FOCUS
ENGINEERING & SURVEYING, LLC

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November 6, 2023

Millcreek City Building Department
Millcreek City Building Inspector

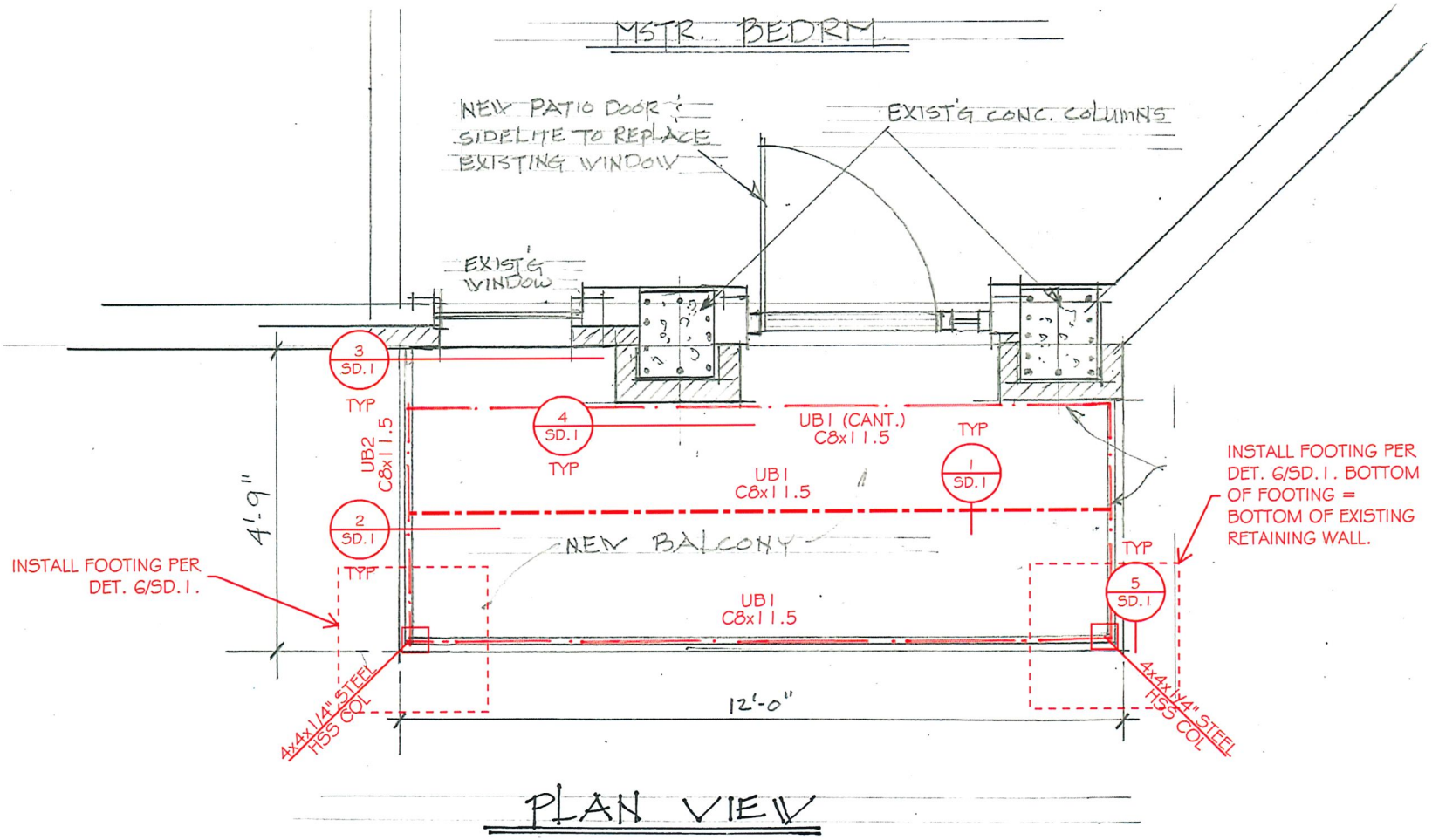
Re: Fregley Balcony 3712 S. Choke Cherry Dr., Salt Lake City, UT 84109

Focus Engineering was contacted to provide engineering for a balcony at the above residence. Figure 1 and the attached details show the framing requirements for the new balcony. See attached calculations for additional information or clarification.

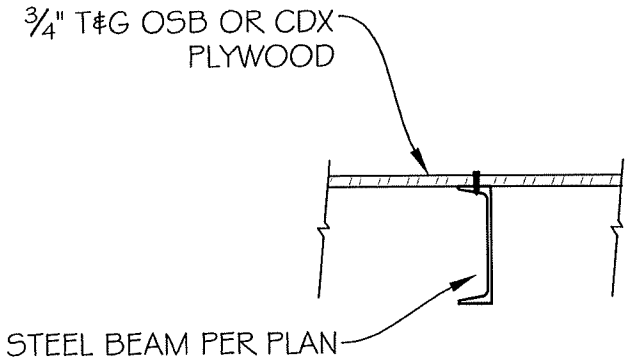
Please call if you have any questions or concerns.

Sincerely,

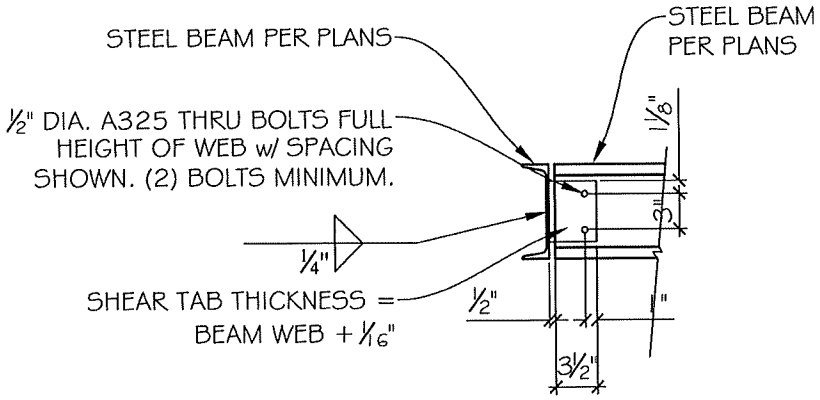
Michael J. Ekenstam, P.E.
Project Engineer
Focus Engineering & Surveying, LLC


MSTR. BEDRM.
NEW PATIO DOOR & SIDELITE TO REPLACE EXISTING WINDOW
EXIST'G CONC. COLUMNS
EXIST'G WINDOW
3 SD.1 TYP
4 SD.1 TYP
UB1 (CANT.) C8x11.5
TYP
1 SD.1
UB2 C8x11.5
UB1 C8x11.5
2 SD.1 TYP
NEW BALCONY
INSTALL FOOTING PER DET. 6/SD.1.
INSTALL FOOTING PER DET. 6/SD.1. BOTTOM OF FOOTING = BOTTOM OF EXISTING RETAINING WALL.
TYP
5 SD.1
UB1 C8x11.5
4'-9"
12'-0"
4x4x1/4" STEEL HSS COL
4x4x1/4" STEEL HSS COL

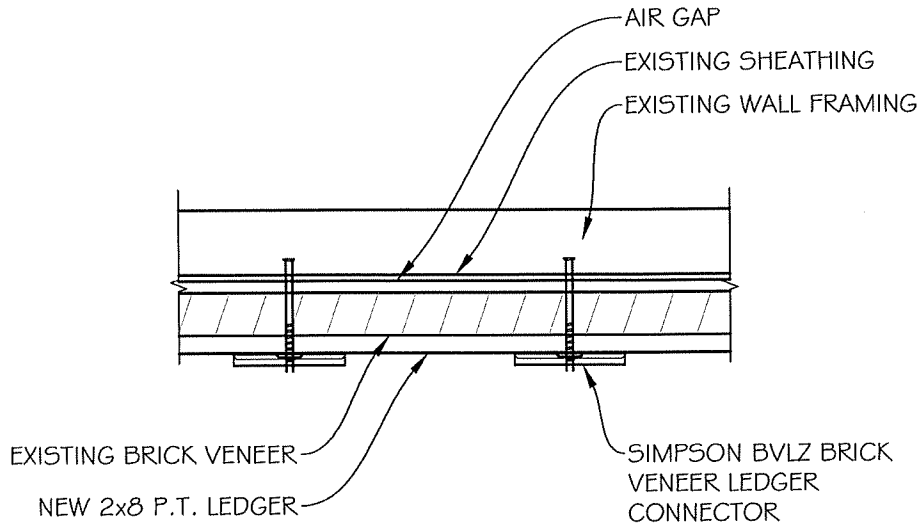
PLAN VIEW



1 FLOOR SHEATHING TO CHANNEL

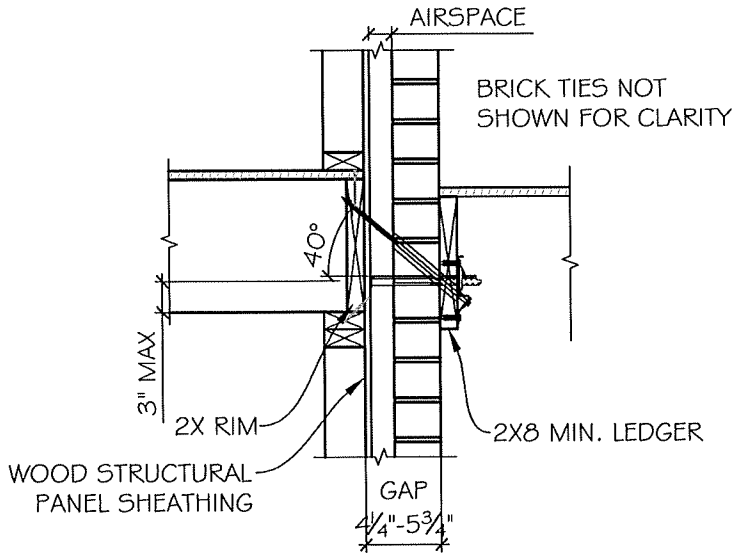


2 STEEL CHANNEL TO STEEL CHANNEL



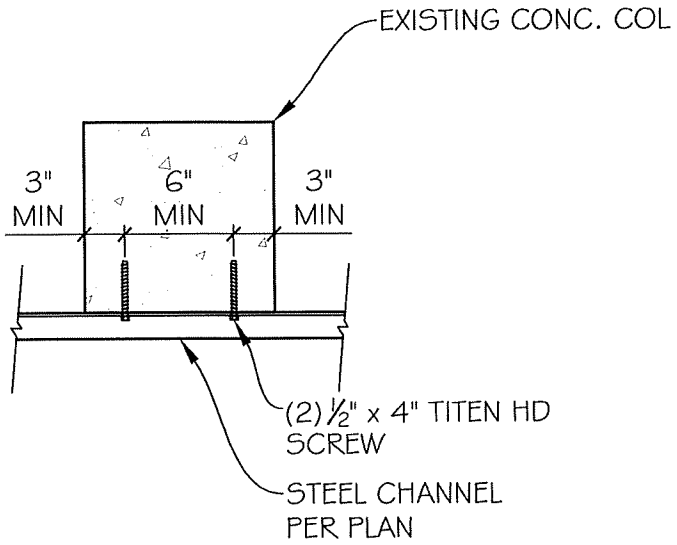
PLAN VIEW

N

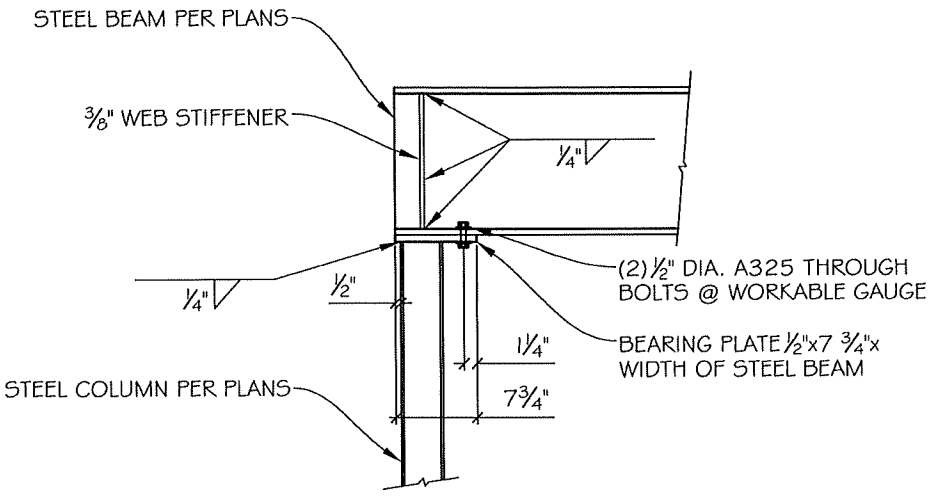


3 LEDGER TO EXISTING WALL

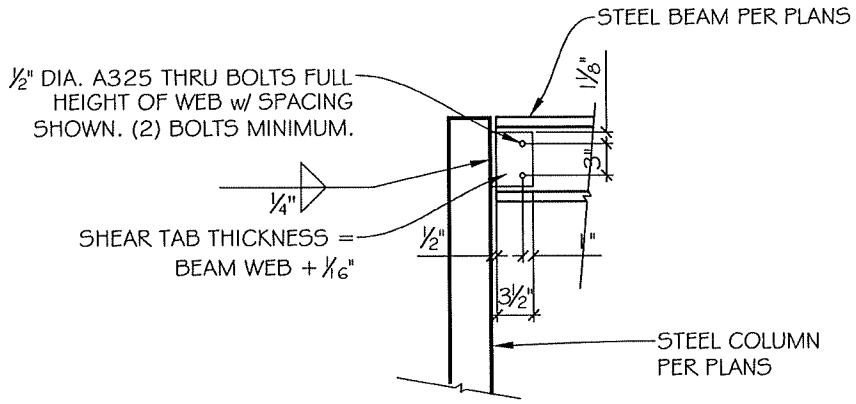
NOTE: REMOVE EXISTING BRICK VENEER BEFORE INSTALLING CHANNEL



4 STEEL CHANNEL TO EXISTING CONCRETE COL

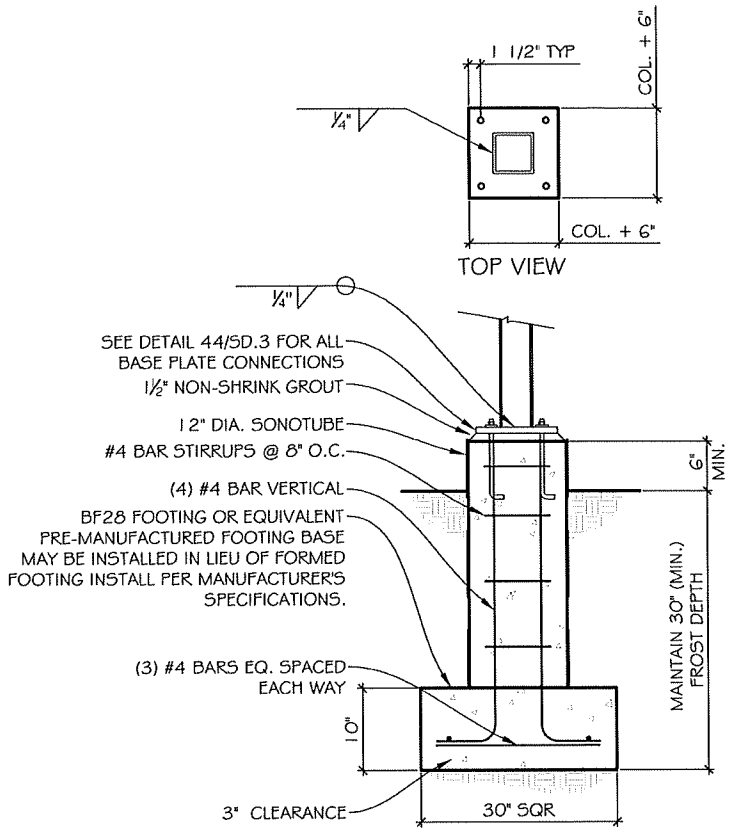


OPTION 1



OPTION 2

5 STEEL BEAM TO STEEL COLUMN



6 TYP. PIER FOUNDATION

BASE PLATE NOTES:

1. INSTALL WITH 3/4" DIA. ANCHOR BOLTS W/ 3" MIN HOOKS (OR MECHANICAL BOLTS, SAME DIAMETER). FOR CAST-IN-PLACE BOLTS, PROJECT BOLTS 3" MIN. ABOVE THE TOP OF THE BASE PLATE. EMBEDMENT SHALL BE 9" MINIMUM (6" FOR MECHANICAL ANCHORS). ALL BOLTS SHALL BE INSTALLED WITH HARDENED WASHERS BENEATH THE NUT.
2. ANCHOR BOLTS SHALL NOT BE WELDED (INCLUDING TACK WELDS).
3. BASE PLATE THICKNESS TO BE 3/4" THICK.
4. IF BASEPLATE BEARS OVER FOOTING, EXTEND BOLT TO BE EMBEDDED 4" MIN. IN FOOTING

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 23-7199 Fregley Balcony.ec6

DESCRIPTION: UB1

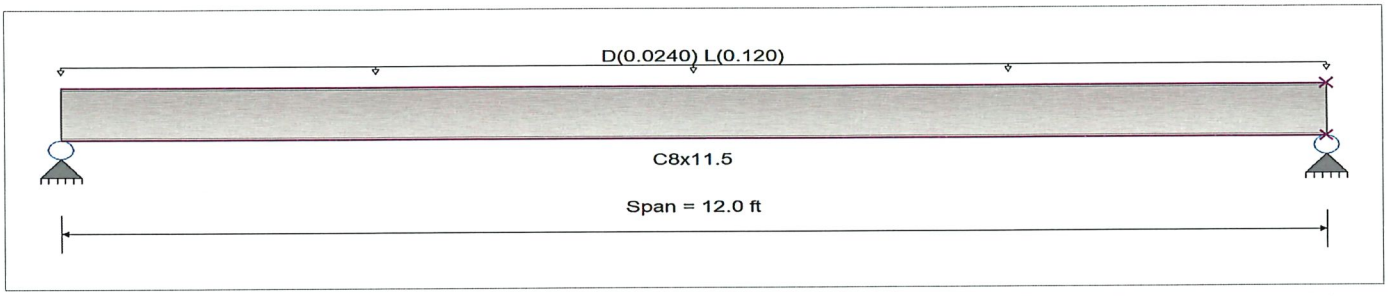
CODE REFERENCES

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 : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading
Uniform Load : D = 0.0120, L = 0.060 ksf, Tributary Width = 2.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.162 : 1	Maximum Shear Stress Ratio =	0.041 : 1
Section used for this span	C8x11.5	Section used for this span	C8x11.5
Ma : Applied	2.799 k-ft	Va : Applied	0.9330 k
Mn / Omega : Allowable	17.299 k-ft	Vn/Omega : Allowable	22.764 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	0.060 in	Ratio =	2,413	>=480.	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<480.0	n/a
Max Downward Total Deflection	0.077 in	Ratio =	1862	>=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 / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx Mnx/Omega Cb	Rm	Summary of Shear Values Va Max	VnxVnx/Omega
D Only										
Dsgn. L = 12.00 ft	1	0.037	0.009	0.64		0.64	28.89 17.30	1.00 1.00	0.21	38.02 22.76
+D+L										
Dsgn. L = 12.00 ft	1	0.162	0.041	2.80		2.80	28.89 17.30	1.00 1.00	0.93	38.02 22.76
+D+0.750L										
Dsgn. L = 12.00 ft	1	0.131	0.033	2.26		2.26	28.89 17.30	1.00 1.00	0.75	38.02 22.76
+0.60D										
Dsgn. L = 12.00 ft	1	0.022	0.006	0.38		0.38	28.89 17.30	1.00 1.00	0.13	38.02 22.76

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0773	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	0.933	0.933
Max Upward from Load Combinations	0.933	0.933
Max Upward from Load Cases	0.720	0.720
D Only	0.213	0.213
+D+L	0.933	0.933
+D+0.750L	0.753	0.753
+0.60D	0.128	0.128

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 23-7199 Fregley Balcony.ec6

DESCRIPTION: UB1

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
L Only	0.720	0.720

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 23-7199 Fregley Balcony.ec6

DESCRIPTION: UB1 CHECK

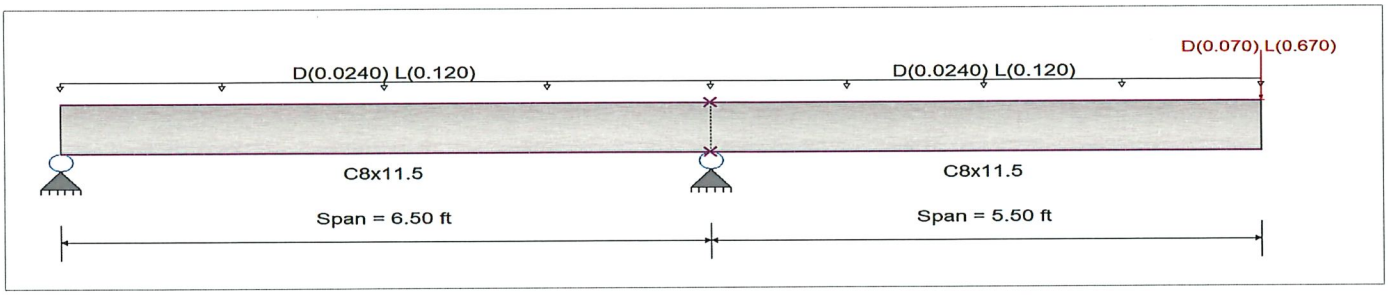
CODE REFERENCES

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 : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E: Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations

Beam self weight calculated and added to loading
Load for Span Number 1
Uniform Load : D = 0.0120, L = 0.060 ksf, Tributary Width = 2.0 ft

Load for Span Number 2
Uniform Load : D = 0.0120, L = 0.060 ksf, Tributary Width = 2.0 ft

Point Load : D = 0.070, L = 0.670 k @ 5.50 ft, (UB2)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.371** : 1	Maximum Shear Stress Ratio =	**0.070** : 1
Section used for this span	**C8x11.5**	Section used for this span	**C8x11.5**
Ma : Applied	6.422 k-ft	Va : Applied	1.595 k
Mn / Omega : Allowable	17.299 k-ft	Vn/Omega : Allowable	22.764 k
Load Combination	+D+L	Load Combination	+D+L
		Location of maximum on span	6.500 ft
Span # where maximum occurs	Span # 1	Span # where maximum occurs	Span # 1

Maximum Deflection

Max Downward Transient Deflection	0.199 in	Ratio =	662	>=480.	Span: 2 : L Only
Max Upward Transient Deflection	-0.023 in	Ratio =	3,465	>=480.	Span: 2 : L Only
Max Downward Total Deflection	0.230 in	Ratio =	574	>=240.	Span: 2 : +D+L
Max Upward Total Deflection	-0.026 in	Ratio =	3041	>=240.	Span: 2 : +D+L

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	VnxVnx/Omega
D Only												
Dsgn. L = 6.50 ft	1	0.053	0.012		-0.92	0.92	28.89	17.30	1.00	1.00	0.27	38.02	22.76
Dsgn. L = 5.50 ft	2	0.053	0.012		-0.92	0.92	28.89	17.30	1.00	1.00	0.27	38.02	22.76
+D+L												
Dsgn. L = 6.50 ft	1	0.371	0.070		-6.42	6.42	28.89	17.30	1.00	1.00	1.60	38.02	22.76
Dsgn. L = 5.50 ft	2	0.371	0.070		-6.42	6.42	28.89	17.30	1.00	1.00	1.60	38.02	22.76
+D+0.750L												
Dsgn. L = 6.50 ft	1	0.292	0.055		-5.05	5.05	28.89	17.30	1.00	1.00	1.26	38.02	22.76
Dsgn. L = 5.50 ft	2	0.292	0.055		-5.05	5.05	28.89	17.30	1.00	1.00	1.26	38.02	22.76
+0.60D												
Dsgn. L = 6.50 ft	1	0.032	0.007		-0.55	0.55	28.89	17.30	1.00	1.00	0.16	38.02	22.76
Dsgn. L = 5.50 ft	2	0.032	0.007		-0.55	0.55	28.89	17.30	1.00	1.00	0.16	38.02	22.76

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 23-7199 Fregley Balcony.ec6

DESCRIPTION: UB1 CHECK

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+L	-0.0257	3.900
+D+L	2	0.2299	5.500		0.0000	3.900

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		3.089	
Max Upward from Load Combinations		3.089	
Max Upward from Load Cases		2.566	
Max Downward from all Load Conditions (Resi	-0.483		
Max Downward from Load Combinations (Resi	-0.483		
Max Downward from Load Cases (Resisting U	-0.456		
D Only	-0.026	0.522	
+D+L	-0.483	3.089	
+D+0.750L	-0.369	2.447	
+0.60D	-0.016	0.313	
L Only	-0.456	2.566	

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 23-7199 Fregley Balcony.ec6

DESCRIPTION: UB2

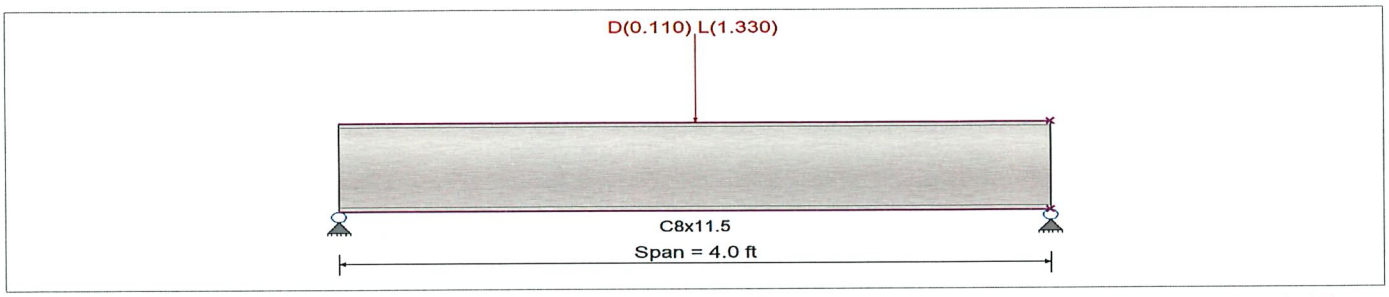
CODE REFERENCES

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 : Beam is Fully Braced against lateral-torsional buckling
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
Load(s) for Span Number 1
Point Load : D = 0.110, L = 1.330 k @ 2.0 ft, (UB1)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.061 : 1	Maximum Shear Stress Ratio =	0.024 : 1
Section used for this span	C8x11.5	Section used for this span	C8x11.5
Ma : Applied	1.463 k-ft	Va : Applied	0.7430 k
Mn / Omega : Allowable	24.027 k-ft	Vn/Omega : Allowable	31.617 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	0.003 in	Ratio =	14,700	>=480.	Span: 1 : L Only
Max Upward Transient Deflection	0 in	Ratio =	0	<480.0	n/a
Max Downward Total Deflection	0.004 in	Ratio =	13312	>=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 / Segment Length	Span #	Max Stress Ratios M	V	Summary of Moment Values Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Summary of Shear Values Va Max	VnxVnx/Omega	
D Only													
Dsgn. L = 4.00 ft	1	0.006	0.002	0.13		0.13	40.13	24.03	1.00	1.00	0.08	52.80	31.62
+D+L													
Dsgn. L = 4.00 ft	1	0.061	0.024	1.46		1.46	40.13	24.03	1.00	1.00	0.74	52.80	31.62
+D+0.750L													
Dsgn. L = 4.00 ft	1	0.047	0.018	1.13		1.13	40.13	24.03	1.00	1.00	0.58	52.80	31.62
+0.60D													
Dsgn. L = 4.00 ft	1	0.003	0.001	0.08		0.08	40.13	24.03	1.00	1.00	0.05	52.80	31.62

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+L	1	0.0036	2.011		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	0.743	0.743
Max Upward from Load Combinations	0.743	0.743
Max Upward from Load Cases	0.665	0.665
D Only	0.078	0.078
+D+L	0.743	0.743
+D+0.750L	0.577	0.577

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Beam

Project File: 23-7199 Fregley Balcony.ec6

DESCRIPTION: UB2

Vertical Reactions

Support notation : Far left is #1 Values in KIPS

Load Combination	Support 1	Support 2
+0.60D	0.047	0.047
L Only	0.665	0.665

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

Project File: 23-7199 Fregley Balcony.ec6

DESCRIPTION: Steel Col

Code References

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

General Information

Steel Section Name : **HSS4x4x1/4**

Analysis Method :	Allowable Strength
Steel Stress Grade	
Fy : Steel Yield	46.0 ksi
E : Elastic Bending Modulus	29,000.0 ksi

Overall Column Height	22 ft
Top & Bottom Fixity	Top & Bottom Pinned
Brace condition :	

Unbraced Length for buckling ABOUT X-X Axis = 22 ft, K = 1.0
Unbraced Length for buckling ABOUT Y-Y Axis = 22 ft, K = 1.0

Applied Loads

Service loads entered. Load Factors will be applied for calculations

Column self weight included : 268.620 lbs * Dead Load Factor
AXIAL LOADS . . .
Axial Load at 22.0 ft, Xecc = 5.0 in, Yecc = 5.0 in, D = 0.110, L = 1.330 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.1623** : 1

Load Combination	+D+L
Location of max.above base	22.0 ft
At maximum location values are . . .	
Pa : Axial	1.709 k
Pn / Omega : Allowabl	16.792 k
Ma-x : Applied	-0.60 k-ft
Mn-x / Omega : Allowable	10.765 k-ft
Ma-y : Applied	-0.60 k-ft
Mn-y / Omega : Allowable	10.765 k-ft

PASS Maximum Shear Stress Rati **0.001073** : 1

Load Combination	+D+L
Location of max.above base	0.0 ft
At maximum location values are . . .	
Va : Applied	0.02727 k
Vn / Omega : Allowable	25.423 k

Maximum Load Reactions . .

Top along X-X	0.02727 k
Bottom along X-X	0.02727 k
Top along Y-Y	0.02727 k
Bottom along Y-Y	0.02727 k

Maximum Load Deflections . . .

Along Y-Y -0.1436 in at 12.846 ft above base
for load combination :+D+L

Along X-X -0.1436 in at 12.846 ft above base
for load combination :+D+L

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios: Stress Ratio	Status	Location	Cbx	Cby	KxLx/Ry	KyLy/Rx	Maximum Shear Ratios: Stress Ratio	Status	Location
D Only	0.023	PASS	0.00 ft	1.66	1.66	173.68	173.68	0.000	PASS	0.00 ft
+D+L	0.162	PASS	22.00 ft	1.66	1.66	173.68	173.68	0.001	PASS	0.00 ft
+D+0.750L	0.127	PASS	22.00 ft	1.66	1.66	173.68	173.68	0.001	PASS	0.00 ft
+0.60D	0.014	PASS	0.00 ft	1.66	1.66	173.68	173.68	0.000	PASS	0.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments k-ft @ Base	Mx - End Moments k-ft @ Top	My - End Moments @ Base	My - End Moments @ Top
D Only	0.379	0.002	0.002	-0.002	0.002				
+D+L	1.709	0.027	0.027	-0.027	0.027				
+D+0.750L	1.376	0.021	0.021	-0.021	0.021				
+0.60D	0.227	0.001	0.001	-0.001	0.001				
L Only	1.330	0.025	0.025	-0.025	0.025				

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base	X-X Axis Reaction @ Top	Y-Y Axis Reaction @ Base	Y-Y Axis Reaction @ Top	Mx - End Moments k-ft @ Base	Mx - End Moments k-ft @ Top	My - End Moments @ Base	My - End Moments @ Top
Axial @ Base	Maximum	1.709	0.027	0.027	-0.027	0.027		-0.600		-0.600
"	Minimum	0.227	0.001	0.001	-0.001	0.001		-0.028		-0.028
Reaction, X-X Axis Base	Maximum	1.709	0.027	0.027	-0.027	0.027		-0.600		-0.600
"	Minimum	0.227	0.001	0.001	-0.001	0.001		-0.028		-0.028

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

Project File: 23-7199 Fregley Balcony.ec6

DESCRIPTION: Steel Col

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base k	X-X Axis Reaction @ Base k	X-X Axis Reaction @ Top k	Y-Y Axis Reaction @ Base k	Y-Y Axis Reaction @ Top k	Mx - End Moments @ Base k-ft	Mx - End Moments @ Top k-ft	My - End Moments @ Base k-ft	My - End Moments @ Top k-ft
Reaction, Y-Y Axis Base	Maximum	0.227	0.001	0.001	-0.001	0.001		-0.028		-0.028
"	Minimum	1.709	0.027	0.027	-0.027	0.027		-0.600		-0.600
Reaction, X-X Axis Top	Maximum	1.709	0.027	0.027	-0.027	0.027		-0.600		-0.600
"	Minimum	0.227	0.001	0.001	-0.001	0.001		-0.028		-0.028
Reaction, Y-Y Axis Top	Maximum	1.709	0.027	0.027	-0.027	0.027		-0.600		-0.600
"	Minimum	0.227	0.001	0.001	-0.001	0.001		-0.028		-0.028
Moment, X-X Axis Base	Maximum	0.379		0.002	-0.002	0.002		-0.046		-0.046
"	Minimum	0.379		0.002	-0.002	0.002		-0.046		-0.046
Moment, Y-Y Axis Base	Maximum	0.379	0.002	0.002	-0.002	0.002		-0.046		-0.046
"	Minimum	0.379	0.002	0.002	-0.002	0.002		-0.046		-0.046
Moment, X-X Axis Top	Maximum	0.227	0.001	0.001	-0.001	0.001		-0.028		-0.028
"	Minimum	1.709	0.027	0.027	-0.027	0.027		-0.600		-0.600
Moment, Y-Y Axis Top	Maximum	0.227	0.001	0.001	-0.001	0.001		-0.028		-0.028
"	Minimum	1.709	0.027	0.027	-0.027	0.027		-0.600		-0.600

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	-0.0110 in	12.846 ft	-0.011 in	12.846 ft
+D+L	-0.1435 in	12.846 ft	-0.144 in	12.846 ft
+D+0.750L	-0.1104 in	12.846 ft	-0.110 in	12.846 ft
+0.60D	-0.0066 in	12.846 ft	-0.007 in	12.846 ft
L Only	-0.1326 in	12.846 ft	-0.133 in	12.846 ft

Steel Section Properties : HSS4x4x1/4

Depth	=	4.000 in	I xx	=	7.80 in^4	J	=	12.800 in^4
Design Thick	=	0.233 in	S xx	=	3.90 in^3			
Width	=	4.000 in	R xx	=	1.520 in			
Wall Thick	=	0.250 in	Zx	=	4.690 in^3			
Area	=	3.370 in^2	I yy	=	7.800 in^4	C	=	6.560 in^3
Weight	=	12.210 plf	S yy	=	3.900 in^3			
			R yy	=	1.520 in			
Ycg	=	0.000 in						

Project Title:
Engineer:
Project ID:
Project Descr:

Steel Column

Project File: 23-7199 Fregley Balcony.ec6

DESCRIPTION: Steel Col

Sketches