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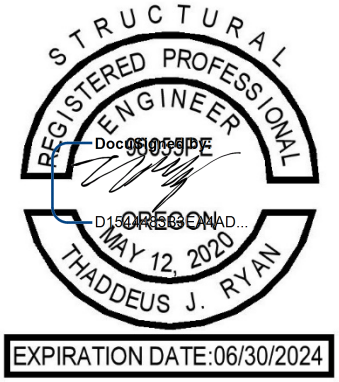
STRUCTURAL CALCULATIONS

FOR

1341 N KILLINGSWORTH APARTMENTS
REV 8 – ROOF FRAMING REVISION
& BALCONY BRACKETS
1341 NORTH KILLINGSWORTH STREET
PORTLAND, OR 97217

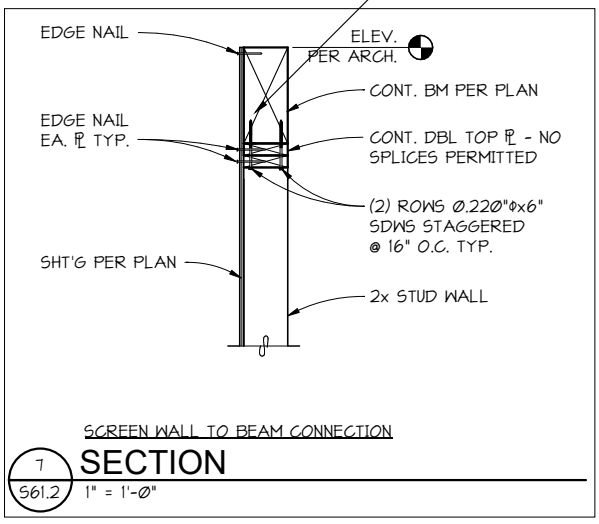
PREPARED BY
PCS STRUCTURAL *SOLUTIONS*



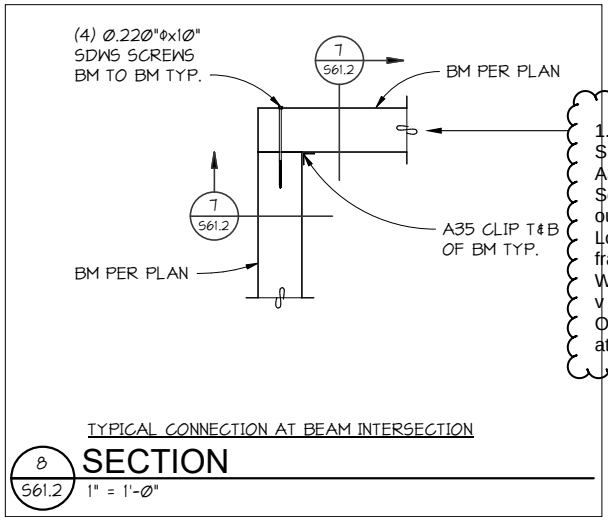
DECEMBER 7, 2023
21-330

REVIEW COMMENT RESPONSES

250 plf out of plane load
SDWS cap = 405 lbs/screw
(250)(16/12) = 333 lbs < 405 lbs -ok-



SCREEN WALL TO BEAM CONNECTION
7 S61.2 SECTION
1" = 1'-Ø"



1.6 kip Reaction
SDWS = (4)(395) = 1.58 kips
A35 cap = (2)(670) = 1.34 kips
Screws w/ clips capable of resisting out of plane loads both directions.
Loads are transferred into wood framed shear wall each direction.
Worst case wall v = 1.6 kips/8'-0"
v = 200 plf Type A1 sheathing -ok-
Overturning resisted by perp. wall at each corner.

TYPICAL CONNECTION AT BEAM INTERSECTION
8 S61.2 SECTION
1" = 1'-Ø"

Loads: (ASCE 7-16)

Per previously submitted calculations

$q_h = q_z = 0.00256K_zK_{zt}K_eK_dV^2 = (0.00256)(0.835)(1.0)(1.0)(0.85)(100)^2 = 18.2$ psf

Wind on Rooftop Structure (ASCE 7-16 29.4.1)

$F_h = q_h(GC_r)A_f$ (EQ. 29.4-1)
$q_h = 18.2$ psf
$GC_r = 1.9$
$A_f = 170$ ft^2

F_h = (18.2 psf)(1.9)(156 ft^2) = 5.4 kips (SD) total load, over 13'-0" = 415 plf (SD) = 250 plf ASD

Beam Design:

L = 13'-0" maximum

$R = \frac{(250\text{ plf})(13'\text{-}0")}{2}$ = 1.6 kips each end of beam.

$M = \frac{(250\text{ plf})(13'\text{-}0")^2}{8}$ = 5.3 ft-kips = 63 in kips

5^1/$_2$x12 24F-V4 glulam check:

Bending:
$F'_b = F_bC_D(C_L \text{ or } C_v)C_{fu}$

Fb = 1450 psi C_D=1.6 C_L= 0.99(controls) C_v= 3.05 C_{fu} = 1.09

F'_b = (1450 psi)(1.6)(0.99(1.09) = 2500 psi

$f_b = \frac{M}{S_y} = \frac{63\text{ in-kips}}{60.50\text{ in}^3}$ = 1045 psi < 2500 psi -ok-

Deflection:

$\frac{5wl^2}{384EI_y} = \frac{(5)(250/12)(13'\text{-}0"\text{x}12)^4}{(384)(1.6\text{x}10^6)(166.4\text{ in}^4)}$ = 0.60 in = 258 > 240 -ok-

5^1/$_2$x12 24F-V4 glulam capable of resisting out of plane wind loads.

Strong-Drive®

SDWS **TIMBER** Screw (Exterior Grade)

Structural Wood-to-Wood Connections Including Ledgers, Indoor/Outdoor Projects

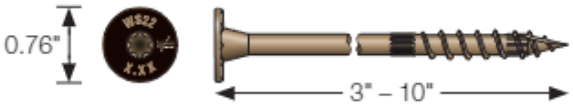
Designed to provide an easy-to-install, high-strength alternative to through-bolting and traditional lag screws. The Strong-Drive SDWS Timber screws are ideal for the contractor and do-it-yourselfer alike.

Double-barrier coating provides corrosion resistance equivalent to hot-dip galvanization, making it suitable for certain exterior and preservative-treated wood applications, as described in the evaluation report.

Codes/Standards: IAPMO UES ER-192, State of Florida FL13975

US Patent 9,523,383

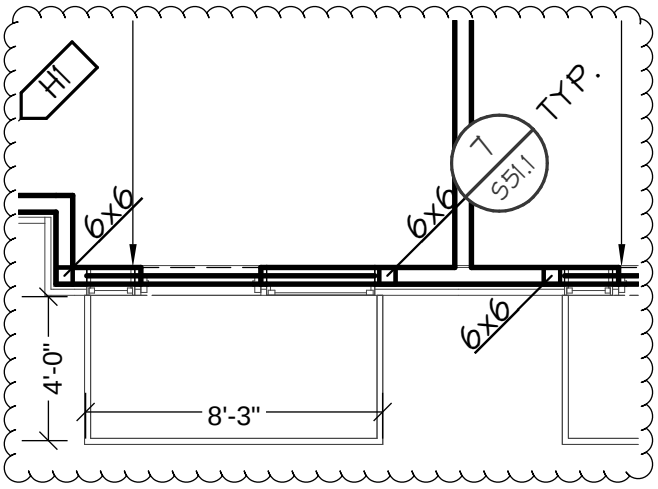
For more information, see p. 59, C-F-2023 *Fastening Systems* catalog

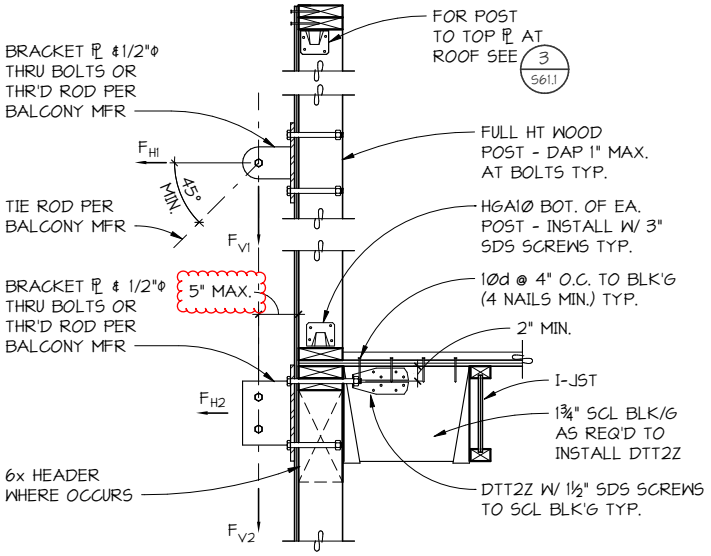


SDWS Timber Screw — Allowable Shear Loads — Douglas Fir–Larch and Southern Pine Lumber

Length (in.)	Model No.	Thread Length (in.)	Reference DFL/SP Allowable Shear Loads (lb.)								
			Wood Side Member Thickness (in.)								
			1.5	2	2.5	3	3.5	4	4.5	6	8
3	SDWS22300DB	1½	255	—	—	—	—	—	—	—	—
4	SDWS22400DB	2⅜	405	405	305	—	—	—	—	—	—
5	SDWS22500DB	3	405	405	360	360	325	—	—	—	—
6	SDWS22600DB	3	405	405	405	405	365	365	355	—	—
8	SDWS22800DB	3	405	405	405	405	395	395	395	395	—
10	SDWS221000DB	3	405	405	405	405	395	395	395	395	395

GRAVITY DESIGN
TYPICAL BALCONY COLUMN & CONNECTIONS OFFSET INCREASED TO 5"



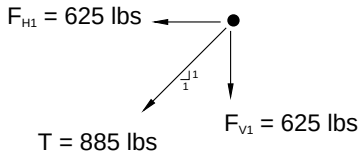


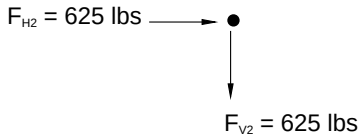
TYPICAL BALCONY CONNECTION AT EXTERIOR WALL

7 S51.1 SECTION 1" = 1'-Ø"

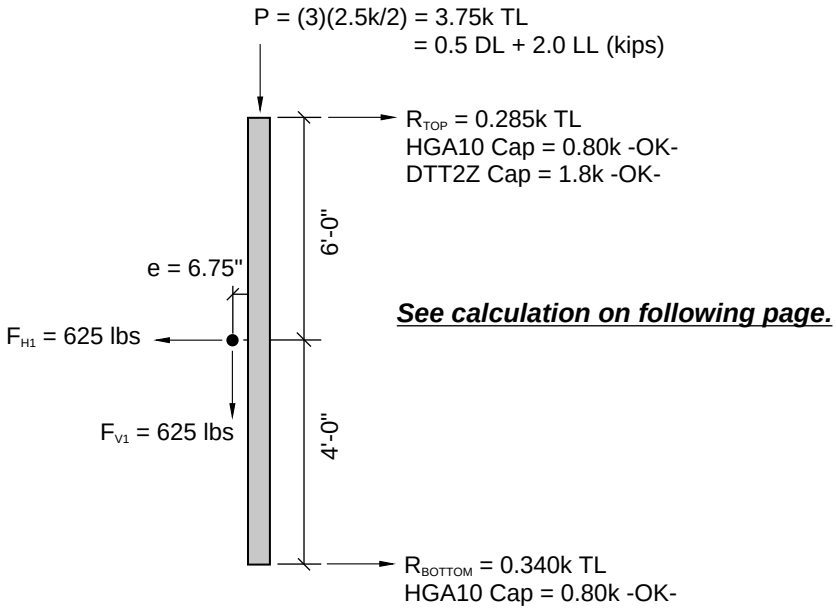
Typical Balcony Loads
60 psf LL
15 psf DL (Maximum per General Notes)
25 psf SL (Live Load Controls by Inspection)

Max. Total Load = (4')(8'-3")(15 DL + 60 LL) = 2.5 kips
Load per Support = 2.5k/4 = 625 lbs





Typical Post Design



See calculation on following page.

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

Project File: Killingsworth.ec6

DESCRIPTION: Typical Balcony Post

Code References

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

General Information

Analysis Method	Allowable Stress Design		
End Fixities	Top & Bottom Pinned		
Overall Column Height	10 ft		
(Used for non-slender calculations)			
Wood Species	Douglas Fir-Larch		
Wood Grade	No.1		
Fb +	1,200.0 psi	Fv	170.0 psi
Fb -	1,200.0 psi	Ft	825.0 psi
Fc - Prll	1,000.0 psi	Density	31.210 pcf
Fc - Perp	625.0 psi		

E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial
Basic	1,600.0	1,600.0	1,600.0 ksi
Minimum	580.0	580.0	

Wood Section Name	**6x6**		
Wood Grading/Manuf.	Graded Lumber		
Wood Member Type	Sawn		
Exact Width	**5.50** in	Allow Stress Modification Factors	
Exact Depth	**5.50** in	Cf or Cv for Bending	1.0
Area	30.250 in^2	Cf or Cv for Compressio	1.0
Ix	76.255 in^4	Cf or Cv for Tension	1.0
Iy	76.255 in^4	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

Column Buckling Condition:
ABOUT X-X Axis: Lux = 10 ft, Kx = 1.0
ABOUT Y-Y Axis: Luy = 10 ft, Ky = 1.0

Applied Loads

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

Column self weight included : 65.563 lbs * Dead Load Factor
AXIAL LOADS . . .
Reactions Floors Above: Axial Load at 10.0 ft, D = 0.50, L = 2.0 k
FV1: Axial Load at 10.0 ft, Xecc = 7.750 in, D = 0.1250, L = 0.50 k
BENDING LOADS . . .
FH1: Lat. Point Load at 4.0 ft creating My-y, D = 0.1250, L = 0.50 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.5597 : 1**

Load Combination	+D+L
Governing NDS Forumla	Comp + Myy, NDS Eq. 3.9-3
Location of max.above base	4.027 ft
At maximum location values are .	
Applied Axial	3.191 k
Applied Mx	0.0 k-ft
Applied My	1.331 k-ft
Fc : Allowable	691.51 psi

PASS Maximum Shear Stress Ratio = **0.09761 : 1**

Load Combination	+D+L
Location of max.above base	3.960 ft
Applied Design Shear	24.890 psi
Allowable Shear	170.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.2904 k	Bottom along X-X	0.3346 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 0.1418 in at 4.564 ft above base
for load combination : +D+L

Other Factors used to calculate allowable stresses . . .

	Bending	Compression	Tension

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Column

DESCRIPTION: Typical Balcony Post

Sketches