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Architectural Metal Works
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SUBJ: BALCONY GUARD POSTS FASCIA MOUNTED TO WOOD DECK

The attached details show two alternatives for attaching guardrail posts to a wood deck rim joist. The details will work with joists that are a minimum 2x8.

The third detail is for attaching to a 4x10 or larger beam with FastenMaster Ledgerok® LL005 fasteners.

Design load is 200# concentrated load on the top rail 42" above the finish floor height.

These installation details comply with the 2010 and 2013 California Building Codes and California Residential Codes.

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Signed 03/28/2014

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Load on post = 200# at top rail

Dead load = $5\text{psf} \times 5' \times 3' + 3.6 \times 5' + 3.6 \times 4.167 = 108\#$

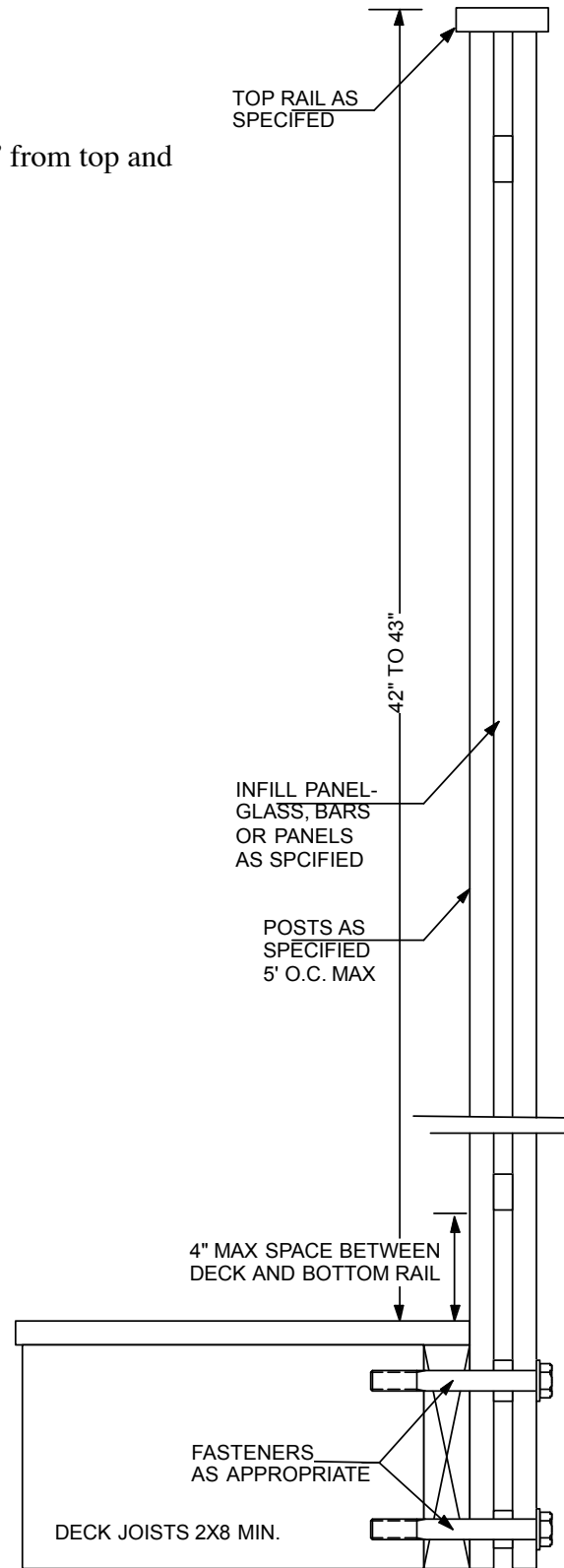
Load on bolts - bolts at 5" on center located at $1\frac{1}{8}$ " from top and bottom

From $\sum M$ about the bottom:

$\sum M = 0 = 200 \times 49.75 + 108 \times 1.375 - T \times 5''$

solving for T:

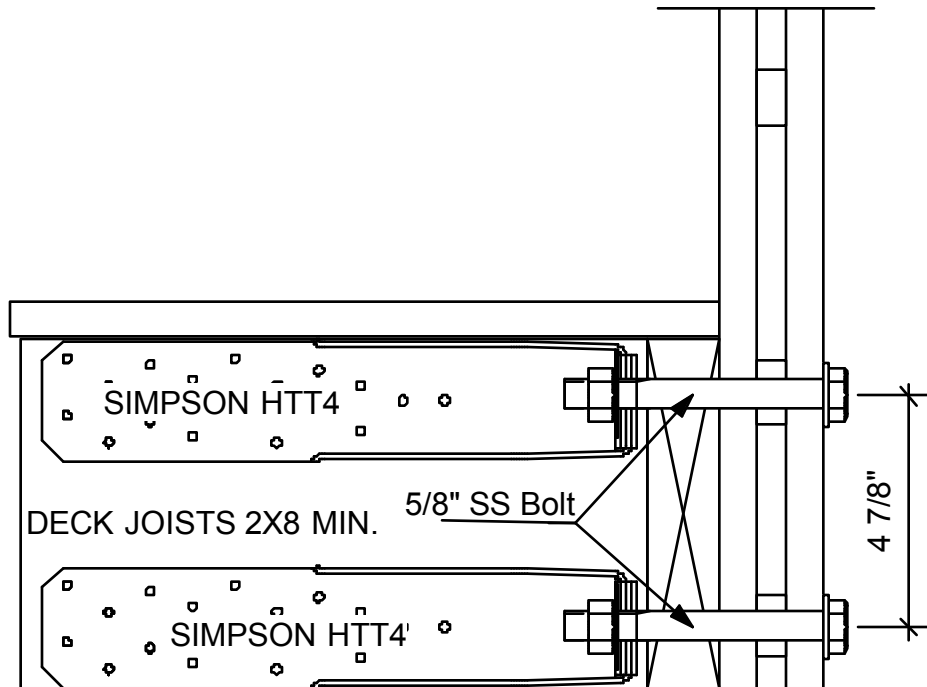
$T = 10,098.5/5 = 2,020\#$



Bolts need to be tied directly to joists so that rim joist doesn't pull off.

Try Simpson HTT4

Tension strength = 3,105# \geq 2,020



This detail requires installation along side joist.

This will require either adding extra joist at post or moving post to be along side joist.

For installation on joists deeper than 2x8 (7-1/4") set tension tie at top of joist and at 4-7/8" center to center for lower tension tie.

OPTION B

Posts located between studs with hold downs mounted on threaded rods.

$$V = 2,020\#$$

Shear strength of threaded rod on joist - NDS Table 11B for $G \geq 0.43$

$$\frac{1}{2}'' \text{ rod; } Z = 520\#; \quad M_a = 422''\#$$

$$\frac{5}{8}'' \text{ rod; } Z = 650\#; \quad M_a = 824''\#$$

$$\frac{3}{4}'' \text{ rod; } Z = 780\#; \quad M_a = 1,424''\#$$

$$\frac{7}{8}'' \text{ rod; } Z = 910\#; \quad M_a = 2,261''\#$$

$$1'' \text{ rod; } Z = 1,040\#; \quad M_a = 3,375''\#$$

Moment on rod from connection at middle of bay

$$M = 2,020\# \cdot 14.5''/8 = 3,661''\#$$

Try HD7B uses three $\frac{3}{4}''$ bolts

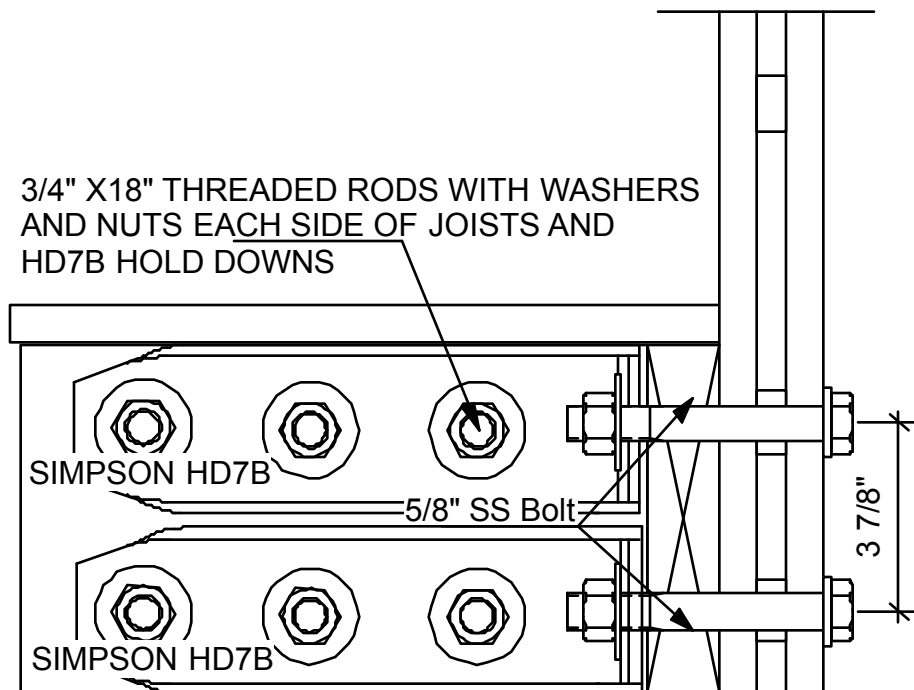
$$V_a = 3 \cdot 2 \cdot 780 = 4,680\# \geq 2,020\#$$

$$M_a = 3 \cdot 1,424 = 4,272''\# \geq 3,661''\#$$

Bolts must be moved closer together so that revised bolt tension force:

$$T = 10,098.5/4.5'' = 2,244\# \leq 4,680$$

$$M = 2,244\# \cdot 14.5''/8 = 4,067''\# \leq 4,272''\#$$



Hold downs may be located at any location between joists on threaded rods.

For installation on joists deeper than 2x8 (7-1/4'') set tension tie at top of joist and at 3-7/8'') center to center for lower tension tie.

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OPTION C

Lag screws into 4x10 beam

Lags at 7" on center

$$\Sigma M = 0 = 200 * 50.5 + 108 * 1.375 - T * 8''$$

solving for T:

$$T = 10,248/8 = 1,281\#$$

Try using (2) pairs of FastenMaster Ledgerok® LL005 fasteners

5" length with 3" thread depth into main member:

Withdrawal strength based on ESR-1078:

TABLE 2—REFERENCE WITHDRAWAL DESIGN VALUES (W)^{1,2,3}
[Reference withdrawal design values (W) are in pounds per inch of thread penetration into side grain of main member]

FASTENER	THREAD LENGTH, L ⁴ (inches)	W (lb./in.) FOR SPECIFIC GRAVITIES OF:					
		0.57	0.55	0.5	0.46	0.43	0.42
OlyLog/ TimberLOK	1.25 or 2.0	270	260	220	200	180	170
HeadLOK	2.0	290	270	230	200	180	170
LedgerLOK/ LogHog	2.0 or 3.0	330	310	270	240	220	210

$$W' = W * C_D * e = 220'' * 1.33 * 3'' = 878\# \text{ each}$$

For 2 screws:

$$W' = 2 * 878 = 1,756\#$$

Shear strength:

TABLE 4—REFERENCE LATERAL DESIGN VALUES (Z) FOR SINGLE SHEAR (TWO-MEMBER) WOOD-TO-WOOD CONNECTIONS
LOADED PARALLEL (Z_{||}) OR PERPENDICULAR (Z_⊥) TO THE GRAIN^{1,2}

FASTENER		MINIMUM SIDE MEMBER THICKNESS ³ , t _s (inches)	MINIMUM MAIN MEMBER PENETRATION ⁴ , p (inches)	Z (lb) FOR MINIMUM SPECIFIC GRAVITIES OF:					
Designation	Length (inches)			0.5		0.46		0.42	
				Z	Z _⊥	Z	Z _⊥	Z	Z _⊥
OlyLog/ TimberLOK	2 ¹ / ₂	1 ¹ / ₂	1	240	220	220	200	200	180
	4 & longer	1 ¹ / ₂	2 ¹ / ₂	280	260	260	230	240	210
	6 & longer	2 ¹ / ₂	3 ¹ / ₂	290	270	270	250	250	230
	8 & longer	3	5	290	270	260	250	240	230
HeadLOK	2 ⁷ / ₈	1 ¹ / ₂	1 ³ / ₈	240	210	220	180	210	150
	4 ¹ / ₂	1 ¹ / ₂	3	280	260	260	240	250	220
	6 & longer	1 ¹ / ₂	4 ¹ / ₂	290	270	270	250	250	230
	6 & longer	2 ¹ / ₂	3 ¹ / ₂	300	280	280	260	270	240
	8 & longer	3	5	290	280	280	260	260	230
LedgerLOK	3 ⁵ / ₈	1 ¹ / ₂	1 ¹ / ₂	—	260	—	220	—	220
	3 ⁵ / ₈	1 ¹ / ₂	2 ¹ / ₈	310	310	290	280	270	250
	5	1 ¹ / ₂	3 ¹ / ₂	320	300	300	280	280	260

$$Z' = Z * C_D = 260\# * 1.33 = 346\# \text{ each}$$

$$V = 108/4 = 27\#$$

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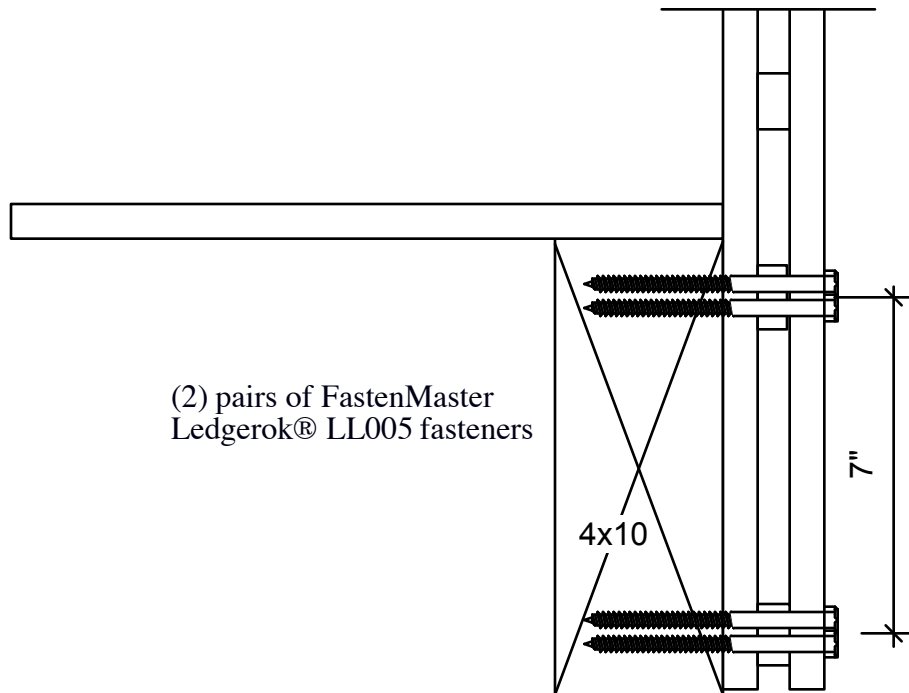
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Install upper screws at 13/16" from top of joist to center line of top screw.

For installation on beams deeper than 4x10 (9-1/4") keep same top distance.

