\_3} := \text{trib}_{r2\_3} \cdot LL_r$$

$$w_{Lr4} := \text{trib}_{r4} \cdot LL_r$$

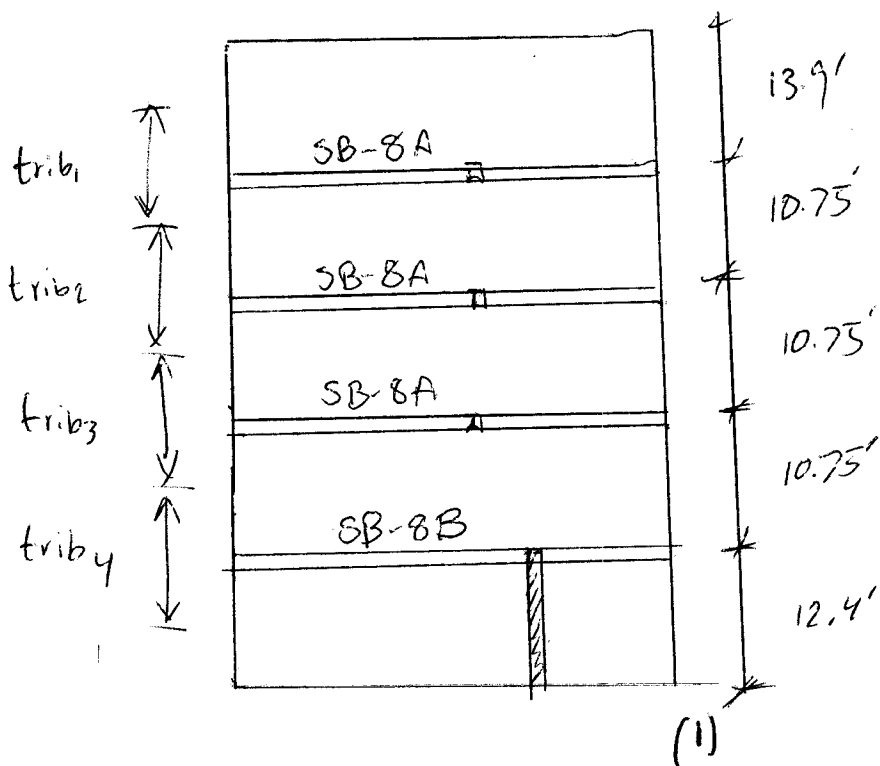
$$w_{Lr1} = 0.37 \cdot \frac{\text{k}}{\text{ft}}$$

$$w_{Lr2\_3} = 0.3 \cdot \frac{\text{k}}{\text{ft}}$$

$$w_{Lr4} = 0.35 \cdot \frac{\text{k}}{\text{ft}}$$

Apply to pg 2.
SB-8A design

Apply to pg 5



trib₁ controls for
SB-8A

Project Title:
Engineer:
Project ID:
Project Descr:

Composite Steel Beam

Project File: huber & khomiak residence_backup_2.ec6

LIC# : KW-06013533, Build:20.22.12.28

THM Structural Consulting

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DESCRIPTION: SB-8A

CODE REFERENCES

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

Load Combination Set : ASCE 7-16

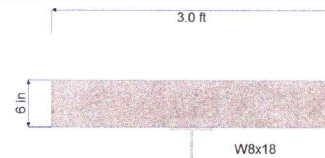
Material Properties

Analysis Method : Load Resistance Factor Design

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

Load Combination ASCE 7-16

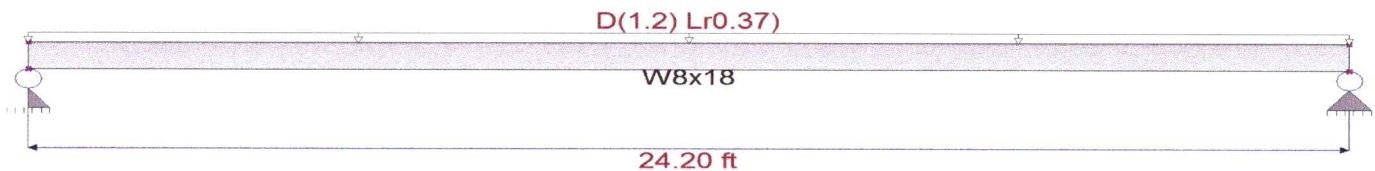
Fy : Steel Yield : 50.0 ksi E: Modulus : 29,000.0 ksi



Beam is SHORED for Concrete Placement

Composite Beam Section Data

Total Slab Thickness	6.0 in	Concrete f'c	4.0 ksi	Stud Diameter	3/4" in
Effective Width	3.0 ft	Concrete Density	145.0 pcf	Qn : Stud Capacity	21.55 k



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : $D = 1.20$, $L_r = 0.370$ k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

MAX Bending Ratio =		MAX Shear Ratio =	
Steel section	0.847 : 1	V_u : Applied	0.442 : 1
Composite	W8x18	$V_n * \Phi$: Allow	56.166 k
% Composite Action	100 %	Location of maximum	0.0 ft
μ_u : Applied	150.327 k-ft	Load Combination	+0.90D+E+0.90H
$M_n * \Phi$: Allow	177.439 k-ft		
Location of maximum	12.019 ft		
Load Combination	+0.90D+E+0.90H		
Pre-Composite			
μ_u : Applied	0 k-ft		
$M_n * \Phi$: Allowable	0 k-ft		

Design OK

DEFLECTIONS

FINAL Composite	
Max Downward	1.555 in
Max Upward	0.000 in
Defl Ratio	186
Transient Composite	
Max Downward	0.362 in
Max Upward	0.000 in
Defl Ratio	801
NonComposite	
Max Downward	in
Max Upward	in
Defl Ratio	

Shear Stud Requirements

From Support 1 to 12.02 ft use 13 studs.

From 12.02 ft to Support 2 use 13 studs.

Maximum Forces & Stresses for Load Combin

Load Comb & Design Length	Span #	Max Stress Ratios		Bending Summary		Shear Summary	
		M	V	Ma	MaxMn / Omega	Va	Vn / Omega
Overall Maximums							
Span L = 24.2 ft	1	0.847	0.442	150.33	177.44	24.85	56.17
+1.40D+1.60H							
Span L = 24.2 ft	1	0.703	0.367	124.82	177.44	20.63	56.17

(2)

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Composite Steel Beam

Project File: huber & khomiak residence_backup_2.ec6

LIC# : KW-06013533, Build:20.22.12.28

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DESCRIPTION: SB-8A

Load Comb & Design Length Span #	Max Stress Ratios		Bending Summary		Shear Summary	
	M	V	Ma	MaxMn / Omega	Va	Vn / Omega
+1.20D+0.50Lr+1.60L+1.60H Span L = 24.2 ft 1	0.679	0.355	120.53	177.44	19.92	56.17
+1.20D+1.60L+0.50S+1.60H Span L = 24.2 ft 1	0.603	0.315	106.99	177.44	17.69	56.17
+1.20D+1.60Lr+L+1.60H Span L = 24.2 ft 1	0.847	0.442	150.33	177.44	24.85	56.17
+1.20D+1.60Lr+0.50W+1.60H Span L = 24.2 ft 1	0.847	0.442	150.33	177.44	24.85	56.17
+1.20D+L+1.60S+1.60H Span L = 24.2 ft 1	0.603	0.315	106.99	177.44	17.69	56.17
+1.20D+1.60S+0.50W+1.60H Span L = 24.2 ft 1	0.603	0.315	106.99	177.44	17.69	56.17
+1.20D+0.50Lr+L+W+1.60H Span L = 24.2 ft 1	0.679	0.355	120.53	177.44	19.92	56.17
+1.20D+L+0.50S+W+1.60H Span L = 24.2 ft 1	0.603	0.315	106.99	177.44	17.69	56.17
+0.90D+W+1.60H Span L = 24.2 ft 1	0.452	0.236	80.24	177.44	13.26	56.17
+1.20D+L+0.20S+E+1.60H Span L = 24.2 ft 1	0.603	0.315	106.99	177.44	17.69	56.17
+0.90D+E+0.90H Span L = 24.2 ft 1	0.452	0.236	80.24	177.44	13.26	56.17

Maximum Deflections for Load Combinations

Load Combination	Span	Deflection	Location in Span	Moment of Inertia				
				Ixx - Used	I-Steel	I-Trans	I per C-I3-1	I per C-I3-2
+D+H	Downward	1	1.1925	12.181	274.724	0.000	0.000	0.000
+D+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+D+L+H	Downward	1	1.1925	12.181	274.724	0.000	0.000	0.000
+D+L+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+D+Lr+H	Downward	1	1.5548	12.181	274.724	0.000	0.000	0.000
+D+Lr+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+D+S+H	Downward	1	1.1925	12.181	274.724	0.000	0.000	0.000
+D+S+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+D+0.750Lr+0.750L+H	Downward	1	1.4642	12.181	274.724	0.000	0.000	0.000
+D+0.750Lr+0.750L+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+D+0.750L+0.750S+H	Downward	1	1.1925	12.181	274.724	0.000	0.000	0.000
+D+0.750L+0.750S+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+D+0.60W+H	Downward	1	1.1925	12.181	274.724	0.000	0.000	0.000
+D+0.60W+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+D+0.750Lr+0.750L+0.450W+H	Downward	1	1.4642	12.181	274.724	0.000	0.000	0.000
+D+0.750Lr+0.750L+0.450W+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+D+0.750L+0.750S+0.450W+H	Downward	1	1.1925	12.181	274.724	0.000	0.000	0.000
+D+0.750L+0.750S+0.450W+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+0.60D+0.60W+0.60H	Downward	1	0.7155	12.181	274.724	0.000	0.000	0.000
+0.60D+0.60W+0.60H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+D+0.70E+0.60H	Downward	1	1.1925	12.181	274.724	0.000	0.000	0.000
+D+0.70E+0.60H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+D+0.750L+0.750S+0.5250E+H	Downward	1	1.1925	12.181	274.724	0.000	0.000	0.000
+D+0.750L+0.750S+0.5250E+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
+0.60D+0.70E+H	Downward	1	0.7155	12.181	274.724	0.000	0.000	0.000
+0.60D+0.70E+H	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
D Only	Downward	1	1.1925	12.181	274.724	0.000	0.000	0.000
D Only	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
Lr Only	Downward	1	0.3623	12.181	274.724	0.000	0.000	0.000
Lr Only	Upward	1	0.0000	0.000	274.724	0.000	0.000	0.000
L Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
L Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
S Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
S Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
W Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
W Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
E Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
E Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
H Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
H Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000

(3)

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Composite Steel Beam

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LIC# : KW-06013533, Build:20.22.12.28

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DESCRIPTION: SB-8A

Maximum Vertical Reactions

Support notation : Far left is #

Load Combination	Support 1	Support 2
Overall MAXimum111	19.215	19.215
+D+H	14.738	14.738
+D+L+H	14.738	14.738
+D+Lr+H	19.215	19.215
+D+S+H	14.738	14.738
+D+0.750Lr+0.750L+H	18.096	18.096
+D+0.750L+0.750S+H	14.738	14.738
+D+0.60W+H	14.738	14.738
+D+0.750Lr+0.750L+0.450W+H	18.096	18.096
+D+0.750L+0.750S+0.450W+H	14.738	14.738
+0.60D+0.60W+0.60H	8.843	8.843
+D+0.70E+0.60H	14.738	14.738
+D+0.750L+0.750S+0.5250E+H	14.738	14.738
+0.60D+0.70E+H	8.843	8.843
D Only	14.738	14.738
Lr Only	4.477	4.477
L Only		
S Only		
W Only		
E Only		
H Only		

Steel Section Properties W8x18

Depth	=	8.140 in	I xx	=	61.90 in^4	I yy	=	7.970 in^4
Web Thick	=	0.230 in	S xx	=	15.20 in^3	S yy	=	3.040 in^3
Flange Width	=	5.250 in	R xx	=	3.430 in	R yy	=	1.230 in
Flange Thick	=	0.330 in	Zx	=	17.000 in^3	Zy	=	4.660 in^3
Area	=	5.260 in^2	J	=	0.172 in^4			
Weight	=	18.000 plf						

Composite Section Properties

Span Number	Plastic N. A. Location	Analysis Type	% Shear Connection	Plastic N.A. from Bottom	Sum Qn Shear (k)	# Studs per 1/2 Span	Mn - Capacity k-ft	Moment of Inertia		
								I-Steel	I-Trans	I-Lwr Bound
	PNA in Slab		100.0	8.140	263.000	13	197.15	61.9	363.6	274.7
	PNA in Flange		95.0	8.115	249.850	12	197.15	61.9	363.6	271.8
	PNA in Flange		90.0	8.090	236.700	11	197.15	61.9	363.6	268.4
	PNA in Flange		85.0	8.065	223.550	11	194.99	61.9	363.6	264.5
	PNA in Flange		80.0	8.040	210.400	10	188.70	61.9	363.6	260.2
	PNA in Flange		75.0	8.015	197.250	10	182.40	61.9	363.6	255.4
	PNA in Flange		70.0	7.990	184.100	9	176.06	61.9	363.6	250.0
	PNA in Flange		65.0	7.965	170.950	8	169.71	61.9	363.6	243.9
	PNA in Flange		60.0	7.940	157.800	8	163.32	61.9	363.6	237.1
	PNA in Flange		55.0	7.915	144.650	7	156.92	61.9	363.6	229.6
	PNA in Flange		50.0	7.890	131.500	7	150.48	61.9	363.6	221.2
	PNA in Flange		45.0	7.864	118.350	6	144.03	61.9	363.6	211.9
	PNA in Flange		40.0	7.839	105.200	5	137.55	61.9	363.6	201.6
	PNA in Flange		35.0	7.814	92.050	5	131.05	61.9	363.6	190.1
	PNA in Web		30.0	7.338	78.900	4	122.63	61.9	363.6	177.2
	PNA in Web		25.0	6.767	65.750	4	115.40	61.9	363.6	163.0

Span 1

Project Title:
Engineer:
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Project Descr:

Composite Steel Beam

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LIC#: KW-06013533, Build:20.22.12.28

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DESCRIPTION: SB-8B AT UPPER ROOF

CODE REFERENCES

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

Load Combination Set : ASCE 7-16

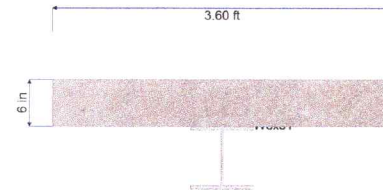
Material Properties

Analysis Method : Load Resistance Factor Design

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

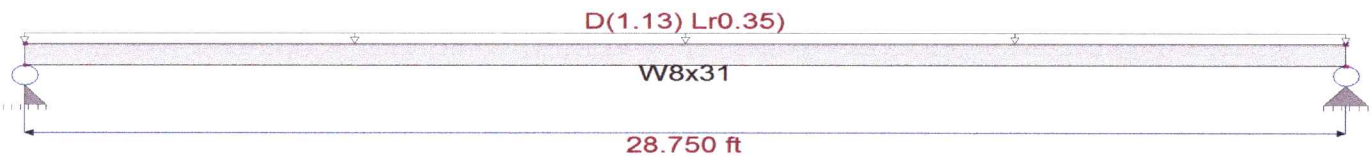
Load Combination ASCE 7-16

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



Composite Beam Section Data

Total Slab Thickness	6.0 in	Concrete f'c	4.0 ksi	Stud Diameter	3/4" in
Effective Width	3.60 ft	Concrete Density	145.0 pcf	Qn : Stud Capacity	21.550 k



Applied Loads

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

Beam self weight calculated and added to loads

Load for Span Number 1

Uniform Load : D = 1.130, Lr = 0.350 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

MAX Bending Ratio =	0.698 : 1	MAX Shear Ratio =	0.410 : 1
Steel section	W8x31	Vu : Applied	28.077 k
Composite		Vn * Phi : Allow	68.40 k
% Composite Action	100 %	Location of maximum	0.0 ft
Mu : Applied	201.796 k-ft	Load Combination	+0.90D+E+0.90H
Mn * Phi : Allow	289.170 k-ft		
Location of maximum	14.279 ft		
Load Combination	+0.90D+E+0.90H		
Pre-Composite			
Mu : Applied	0 k-ft		
Mn * Phi : Allowable	0 k-ft		

Design OK

DEFLECTIONS

FINAL Composite	
Max Downward	1.858 in
Max Upward	0.000 in
Defl Ratio	185
Transient Composite	
Max Downward	0.430 in
Max Upward	0.000 in
Defl Ratio	801
NonComposite	
Max Downward	in
Max Upward	in
Defl Ratio	

Shear Stud Requirements

From Support 1 to 14.28 ft use 22 studs.

From 14.28 ft to Support 2 use 22 studs.

Maximum Forces & Stresses for Load Combin

Load Comb & Design Length		Max Stress Ratios		Bending Summary		Shear Summary	
Span #		M	V	Ma	MaxMn / Omega	Va	Vn / Omega
Overall Maximums							
Span L = 28.75 ft	1	0.698	0.410	201.80	289.17	28.08	68.40
+1.40D+1.60H							
Span L = 28.75 ft	1	0.581	0.342	167.93	289.17	23.37	68.40

(5)

Project Title:
 Engineer:
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Composite Steel Beam

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DESCRIPTION: SB-8B AT UPPER ROOF

Load Comb & Design Length Span #	Max Stress Ratios		Bending Summary		Shear Summary	
	M	V	Ma	MaxMn / Omega	Va	Vn / Omega
+1.20D+0.50Lr+1.60L+1.60H Span L = 28.75 ft 1	0.560	0.330	162.02	289.17	22.54	68.40
+1.20D+1.60L+0.50S+1.60H Span L = 28.75 ft 1	0.498	0.293	143.94	289.17	20.03	68.40
+1.20D+1.60Lr+L+1.60H Span L = 28.75 ft 1	0.698	0.410	201.80	289.17	28.08	68.40
+1.20D+1.60Lr+0.50W+1.60H Span L = 28.75 ft 1	0.698	0.410	201.80	289.17	28.08	68.40
+1.20D+L+1.60S+1.60H Span L = 28.75 ft 1	0.498	0.293	143.94	289.17	20.03	68.40
+1.20D+1.60S+0.50W+1.60H Span L = 28.75 ft 1	0.498	0.293	143.94	289.17	20.03	68.40
+1.20D+0.50Lr+L+W+1.60H Span L = 28.75 ft 1	0.560	0.330	162.02	289.17	22.54	68.40
+1.20D+L+0.50S+W+1.60H Span L = 28.75 ft 1	0.498	0.293	143.94	289.17	20.03	68.40
+0.90D+W+1.60H Span L = 28.75 ft 1	0.373	0.220	107.95	289.17	15.02	68.40
+1.20D+L+0.20S+E+1.60H Span L = 28.75 ft 1	0.498	0.293	143.94	289.17	20.03	68.40
+0.90D+E+0.90H Span L = 28.75 ft 1	0.373	0.220	107.95	289.17	15.02	68.40

Maximum Deflections for Load Combinations

Load Combination	Span	Deflection	Location in Span	Moment of Inertia				
				Ixx - Used	I-Steel	I-Trans	I per C-I3-1	I per C-I3-2
+D+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+D+L+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+L+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+D+Lr+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+Lr+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+D+S+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+S+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+D+0.750Lr+0.750L+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+0.750Lr+0.750L+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+D+0.750L+0.750S+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+0.750L+0.750S+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+D+0.60W+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+0.60W+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+D+0.750Lr+0.750L+0.450W+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+0.750Lr+0.750L+0.450W+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+D+0.750L+0.750S+0.450W+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+0.750L+0.750S+0.450W+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+0.60D+0.60W+0.60H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+0.60D+0.60W+0.60H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+D+0.70E+0.60H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+0.70E+0.60H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+D+0.750L+0.750S+0.5250E+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+D+0.750L+0.750S+0.5250E+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
+0.60D+0.70E+H	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
+0.60D+0.70E+H	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
D Only	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
D Only	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
Lr Only	Downward	1	14.471	435.645	0.000	0.000	0.000	0.000
Lr Only	Upward	1	0.0000	435.645	0.000	0.000	0.000	0.000
L Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
L Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
S Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
S Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
W Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
W Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
E Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
E Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
H Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
H Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000

(6)

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Composite Steel Beam

Project File: huber & khomiak residence_backup_2.ec6

LIC#: KW-06013533, Build: 20.22.12.28

THM Structural Consulting

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DESCRIPTION: SB-8B AT UPPER ROOF

Maximum Vertical Reactions

Support notation : Far left is #

Load Combination	Support 1	Support 2
Overall MAXimum111	21.721	21.721
+D+H	16.689	16.689
+D+L+H	16.689	16.689
+D+Lr+H	21.721	21.721
+D+S+H	16.689	16.689
+D+0.750Lr+0.750L+H	20.463	20.463
+D+0.750L+0.750S+H	16.689	16.689
+D+0.60W+H	16.689	16.689
+D+0.750Lr+0.750L+0.450W+H	20.463	20.463
+D+0.750L+0.750S+0.450W+H	16.689	16.689
+0.60D+0.60W+0.60H	10.014	10.014
+D+0.70E+0.60H	16.689	16.689
+D+0.750L+0.750S+0.5250E+H	16.689	16.689
+0.60D+0.70E+H	10.014	10.014
D Only	16.689	16.689
Lr Only	5.031	5.031
L Only		
S Only		
W Only		
E Only		
H Only		

Steel Section Properties W8x31

Depth	=	8.000 in	I xx	=	110.00 in^4	I yy	=	37.100 in^4
Web Thick	=	0.285 in	S xx	=	27.50 in^3	S yy	=	9.270 in^3
Flange Width	=	8.000 in	R xx	=	3.470 in	R yy	=	2.020 in
Flange Thick	=	0.435 in	Zx	=	30.400 in^3	Zy	=	14.100 in^3
Area	=	9.130 in^2	J	=	0.536 in^4			
Weight	=	31.000 plf						

Composite Section Properties

Span Number	Plastic N. A. Location	Analysis Type	% Shear Connection	Plastic N.A. from Bottom	Sum Qn Shear (k)	# Studs per 1/2 Span	Mn - Capacity k-ft	Moment of Inertia		
								I-Steel	I-Trans	I-Lwr Bound
	PNA in Slab		100.0	8.000	456.500	22	321.30	110.0	557.1	435.6
	PNA in Flange		95.0	7.971	433.675	21	321.30	110.0	557.1	433.2
	PNA in Flange		90.0	7.943	410.850	20	321.30	110.0	557.1	430.0
	PNA in Flange		85.0	7.914	388.025	19	321.30	110.0	557.1	426.0
	PNA in Flange		80.0	7.886	365.200	17	321.30	110.0	557.1	421.2
	PNA in Flange		75.0	7.857	342.375	16	313.86	110.0	557.1	415.4
	PNA in Flange		70.0	7.829	319.550	15	302.84	110.0	557.1	408.6
	PNA in Flange		65.0	7.800	296.725	14	291.76	110.0	557.1	400.7
	PNA in Flange		60.0	7.772	273.900	13	280.64	110.0	557.1	391.5
	PNA in Flange		55.0	7.743	251.075	12	269.46	110.0	557.1	381.0
	PNA in Flange		50.0	7.715	228.250	11	258.24	110.0	557.1	368.9
	PNA in Flange		45.0	7.686	205.425	10	246.97	110.0	557.1	355.1
	PNA in Flange		40.0	7.658	182.600	9	235.65	110.0	557.1	339.4
	PNA in Flange		35.0	7.629	159.775	8	224.28	110.0	557.1	321.7
	PNA in Flange		30.0	7.601	136.950	7	212.87	110.0	557.1	301.5
	PNA in Flange		25.0	7.572	114.125	6	201.41	110.0	557.1	278.7

Span 1

DESIGN OF COMPOSITE STEEL BEAM

FLOOR & BALCONY LOADING

$$wt_{flr\_slab} := \gamma_{concrete} \cdot (6 \cdot in)$$

$$DL_{flr} := 30 \cdot psf$$

$$LL_{flr} := 40 \cdot psf$$

$$wt_{flr\_slab} = 72.5 \cdot psf$$

$$LL_{balcony} := 60 \cdot psf$$

$$trib_{flr} := \frac{(12.33 \cdot ft)}{2}$$

$$trib_{balcony} := \frac{(4.6 \cdot ft)}{2}$$

$$trib_{flr} = 6.17 \text{ ft}$$

$$trib_{balcony} = 2.3 \text{ ft}$$

FLOOR DEAD LOADS

$$w_{DL_{flr}} := (trib_{flr} + trib_{balcony}) \cdot (DL_{flr} + wt_{flr\_slab})$$

$$w_{DL_{flr}} = 0.87 \cdot \frac{k}{ft} \text{ — apply to pg 9}$$

FLOOR & BALCONY LIVE LOADS

$$w_{LL_{flr}} := trib_{flr} \cdot LL_{flr}$$

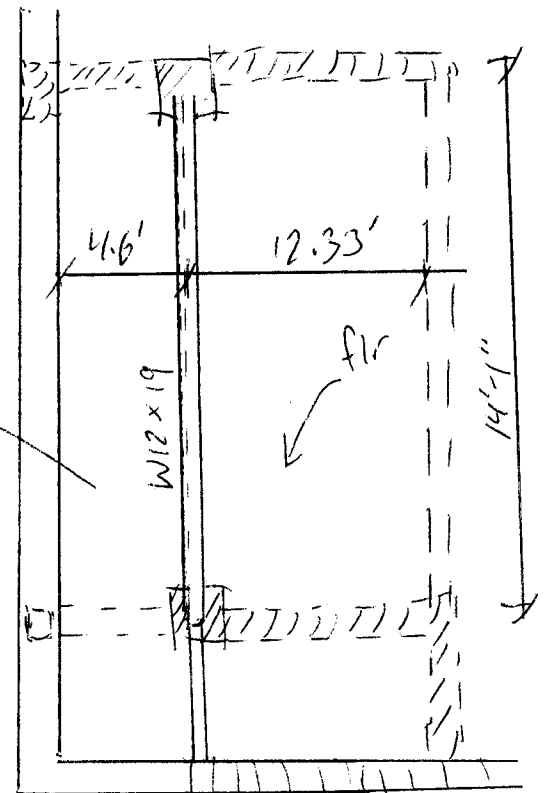
$$w_{LL_{balcony}} := trib_{balcony} \cdot LL_{flr}$$

$$w_{LL_{flr}} = 246.6 \cdot \frac{lb}{ft}$$

$$w_{LL_{balcony}} = 92 \cdot \frac{lb}{ft}$$

$$w_{LL\_Total} := w_{LL_{flr}} + w_{LL_{balcony}}$$

$$w_{LL\_Total} = 338.6 \cdot \frac{lb}{ft} \text{ — apply to pg 9}$$



Partial 2nd Floor
NTS

Project Title:
Engineer:
Project ID:
Project Descr:

Composite Steel Beam

Project File: huber & khomiak residence_backup_2.ec6

LIC#: KW-06013533, Build:20.22.12.28

THM Structural Consulting

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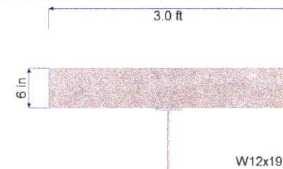
DESCRIPTION: SB-12A

CODE REFERENCES

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

Material Properties

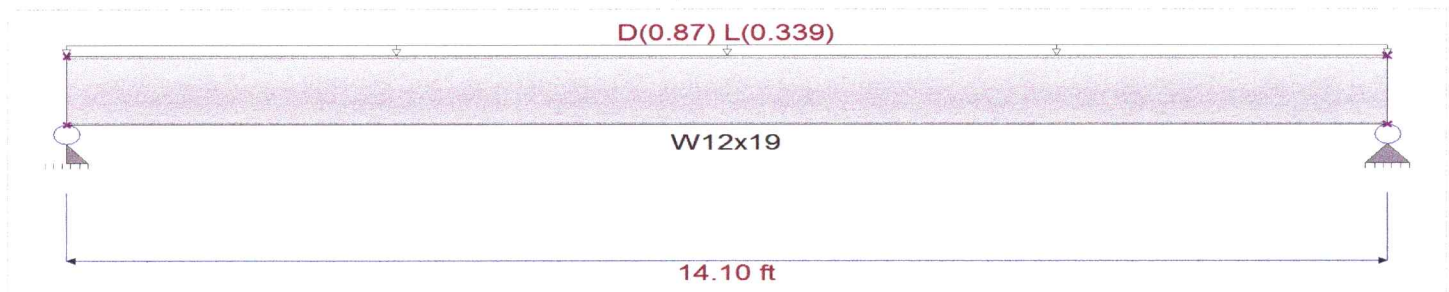
Analysis Method : Load Resistance Factor Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buc
Load Combination ASCE 7-16
Fy : Steel Yield : 50.0 ksi E: Modulus : 29,000.0 ksi



Beam is SHORED for Concrete Placement

Composite Beam Section Data

Total Slab Thickness	6.0 in	Concrete f'c	4.0 ksi	Stud Diameter	3/4" in
Effective Width	3.0 ft	Concrete Density	145.0 pcf	Qn : Stud Capacity	21.550 k



Applied Loads

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

Beam self weight calculated and added to loads
Load for Span Number 1
Uniform Load : D = 0.870, L = 0.3390 k/ft, Tributary Width = 1.0 ft

DESIGN SUMMARY

MAX Bending Ratio =	0.175 : 1	MAX Shear Ratio =	0.132 : 1
Steel section	W12x19	Vu : Applied	11.345 k
Composite		Vn * Phi : Allow	86.010 k
% Composite Action	100 %	Location of maximum	0.0 ft
Mu : Applied	39.989 k-ft	Load Combination	+0.90D+E+0.90H
Mn * Phi : Allow	228.976 k-ft		
Location of maximum	7.003 ft		
Load Combination	+0.90D+E+0.90H		
Pre-Composite			
Mu : Applied	0 k-ft		
Mn * Phi : Allowable	0 k-ft		

Design OK

DEFLECTIONS

FINAL Composite	
Max Downward	0.082 in
Max Upward	0.000 in
Defl Ratio	2065
Transient Composite	
Max Downward	0.023 in
Max Upward	0.000 in
Defl Ratio	7482
NonComposite	
Max Downward	in
Max Upward	in
Defl Ratio	

Shear Stud Requirements

From Support 1 to 7.00 ft use 13 studs.
From 7.00 ft to Support 2 use 13 studs.

Maximum Forces & Stresses for Load Combin

Load Comb & Design Length	Span #	Max Stress Ratios	Bending Summary	Shear Summary
		M V	Ma MaxMn / Omega	Va Vn / Omega
Overall Maximums				
Span L = 14.1 ft	1	0.175 0.132	39.99 228.98	11.34 86.01
+1.40D+1.60H				
Span L = 14.1 ft	1	0.135 0.102	30.93 228.98	8.77 86.01

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Composite Steel Beam

Project File: huber & khomiak residence_backup_2.ec6

LIC#: KW-06013533, Build:20.22.12.28

THM Structural Consulting

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DESCRIPTION: SB-12A

Load Comb & Design Length	Span #	Max Stress Ratios		Bending Summary		Shear Summary	
		M	V	Ma	MaxMn / Omega	Va	Vn / Omega
+1.20D+0.50Lr+1.60L+1.60H							
Span L = 14.1 ft	1	0.175	0.132	39.99	228.98	11.34	86.01
+1.20D+1.60L+0.50S+1.60H							
Span L = 14.1 ft	1	0.175	0.132	39.99	228.98	11.34	86.01
+1.20D+1.60Lr+L+1.60H							
Span L = 14.1 ft	1	0.153	0.115	34.93	228.98	9.91	86.01
+1.20D+1.60Lr+0.50W+1.60H							
Span L = 14.1 ft	1	0.116	0.087	26.51	228.98	7.52	86.01
+1.20D+L+1.60S+1.60H							
Span L = 14.1 ft	1	0.153	0.115	34.93	228.98	9.91	86.01
+1.20D+1.60S+0.50W+1.60H							
Span L = 14.1 ft	1	0.116	0.087	26.51	228.98	7.52	86.01
+1.20D+0.50Lr+L+W+1.60H							
Span L = 14.1 ft	1	0.153	0.115	34.93	228.98	9.91	86.01
+1.20D+L+0.50S+W+1.60H							
Span L = 14.1 ft	1	0.153	0.115	34.93	228.98	9.91	86.01
+0.90D+W+1.60H							
Span L = 14.1 ft	1	0.087	0.066	19.88	228.98	5.64	86.01
+1.20D+L+0.20S+E+1.60H							
Span L = 14.1 ft	1	0.153	0.115	34.93	228.98	9.91	86.01
+0.90D+E+0.90H							
Span L = 14.1 ft	1	0.087	0.066	19.88	228.98	5.64	86.01

Maximum Deflections for Load Combinations

Load Combination	Span	Deflection	Location in Span	Moment of Inertia				
				Ixx - Used	I-Steel	I-Trans	I per C-I3-1	I per C-I3-2
+D+H	Downward	1	0.0593	7.097	464.681	0.000	0.000	0.000
+D+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+D+L+H	Downward	1	0.0819	7.097	464.681	0.000	0.000	0.000
+D+L+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+D+Lr+H	Downward	1	0.0593	7.097	464.681	0.000	0.000	0.000
+D+Lr+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+D+S+H	Downward	1	0.0593	7.097	464.681	0.000	0.000	0.000
+D+S+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+D+0.750Lr+0.750L+H	Downward	1	0.0763	7.097	464.681	0.000	0.000	0.000
+D+0.750Lr+0.750L+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+D+0.750L+0.750S+H	Downward	1	0.0763	7.097	464.681	0.000	0.000	0.000
+D+0.750L+0.750S+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+D+0.60W+H	Downward	1	0.0593	7.097	464.681	0.000	0.000	0.000
+D+0.60W+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+D+0.750Lr+0.750L+0.450W+H	Downward	1	0.0763	7.097	464.681	0.000	0.000	0.000
+D+0.750Lr+0.750L+0.450W+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+D+0.750L+0.750S+0.450W+H	Downward	1	0.0763	7.097	464.681	0.000	0.000	0.000
+D+0.750L+0.750S+0.450W+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+0.60D+0.60W+0.60H	Downward	1	0.0356	7.097	464.681	0.000	0.000	0.000
+0.60D+0.60W+0.60H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+D+0.70E+0.60H	Downward	1	0.0593	7.097	464.681	0.000	0.000	0.000
+D+0.70E+0.60H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+D+0.750L+0.750S+0.5250E+H	Downward	1	0.0763	7.097	464.681	0.000	0.000	0.000
+D+0.750L+0.750S+0.5250E+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
+0.60D+0.70E+H	Downward	1	0.0356	7.097	464.681	0.000	0.000	0.000
+0.60D+0.70E+H	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
D Only	Downward	1	0.0593	7.097	464.681	0.000	0.000	0.000
D Only	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
Lr Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
Lr Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
L Only	Downward	1	0.0226	7.097	464.681	0.000	0.000	0.000
L Only	Upward	1	0.0000	0.000	464.681	0.000	0.000	0.000
S Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
S Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
W Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
W Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
E Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
E Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000
H Only	Downward	1	0.0000	0.000	0.000	0.000	0.000	0.000
H Only	Upward	1	0.0000	0.000	0.000	0.000	0.000	0.000

Project Title:
 Engineer:
 Project ID:
 Project Descr:

Composite Steel Beam

Project File: huber & khomiak residence_backup_2.ec6

LIC# : KW-06013533, Build:20.22.12.28

THM Structural Consulting

(c) ENERCALC INC 1983-2022

DESCRIPTION: SB-12A

Maximum Vertical Reactions

Support notation : Far left is #

Load Combination	Support 1	Support 2
Overall MAXimum111	8.657	8.657
+D+H	6.267	6.267
+D+L+H	8.657	8.657
+D+Lr+H	6.267	6.267
+D+S+H	6.267	6.267
+D+0.750Lr+0.750L+H	8.060	8.060
+D+0.750L+0.750S+H	8.060	8.060
+D+0.60W+H	6.267	6.267
+D+0.750Lr+0.750L+0.450W+H	8.060	8.060
+D+0.750L+0.750S+0.450W+H	8.060	8.060
+0.60D+0.60W+0.60H	3.760	3.760
+D+0.70E+0.60H	6.267	6.267
+D+0.750L+0.750S+0.5250E+H	8.060	8.060
+0.60D+0.70E+H	3.760	3.760
D Only	6.267	6.267
Lr Only		
L Only	2.390	2.390
S Only		
W Only		
E Only		
H Only		

Steel Section Properties W12x19

Depth	=	12.200 in	I xx	=	130.00 in^4	I yy	=	3.760 in^4
Web Thick	=	0.235 in	S xx	=	21.30 in^3	S yy	=	1.880 in^3
Flange Width	=	4.010 in	R xx	=	4.820 in	R yy	=	0.822 in
Flange Thick	=	0.350 in	Zx	=	24.700 in^3	Zy	=	2.980 in^3
Area	=	5.570 in^2	J	=	0.180 in^4			
Weight	=	19.000 plf						

Composite Section Properties

Span Number	Plastic N. A. Location	Analysis Type	% Shear Connection	Plastic N.A. from Bottom	Sum Qn Shear (k)	# Studs per 1/2 Span	Mn - Capacity k-ft	Moment of Inertia		
								I-Steel	I-Trans	I-Lwr Bound
	PNA in Slab		100.0	12.200	278.500	13	254.42	130.0	594.1	464.7
	PNA in Flange		95.0	12.165	264.575	13	254.42	130.0	594.1	459.5
	PNA in Flange		90.0	12.131	250.650	12	254.42	130.0	594.1	453.7
	PNA in Flange		85.0	12.096	236.725	11	253.56	130.0	594.1	447.2
	PNA in Flange		80.0	12.061	222.800	11	246.87	130.0	594.1	440.0
	PNA in Flange		75.0	12.026	208.875	10	240.15	130.0	594.1	431.9
	PNA in Flange		70.0	11.992	194.950	10	233.38	130.0	594.1	423.0
	PNA in Flange		65.0	11.957	181.025	9	226.59	130.0	594.1	413.2
	PNA in Flange		60.0	11.922	167.100	8	219.75	130.0	594.1	402.3
	PNA in Flange		55.0	11.887	153.175	8	212.88	130.0	594.1	390.2
	PNA in Flange		50.0	11.853	139.250	7	205.97	130.0	594.1	376.9
	PNA in Web		45.0	11.304	125.325	6	196.86	130.0	594.1	362.1
	PNA in Web		40.0	10.712	111.400	6	189.04	130.0	594.1	345.8
	PNA in Web		35.0	10.119	97.475	5	180.53	130.0	594.1	327.7
	PNA in Web		30.0	9.527	83.550	4	171.33	130.0	594.1	307.7
	PNA in Web		25.0	8.934	69.625	4	161.44	130.0	594.1	285.5

Span 1