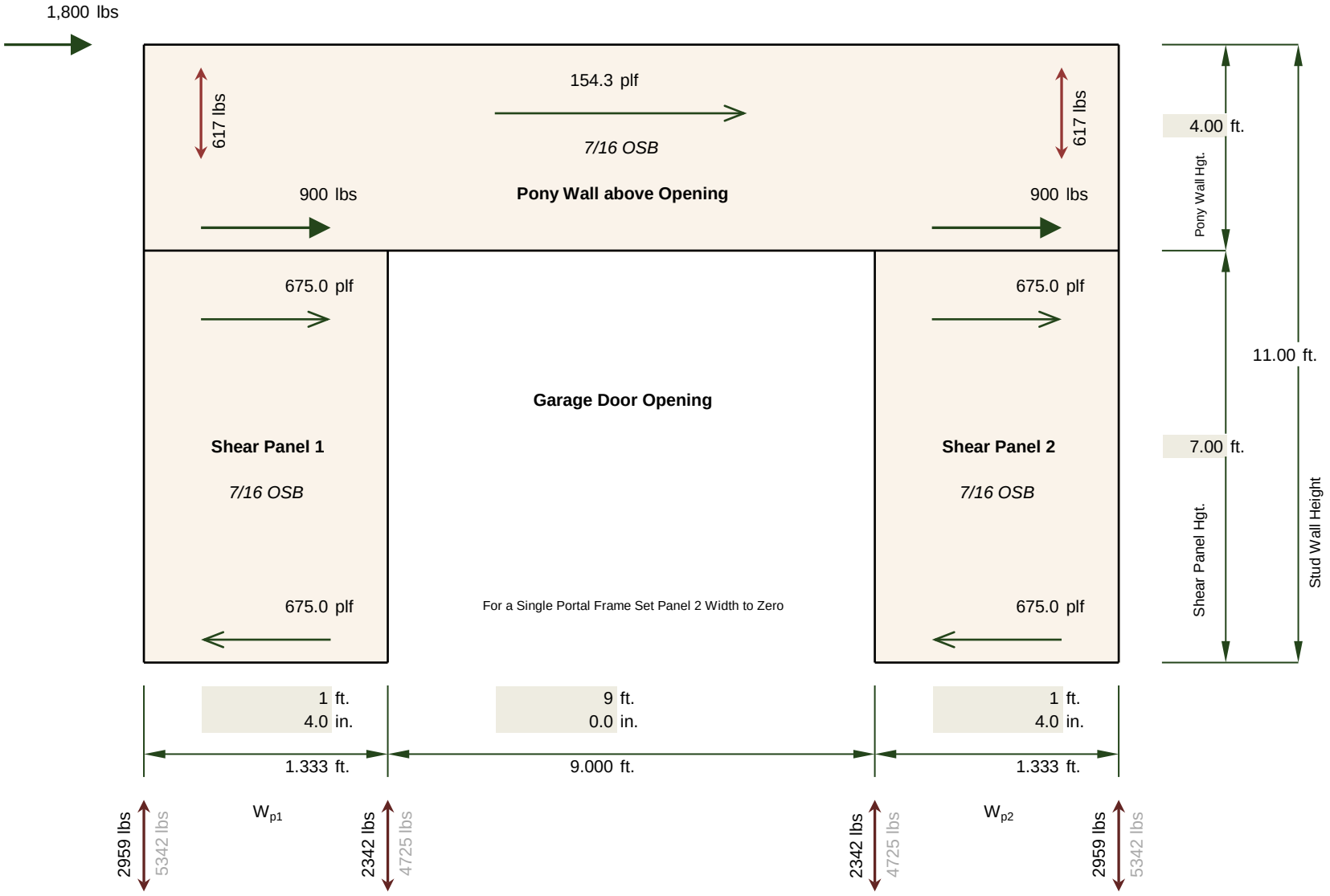
PORTAL FRAME CALCULATOR **PFH1** Vs = 800 lbs (ASD) Vw = 1,800 lbs (ASD) **Job#: 2015-036**

Wind Load Governs

Total Wall Length: 11.67 ft.
Portal Frame Deflection (ASD): 1.10 in.
Max. Tension of Header Strap: 2,529 lbs



*Notes: 1.) Shear Distribution based on equivalent deflection of each shear panel.

2.) Holdown forces shown in grey indicate loads if holdowns assume 100% of shear panel overturning moments.

3.) Holdown forces conservative since counteracting dead loads (LC7: 0.6D + 0.6W) are not considered in analysis.

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Design Criteria:

Max. Shear @ Panels =	900	lbs
Max. Panel Width =	1.333	ft.
Max. Unit Shear @ Panels =	675.0	plf

Moment Distribution:

Max. Moments @ Panels =	75,600	in-lbs	
Applied Moment @ Top of Shear Panel =	43,348	in-lbs	57%
Applied Moment @ Bottom of Shear Panel =	32,252	in-lbs	43%

Shear Capacity of Sheathing (Shear-through-Thickness):

Adjusted Panel Shear through Thickness: $F_vt_v' = F_vt_v(C_D)(C_M)(C_t)(C_G)$ = 3,168 plf

3,168 plf > 675 plf → **OK**

Shear Capacity of Panel-to-Framing Nails:

Number of Nails (based on two rows at 3" o/c) = 12.0 nails

Adjusted Lateral Capacity of Nails: $Z' = Z(C_D)(N)$ = 1,402 lbs

1,402 lbs > 900 lbs → **OK**

Shear Capacity of Anchor Bolts:

Adjusted Lateral Capacity of Bolts: $Z_{ab}' = Z_{ab}(C_D)(N)$ = 1,712 lbs

1,712 lbs > 900 lbs → **OK**

Moment Capacity of Sheathing (Edgewise Bending @ Header/Top of Panel):

Section Modulus of Sheathing Panel in Bending: $S = bh^2/6$ = 18.67 $in.^3$

Adjusted Moment Capacity of Sheathing: $M_{wsp}' = F_{be}(C_D)(S)$ = 17,920 in-lbs

Moment Capacity of Header Strap (Tension @ Header/Top of Panel):

Adjusted Moment Capacity of Header Strap: $M_{strap}' = T_{strap}(W_p - 1.5)$ = 50,098 in-lbs

Moment Capacity of Nails into Header: (nail spacing @ 3 x 3 grid pattern)

Distance from center of rotation to furthest fastener (longest moment arm): r_{max} = 7.57 in. (assume nail edge distance of 0.75")

Polar Moment of Inertia of Nail Group: $J = I_x + I_y = bh^3/12 + hb^3/12$ = 5,326 $in.^4$

Adjusted Moment Capacity of Header Nail Group: $M_{header}' = ZC_DJ/S^2r_{max}$ = 9,133 in-lbs

Combined Moment Capacity at Top of Portal Frame Shear Panel = **59,231 in-lbs** > 43,348 in-lbs → **OK**

Moment Capacity of Holdown:

Distance from centerline of holdown to panel edge: D_{center} = 3 in.

Adjusted Moment Capacity of Holdown: $M_{holdown}' = T_{holdown}(W_p - D_{center})$ = 41,600 in-lbs > 30,445 in-lbs → **OK**

Moment Capacity of Nails into Sill Plate: (only nails into bottom sill plate considered, conservative)

Distance from center of rotation to furthest fastener (longest moment arm): r_{max} = 7.25 in. (assume nail edge distance of 0.75")

Polar Moment of Inertia of Nail Group: $J = I_x + I_y = bh^3/12 + hb^3/12$ = 1,379 $in.^4$

Adjusted Moment Capacity of Sill Plate Nail Group: $M_{sill}' = ZC_DJ/S^2r_{max}$ = 2,469 in-lbs

Combined Moment Capacity at Bottom of Portal Frame Shear Panel = **44,069 in-lbs** > 32,252 in-lbs → **OK**

Sheathing Panel Thickness =	7/16	in
Panel Shear through Thickness: F_vt_v =	165	lbs/in.
Sheathing both sides :	NO	
Nail Spacing: S =	3	in.
Fastener Type :	8d	
Fastener Lateral Design Value: Z =	73	lbs (TABLE 11Q, 2012 NDS)
Header Depth =	9.25	in.
Header Strap :	MSTC28	(Simpson)
Header Strap Allowable Tension =	3,455	lbs → OK
Header Strap both sides :	NO	
Holdowns :	STHD14	(Simpson)
Holdown Allowable Tension =	3,200	lbs → OK
Shear Panel Posts :	(2) 2x6	
Shear Panel Posts Thickness =	3.00	in.
Load Duration Factor: C_D =	1.6	(Seismic/Wind)
Sill Plate:	(3)-2x	
Number of Anchor Bolts per Panel =	1	
Anchor Bolt DIA =	0.625	in
AB Lateral Design Value: Z_{ab} =	1,070	lbs (TABLE 11E, 2012 NDS)
Allowable Edgewise Bending Stress: F_{be} =	600	psi (TABLE 4, APA W345)
Foundation Type =	6" Stemwall	