

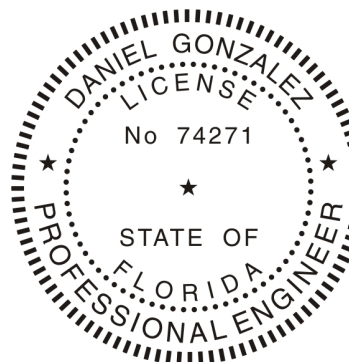


AM American Consulting, Inc.
P.O.BOX 960661 Miami, FL 33296
Ph: (786) 219 9490
www.amamericanconsulting.com

10635 SW 63 AVE RESIDENCE MIAMI, FLORIDA

WINDOWS & DOORS CALCULATIONS

SHOP DRAWING/ SUBMITTAL REVIEW	
☒	REVIEWED NO EXCEPTIONS TAKEN
☐	REVIEWED WITH CHANGES NOTED
SUBMITTAL WAS REVIEWED FOR DESIGN CONFORMITY AND GENERAL CONFORMANCE TO CONTRACT DOCUMENTS ONLY.	
SUBMITTAL NO.:	_____
REVIEWED BY:	_____ DATE: 8.7.26
	
BALLI-TRAUTMAN ARCHITECTS LLC David Scott Trautman, AIA, RA, LEED AP	



Digitally signed
by Daniel
Gonzalez
Date:
2026.08.11
17:27:55-04'00'

Daniel Gonzalez, PE
Lic. No. 74271
CA# 31388

This item has been digitally signed & sealed by Daniel Gonzalez, PE 74271. Printed copies of this document are not considered signed & sealed, and the signature must be verified on any electronic copies.

Design Criteria

- Calculations based on the 2023 Florida Building Code.
- Design pressures based on Structural Plans S400 & S401.
- All fasteners and anchors to be coated or stainless steel.
- Glass to be: Laminated Glass as per ASTM standards.

Note: Calculations based on shop drawings sealed on 04-2026. Dimensional variation of +/- 1" Ok by inspection. Any deviation from conditions shown on calculations or shop drawings to be engineered separately.

WIND PRESSURES



RESIDENCE:
GS JPD 10635
LLC

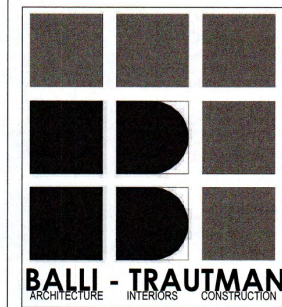
10635 SW 63 AV
MIAMI, FL

SEAL

BALLI-TRAUTMAN ARCHITECTS LLC -AA26002968
GIORGIO LUIGI BALLI -AR13951
DAVID SCOTT TRAUTMAN -AR15045

REVISIONS		
NO.	DESC	DATE

SCHEMATIC SET



JOB NUMBER:
CHECKED BY: GB
ISSUE DATE: 11/11/2024
SCALE: AS NOTED

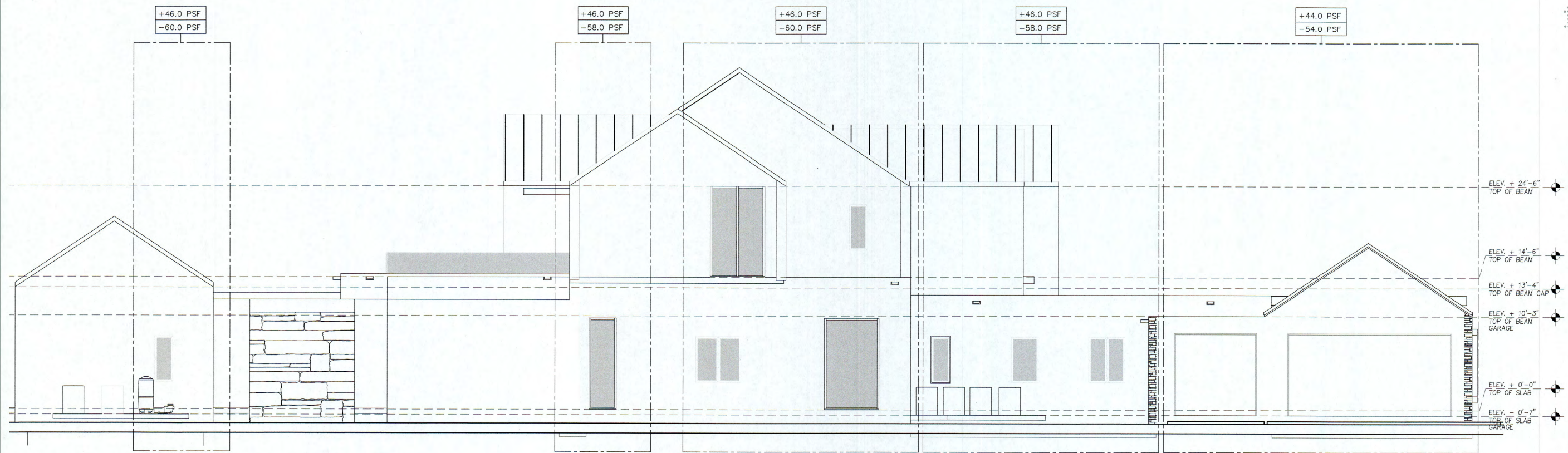
SHEET TITLE

NORTH AND
EAST
ELEVATIONS

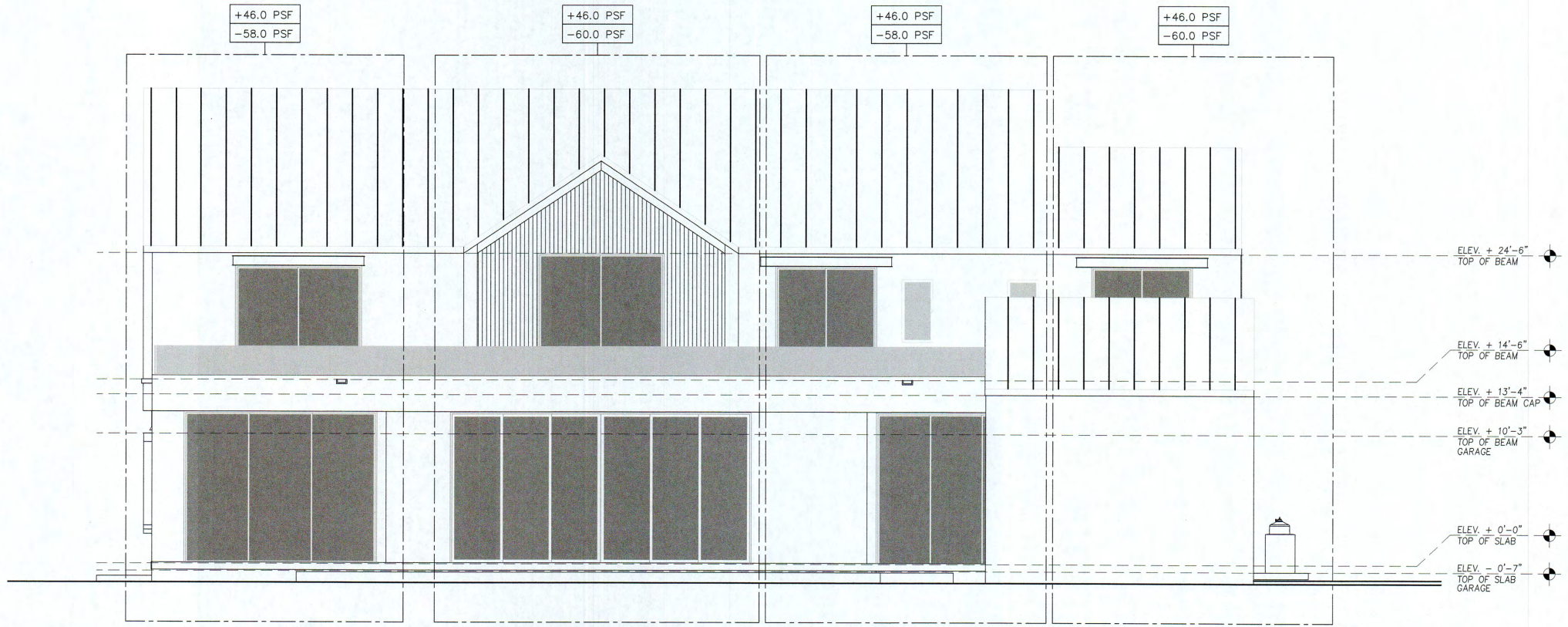
SHEET NUMBER

S400

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1533 SUNSET DRIVE SUITE 101, CORAL GABLES, FL 33143



① North Architectural Building Elevation
3/16" = 1'-0"



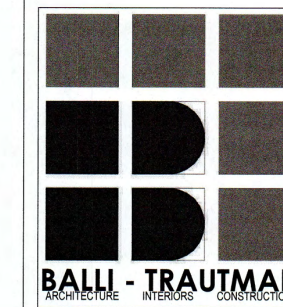
② East Architectural Building Elevation
3/16" = 1'-0"



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REVISIONS		
NO.	DESC	DATE

SCHEMATIC SET



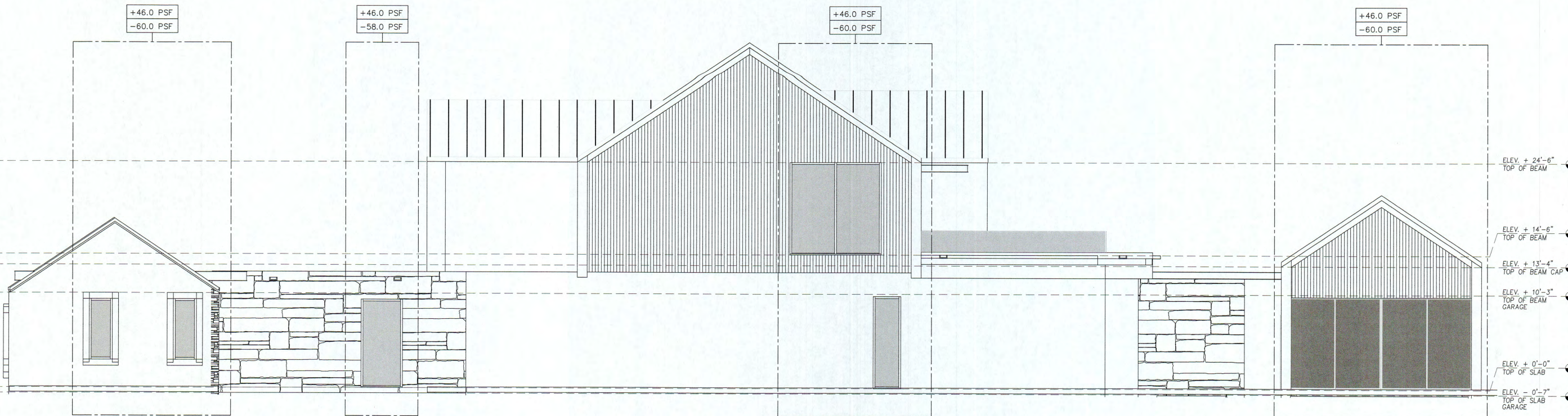
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ISSUE DATE:	11/11/2024
SCALE:	AS NOTED

SHEET TITLE

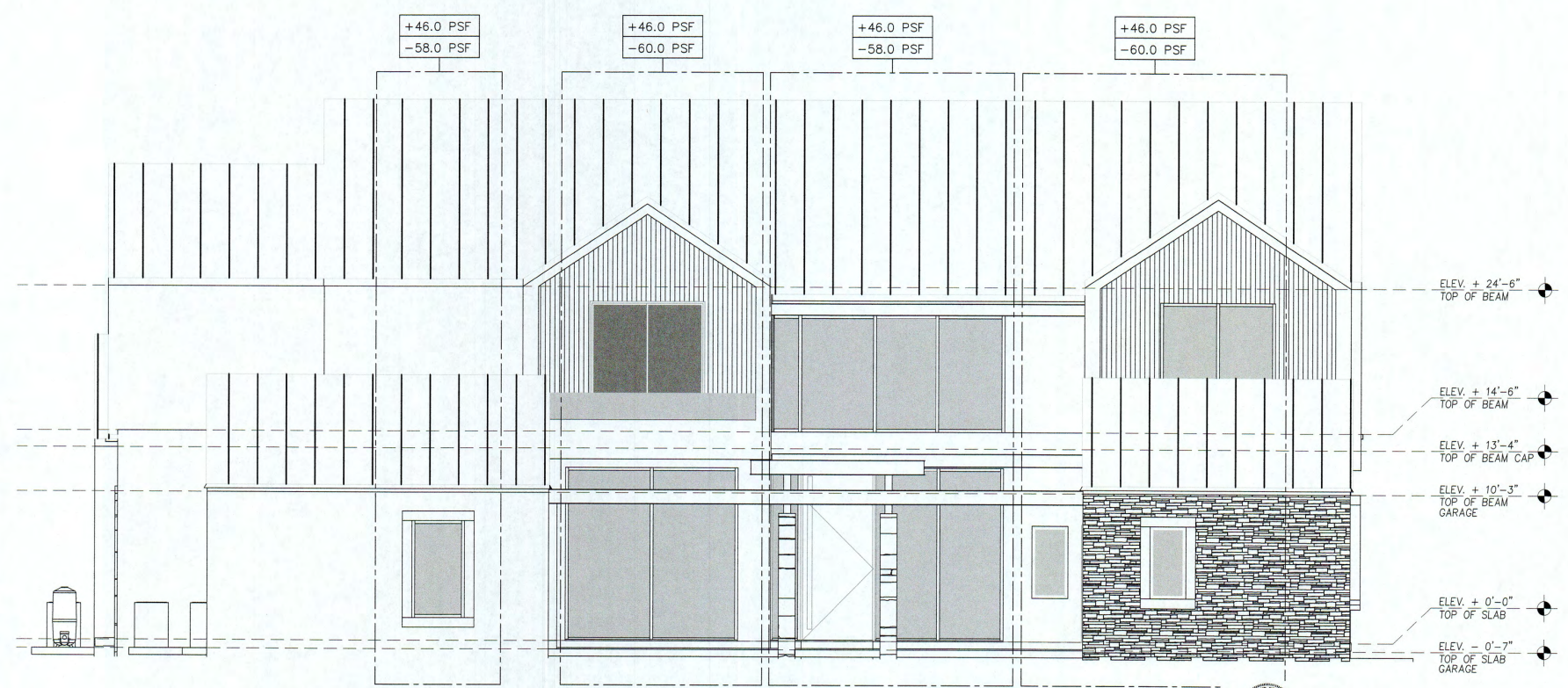
SOUTH AND
WEST
ELEVATIONS

SHEET NUMBER

S401



① South Architectural Building Elevation
3/16" = 1'-0"



② West Architectural Building Elevation
3/16" = 1'-0"

Digitally signed by Zvonimir Belfranin
DN: c=US, o=Zvonimir Belfranin, dnQualifier=A01410D0000017BEE7
6185400015194, cn=Zvonimir Belfranin
Date: 2024.12.02 13:57:16 -05'00'

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ALUMINUM TUBES CALCULATIONS

10635 SW 63 AVE. RESIDENCE
ELEVATIONS ST-01

1)

LOADS FROM SERIES 8000 ANCHORED JAMB	WIND LOAD (PSF)	DISTRIB. LOAD (LBS/FT)	DISTRIB. LOAD (LBS/IN)
	60.00	359	30

CONSERVATIVE

TRIB-FT (HORIZ.)	5.98	(69 3/4 IN + 2 IN) / 12
------------------	------	-------------------------

10635 SW 63 AVE. RESIDENCE

Cbeam 2000

4/24/2026 16:14 File: ST-01.cbm

Frame Check

By: Alex

Beam Results

Max. Span Deflection = 0.7177" (Span 1, @ 71.00")
Max. Negative Moment = -75615"# (Span 1, @ 71.00")

Member Information

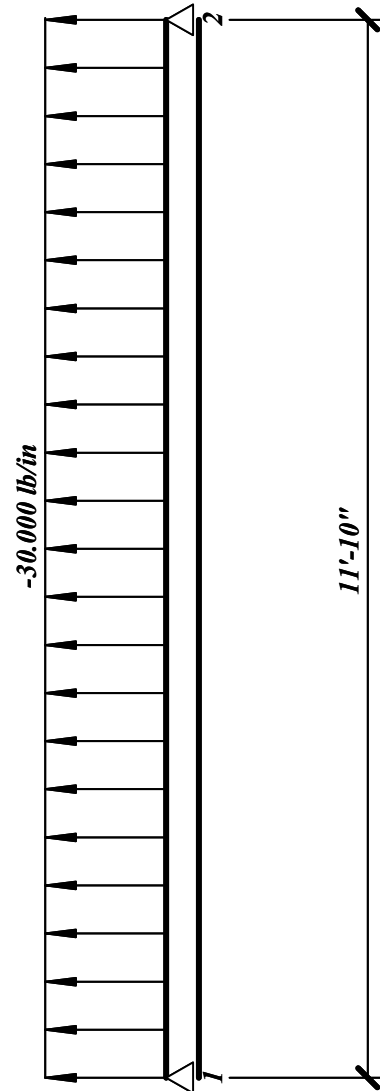
Span	L(in)	I(in^4)	S(in^3)	E(psi)	Reinf-I	Reinf-E
1	142.000	15.200	5.070	1.0e+007	6.930	1.0e+007

Distributed Load Information

Span	W1(#/in)	W2(#/in)	X1(in)	X2(in)
1	-30.000	-30.000	0.000	142.000

Support Reactions

Joint	Pounds
1	-2130
2	-2130



Maximum distributed load value shown only, see distributed load table for detailed information.

10635 SW 63 AVE. RESIDENCE

Cbeam 2000

4/24/2026 16:14 File: ST-01.cbm

Span No. 1

	0.00L	0.10L	0.20L	0.30L	0.40L	0.50L	0.60L	0.70L	0.80L	0.90L	1.00L
Location	0.00	14.20	28.40	42.60	56.80	71.00	85.20	99.40	113.60	127.80	142.00
Shear	-2130.00	-1704.00	-1278.00	-852.00	-426.00	0.00	426.00	852.00	1278.00	1704.00	2130.00
Moment	0.0	-27221.4	-48393.6	-63516.6	-72590.4	-75615.0	-72590.4	-63516.6	-48393.6	-27221.4	0.0
Defl.	0.0000	0.2253	0.4262	0.5836	0.6835	0.7177	0.6835	0.5836	0.4262	0.2253	0.0000
Stress	0.0	-5369.1	-9545.1	-12527.9	-14317.6	-14914.2	-14317.6	-12527.9	-9545.1	-5369.1	0.0

Max. Moment = 75615 lbs-in = 6.30 kip-ft

Max. Shear = 2130 lbs = 2.13 kips

Max. Deflection = 0.717 in < L/180 = 142in/180 = 0.78 in OK!!!

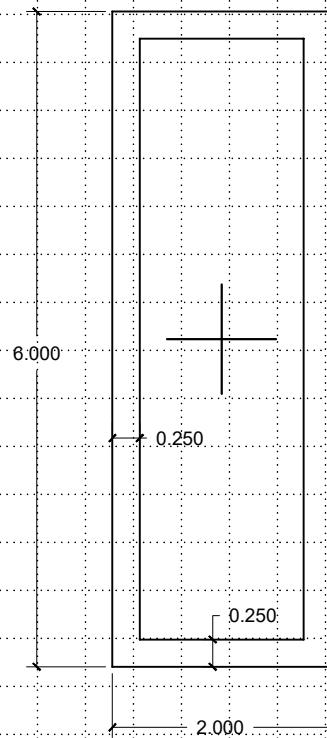
For questions on Cbeam, a Windows-based program, contact:

Architectural Wall Systems, Inc. at

Ph- (972) 552-9336 Fax- (972) 552-9608

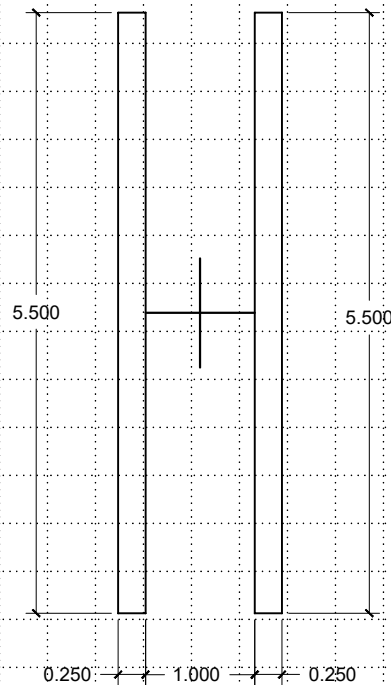
Email: software@arcwallsys.com

VERTICAL MULLION 6"X2"X1/4" ALLOY 6063-T6



Section Properties	
Area-Sq In	3.7500
Perimeter Ins	30.0000
Wt/Ft-Lbs	4.3125
Ix-In4	15.2031
Sx-In3	5.0717
Rx-In	2.0135
Iy-In4	2.4531
Sy-In3	2.4531
Ry-In	0.8088

VERTICAL MULLION ALUM. REINFORCEMENT ALLOY 6063-T6



Section Properties	
Area-Sq In	2.7500
Perimeter Ins	23.0000
Wt/Ft-Lbs	3.1625
Ix-In4	6.9323
Sx-In3	2.5208
Rx-In	1.5877
Iy-In4	1.0885
Sy-In3	1.4513
Ry-In	0.6292

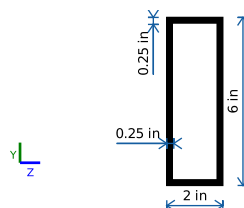
ADM 2020 Aluminum Member Design



Input Summary

Input	Description	Value
<i>Label</i>	Member Label	Member 1
<i>Shape</i>	Shape	Hollow Rectangle
<i>Section</i>	Section	RT 6x2x1/4
<i>Welded</i>	Welded	Not Welded
<i>Alloy</i>	Alloy	6063
<i>Temper</i>	Temper	T6
<i>Product</i>	Product	B241, pipe & tube
<i>B</i>	Width (B) The width of the section.	2 in
<i>D</i>	Depth (D) The depth of the section.	6 in
<i>t_f</i>	Thickness t_f Flange thickness, top/btm wall thickness (Rectangular Hollow Sections).	0.25 in
<i>t_w</i>	Thickness t_w Web thickness, or side wall thickness (Rectangular Hollow Sections) or Hollow Circular Section thickness.	0.25 in
<i>NetAreaFactor</i>	Net Area Factor Reduction factor for the net area of the section (including holes). 100% means the net area is equal to the section's gross area.	100 %
<i>L_b</i>	L_b Length between bending restraints.	142 in
<i>L_z</i>	L_{z.comp} Distance between restraints for compression buckling about the Major Z axis.	142 in
<i>L_y</i>	L_{y.comp} The span of the member, as unbraced length in the Y (minor) direction.	142 in
<i>k_z</i>	k_z Distance between restraints for compression buckling about the Minor Y axis.	1
<i>k_y</i>	k_y Effective length coefficient for buckling about the minor Y axis.	1
<i>C_b</i>	Moment Gradient Factor (C_b) User defined C _b factor, to be calculated to ADM 2020 CI F.4.1.1	1
<i>Method</i>	Design Method ASD - Allowable Stress Design LRFD - Load Resistance Factor Design	ASD
<i>M_{d,z}</i>	Major Bending (M_{d,z}) Moment about major Z-axis. Positive for compression at the top of section.	6.3 kip-ft
<i>M_{d,y}</i>	Minor Bending (M_{d,y}) Moment about minor Y-axis. Positive for compression at right of section.	0 kip-ft
<i>V_{d,y}</i>	Major Shear (V_{d,y}) Shear along major Y-axis.	2.13 kip
<i>V_{d,z}</i>	Minor Shear (V_{d,z}) Shear along minor Z-axis.	0 kip
<i>P_{d,c}</i>	Axial Compression (P_{d,c}) Design axial compression.	0 kip
<i>P_{d,t}</i>	Axial Tension (P_{d,t}) Design axial tension.	0 kip
<i>FlexureMethod</i>	Bending	Weighted Average

Section Profile



Section Properties

Gross Section Area	$A_g = 3.75 \text{ in}^2$
Net Section Area	$A_n = 3.75 \text{ in}^2$
Centroid Z	$C_z = 1 \text{ in}$
Centroid Y	$C_y = 3 \text{ in}$
Moment of Inertia (Z)	$I_z = 15.2 \text{ in}^4$
Moment of Inertia (Y)	$I_y = 2.45 \text{ in}^4$
Elastic Section Modulus (Compression Side, Z)	$S_{z,c} = 5.07 \text{ in}^3$
Elastic Section Modulus (Tension Side, Z)	$S_{z,t} = 5.07 \text{ in}^3$
Elastic Section Modulus (Compression Side, Y)	$S_{y,c} = 2.45 \text{ in}^3$
Elastic Section Modulus (Tension Side, Y)	$S_{y,t} = 2.45 \text{ in}^3$
Plastic Section Modulus (about Z axis)	$Z_z = 6.66 \text{ in}^3$
Plastic Section Modulus (about Y axis)	$Z_y = 2.91 \text{ in}^3$
Radius of Gyration about Z	$r_z = 2.013 \text{ in}$
Radius of Gyration about Y	$r_y = 0.808 \text{ in}$
Torsion Constant	$J = 6.75 \text{ in}^4$

Note: Section properties for standard sections are based on properties from ADM 2015 library. There may be some minor differences in properties compared to ADM 2020.

Material Properties

ADM 2020
Table A.4.1
& Table A.4.3

Material properties imported based on Not Welded 6063 - T6, B241, pipe & tube with material thickness of 0.25 inches.

Tensile Ultimate Strength	$F_{tu} = 30 \text{ ksi}$
Tensile Yield Strength	$F_{ty} = 25 \text{ ksi}$
Compressive Yield Strength	$F_{cy} = 25 \text{ ksi}$
Shear Ultimate Strength	$F_{su} = 18 \text{ ksi}$
Shear Yield Strength	$F_{sy} = 15 \text{ ksi}$
Modulus of Elasticity	$E = 10100 \text{ ksi}$
Coefficient for Tension Members	$k_t = 1$

Buckling Coefficients

ADM 2020 Table B.4.2

Member Buckling

$B_c = 27.635$
$D_c = 0.145$
$C_c = 78.381$

Uniform Compression in Flat Elements

$B_p = 31.386$
$D_p = 0.175$
$C_p = 73.549$

Uniform Compression in Curved Elements

$B_t = 30.467$
$D_t = 0.978$
$C_t = 14.07$

Flexural Compression in Flat Elements

$B_{br} = 46.116$
$D_{br} = 0.382$
$C_{br} = 80.556$

Flexural Compression in Curved Elements

$B_{tb} = 45.7$
$D_{tb} = 2.8$
$C_{tb} = 8.364$

Shear in Flat Elements

$B_s = 18.985$
$D_s = 0.082$

Strength Checks

Axial Tension

ADM 2020 CI D.1

Use the following factors for all tension checks assessed using the ASD method:

Safety Factor (ASD) - Rupture

$$\Omega_{t,r} = 1.95$$

Safety Factor (ASD) - Yielding

$$\Omega_{t,y} = 1.65$$

ADM2020 CI D.2

Check axial tension capacity

Check Yielding

$$P_{nt,y} = \frac{F_{ty}A_g}{\Omega_{t,y}} = 56.818 \text{ kip}$$

Check rupture

$$P_{nt,r} = \frac{F_{tu}A_g}{k_t\Omega_{t,r}} = 57.692 \text{ kip}$$

$$P_t = \min(P_{nt,y}, P_{nt,r}) = 56.818 \text{ kip}$$

$$UR = \frac{P_{dt}}{P_t} = \frac{0}{56.818}$$

UTILITY: 0.00

Axial Compression

ADM2020 CI E.1

Use the following factor for all compression checks assessed using the ASD method:

Safety Factor

$$\Omega_c = 1.65$$

Compression - Member Buckling

ADM2020 CI E.2

Check member buckling capacity about major Z-axis

Slenderness Limit 1

$$\lambda_1 = 18.23$$

Slenderness Limit 2

$$\lambda_2 = 78.381$$

Calculate slenderness value

$$\lambda_z = \left(\frac{kL_z}{r_z} \right)$$

$$\lambda_z = \left(\frac{1 \times 142}{2.013} \right)$$

$$\lambda_z = 70.531$$

$$\lambda_1 < \lambda_z < \lambda_2$$

$$\therefore F_c = (B_c - D_c\lambda_z) \left(0.85 + 0.15 \frac{C_c - \lambda_z}{C_c - \lambda_1} \right) = 15.165 \text{ ksi}$$

$$P_c = \frac{F_c A_g}{\Omega} = 34.466 \text{ kip}$$

$$UR = \frac{P_{dc}}{P_c} = \frac{0}{34.466}$$

UTILITY: 0.00

ADM2020 CI E.2

Check member buckling capacity about minor Y-axis

Slenderness Limit 1

$$\lambda_1 = 18.23$$

Slenderness Limit 2

$$\lambda_2 = 78.381$$

Calculate slenderness value

$$\lambda_y = \left(\frac{kL_y}{r_y} \right)$$

$$\lambda_y = \left(\frac{1 \times 142}{0.808} \right)$$

$$\lambda_y = 175.679$$

$$\lambda_y \geq \lambda_2$$

$$\therefore F_c = \frac{0.85\pi E}{\lambda^2} = 2.745 \text{ ksi}$$

$$P_c = \frac{F_c A_g}{\Omega} = 6.239 \text{ kip}$$

$$UR = \frac{P_{dc}}{P_c} = \frac{0}{6.239}$$

UTILITY: 0.00

Compression - Local Buckling

Assess capacity of each element using the weighted average method to ADM 2020 CI E.3.1

ADM2020 CI B.5.4.2

Check capacity of top and bottom flange subjected to axial compression

Slenderness Limit 1

$$\lambda_1 = 22.812$$

Slenderness Limit 2

$$\lambda_2 = 39.241$$

Calculate slenderness value

$$\lambda = b/t$$

$$\lambda = 1.5/0.25 = 6$$

$$\lambda < \lambda_1$$

$$\therefore F_c = F_{cy} = 25 \text{ ksi}$$

ADM2020 CI B.5.4.2

Check capacity of webs subjected to axial compression

Slenderness Limit 1

$$\lambda_1 = 22.812$$

Slenderness Limit 2

$$\lambda_2 = 39.241$$

Calculate slenderness value

$$\lambda = b/t$$

$$\lambda = 5.5/0.25 = 22$$

$$\lambda < \lambda_1$$

$$\therefore F_c = F_{cy} = 25 \text{ ksi}$$

ADM2020 CI E.3.1

Check local buckling using the weighted average method

$$P_{nc} = \sum_{i=1}^n F_{ci} A_i + F_{cy} \left(A_g - \sum_{i=1}^n A_i \right)$$

Individual Element Data

Element	F _{ci} (ksi)	A _i (in ²)	F _{ci} × A _i (kip)
Flange	25	0.375	9.375
Flange	25	0.375	9.375
Web	25	1.375	34.375
Web	25	1.375	34.375
SUM OF ELEMENTS:	100	3.5	87.5

$$P_{nc} = 87.5 + 25(3.75 - 3.5)$$

$$\therefore P_{nc} = 93.75 \text{ kip}$$

$$P_c = \frac{P_{nc}}{\Omega} = 56.818 \text{ kip}$$

$$UR = \frac{P_{dc}}{P_c} = \frac{0}{56.818}$$

UTILITY: 0.00

Compression - Member and Local Buckling Interaction

ADM 2020 CI E4

Check for interaction between member buckling and local buckling

ADM 2020 CI B.5.6

Evaluate elastic buckling stress F_e of each element and check whether $F_e < F_c$:

F_c is based on the minimum member buckling strength calculated previously in Clause E2

$$\therefore F_c = 2.745 \text{ ksi}$$

Element Name	Element Type/Support	F _e (ksi)	> F _c (ksi)?
Flange	Flat - Both Edges	1081.63	YES
Web	Flat - Both Edges	80.452	YES

As all values of F_e exceeded the value of F_c , no additional check for interaction between member buckling and local buckling is required

Governing Compression Capacity:

Axial compression capacity is governed by member buckling about minor Y-axis

$$P_c = 6.239 \text{ kip}$$

UTILITY: 0.00

Bending - Major Axis

Convert user defined bending moments from kip-ft to kip-in

$$\begin{aligned} \text{Major Axis Bending} & M_{dz} = 75.6 \text{ kip-in} \\ \text{Minor Axis Bending} & M_{dy} = 0 \text{ kip-in} \end{aligned}$$

ADM 2020 CI F.1

Use the following factors for all bending checks assessed using the ASD method:

$$\begin{aligned} \text{Safety Factor (ASD) - Rupture} & \Omega_{br} = 1.95 \\ \text{Safety Factor (ASD) - Other Bending Limit States} & \Omega_b = 1.65 \end{aligned}$$

Major Axis Bending - Yielding and Rupture

ADM2020 CI F.2

Check strength of member for yielding and rupture about major axis

Check yielding:

Assuming the product is wrought as per Clause F.2(a):

$$M_{npz} = \min(Z_x F_{cy}, 1.5 S_{x,t} F_{ty}, 1.5 S_{x,c} F_{cy})$$

$$\therefore M_{npz} = \min(166.5, 190.125, 190.125) = 166.5 \text{ kip-in}$$

$$M_{nz,yield} = \frac{M_{npz}}{\Omega_b} = 100.909 \text{ kip-in}$$

Check rupture:

$$M_{nz,rupt} = \frac{ZF_{tu}}{k_t \Omega_{b,r}} = 102.462 \text{ kip-in}$$

$$M_{cz} = \min(M_{nz,yield}, M_{nz,rupt}) = 100.909 \text{ kip-in}$$

$$UR = \frac{M_{d,z}}{M_{cz}} = \frac{75.6}{100.909}$$

UTILITY: 0.75

Major Axis Bending - Local Buckling

Assess flexure capacity using the weighted average method to ADM 2020 CI F.3.1

$$M_{nlb,z} = \frac{F_c I_f}{c_{cf}} + \frac{F_b I_w}{c_{cw}}$$

Check the individual components applicable to the flexure weighted average method:

ADM2020 CI B.5.4.2

Check flange in uniform compression:

Slenderness Limit 1	$\lambda_1 = 22.812$
Slenderness Limit 2	$\lambda_2 = 39.241$

Calculate slenderness value

$$\lambda = b/t$$

$$\lambda = 1.5/0.25 = 6$$

$$\lambda < \lambda_1$$

$$\therefore F_c = F_{cy} = 25 \text{ ksi}$$

ADM2020 CI B.5.5.1

Check web subject to bending about major axis:

Assess 'm' coefficient required for Clause B.5.5.1

Centroid to element extreme compressive fiber	$c_c = -2.75 \text{ in}$
Centroid to other extreme fiber of the element	$c_o = 2.75 \text{ in}$

$$c_o/c_c = -1$$

$$\therefore m = \frac{1.3}{(1 - c_o/c_c)} = 0.65$$

Slenderness Limit 1	$\lambda_1 = 34.731$
Slenderness Limit 2	$\lambda_2 = 92.95$

Calculate slenderness value

$$\lambda = b/t$$

$$\lambda = 5.5/0.25 = 22$$

$$\lambda \leq \lambda_1$$

$$\therefore F_b = 1.5 F_{cy} = 37.5 \text{ ksi}$$

Compression Element Data:

Element	F_c (ksi)	I_f (in ⁴)	c_{cf} (in)	$F_c I_f / c_{cf}$
Flange	25	8.268	2.875	71.893

Flexure Element Data:

Element	F_b (ksi)	I_w (in ⁴)	c_{cw} (in)	$F_b I_w / c_{cw}$
Web	37.5	6.932	2.75	94.531

$$\therefore M_{nlb,z} = 71.893 + 94.531 = 166.424 \text{ kip-in}$$

$$M_{c,z} = \frac{M_{nlb,z}}{\Omega_b} = 100.863 \text{ kip-in}$$

$$UR = \frac{M_{d,z}}{M_{c,z}} = \frac{75.6}{100.863}$$

UTILITY: 0.75

Lateral-Torsional Buckling

ADM2020 CI F.4

Check lateral-torsional buckling capacity of member

Slenderness Limit 1

$$\lambda_1 = 78.381$$

Calculate slenderness value

ADM 2020 CI F.4.2.3

$$\lambda = 2.3 \sqrt{\frac{L_b S_{xc}}{C_b \sqrt{I_y J}}}$$

$$\therefore \lambda = 2.3 \sqrt{\frac{142 \times 5.07}{1 \sqrt{2.45 \times 6.75}}} = 30.603$$

Calculate capacity:

$$\lambda < \lambda_1$$

From Design Check F.2 for above:

$$M_{np} = 166.5 \text{ kip-in}$$

$$\therefore M_{nmb} = M_{np} \left(1 - \frac{\lambda}{C_c} \right) + \frac{\pi^2 E \lambda S_{xc}}{C_c^3} = 133.611 \text{ kip-in}$$

$$M_c = \frac{M_{nmb}}{\Omega_b} = 80.976 \text{ kip-in}$$

$$UR = \frac{M_d}{M_c} = \frac{75.6}{80.976}$$

UTILITY: 0.93

Governing Major Axis Bending Capacity:

Major axis bending capacity is governed by lateral-torsional buckling

$$M_{c,z} = 80.976 \text{ kip-in}$$

UTILITY: 0.93

Bending - Minor Axis

Minor Axis Bending - Yielding and Rupture

ADM2020 CI F.2

Check strength of member for yielding and rupture about minor axis

Check yielding:

Assuming the product is wrought as per Clause F.2(a):

$$M_{npy} = \min(Z_y F_{cy}, 1.5 S_{yt} F_{ty}, 1.5 S_{yc} F_{cy})$$

$$\therefore M_{npy} = \min(72.75, 91.875, 91.875) = 72.75 \text{ kip-in}$$

$$M_{ny, yield} = \frac{M_{npy}}{\Omega_b} = 44.091 \text{ kip-in}$$

Check rupture:

$$M_{ny, rupt} = \frac{Z F_{tu}}{k_t \Omega_{b,r}} = 44.769 \text{ kip-in}$$

$$M_{cy} = \min(M_{ny, yield}, M_{ny, rupt}) = 44.091 \text{ kip-in}$$

$$UR = \frac{M_{d,y}}{M_{cy}} = \frac{0}{44.091}$$

UTILITY: 0.00

Minor Axis Bending - Local Buckling

Assess flexure capacity using the weighted average method to ADM 2020 CI F.3.1

$$M_{nlby} = \frac{F_c I_f}{c_{cf}} + \frac{F_b I_w}{c_{cw}}$$

Check the individual components applicable to the flexure weighted average method:

ADM2020 CI B.5.4.2

Check web in uniform compression:

Slenderness Limit 1	$\lambda_1 = 22.812$
Slenderness Limit 2	$\lambda_2 = 39.241$

Calculate slenderness value

$$\lambda = b/t$$

$$\lambda = 5.5/0.25 = 22$$

$$\lambda < \lambda_1$$

$$\therefore F_c = F_{cy} = 25 \text{ ksi}$$

ADM2020 CI B.5.5.1

Check flange subject to bending about minor axis:

Assess 'm' coefficient required for Clause B.5.5.1

Centroid to element extreme compressive fiber	$c_c = -0.75 \text{ in}$
Centroid to other extreme fiber of the element	$c_o = 0.75 \text{ in}$

$$c_o/c_c = -1$$

$$\therefore m = \frac{1.3}{(1 - c_o/c_c)} = 0.65$$

Slenderness Limit 1	$\lambda_1 = 34.731$
Slenderness Limit 2	$\lambda_2 = 92.95$

Calculate slenderness value

$$\lambda = b/t$$

$$\lambda = 1.5/0.25 = 6$$

$$\lambda \leq \lambda_1$$

$$\therefore F_b = 1.5 F_{cy} = 37.5 \text{ ksi}$$

Compression Element Data:

Element	F _c (ksi)	I _f (in ⁴)	c _{cf} (in)	F _c I _f / c _{cf}
Web	25	2.408	0.875	68.81

Flexure Element Data:

Element	F _b (ksi)	I _w (in ⁴)	c _{cw} (in)	F _b I _w / c _{cw}
Flange	37.5	0.021	0.75	1.042

$$\therefore M_{nlby} = 68.81 + 1.042 = 69.851 \text{ kip-in}$$

$$M_{cy} = \frac{M_{nlby}}{\Omega_b} = 42.334 \text{ kip-in}$$

$$UR = \frac{M_{dy}}{M_{cy}} = \frac{0}{42.334}$$

UTILITY: 0.00

Governing Minor Axis Bending Capacity:

Minor axis bending capacity is governed by local-buckling using the weighted-average method

$$M_{cy} = 42.334 \text{ kip-in}$$

UTILITY: 0.00

Shear

ADM 2020 C I G.1

Use the following factors for all shear checks assessed using the ASD method:

Safety Factor (ASD) - Other Shear Limit States

$$\Omega_v = 1.65$$

Safety Factor (ASD) - Rupture

$$\Omega_{v,r} = 1.95$$

Shear - Major Axis

ADM 2020 C I G.2

Check shear capacity for shear in web (major axis shear)

Assume shear along major axis is resisted by both webs together

Check shear yielding:

ADM 2020 C I G.1

$$V_n = F_s A_v$$

Slenderness Limit 1

$$\lambda_1 = 38.731$$

Slenderness Limit 2

$$\lambda_2 = 75.654$$

Calculate slenderness value

$$\lambda = b/t$$

$$\lambda = 5.5/0.25 = 22$$

$$\lambda \leq \lambda_1$$

$$\therefore F_s = F_{sy} = 15 \text{ ksi}$$

$$A_v = 2.75 \text{ in}^2$$

$$\therefore V_{n,yield} = 41.25 \text{ kip}$$

$$V_{c,yield} = \frac{V_{n,yield}}{\Omega_v} = 25 \text{ kip}$$

Check shear rupture:

ADM 2020 CI G.2

$$V_n = \frac{F_{su} A_v}{k_t}$$

$$\therefore V_{n,rupture} = 49.5 \text{ kip}$$

$$V_{c,rupture} = \frac{V_{n,rupture}}{\Omega_{v,r}} = 25.385 \text{ kip}$$

Evaluate governing shear capacity:

$$V_c = \min(V_{c,yield}, V_{c,rupture}) = 25 \text{ kip}$$

$$UR = \frac{V_{dy}}{V_c} = \frac{2.13}{25}$$

UTILITY: 0.09

Shear - Minor Axis

ADM 2020 CI G.2

Check shear capacity for shear in flange (minor axis shear)

Assume shear along minor axis is resisted by both flanges together

Check shear yielding:

ADM 2020 CI G.1

$$V_n = F_s A_v$$

Slenderness Limit 1

$$\lambda_1 = 38.731$$

Slenderness Limit 2

$$\lambda_2 = 75.654$$

Calculate slenderness value

$$\lambda = b/t$$

$$\lambda = 1.5/0.25 = 6$$

$$\lambda \leq \lambda_1$$

$$\therefore F_s = F_{sy} = 15 \text{ ksi}$$

$$A_v = 1 \text{ in}^2$$

$$\therefore V_{n,yield} = 15 \text{ kip}$$

$$V_{c,yield} = \frac{V_{n,yield}}{\Omega_v} = 9.091 \text{ kip}$$

Check shear rupture:

ADM 2020 CI G.2

$$V_n = \frac{F_{su} A_v}{k_t}$$

$$\therefore V_{n,rupture} = 18 \text{ kip}$$

$$V_{c,rupture} = \frac{V_{n,rupture}}{\Omega_{v,r}} = 9.231 \text{ kip}$$

Evaluate governing shear capacity:

$$V_c = \min(V_{c,yield}, V_{c,rupture}) = 9.091 \text{ kip}$$

$$UR = \frac{V_{dz}}{V_c} = \frac{0}{9.091}$$

UTILITY: 0.00

Combined Actions

ADM 2020 CI H.1

Check combined axial and bending

Check combined compression and bending

$$UR = \frac{P_{dc}}{P_c} + \frac{M_{dz}}{M_{cz}} + \frac{M_{dy}}{M_{cy}} \leq 1$$

$$UR = \frac{0}{6.239} + \frac{75.6}{80.976} + \frac{0}{42.334}$$

$$\therefore UR = 0.934$$

UTILITY: 0.93

Check combined tension and bending

$$UR = \frac{P_{dt}}{P_t} + \frac{M_{dz}}{M_{cz}} + \frac{M_{dy}}{M_{cy}} \leq 1$$

$$UR = \frac{0}{56.818} + \frac{75.6}{80.976} + \frac{0}{42.334}$$

$$\therefore UR = 0.934$$

UTILITY: 0.93

ADM 2020 CI H.3

Check combined bending compression and shear, major axis

Check combined compression, bending and shear

$$UR = \frac{P_{dc}}{P_c} + \left(\frac{M_d}{M_c}\right)^2 + \left(\frac{V_d}{V_c}\right)^2 \leq 1$$

$$UR = \frac{0}{6.239} + \left(\frac{75.6}{80.976}\right)^2 + \left(\frac{2.13}{25}\right)^2$$

$$\therefore UR = 0.879$$

UTILITY: 0.88

ADM 2020 CI H.3

Check combined bending compression and shear, minor axis

Check combined compression, bending and shear

$$UR = \frac{P_{dc}}{P_c} + \left(\frac{M_d}{M_c}\right)^2 + \left(\frac{V_d}{V_c}\right)^2 \leq 1$$

$$UR = \frac{0}{6.239} + \left(\frac{0}{42.334}\right)^2 + \left(\frac{0}{9.091}\right)^2$$

$$\therefore UR = 0$$

UTILITY: 0.00

Results Summary

Result Name	Results
MEMBERS	
Tension Utilization	0.00
Compression Utilization	0.00
Major Axis Bending Utilization	0.93
Minor Axis Bending Utilization	0.00
Shear along Major Z Axis Utilization	0.09
Shear along Minor Y Axis Utilization	0.00

Result Name	Results
COMBINED	
Combined Compression + Bending	0.93
Combined Tension + Bending	0.93
Combined Bending and Shear (Major Axis)	0.88
Combined Bending and Shear (Minor Axis)	0.00

About this Calculator



Calculator Name: ADM 2020 Aluminum Member Design

Description: Calculates the bending, shear, axial and combined utilization of aluminum sections as per ADM 2020.

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URL: https://platform.skyciv.com/quick-design?uid=2605-us-aluminium-design&load_by_country=1&member_label=Member%201&shape=hollow_rectangular&ion=RT%206x2x1/4&welded=Not%20Welded&alloy=6063&temper=T6&product=B241.%20pipe%20%26%20tube&B=2&D=6&t_f=0.25&t_w=0.25&an_factor=100&Lb=142&Lz=142&ly=142&kz=1&ky=1&ch_factor=1&method=ASD&Mrz=6.3&Mrz=0&Vry=2.13&Vrz=0&Prc=0&Prt=0&flexure_setting=weighted_average

Contact: support@skyciv.com

Loads (Allowable)

		<u># Anchors</u>	<u>1 Anchor</u>
T anchor (lbs)	0.0	4	<u>0.0</u>
V anchor (lbs)	2,130.0	4	<u>532.5</u>

Anchor Description:**1/4" KWIK-CON II INTO CONCRETE**

Min. Embedment (in)	1.75
Min. Edge Distance (in)	1.5
Min. Spacing O.C. (in)	3.0

Anchor Tech Data (see Table attached)

Allow.Tension (lbs)	Edge Dist. Factor	Spacing Factor	Tension w/ factor (lbs)
625.0	1.00	1.00	625.0

0.00

ok!

Allow.Shear (lbs)	Edge Dist. Factor	Spacing Factor	Shear w/ factor (lbs)
600.0	1.00	1.00	600.0

0.89

ok!

Combined Tension & Shear - (Ta/T) + (Va/V)	0.89
---	------

< 1

ok!

3.3.15 KWIK-CON II+ Concrete and Masonry Screw

3.3.15.3 Technical data

Table 1 - Tension and shear allowable loads in concrete^{1,2}

Nominal anchor diameter	Nominal embedment in. (mm)	$f'_c = 2,000$ psi		$f'_c = 4,000$ psi		$f'_c = 6,000$ psi	
		Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
3/16	1 (25)	100 (0.44)	260 (1.16)	125 (0.56)	260 (1.16)	185 (0.82)	280 (1.25)
3/16	1-3/4 (44)	275 (1.22)	260 (1.16)	295 (1.31)	265 (1.18)	325 (1.45)	300 (1.33)
1/4	1 (25)	190 (0.85)	325 (1.45)	240 (1.07)	390 (1.73)	275 (1.22)	540 (2.40)
1/4	1-3/4 (44)	425 (1.89)	560 (2.49)	625 (2.78)	600 (2.82)	650 (2.89)	600 (2.67)

1 Screws installed in holes drilled with Hilti TKC carbide bits.

2 Allowable loads are based on a safety factor of 4.

Table 2 - Tension and shear ultimate loads in concrete¹

Nominal anchor diameter	Nominal embedment in. (mm)	$f'_c = 2,000$ psi		$f'_c = 4,000$ psi		$f'_c = 6,000$ psi	
		Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
3/16	1 (25)	400 (1.78)	1,050 (4.67)	500 (2.22)	1,050 (4.67)	750 (3.34)	1,150 (5.12)
3/16	1-3/4 (44)	1,100 (4.89)	1,050 (4.67)	1,180 (5.25)	1,070 (4.76)	1,300 (5.78)	1,200 (5.34)
1/4	1 (25)	760 (3.38)	1,300 (5.78)	970 (4.31)	1,575 (7.01)	1,100 (4.89)	2,175 (9.68)
1/4	1-3/4 (44)	1,700 (7.56)	2,250 (10.0)	2,500 (11.1)	2,400 (11.3)	2,600 (11.6)	2,400 (10.7)

1 Screws installed in holes drilled with TKC bits.

Table 3 - Tension and shear allowable loads in hollow block^{1,2,3}

Nominal anchor diameter	Nominal embedment in. (mm)	Tension lb (kN)	Shear lb (kN)
3/16	1 (25)	150 (0.67)	225 (1.00)
3/16	1-3/4 (44)	290 (1.29)	300 (1.33)
1/4	1 (25)	165 (0.73)	275 (1.22)
1/4	1-3/4 (44)	310 (1.38)	400 (1.78)

1 All values for anchors installed in hollow concrete masonry with a minimum prism strength of 1,500 psi. Concrete block may be lightweight, medium-weight or normal-weight conforming to ASTM C90.

2 Screws installed in holes drilled with TKC bits.

3 Allowable loads calculated using a factor of safety of 4.

Table 4 - Tension and shear allowable loads in red brick^{1,2}

Nominal anchor diameter	Nominal embedment in. (mm)	Tension lb (kN)	Shear lb (kN)
3/16	1 (25)	125 (0.56)	235 (1.05)
3/16	1-3/4 (44)	350 (1.56)	300 (1.33)
1/4	1 (25)	205 (0.91)	415 (1.85)
1/4	1-3/4 (44)	350 (1.56)	500 (2.22)

1 This test was performed on individual specimens of ASTM C62 common red brick. Due to the wide variations encountered in the compressive strength of brick, these values should be considered guide values.

2 Allowable loads are based on a safety factor of 4.

The anchors are installed a minimum of 12 diameters on center with a minimum edge distance of six diameters for 100 percent anchor efficiency. Spacing and edge distance may be reduced to six diameter spacing and three diameter edge distance providing values are reduced 50 percent. Linear interpolation may be used for intermediate spacing and edge margins.

Combined shear and tension loading

$$\left(\frac{N_d}{N_d} \right) + \left(\frac{V_d}{V_d} \right) \leq 1.0$$

3.3.15.4 Installation instructions

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at www.us.hilti.com (US) and www.hilti.ca (Canada). Because of the possibility of changes, always verify that downloaded IFU are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the IFU.