



524 CLEVELAND BLVD. #230
CALDWELL, IDAHO 83605
(208) 453-6512

Completed by: ASF
Review/Check: ARA

Project Name: Foster RV Garage
SRE Project #: 2024-7401
City and State: Valley County, Idaho

Structural Calculations

Project Title: Foster R V Garage

Location: Valley County, Idaho

Job #: 2024-7401



Prepared in accordance with 2018 IBC. Calculations expire by: 4/26/2025



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SITE SPECIFIC DESIGN CRITERIA:

Snow Criteria:

Roof Load (P_f)	150 psf	
Ground Load (P_g)	150 psf	
Exposure Factor (C_e)	1.0	Partially
Thermal Factor (C_t)	1.0	Typical
Importance (I_s)	1.0	

Wind Criteria:

Wind Speed (V_3)	115 mph	
Wind Exposure	C	Open Terrain
Wind Importance (I_w)	1.0	
Building Category	II	

Seismic Criteria:

Site Class	D	Stiff Soil
S_s	0.51	F_a 1.39
S_1	0.15	F_v 2.19
S_{D1}	0.47	S_{D1} 0.22
Risk Category	II	Other
Seismic Importance (I_E)	1.0	
Seismic Design Category (SDC)	D	

Seismic Criteria (continued):

Wall Material	Design Base Shear	Response Coeff., R	
OSB	.09Wp	6.5	Typ @ Ext
GYP	.28Wp	2	Typ @ Int
Cant. Col.	.38Wp	1.5	

Soil Criteria:

Brg. Strength	1500 psf
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STRUCTURE SPECIFIC DESIGN CRITERIA:

Live Loads:

Typ Residential	40 psf
Garage (P.V.)	50 psf
Sleeping Area's	30 psf

Roof Dead Loads:

Deck	1.5
Insulation	2.0
Roofing	3.0
Joist	2.5
Ceiling	3.0
Misc	4.5
TOTAL	17 psf

Roof not engineered for Tile, Slate or Concrete.

Exterior Wall Dead Loads:

Studs	2.0
Siding	2.5
Insulation	0.5
Gyp. Board	2.5
Sheathing	1.5
Misc	3.0
TOTAL	12 psf

Floor Dead Loads:

Deck	2.5
Joist	2.0
Ceiling	2.0
Flooring	2.5
Misc	3.0
TOTAL	12 psf

Floor joists not engineered for concrete overlay.

Interior Wall Dead Loads:

Studs	2.0
Gyp. Board	2.5
Misc	3.0
TOTAL	8 psf

Deck Dead Load

Decking	4.4
Joist	2.0
Misc	3.0
TOTAL	10 psf

Deck not engineered for hot tub loading.

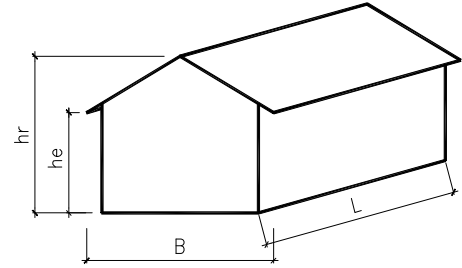
Deck not engineered for concrete overlay.



WIND ANALYSIS: Low-rise Building - Based on IBC / ASCE 7

INPUT DATA

Exposure category (B, C or D, ASCE 7-16 26.7.3)		C			
Importance factor (ASCE 7-16 Table 1.5-2)	$I_w =$	1.00	for all Category		
Basic wind speed (ASCE 7-16 26.5.1 or 2018 IBC)	$V =$	115	mph		
Topographic factor (ASCE 7-16 26.8 & Table 26.8-1)	$K_{zt} =$	1.00	Flat		
Building height to ridge	$h_r =$	25.00	ft		
Building height to eave	$h_e =$	16.00	ft		
Building width	$B =$	32.00	ft		
Building length	$L =$	48.00	ft		
Overhang sloped width	$O_h =$	3.00	ft		
Effective area of components (or Solar Panel area)	$A =$	85.3	ft ² , <== Overhang? (Yes or No):	Yes	
Enclosed? (Y/N)		y			



ANALYSIS

Velocity pressure

$$q_h = 0.00256 K_z K_{zt} K_d K_e V^2 = 26.09 \text{ psf}$$

where: q_h = velocity pressure at mean roof height, h. (Eq. 26.10-1 page 268)

K_z = velocity pressure exposure coefficient evaluated at height, h, (Tab. 26.10-1, pg. 268) = **0.91**

K_d = wind directionality factor. (Tab. 26.6-1, for building, page 266) = **0.85**

h = mean roof height = **20.50 ft**

K_e = ground elevation factor. (**1.0** per Sec. 26.9, page 268) **< 60 ft, [Satisfactory]** (ASCE 7-16 26.2.1)

< Min (L, B), [Satisfactory] (ASCE 7-16 26.2.2)

Design pressures for MWFRS

$$p = q_h [(G C_{pf}) - (G C_{pi})]$$

where: p = pressure in appropriate zone. (Eq. 28.3-1, page 311).

$p_{min} = 16 \text{ psf}$ (ASCE 7-16 28.3.4)

$G C_{pf}$ = product of gust effect factor and external pressure coefficient, see table below. (Fig. 28.3-1, page 312 & 313)

$G C_{pi}$ = product of gust effect factor and internal pressure coefficient. (Tab. 26.13-1, Enclosed Building, page 271)

= **0.18** or **-0.18**

a = width of edge strips, Fig 28.3-1, page 312, $\text{MAX}[\text{MIN}(0.1B, 0.1L, 0.4h), \text{MIN}(0.04B, 0.04L), 3] = 3.20 \text{ ft}$

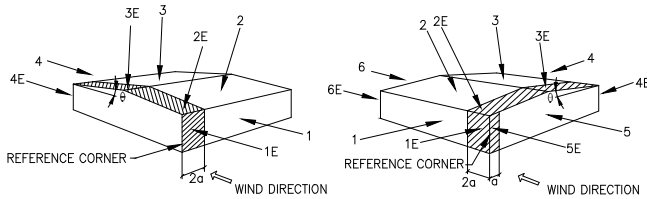
Net Pressures (psf), Basic Load Cases

Surface	Roof angle $q = 18.43$			Roof angle $q = 18.43$		
	$G C_{pf}$	Net Press. W/		$G C_{pf}$	Net Press. W/	
		(+ $G C_{pi}$)	(- $G C_{pi}$)		(+ $G C_{pi}$)	(- $G C_{pi}$)
1	0.52	8.78	18.17	-0.45	-16.44	-7.04
2	-0.69	-22.70	-13.31	-0.69	-22.70	-13.31
3	-0.47	-16.92	-7.53	-0.37	-14.35	-4.96
4	-0.42	-15.53	-6.14	-0.45	-16.44	-7.04
5				0.40	5.74	15.13
6				-0.29	-12.26	-2.87
1E	0.78	15.66	25.05	-0.48	-17.22	-7.83
2E	-1.07	-32.61	-23.22	-1.07	-32.61	-23.22
3E	-0.67	-22.26	-12.87	-0.53	-18.52	-9.13
4E	-0.62	-20.82	-11.43	-0.48	-17.22	-7.83
5E				0.61	11.22	20.61
6E				-0.43	-15.91	-6.52

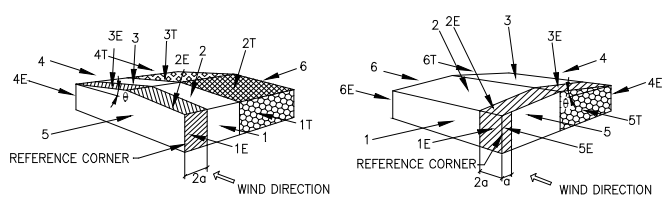
Net Pressures (psf), Torsional Load Cases

Surface	Roof angle $q = 18.43$		
	$G C_{pf}$	Net Press. W/	
		(+ $G C_{pi}$)	(- $G C_{pi}$)
1T	0.52	2.19	4.54
2T	-0.69	-5.67	-3.33
3T	-0.47	-4.23	-1.88
4T	0.00	-3.88	-1.54
Surface	Roof angle $q = 0.00$		
	$G C_{pf}$	Net Press. W/	
		(+ $G C_{pi}$)	(- $G C_{pi}$)
5T	0.40	1.43	3.78
6T	-0.29	-3.07	-0.72

+ / - Wind Pressure 64%



Load Case A (Transverse) Load Case B (Longitudinal)
Basic Load Cases



Load Case A (Transverse) Load Case B (Longitudinal)
Torsional Load Cases

Design pressures for components and cladding

$p = q_h [(G C_p) - (G C_{pi})]$

where: p = pressure on component. (Eq. 30.3-1, pg 33)

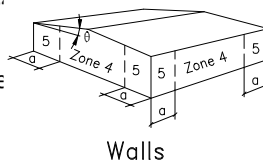
$p_{min} = 16.00$ psf (ASCE 7-16 30.2.2)

$G C_p = 1.00$ external pressure coefficient
see table below. (ASCE 7-16 30.3.2)

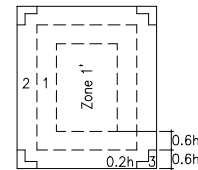
$q = 18.43$ °

$p_{overhang} = -90.01$ psf

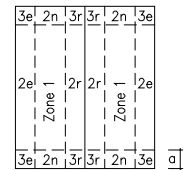
(ASCE 7-16 28.3.3)



Walls



Roof $\theta \leq 7^\circ$



Roof $\theta > 7^\circ$

Comp. & Cladding Coeffs.	Effective Area (ft ²)	Zone 1		Zone 1'		Zone 2		Zone 2e		Zone 2n		Zone 2r	
		GC _p	-GC _p	GC _p	-GC _p	GC _p	-GC _p	GC _p	-GC _p	GC _p	-GC _p	GC _p	-GC _p
	341	0.30	-0.80	0.30	-0.80	0.30	-2.20	0.30	-0.80	0.30	-1.00	0.30	-1.00
Effective Area (ft ²)	Zone 3		Zone 3e		Zone 3r		Zone 4		Zone 5				
	GC _p	-GC _p	GC _p	-GC _p	GC _p	-GC _p	GC _p	-GC _p	GC _p	-GC _p			
85	0.30	-2.50	0.30	-2.50	0.30	-1.80	0.95	-1.05	0.95	-1.31			

Comp. & Cladding Pressures	Zone 1		Zone 1'		Zone 2		Zone 2e		Zone 2n		Zone 2r	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
	3.13	-16.18	3.13	-16.18	3.13	-52.70	3.13	-16.18	3.13	-21.39	3.13	-21.39
	Zone 3		Zone 3e		Zone 3r		Zone 4		Zone 5			
Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	(Max Pressure 60.53 psf)		
3.13	-60.53	3.13	-60.53	3.13	-42.26	20.19	-22.80	20.19	-29.42			

LOAD CASE 'A' FACTORED LOADS	
$0.6 * W_r = (Z_2 + Z_3) * 0.6 =$	3.5 psf
$0.6 * W_{rE} = (Z_{2E} + Z_{3E}) * 0.6 =$	6.2 psf
$0.6 * W_w = (Z_1 + Z_4) * 0.6 =$	14.6 psf
$0.6 * W_{wE} = (Z_{1E} + Z_{4E}) * 0.6 =$	21.9 psf

LOAD CASE 'B' FACTORED LOADS	
$0.6 * W_r = (Z_2 + Z_3) * 0.6 =$	5.0 psf
$0.6 * W_{rE} = (Z_{2E} + Z_{3E}) * 0.6 =$	8.5 psf
$0.6 * W_w = (Z_5 + Z_6) * 0.6 =$	10.8 psf
$0.6 * W_{wE} = (Z_{5E} + Z_{6E}) * 0.6 =$	16.3 psf

ROOF COMPONENTS FACTORED LOAD	
$0.6 * Z_{r,c\&c} =$	12.8 psf

WALL COMPONENTS FACTORED LOAD	
$0.6 * Z_{w,c\&c} =$	13.7 psf



OSB SEISMIC LOADING ANALYSIS

IBC / ASCE 7: Equivalent Lateral Force (ELF) Procedure:

INPUT DATA

DESIGN SUMMARY

Typical floor height:	$h = 16$ ft	$C_s = 1.2 * S_{DS} / (R / I_e) = 0.0870$	<= Applicable
Typical floor weight:	$w_x = 26.1$ kips	Period Parameter, $x = 0.75$	, ASCE Tab 12.8-2
Number of floors:	$n = 1$	Period: $T_a = C_t (h_n)^x = 0.22$	sec, ASCE 12.8.2.1
Importance factor (ASCE 11.5.1):	$I_e = 1.00$	$C_s < S_{D1} / [(R / I_e) T_a] = 0.1528$	, ASCE Tab 12.8.1.1 <= Not Applicable
Design spectral response:	$S_{DS} = 0.47$ g	$C_s > 0.044 S_{DS} I_e = 0.0207$	, ASCE Tab 12.8.1.1 <= Not Applicable
	$S_{D1} = 0.22$ g	$C_s > 0.5 S_1 / (R / I_e) = 0.0117$	, ASCE Tab 12.8.1.1 <= Not Applicable
Mapped spectral resp.:	$S_1 = 0.15$ g	$k = 1.48$	, (ASCE 12.8.3, page 91)
Period Parameter, C_t :	(ASCE Tab 12.8-2): $C_t = 0.020$	$V = C_s W = 0.0870$ W	
Resp. coefficient: (ASCE Tab. 12.2.1):	$R = 6.5$	$0.7 * V = 0.0609$ W	
Seismic design category: SDC = D	$h_n = 25.0$ ft	$W = 26$ kips, total	

SEISMIC COMPONENT & ANCHORING ANALYSIS

Out-of-plane seismic force for wall design (ASCE 7, Sec.12.11.1)

$$w_{1, seismic} = MAX(0.4 I S_{DS} W_p, 0.1 W_p) = 0.2 W_p = 0.2 \text{ psf} \quad \text{<= USE FOR DIAPHRAGMS}$$

Where: $W_p = 1.0$ psf, $I_e = 1.00$
(CBC / IBC Tab. 1604.5 & ASCE 7 Tab. 1.5-2)

Out-of-plane seismic force for anchorage design

For seismic design category A & B, any diaphragm (ASCE 7 Sec. 12.11.2)

$$F_{anch, seismic} = MAX \left[0.4 S_{DS} I W_p \frac{(h+h_p)^2}{2h}, 0.1 W_p \frac{(h+h_p)^2}{2h}, 400 S_{DS} I, F_{min} \right] =$$

Where: $F_{min} = 0.14$ plf, $2.36 W_p = 188$ plf (Horizontal) **<= Not Applicable**
(ASCE 7 Sec. 12.11.2 & 11.7.3)

For seismic design category C and above, flexible diaphragm (ASCE 7 Sec. 12.11.2.1)

$$F_{anch, seismic} = MAX \left[0.8 S_{DS} I W_p \frac{(h+h_p)^2}{2h}, 0.1 W_p \frac{(h+h_p)^2}{2h}, 400 S_{DS} I, F_{min} \right] =$$

$$= 4.71 W_p = 188 \text{ plf (Horizontal) } \text{<= Applicable}$$

For connections (ASCE 7 Sec. 12.11.2.1)

$$F_{conn, seismic} = MAX [0.133 S_{DS} w_p, 0.5 w_p] = 0.5 W_p = 0.5 \text{ plf (Horizontal)}$$



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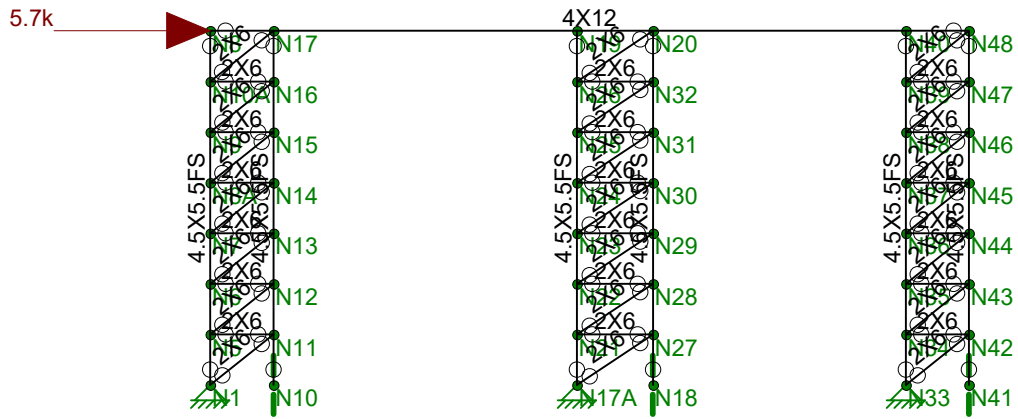
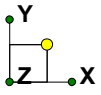
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WIND / SEISMIC SHEAR FORCE CALCULATIONS:

From ASCE 7-16 Wind & Seismic Loading Analysis

Wall Line	Roof / Floor						Wall					Load above		*C _s (W/p)	=	Loading		
	Wind Force (psf)	Diaph. Weight	Wt, We truss trib (ft)	Area W (ft)	Area L (ft)	Wind Force (psf)	Wall DL (psf)	Wall ht (ft)	wall line dist (ft)	Upr. Fir Wall ht (ft)	Wind (#)	Seismic (#)	Wind Force (kips)			Seismic Force (kips)	Lateral Control	
X1-1	9.6	55	9.0	32.0	48.0	16.0	12.0	16.0	32.0				0.06	=	3.44	2.92	Wind	
X2-1	9.6	55	9.0	32.0	48.0	16.0	12.0	16.0	32.0				0.06	=	3.44	2.92	Wind	
														=				
														=				
Y1-1	9.6	55	9.0	48.0	32.0	15.6	12.0	16.0	48.0				0.06	=	5.06	3.11	Wind	
Y2-1	9.6	55	9.0	48.0	32.0	15.6	12.0	16.0	48.0				0.06	=	5.06	3.11	Wind	
														=				
														=				



Loads: BLC 1, Wind Load
Envelope Only Solution

SK - 1

July 5, 2023 at 5:23 PM

04/26/24

2ftx14ft.r2d Page 8 of 79



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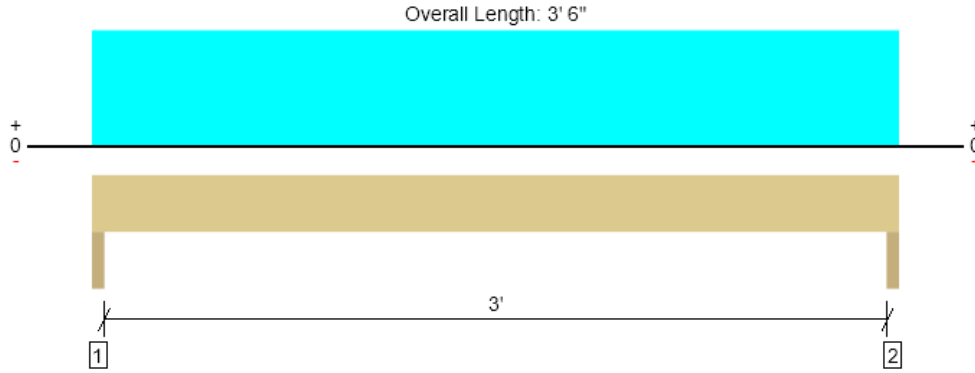
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TALL WALL CALCULATIONS:

This spreadsheet is used for designing a stud wall according to the NDS.

Description:	16' Tall Wall	King Stud (3' Max Opening)	16' Trimmer	16' Tall Wall		
Type:	2x Lumber (2"-4")	2x Lumber (2"-4")	2x Lumber (2"-4")	2x Lumber (2"-4")		
Species:	DF-L	DF-L	DF-L	DF-L		
Grade:	No. 2	No. 2	No. 2	No. 2		
Nominal width, t =	(2) 2	(2) 2	(2) 2	(1) 2		
Actual width =	3.00 in	3.00 in	3.00 in	1.50 in		
Nominal depth, d =	6	6	6	6		
Actual depth =	5.50 in	5.50 in	5.50 in	5.50 in		
Span, L =	16.000 ft	16.000 ft	16.000 ft	16.000 ft		
w/o Plates	15.750 ft	15.750 ft	15.750 ft	15.750 ft		
Stud spacing, s =	16 in	28 in	16 in	16 in		
Lat. Pressure, w _{wind} =	13.68 psf	13.68 psf	5.00 psf	13.68 psf		
Axial load, P =	4008 lbs	50 lbs	4509 lbs	668 lbs		
Eccentricity, e =	0 in	0 in	0 in	0 in		
K _{cE} =	0.3	0.3	0.3	0.3		
c =	0.8	0.8	0.8	0.8		
w =	18.2 plf	32.2 plf	6.7 plf	18.2 plf		
F _b	900 psi	900 psi	900 psi	900 psi		
F _v	180 psi	180 psi	180 psi	180 psi		
F _{c-prll}	1,350 psi	1,350 psi	1,350 psi	1,350 psi		
F _{c-perp}	625 psi	625 psi	625 psi	625 psi		
C _d	1.60	1.60	1.15	1.60		
C _{F,Fb}	1.30	1.30	1.30	1.30		
C _{F,Fcprll}	1.10	1.10	1.10	1.10		
C _r	1.15	1.00	1.00	1.15		
C _p	0.16	0.16	0.22	0.16		
C _H	1.00	1.00	1.00	1.00		
C _b	1.07	1.07	1.07	1.07		
E	1,600,000 psi	1,600,000 psi	1,600,000 psi	1,600,000 psi		
E _{min}	580,000 psi	580,000 psi	580,000 psi	580,000 psi		
Allowable Stress:						
F' _b = F _b C _d C _F C _r	2153 psi	1872 psi	1346 psi	2153 psi		
F' _v = F _v C _d C _H	288 psi	288 psi	207 psi	288 psi		
F' _c = F _c C _d C _F	2376 psi	2376 psi	1708 psi	2376 psi		
F' _{cE} = (K _{cE} E')/(l/d)2	406 psi	406 psi	406 psi	406 psi		
F' _c = F _c C _d C _F C _p	391 psi	391 psi	384 psi	391 psi		
F' _{c-perp} = F _{c-perp} C _b	668 psi	668 psi	668 psi	668 psi		
E'	1600000 psi	1600000 psi	1600000 psi	1600000 psi		
F _{bE}	6026 psi	6026 psi	6026 psi	1506 psi		
Slenderness Ratio:	< 50 OK	< 50 OK	< 50 OK	< 50 OK		
R _g	11	11	11	21		
Bending:	< F'_b OK	< F'_b OK	< F'_b OK	< F'_b OK		
M = w L ² /8 + P e/12 =	566 ft-lbs	999 ft-lbs	207 ft-lbs	566 ft-lbs		
f _b = M/S =	449 psi	792 psi	164 psi	897 psi		
S =	15 in ³	15 in ³	15 in ³	8 in ³		
Shear:	< F'_v OK	< F'_v OK	< F'_v OK	< F'_v OK		
V = w L/2 =	144 lbs	254 lbs	53 lbs	144 lbs		
f _v = 1.5 V/A =	13 psi	23 psi	5 psi	26 psi		
A =	17 in ²	17 in ²	17 in ²	8 in ²		
Compression:	< F'_c OK	< F'_c OK	< F'_c OK	< F'_c OK		
f _c = P/A =	243 psi	3 psi	273 psi	81 psi		
Compression (perp.):	< F'_c OK	< F'_c OK	< F'_c OK	< F'_c OK		
f _{c-perp} = P/A =	243 psi	3 psi	273 psi	81 psi		
Combined:	< 1.0 OK			< 1.0 OK		
((f _c /F _c)2 + (f _b /(F _b (1-(f _c /F _c E)))) =	0.90			0.56		
Deflection:	≥ 180 OK	≥ 180 OK	≥ 180 OK	≥ 180 OK		
D = 22.5 w L ⁴ /E'I =	0.38 in	0.67 in	0.14 in	0.76 in		
I =	42 in ⁴	42 in ⁴	42 in ⁴	21 in ⁴		
SPAN /	498	282	1363	249		

Level, 3'-0" HDR
2 piece(s) 2 x 12 DF No.2



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5275 @ 1' 1/2"	5625 (3.00")	Passed (94%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1696 @ 1' 2 1/4"	4658	Passed (36%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3980 @ 1' 9"	5458	Passed (73%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.012 @ 1' 9"	0.108	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.013 @ 1' 9"	0.162	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 3' 6"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - DF	3.00"	3.00"	2.81"	550	4725	5275	None
2 - Trimmer - DF	3.00"	3.00"	2.81"	550	4725	5275	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 6" o/c	
Bottom Edge (Lu)	3' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 6"	N/A	8.6	--	
1 - Uniform (PSF)	0 to 3' 6"	18'	17.0	150.0	Roof

Weyerhaeuser Notes

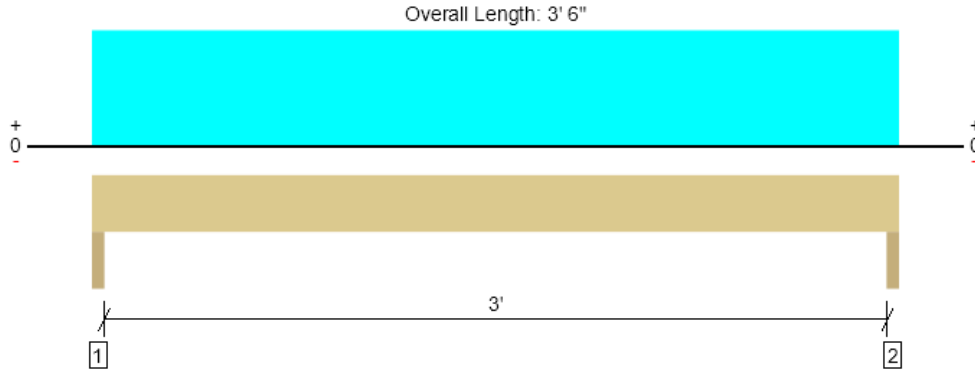
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Austin Fox Snake River Engineering (208) 453-6512 austin@snakeriverengineering.com	



Level, Copy of 3'-0" HDR
1 piece(s) 6 x 10 DF No.2



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5284 @ 1' 1/2"	10313 (3.00")	Passed (51%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2139 @ 1' 1/2"	6810	Passed (31%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3986 @ 1' 9"	6937	Passed (57%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.013 @ 1' 9"	0.108	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.015 @ 1' 9"	0.162	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

Member Length : 3' 6"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Lumber grading provisions must be extended over the length of the member per NDS 4.2.5.5.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.54"	559	4725	5284	None
2 - Trimmer - DF	3.00"	3.00"	1.54"	559	4725	5284	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 6" o/c	
Bottom Edge (Lu)	3' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 6"	N/A	13.2	--	
1 - Uniform (PSF)	0 to 3' 6"	18'	17.0	150.0	Roof

Weyerhaeuser Notes

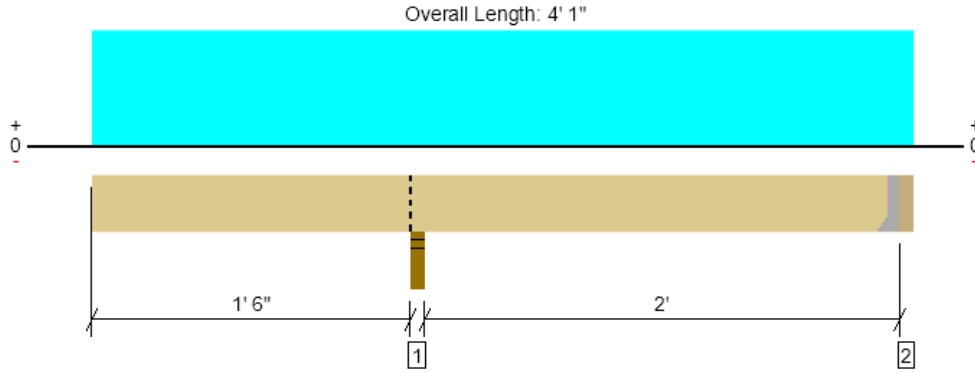
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ForteWEB Software Operator	Job Notes
Austin Fox 04/26/24 Snake River Engineering (208) 453-6512 austin@snakeriverengineering.com	



Level, Outlooker
1 piece(s) 2 x 6 DF No.2



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1126 @ 1' 7 3/4"	3281 (3.50")	Passed (34%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	370 @ 2' 3"	1139	Passed (32%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-455 @ 1' 7 3/4"	848	Passed (54%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.034 @ 0	0.200	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.037 @ 0	0.219	Passed (2L/999+)	--	1.0 D + 1.0 S (Alt Spans)

Member Length : 3' 9 1/2"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (0.2") and TL (2L/180).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Stud wall - DF	3.50"	3.50"	1.50"	121	1005	1126	Blocking
2 - Hanger on 5 1/2" DF beam	3.50"	Hanger ¹	1.50"	26	315	341	See note ¹

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 10" o/c	
Bottom Edge (Lu)	3' 10" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie							
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories	
2 - Face Mount Hanger	LU26	1.50"	N/A	6-10dx1.5	4-10dx1.5		

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 9 1/2"	N/A	2.1	--	
1 - Uniform (PSF)	0 to 4' 1" (Front)	2'	17.0	150.0	Roof

Weyerhaeuser Notes

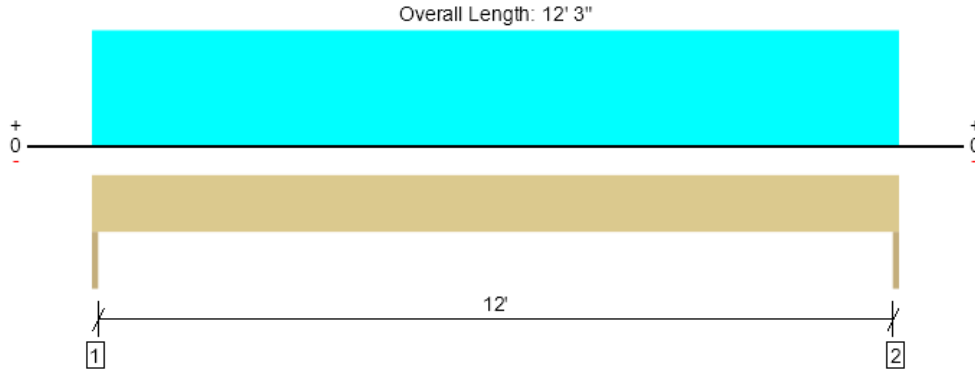
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ForteWEB Software Operator	Job Notes
Austin Fox Snake River Engineering (208) 453-6512 austin@snakeriverengineering.com	



Level, Garage Door HDR
2 piece(s) 1 3/4" x 11 7/8" 2.0E Microllam® LVL



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal.

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3143 @ 0	3938 (1.50")	Passed (80%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2571 @ 1' 1 3/8"	9081	Passed (28%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	9625 @ 6' 1 1/2"	20525	Passed (47%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.257 @ 6' 1 1/2"	0.408	Passed (L/572)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.293 @ 6' 1 1/2"	0.613	Passed (L/502)	--	1.0 D + 1.0 S (All Spans)

Member Length : 12' 3"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Factored	
1 - Trimmer - DF	1.50"	1.50"	1.50"	387	2756	3143	None
2 - Trimmer - DF	1.50"	1.50"	1.50"	387	2756	3143	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 3" o/c	
Bottom Edge (Lu)	12' 3" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 12' 3"	N/A	12.1	--	
1 - Uniform (PSF)	0 to 12' 3"	3'	17.0	150.0	Roof

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ForteWEB Software Operator	Job Notes
Austin Fox Snake River Engineering (208) 453-6512 austin@snakeriverengineering.com	04/26/24





524 CLEVELAND BLVD. #230
CALDWELL, IDAHO 83605
(208) 453-6512

Completed by: ASF
Review/Check: ARA

Project Name: Foster RV Garage
SRE Project #: 2024-7401
City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 5'-0" - BEARING - LEFT ELEV.

Code Reference:

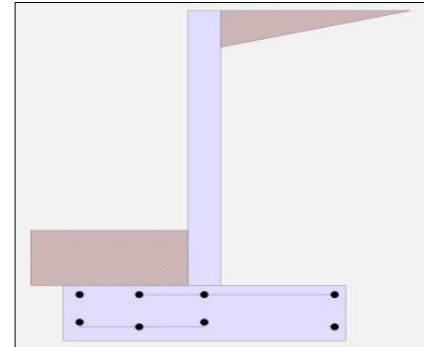
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	5.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	50.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	498.0 lbs
Axial Live Load	=	2,700.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300



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LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

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DESCRIPTION: 5'-0" - BEARING - LEFT ELEV.

Design Summary

Wall Stability Ratios

Overturning	=	4.78	OK
Sliding	=	2.11	OK
Global Stability	=	2.81	

Total Bearing Load	=	3,162	lbs
...resultant ecc.	=	0.88	in

Eccentricity within middle third

Soil Pressure @ Toe	=	1,420	psf OK
Soil Pressure @ Heel	=	1,157	psf OK
Allowable	=	1,500	psf

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,988	psf
ACI Factored @ Heel	=	1,620	psf
Footing Shear @ Toe	=	18.7	psi OK
Footing Shear @ Heel	=	13.1	psi OK
Allowable	=	75.0	psi

Sliding Calcs

Lateral Sliding Force	=	725.5	lbs
less 100% Passive Force	=	375.0	lbs
less 100% Friction Force	=	1,153.7	lbs
Added Force Req'd	=	0.0	lbs OK
...for 1.5 Stability	=	0.0	lbs OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftc	ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete	
Design Method	=	SD	SD SD
Thickness	=	6.00	
Rebar Size	=	# 4	
Rebar Spacing	=	18.00	
Rebar Placed at	=	Center	

Design Data

fb/FB + fa/Fa	=	0.870
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	827.3

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	1,484.8

Moment.....Allowable	=	1,705.6
----------------------	---	---------

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	23.0

Shear.....Allowable	psi =	75.0
---------------------	-------	------

Anet (Masonry)	in2 =	
----------------	-------	--

Wall Weight	psf =	75.0
-------------	-------	------

Rebar Depth 'd'	in =	3.00
-----------------	------	------

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	60,000.0



524 CLEVELAND BLVD. #230
CALDWELL, IDAHO 83605
(208) 453-6512

Completed by: ASF
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Project Name: Foster RV Garage
SRE Project #: 2024-7401
City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 5'-0" - BEARING - LEFT ELEV.

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
Bottom Stem			
As (based on applied moment) :	0.1231 in ² /ft		
(4/3) * As :	0.1641 in ² /ft	Min Stem T&S Reinf Area 0.720 in ²	
200bd/fy : 200(12)(3)/60000 :	0.12 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in ² /ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in ² /ft	Horizontal Reinforcing Options :	
	=====	<u>One layer of :</u> <u>Two layers of :</u>	
Required Area :	0.1231 in ² /ft	#4@ 16.67 in	#4@ 33.33 in
Provided Area :	0.1333 in ² /ft	#5@ 25.83 in	#5@ 51.67 in
Maximum Area :	0.4064 in ² /ft	#6@ 36.67 in	#6@ 73.33 in

Footing Data

Toe Width	=	1.92 ft
Heel Width	=	2.42
Total Footing Width	=	4.33
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.83 ft
f _c =	2,500 psi	F _y = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>
Factored Pressure	= 1,988	1,620 psf
Mu' : Upward	= 3,553	3,076 ft-#
Mu' : Downward	= 573	1,690 ft-#
Mu: Design	= 2,979 OK	-1,386 ft-#
phiMn	= 10,125	11,029 ft-#
Actual 1-Way Shear	= 18.73	13.14 psi
Allow 1-Way Shear	= 75.00	75.00 psi
Toe Reinforcing	= # 4 @ 9.00 in	
Heel Reinforcing	= # 4 @ 9.25 in	
Key Reinforcing	= None Spec'd	
Footing Torsion, Tu	=	0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Heel: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Key: No key defined

Min footing T&S reinf Area	1.12	in ²
Min footing T&S reinf Area per foot	0.26	in ² /ft

If one layer of horizontal bars:

#4@ 9.26 in
#5@ 14.35 in
#6@ 20.37 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in



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Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 5'-0" - BEARING - LEFT ELEV.

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....				
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#			
HL Act Pres (ab water tbl)	630.0	2.00	1,260.0	Soil Over HL (ab. water tbl)	1,054.4	3.38	3,559.0		
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		3.38	3,559.0		
Hydrostatic Force				Water Table					
Buoyant Force	=			Sloped Soil Over Heel	=				
Surcharge over Heel	=	95.5	3.00	286.4	Surcharge Over Heel	=	95.9	3.38	323.5
Surcharge Over Toe	=			Adjacent Footing Load	=				
Adjacent Footing Load	=			Axial Dead Load on Stem	=	498.0	2.17	1,079.2	
Added Lateral Load	=			* Axial Live Load on Stem	=	2,700.0	2.17	5,850.9	
Load @ Stem Above Soil	=			Soil Over Toe	=	210.9	0.96	202.1	
	=			Surcharge Over Toe	=				
				Stem Weight(s)	=	375.0	2.17	812.6	
				Earth @ Stem Transitions	=				
Total	=	725.5	O.T.M. =	1,546.4	Footing Weight	=	650.1	2.17	1,408.8
					Key Weight	=		1.83	
					Vert. Component	=			
Resisting/Overturning Ratio			=	4.78	Total =	2,884.2 lbs	R.M.=	7,385.2	
Vertical Loads used for Soil Pressure =		3,162.3	lbs						

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.045 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
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Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

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DESCRIPTION: 5'-0" - BEARING - LEFT ELEV.

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	18.72 in
Development length for #4 bar specified in this stem design segment =	14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	7.75 in
As Provided =	0.1333 in/ft
As Required =	0.1231 in/ft



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CALDWELL, IDAHO 83605
(208) 453-6512

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SRE Project #: 2024-7401
City and State: Valley County, Idaho

Cantilevered Retaining Wall

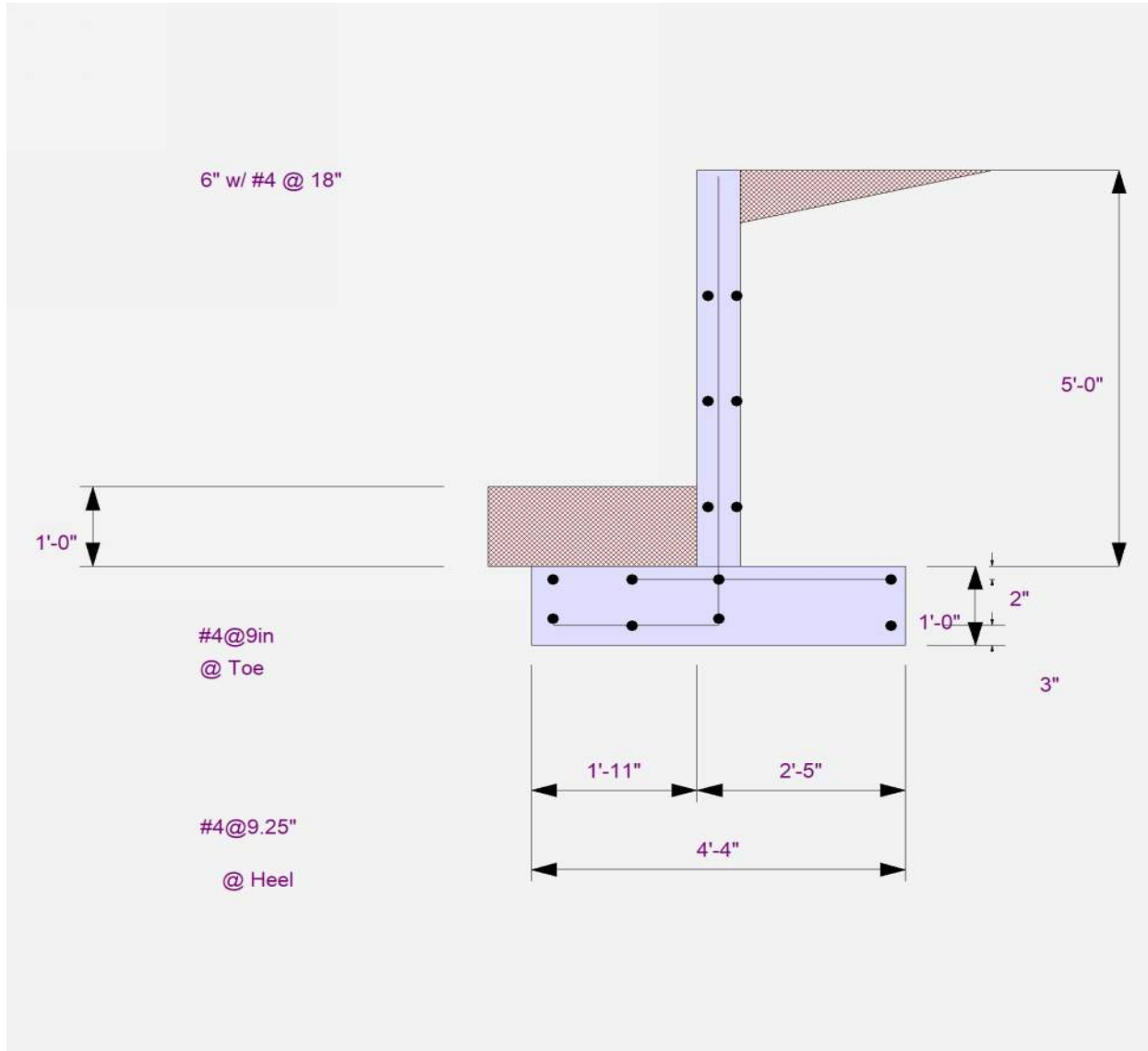
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LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

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DESCRIPTION: 5'-0" - BEARING - LEFT ELEV.





524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
 (208) 453-6512

Completed by: ASF
 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

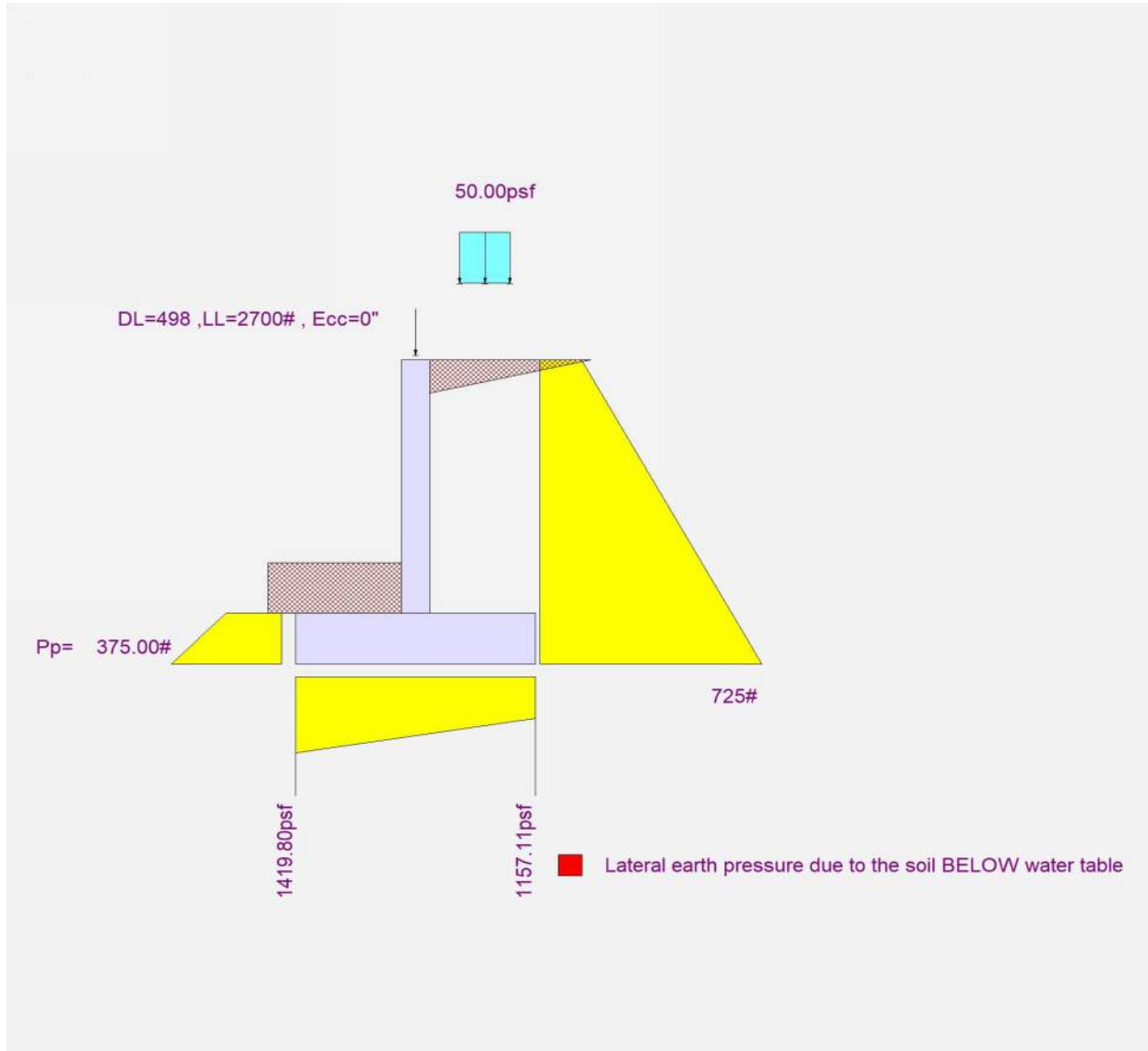
Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 5'-0" - BEARING - LEFT ELEV.





524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
 (208) 453-6512

Completed by: ASF
 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - BEARING - LEFT ELEV

Code Reference:

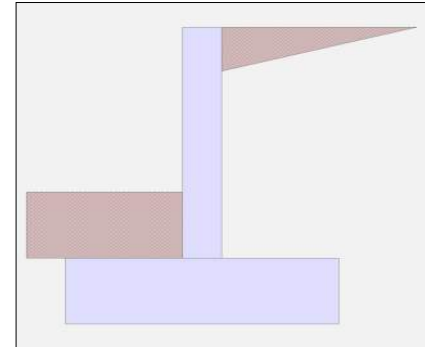
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	3.50 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	50.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	498.0 lbs
Axial Live Load	=	2,700.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300



524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
 (208) 453-6512

Completed by: ASF
 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - BEARING - LEFT ELEV

Design Summary

Wall Stability Ratios

Overturning	=	6.02	OK
Sliding	=	2.86	OK
Global Stability	=	3.74	

Total Bearing Load	=	2,259	lbs
...resultant ecc.	=	0.51	in

Eccentricity within middle third

Soil Pressure @ Toe	=	1,473	psf	OK
Soil Pressure @ Heel	=	1,272	psf	OK
Allowable	=	1,500	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	2,062	psf	
ACI Factored @ Heel	=	1,781	psf	
Footing Shear @ Toe	=	11.0	psi	OK
Footing Shear @ Heel	=	14.0	psi	OK
Allowable	=	75.0	psi	

Sliding Calcs

Lateral Sliding Force	=	426.0	lbs	
less 100% Passive Force	=	375.0	lbs	
less 100% Friction Force	=	841.2	lbs	
Added Force Req'd	=	0.0	lbs	OK
...for 1.5 Stability	=	0.0	lbs	OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftc	ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete	
Design Method	=	SD	SD SD
Thickness	=	6.00	
Rebar Size	=	# 4	
Rebar Spacing	=	18.00	
Rebar Placed at	=	Center	

Design Data

fb/FB + fa/Fa	=	0.326
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	432.1

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	556.1

Moment.....Allowable	=	1,705.6
----------------------	---	---------

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	12.0

Shear.....Allowable	psi =	75.0
---------------------	-------	------

Anet (Masonry)	in2 =	
----------------	-------	--

Wall Weight	psf =	75.0
-------------	-------	------

Rebar Depth 'd'	in =	3.00
-----------------	------	------

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	60,000.0



524 CLEVELAND BLVD. #230
CALDWELL, IDAHO 83605
(208) 453-6512

Completed by: ASF
Review/Check: ARA

Project Name: Foster RV Garage
SRE Project #: 2024-7401
City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - BEARING - LEFT ELEV

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
Bottom Stem			
As (based on applied moment) :	0.0461 in2/ft		
(4/3) * As :	0.0615 in2/ft	Min Stem T&S Reinf Area 0.504 in2	
200bd/fy : 200(12)(3)/60000 :	0.12 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	=====	<u>One layer of :</u> <u>Two layers of :</u>	
Required Area :	0.1296 in2/ft	#4@ 16.67 in	#4@ 33.33 in
Provided Area :	0.1333 in2/ft	#5@ 25.83 in	#5@ 51.67 in
Maximum Area :	0.4064 in2/ft	#6@ 36.67 in	#6@ 73.33 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	2.00
Total Footing Width	=	3.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.50 ft
f _c =	2,500 psi	F _y = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm. = 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>
Factored Pressure	= 2,062	1,781 psf
Mu' : Upward	= 2,274	2,048 ft-#
Mu' : Downward	= 351	812 ft-#
Mu: Design	= 1,923 OK	-1,236 ft-#
phiMn	= 2,500	2,500 ft-#
Actual 1-Way Shear	= 11.04	13.99 psi
Allow 1-Way Shear	= 40.00	40.00 psi
Toe Reinforcing	= None Spec'd	
Heel Reinforcing	= None Spec'd	
Key Reinforcing	= None Spec'd	
Footing Torsion, Tu	=	0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: $\phi M_n = \phi * 5 * \lambda * \sqrt{f_c} * S_m$

Heel: $\phi M_n = \phi * 5 * \lambda * \sqrt{f_c} * S_m$

Key: No key defined

Min footing T&S reinf Area	0.91	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in



524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
 (208) 453-6512

Completed by: ASF
 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - BEARING - LEFT ELEV

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....				
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#			
HL Act Pres (ab water tbl)	354.4	1.50	531.6	Soil Over HL (ab. water tbl)	577.5	2.75	1,588.1		
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.75	1,588.1		
Hydrostatic Force				Water Table					
Buoyant Force	=			Sloped Soil Over Heel	=				
Surcharge over Heel	=	71.6	2.25	161.1	Surcharge Over Heel	=	75.0	2.75	206.3
Surcharge Over Toe	=			Adjacent Footing Load	=				
Adjacent Footing Load	=			Axial Dead Load on Stem	=	498.0	1.75	871.5	
Added Lateral Load	=			* Axial Live Load on Stem	=	2,700.0	1.75	4,725.0	
Load @ Stem Above Soil	=			Soil Over Toe	=	165.0	0.75	123.8	
	=			Surcharge Over Toe	=				
				Stem Weight(s)	=	262.5	1.75	459.4	
				Earth @ Stem Transitions	=				
Total	=	426.0	O.T.M. =	692.6	Footing Weight	=	525.0	1.75	918.8
				Key Weight	=			1.50	
				Vert. Component	=				
Resisting/Overturning Ratio			=	6.02	Total =	2,103.0 lbs	R.M.=	4,167.8	
Vertical Loads used for Soil Pressure	=	2,259.4	lbs						

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.041 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



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 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - BEARING - LEFT ELEV

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	18.72 in
Development length for #4 bar specified in this stem design segment =	14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	8.16 in
As Provided =	0.1333 in/ft
As Required =	0.1296 in/ft



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City and State: Valley County, Idaho

Cantilevered Retaining Wall

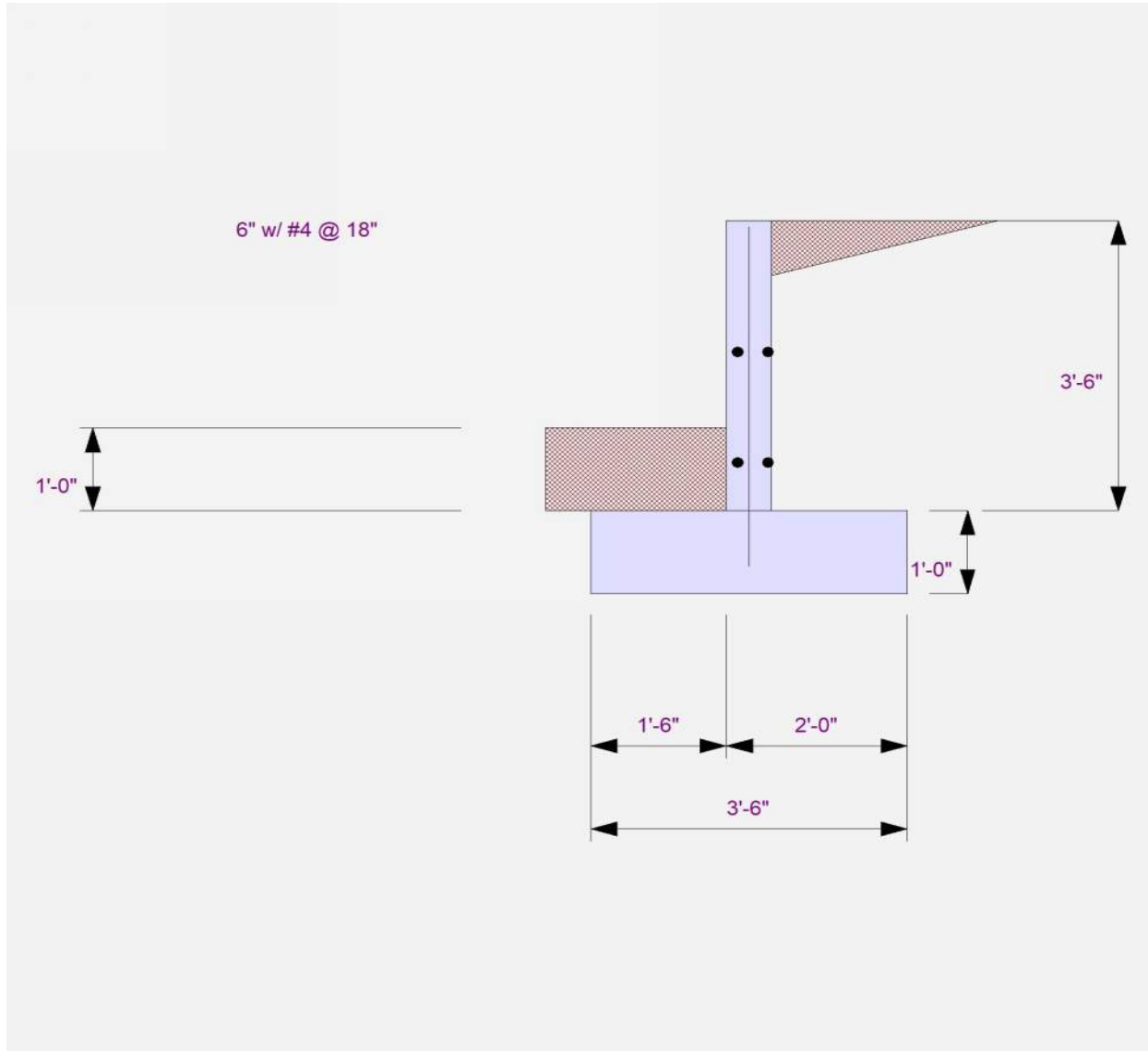
Project File: 05 Beams.ec6

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SNAKE RIVER ENGINEERING

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DESCRIPTION: 3'-6" - BEARING - LEFT ELEV





524 CLEVELAND BLVD. #230
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SNAKE RIVER ENGINEERING

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DESCRIPTION: 3'-6" - BEARING - LEFT ELEV





524 CLEVELAND BLVD. #230
CALDWELL, IDAHO 83605
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Project Name: Foster RV Garage
SRE Project #: 2024-7401
City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 2'-6" - BEARING - RIGHT ELE. - GRAVITY GOVERNS

Code Reference:

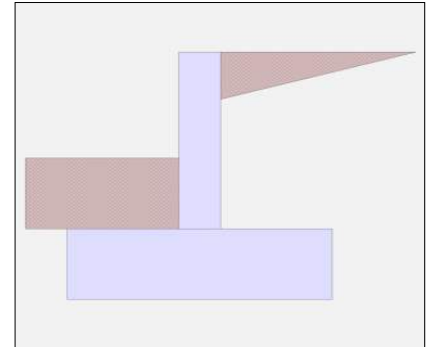
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	2.50 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	50.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	498.0 lbs
Axial Live Load	=	2,700.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300



524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
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Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 2'-6" - BEARING - RIGHT ELE. - GRAVITY GOVERNS

Design Summary

Wall Stability Ratios

Overturning	=	8.69	OK
Sliding	=	3.97	OK
Global Stability	=	5.24	
Total Bearing Load	=	1,835	lbs
...resultant ecc.	=	0.23	in
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,453	psf OK
Soil Pressure @ Heel	=	1,351	psf OK
Allowable	=	1,500	psf
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	2,034	psf
ACI Factored @ Heel	=	1,892	psf
Footing Shear @ Toe	=	8.7	psi OK
Footing Shear @ Heel	=	14.8	psi OK
Allowable	=	75.0	psi

Sliding Calcs

Lateral Sliding Force	=	270.1	lbs
less 100% Passive Force	=	375.0	lbs
less 100% Friction Force	=	696.2	lbs
Added Force Req'd	=	0.0	lbs OK
...for 1.5 Stability	=	0.0	lbs OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftc	ft =	Stem OK		
		0.00		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD	SD
Thickness	=	6.00		
Rebar Size	=	# 4		
Rebar Spacing	=	18.00		
Rebar Placed at	=	Center		

Design Data

fb/FB + fa/Fa	=	0.132
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	238.6

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	225.4

Moment.....Allowable	=	1,705.6
----------------------	---	---------

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	6.6

Shear.....Allowable	psi =	75.0
---------------------	-------	------

Anet (Masonry)	in2 =	
----------------	-------	--

Wall Weight	psf =	75.0
-------------	-------	------

Rebar Depth 'd'	in =	3.00
-----------------	------	------

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	60,000.0



524 CLEVELAND BLVD. #230
CALDWELL, IDAHO 83605
(208) 453-6512

Completed by: ASF
Review/Check: ARA

Project Name: Foster RV Garage
SRE Project #: 2024-7401
City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 2'-6" - BEARING - RIGHT ELE. - GRAVITY GOVERNS

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
Bottom Stem			
As (based on applied moment) :	0.0187 in ² /ft		
(4/3) * As :	0.0249 in ² /ft	Min Stem T&S Reinf Area 0.360 in ²	
200bd/fy : 200(12)(3)/60000 :	0.12 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in ² /ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in ² /ft	Horizontal Reinforcing Options :	
	=====	<u>One layer of :</u> <u>Two layers of :</u>	
Required Area :	0.1296 in ² /ft	#4@ 16.67 in	#4@ 33.33 in
Provided Area :	0.1333 in ² /ft	#5@ 25.83 in	#5@ 51.67 in
Maximum Area :	0.4064 in ² /ft	#6@ 36.67 in	#6@ 73.33 in

Footing Data

Toe Width	=	1.33 ft
Heel Width	=	1.83
Total Footing Width	=	3.17
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.33 ft
f _c =	2,500 psi	F _y = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm. = 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>
Factored Pressure	= 2,034	1,892 psf
Mu' : Upward	= 1,791	1,700 ft-#
Mu' : Downward	= 277	525 ft-#
Mu: Design	= 1,513 OK	-1,175 ft-#
phiMn	= 2,500	2,500 ft-#
Actual 1-Way Shear	= 8.67	14.80 psi
Allow 1-Way Shear	= 40.00	40.00 psi
Toe Reinforcing	= None Spec'd	
Heel Reinforcing	= None Spec'd	
Key Reinforcing	= None Spec'd	
Footing Torsion, Tu	=	0.00 ft-lbs
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: $\phi M_n = \phi \cdot 5 \cdot \lambda \cdot \sqrt{f_c} \cdot S_m$

Heel: $\phi M_n = \phi \cdot 5 \cdot \lambda \cdot \sqrt{f_c} \cdot S_m$

Key: No key defined

Min footing T&S reinf Area	0.82	in ²
Min footing T&S reinf Area per foot	0.26	in ² /ft

If one layer of horizontal bars:

#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in



524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
 (208) 453-6512

Completed by: ASF
 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 2'-6" - BEARING - RIGHT ELE. - GRAVITY GOVERNS

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#		
HL Act Pres (ab water tbl)	214.4	1.17	250.1	Soil Over HL (ab. water tbl)	366.7	2.50	916.9		
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.50	916.9		
Hydrostatic Force				Water Table					
Buoyant Force	=			Sloped Soil Over Heel	=				
Surcharge over Heel	=	55.7	1.75	97.4	Surcharge Over Heel	=	66.7	2.50	166.7
Surcharge Over Toe	=			Adjacent Footing Load	=				
Adjacent Footing Load	=			Axial Dead Load on Stem	=	498.0	1.58	788.6	
Added Lateral Load	=			* Axial Live Load on Stem	=	2,700.0	1.58	4,275.5	
Load @ Stem Above Soil	=			Soil Over Toe	=	146.7	0.67	97.8	
	=			Surcharge Over Toe	=				
				Stem Weight(s)	=	187.5	1.58	296.9	
				Earth @ Stem Transitions	=				
Total	=	270.1	O.T.M. =						
				347.5					
Resisting/Overturning Ratio			=	8.69					
Vertical Loads used for Soil Pressure	=	1,835.3	lbs						
					Total =	1,740.6	lbs	R.M.=	3,019.1

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.032 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
 (208) 453-6512

Completed by: ASF
 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 2'-6" - BEARING - RIGHT ELE. - GRAVITY GOVERNS

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	18.72 in
Development length for #4 bar specified in this stem design segment =	14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	8.16 in
As Provided =	0.1333 in/ft
As Required =	0.1296 in/ft



524 CLEVELAND BLVD. #230
CALDWELL, IDAHO 83605
(208) 453-6512

Completed by: ASF
Review/Check: ARA

Project Name: Foster RV Garage
SRE Project #: 2024-7401
City and State: Valley County, Idaho

Cantilevered Retaining Wall

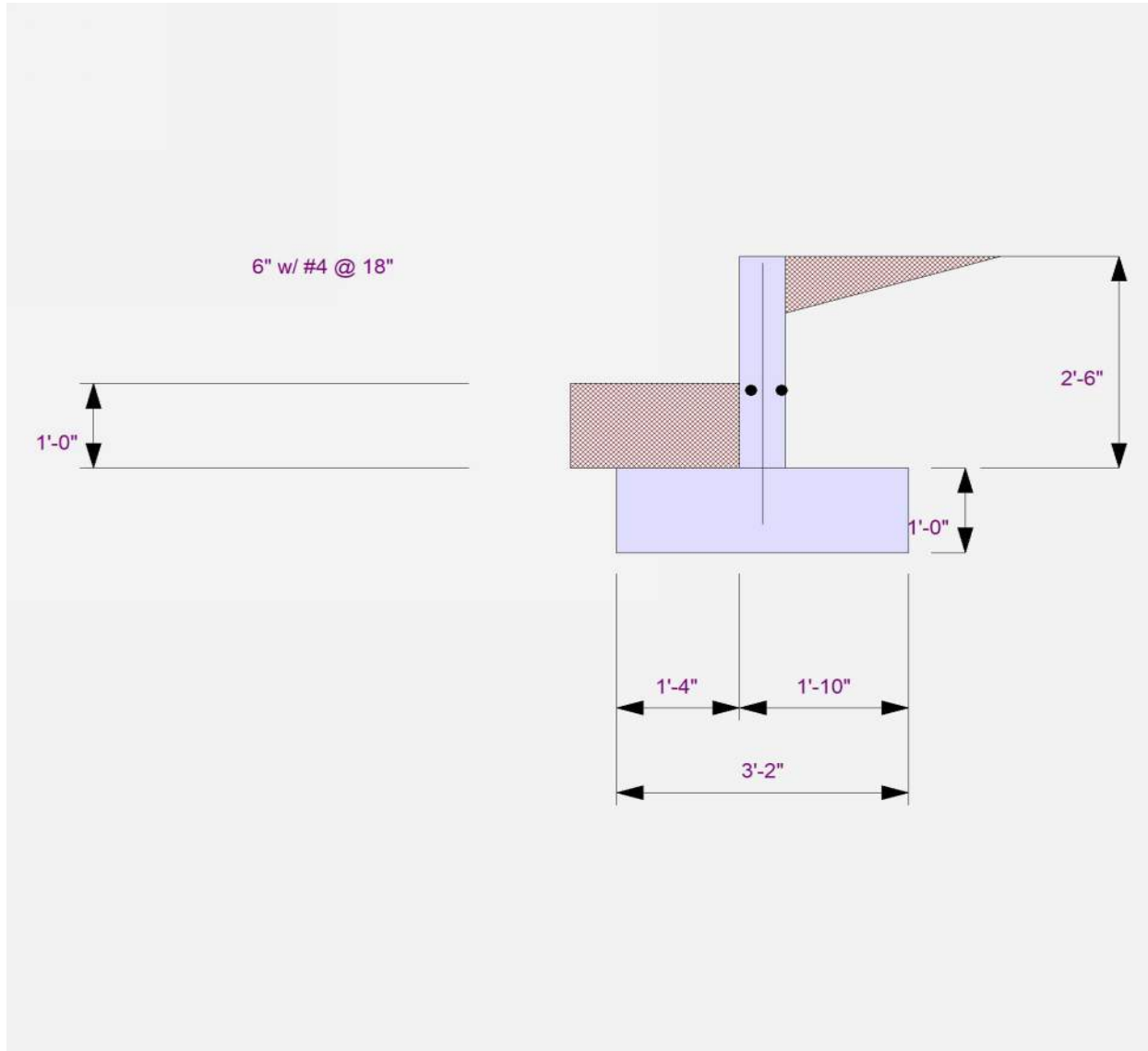
Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

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DESCRIPTION: 2'-6" - BEARING - RIGHT ELE. - GRAVITY GOVERNS





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Cantilevered Retaining Wall

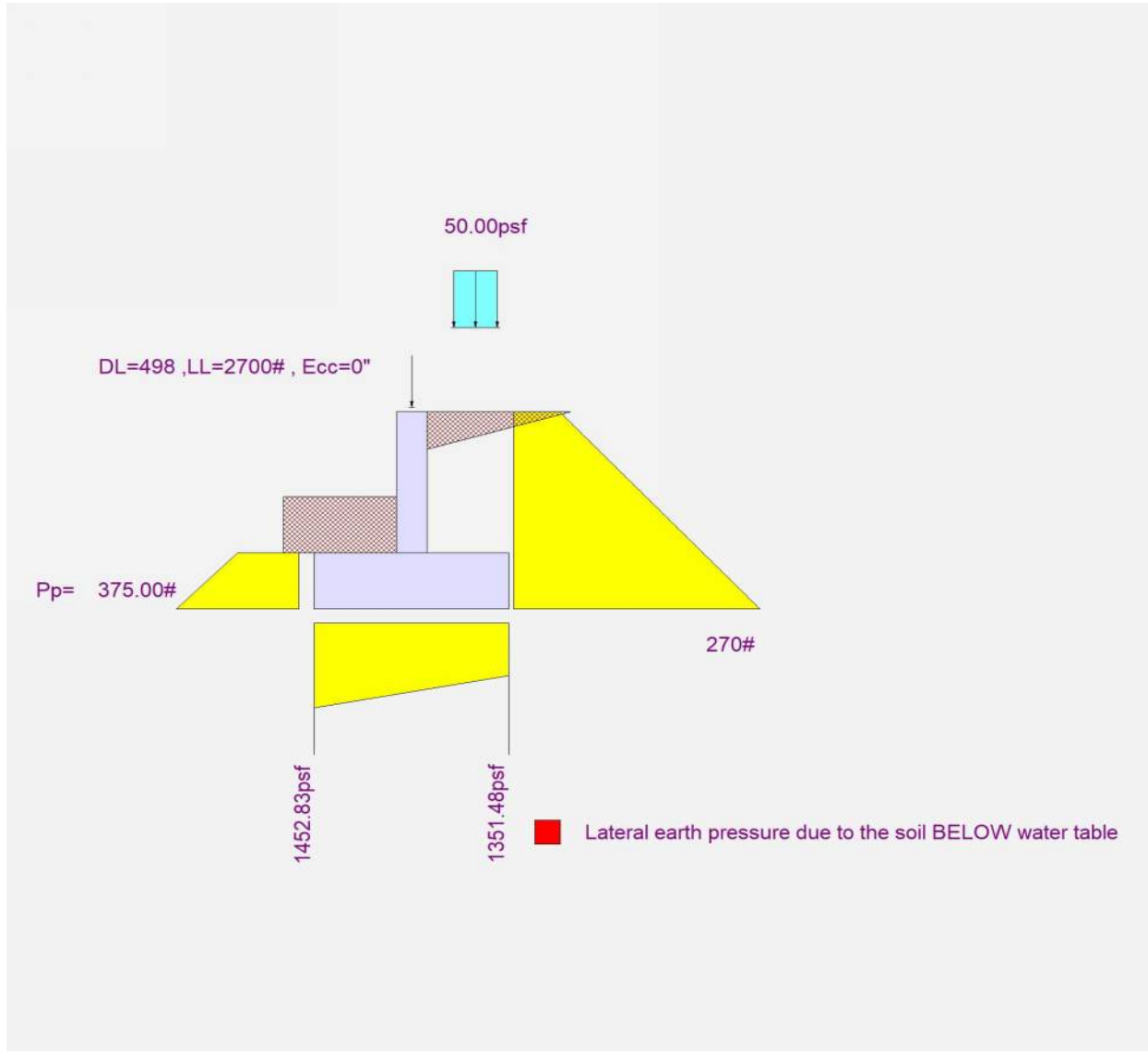
Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 2'-6" - BEARING - RIGHT ELE. - GRAVITY GOVERNS





524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
 (208) 453-6512

Completed by: ASF
 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 5'-0" - GABLE - REAR ELEV

Code Reference:

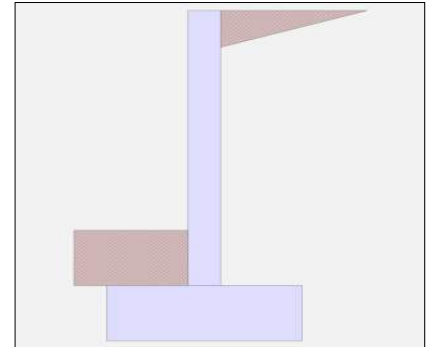
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	5.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	50.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	243.0 lbs
Axial Live Load	=	450.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300



524 CLEVELAND BLVD. #230
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 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

NAKKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 5'-0" - GABLE - REAR ELEV

Design Summary

Wall Stability Ratios

Overturning	=	2.24	OK
Sliding	=	1.60	OK
Global Stability	=	2.53	
Total Bearing Load	=	2,234	lbs
...resultant ecc.	=	5.04	in
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,475	psf OK
Soil Pressure @ Heel	=	128	psf OK
Allowable	=	1,500	psf
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	2,066	psf
ACI Factored @ Heel	=	180	psf
Footing Shear @ Toe	=	6.9	psi OK
Footing Shear @ Heel	=	3.6	psi OK
Allowable	=	75.0	psi

Sliding Calcs

Lateral Sliding Force	=	725.5	lbs
less 100% Passive Force	=	375.0	lbs
less 100% Friction Force	=	782.2	lbs
Added Force Req'd	=	0.0	lbs OK
...for 1.5 Stability	=	0.0	lbs OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftc	ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete	
Design Method	=	SD	SD SD
Thickness	=	6.00	
Rebar Size	=	# 4	
Rebar Spacing	=	18.00	
Rebar Placed at	=	Center	

Design Data

fb/FB + fa/Fa	=	0.870
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	827.3

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	1,484.8

Moment.....Allowable	=	1,705.6
----------------------	---	---------

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	23.0

Shear.....Allowable	psi =	75.0
---------------------	-------	------

Anet (Masonry)	in2 =	
----------------	-------	--

Wall Weight	psf =	75.0
-------------	-------	------

Rebar Depth 'd'	in =	3.00
-----------------	------	------

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	60,000.0



524 CLEVELAND BLVD. #230
CALDWELL, IDAHO 83605
(208) 453-6512

Completed by: ASF
Review/Check: ARA

Project Name: Foster RV Garage
SRE Project #: 2024-7401
City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 5'-0" - GABLE - REAR ELEV

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
Bottom Stem			
As (based on applied moment) :	0.1231 in ² /ft		
(4/3) * As :	0.1641 in ² /ft	Min Stem T&S Reinf Area 0.720 in ²	
200bd/fy : 200(12)(3)/60000 :	0.12 in ² /ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in ² /ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in ² /ft	Horizontal Reinforcing Options :	
	=====	<u>One layer of :</u> <u>Two layers of :</u>	
Required Area :	0.1231 in ² /ft	#4@ 16.67 in	#4@ 33.33 in
Provided Area :	0.1333 in ² /ft	#5@ 25.83 in	#5@ 51.67 in
Maximum Area :	0.4064 in ² /ft	#6@ 36.67 in	#6@ 73.33 in

Footing Data

Toe Width	=	1.25 ft
Heel Width	=	1.75
Total Footing Width	=	3.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.25 ft
f _c =	2,500 psi	F _y = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	= 2,066	180 psf	
Mu' : Upward	= 1,409	345 ft-#	
Mu' : Downward	= 244	719 ft-#	
Mu: Design	= 1,165 OK	374 ft-#	OK
phiMn	= 2,500	2,500 ft-#	
Actual 1-Way Shear	= 6.95	3.62 psi	
Allow 1-Way Shear	= 40.00	40.00 psi	
Toe Reinforcing	= None Spec'd		
Heel Reinforcing	= None Spec'd		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs	
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs	

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: $\phi M_n = \phi * 5 * \lambda * \sqrt{f_c} * S_m$

Heel: $\phi M_n = \phi * 5 * \lambda * \sqrt{f_c} * S_m$

Key: No key defined

Min footing T&S reinf Area	0.78	in ²
Min footing T&S reinf Area per foot	0.26	in ² /ft

If one layer of horizontal bars:

#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in



524 CLEVELAND BLVD. #230
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Completed by: ASF
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Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 5'-0" - GABLE - REAR ELEV

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....				
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#			
HL Act Pres (ab water tbl)	630.0	2.00	1,260.0	Soil Over HL (ab. water tbl)	687.5	2.38	1,632.8		
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		2.38	1,632.8		
Hydrostatic Force				Water Table					
Buoyant Force	=			Sloped Soil Over Heel	=				
Surcharge over Heel	=	95.5	3.00	286.4	Surcharge Over Heel	=	62.5	2.38	148.4
Surcharge Over Toe	=			Adjacent Footing Load	=				
Adjacent Footing Load	=			Axial Dead Load on Stem	=	243.0	1.50	364.5	
Added Lateral Load	=			* Axial Live Load on Stem	=	450.0	1.50	675.0	
Load @ Stem Above Soil	=			Soil Over Toe	=	137.5	0.63	85.9	
	=			Surcharge Over Toe	=				
				Stem Weight(s)	=	375.0	1.50	562.5	
				Earth @ Stem Transitions	=				
Total	=	725.5	O.T.M. =	1,546.4	Footing Weight	=	450.0	1.50	675.0
					Key Weight	=		1.25	
					Vert. Component	=			
Resisting/Overturning Ratio			=	2.24	Total =	1,955.5 lbs	R.M.=	3,469.2	
Vertical Loads used for Soil Pressure =		2,233.6	lbs						

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.068 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



524 CLEVELAND BLVD. #230
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Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 5'-0" - GABLE - REAR ELEV

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) = 18.72 in

Development length for #4 bar specified in this stem design segment = 14.40 in

Hooked embedment length into footing for #4 bar specified in this stem design segment = 7.75 in

As Provided = 0.1333 in/ft

As Required = 0.1231 in/ft



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SRE Project #: 2024-7401
City and State: Valley County, Idaho

Cantilevered Retaining Wall

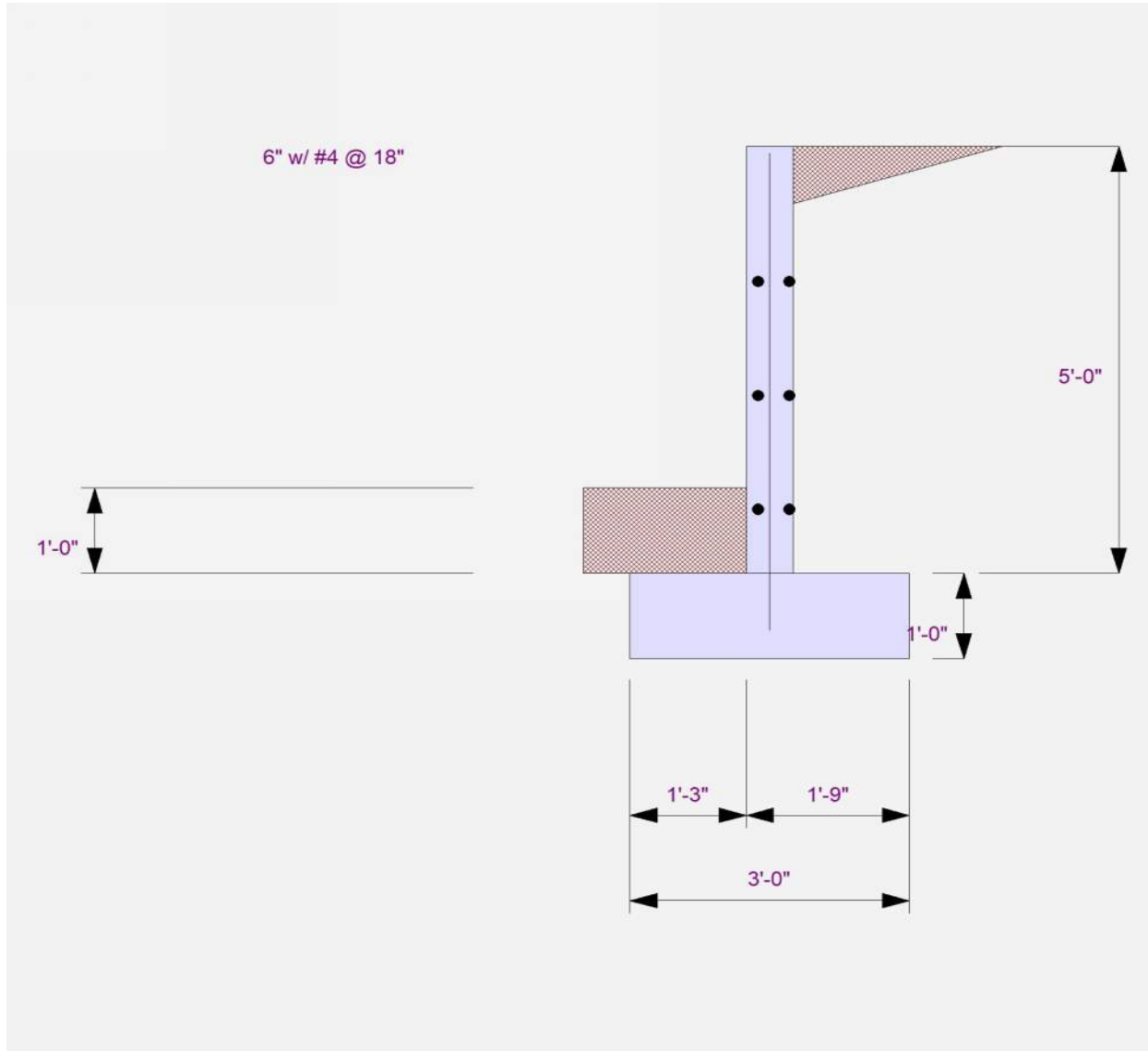
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SNAKE RIVER ENGINEERING

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DESCRIPTION: 5'-0" - GABLE - REAR ELEV





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Cantilevered Retaining Wall

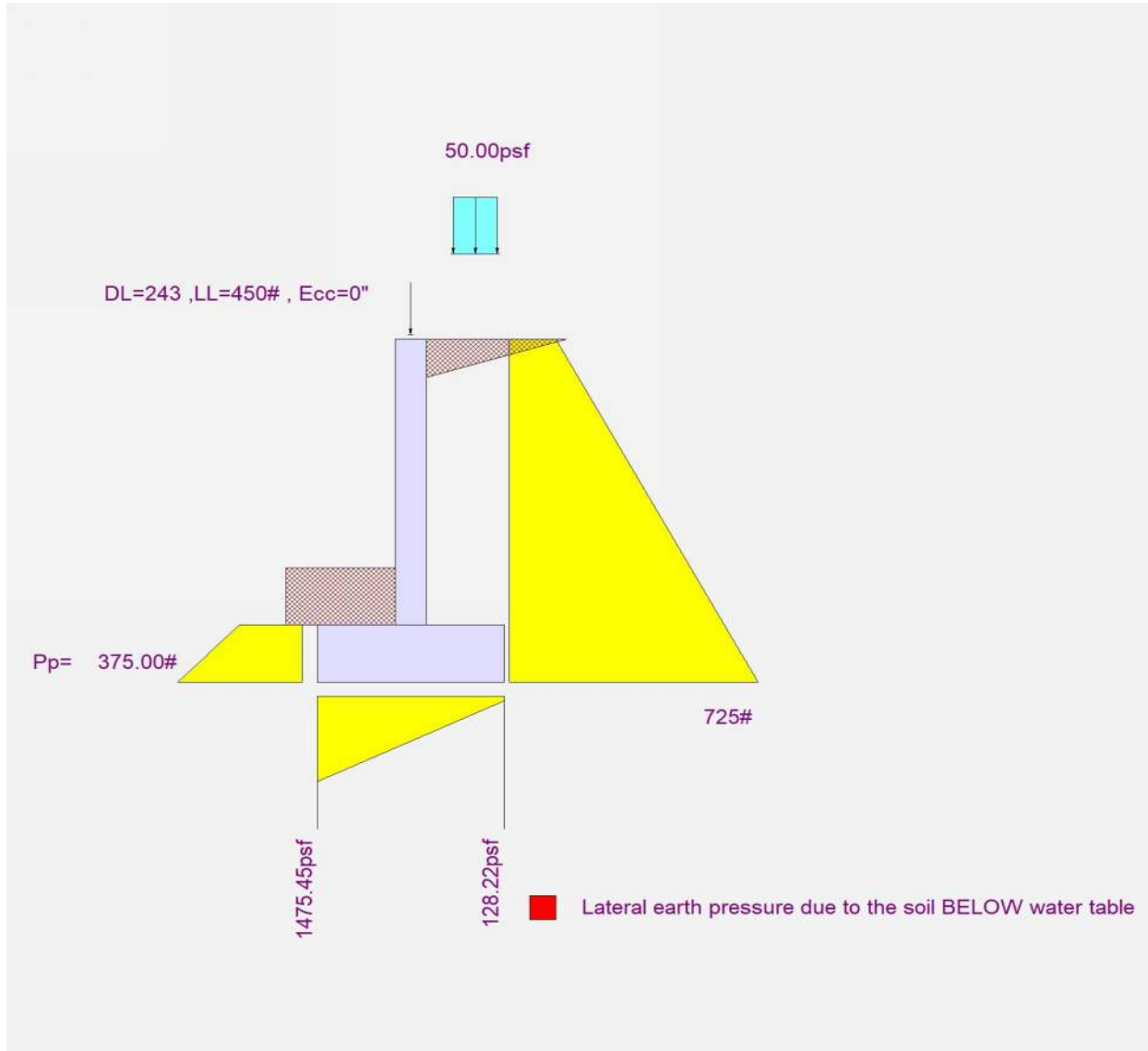
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LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

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DESCRIPTION: 5'-0" - GABLE - REAR ELEV





524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
 (208) 453-6512

Completed by: ASF
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Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - GABLE - REAR ELEV

Code Reference:

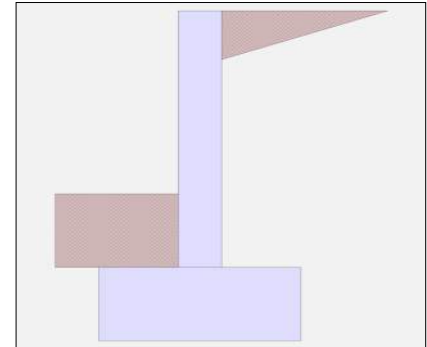
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	3.50 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	50.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	243.0 lbs
Axial Live Load	=	450.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300



524 CLEVELAND BLVD. #230
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City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - GABLE - REAR ELEV

Design Summary

Wall Stability Ratios

Overtuning	=	2.58	OK
Sliding	=	2.15	OK
Global Stability	=	3.38	

Total Bearing Load	=	1,510	lbs
...resultant ecc.	=	3.21	in

Eccentricity within middle third

Soil Pressure @ Toe	=	1,307	psf	OK
Soil Pressure @ Heel	=	241	psf	OK
Allowable	=	1,500	psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,830	psf	
ACI Factored @ Heel	=	338	psf	
Footing Shear @ Toe	=	2.4	psi	OK
Footing Shear @ Heel	=	0.7	psi	OK
Allowable	=	75.0	psi	

Sliding Calcs

Lateral Sliding Force	=	426.0	lbs	
less 100% Passive Force	=	375.0	lbs	
less 100% Friction Force	=	541.5	lbs	
Added Force Req'd	=	0.0	lbs	OK
...for 1.5 Stability	=	0.0	lbs	OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftc	ft =	Stem OK	0.00
Wall Material Above "Ht"	=	Concrete	
Design Method	=	SD	SD SD
Thickness	=	6.00	
Rebar Size	=	# 4	
Rebar Spacing	=	18.00	
Rebar Placed at	=	Center	

Design Data

fb/FB + fa/Fa	=	0.326
---------------	---	-------

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	432.1

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	556.1

Moment.....Allowable	=	1,705.6
----------------------	---	---------

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	12.0

Shear.....Allowable	psi =	75.0
---------------------	-------	------

Anet (Masonry)

Wall Weight	psf =	75.0
Rebar Depth 'd'	in =	3.00

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	60,000.0



524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
 (208) 453-6512

Completed by: ASF
 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

Snake River Engineering

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - GABLE - REAR ELEV

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
Bottom Stem			
As (based on applied moment) :	0.0461 in2/ft		
(4/3) * As :	0.0615 in2/ft	Min Stem T&S Reinf Area 0.504 in2	
200bd/fy : 200(12)(3)/60000 :	0.12 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	=====	<u>One layer of :</u> <u>Two layers of :</u>	
Required Area :	0.1296 in2/ft	#4@ 16.67 in	#4@ 33.33 in
Provided Area :	0.1333 in2/ft	#5@ 25.83 in	#5@ 51.67 in
Maximum Area :	0.4064 in2/ft	#6@ 36.67 in	#6@ 73.33 in

Footing Data

Toe Width	=	0.92 ft
Heel Width	=	1.42
Total Footing Width	=	2.33
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.83 ft
f _c =	2,500 psi	F _y = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	= 1,830	338 psf	
Mu' : Upward	= 684	223 ft-#	
Mu' : Downward	= 131	302 ft-#	
Mu: Design	= 554 OK	79 ft-#	OK
phiMn	= 2,500	2,500 ft-#	
Actual 1-Way Shear	= 2.42	0.70 psi	
Allow 1-Way Shear	= 40.00	40.00 psi	
Toe Reinforcing	= None Spec'd		
Heel Reinforcing	= None Spec'd		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs	
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs	

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: $\phi M_n = \phi * 5 * \lambda * \sqrt{f_c} * S_m$

Heel: $\phi M_n = \phi * 5 * \lambda * \sqrt{f_c} * S_m$

Key: No key defined

Min footing T&S reinf Area	0.60	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in



524 CLEVELAND BLVD. #230
 CALDWELL, IDAHO 83605
 (208) 453-6512

Completed by: ASF
 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

Snake River Engineering

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - GABLE - REAR ELEV

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....				.....RESISTING.....			
	Force lbs	Distance ft	Moment ft-#		Force lbs	Distance ft	Moment ft-#		
HL Act Pres (ab water tbl)	354.4	1.50	531.6	Soil Over HL (ab. water tbl)	352.3	1.87	659.6		
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		1.87	659.6		
Hydrostatic Force				Water Table					
Buoyant Force	=			Sloped Soil Over Heel	=				
Surcharge over Heel	=	71.6	2.25	161.1	Surcharge Over Heel	=	45.8	1.87	85.7
Surcharge Over Toe	=			Adjacent Footing Load	=				
Adjacent Footing Load	=			Axial Dead Load on Stem	=	243.0	1.17	283.1	
Added Lateral Load	=			* Axial Live Load on Stem	=	450.0	1.17	524.3	
Load @ Stem Above Soil	=			Soil Over Toe	=	100.7	0.46	46.0	
	=			Surcharge Over Toe	=				
				Stem Weight(s)	=	262.5	1.17	305.8	
				Earth @ Stem Transitions	=				
Total	=	426.0	O.T.M. =	692.6	Footing Weight	=	349.5	1.17	407.2
					Key Weight	=		0.83	
					Vert. Component	=			
Resisting/Overturning Ratio			=	2.58	Total =	1,353.7 lbs	R.M.=	1,787.4	
Vertical Loads used for Soil Pressure	=	1,510.1	lbs						

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.055 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



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 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - GABLE - REAR ELEV

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	18.72 in
Development length for #4 bar specified in this stem design segment =	14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	8.16 in
As Provided =	0.1333 in/ft
As Required =	0.1296 in/ft



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 City and State: Valley County, Idaho

Cantilevered Retaining Wall

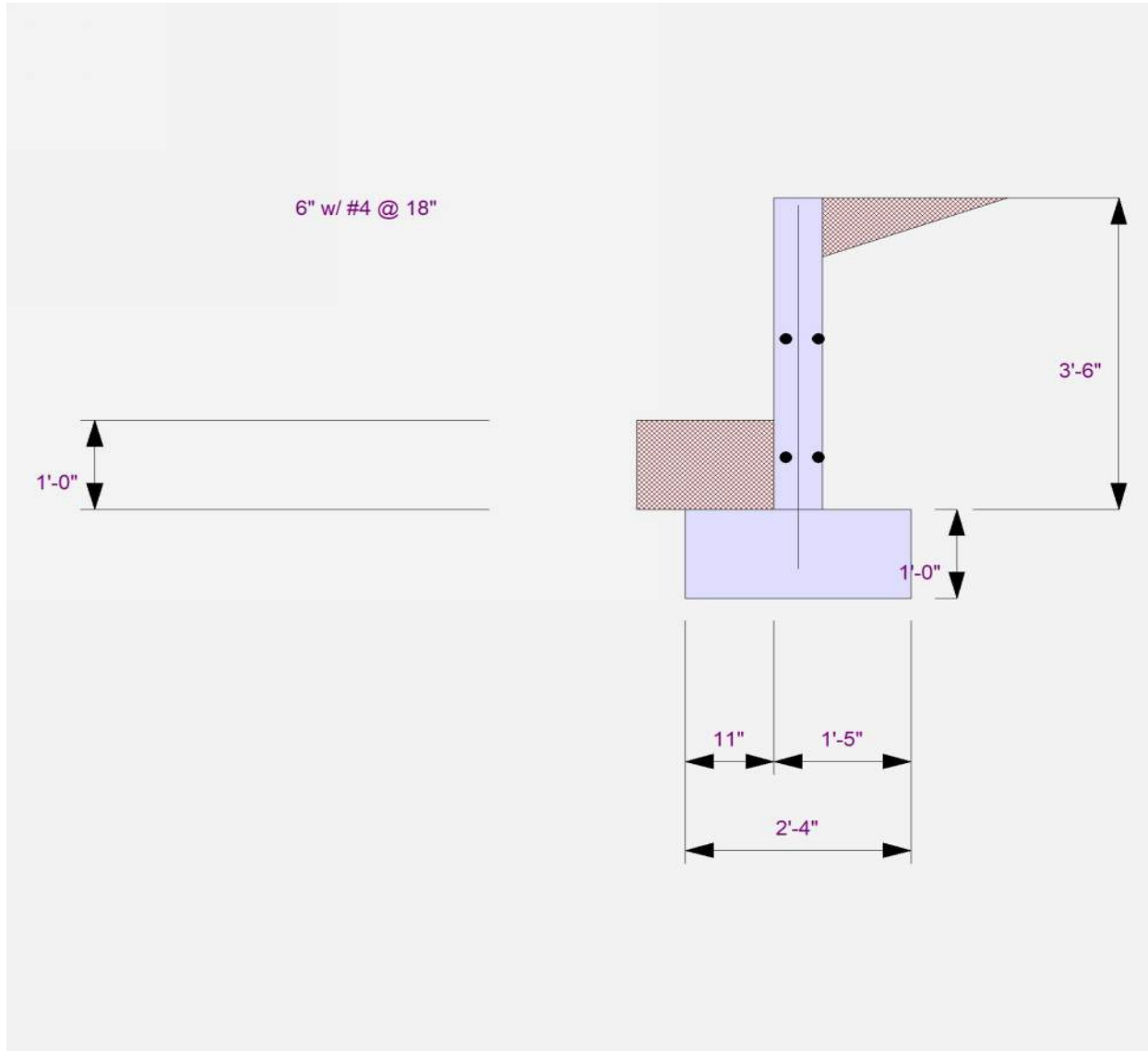
Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

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DESCRIPTION: 3'-6" - GABLE - REAR ELEV





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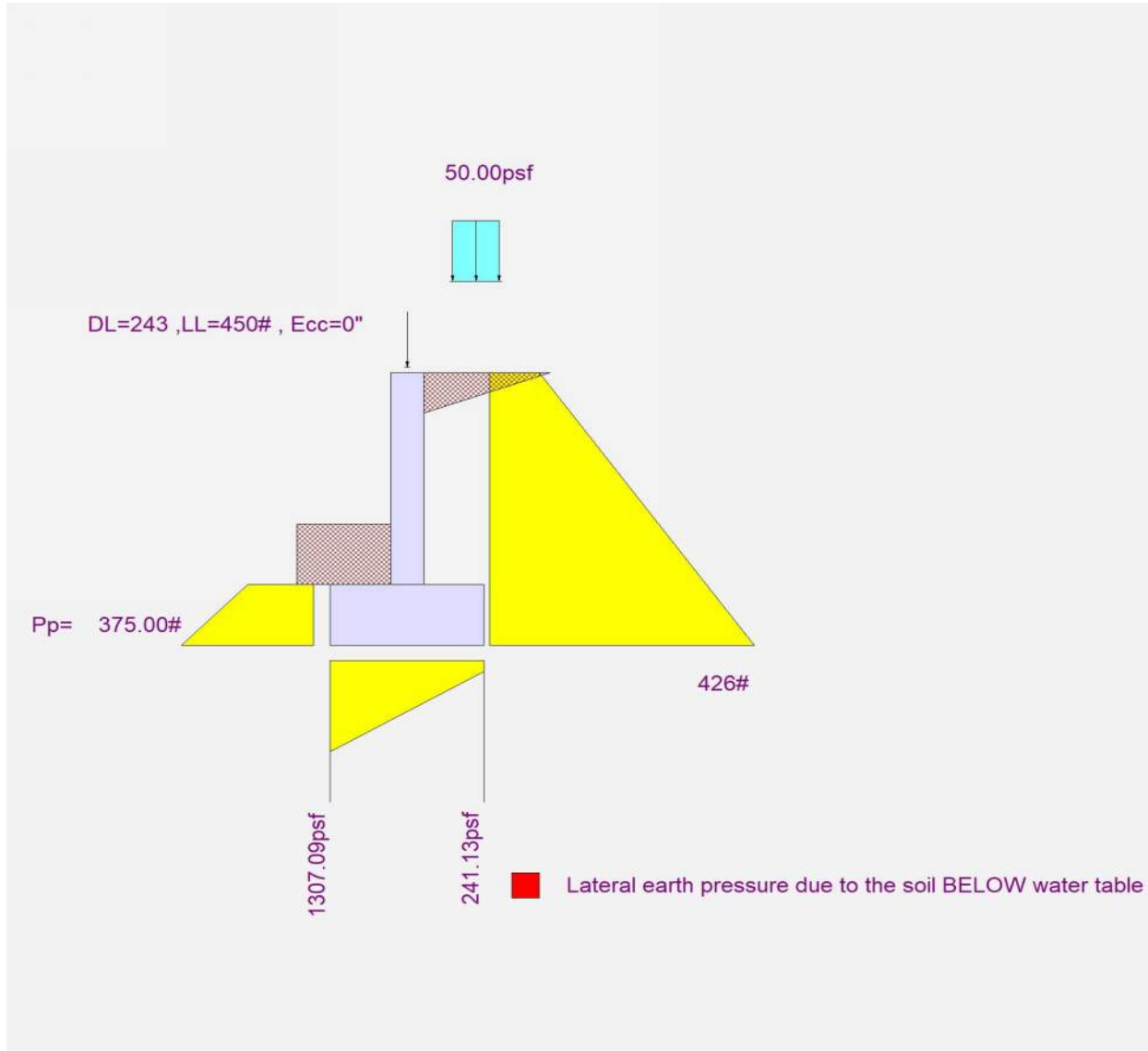
Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 3'-6" - GABLE - REAR ELEV





524 CLEVELAND BLVD. #230
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 (208) 453-6512

Completed by: ASF
 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 2'-6" - GABLE - FRONT ELEV

Code Reference:

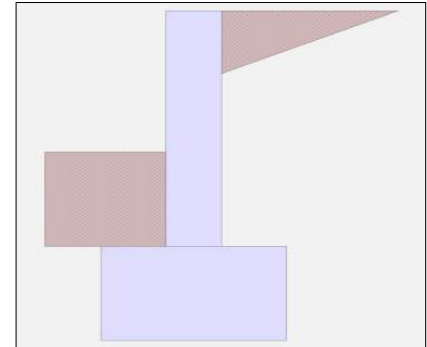
Calculations per IBC 2018 1807.3, CBC 2019, ASCE 7-16

Criteria

Retained Height	=	2.50 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	12.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	50.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	243.0 lbs
Axial Live Load	=	450.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem	=	0.0 psf (Strength Level)

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type	=	Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300



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Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

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DESCRIPTION: 2'-6" - GABLE - FRONT ELEV

Design Summary

Wall Stability Ratios

Overturning	=	2.44	OK
Sliding	=	2.77	OK
Global Stability	=	4.46	
Total Bearing Load	=	1,029 lbs	
...resultant ecc.	=	2.42 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,435 psf	OK
Soil Pressure @ Heel	=	227 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	2,008 psf	
ACI Factored @ Heel	=	317 psf	
Footing Shear @ Toe	=	0.4 psi	OK
Footing Shear @ Heel	=	0.1 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	270.1 lbs	
less 100% Passive Force	=	375.0 lbs	
less 100% Friction Force	=	373.7 lbs	
Added Force Req'd	=	0.0 lbs	OK
...for 1.5 Stability	=	0.0 lbs	OK

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

Design Height Above Ftc	ft =	Stem OK		
Wall Material Above "Ht"	=	Concrete		
Design Method	=	SD	SD	SD
Thickness	=	6.00		
Rebar Size	=	# 4		
Rebar Spacing	=	18.00		
Rebar Placed at	=	Center		

Design Data

fb/FB + fa/Fa = 0.132

Total Force @ Section

Service Level	lbs =	
Strength Level	lbs =	238.6

Moment....Actual

Service Level	ft-# =	
Strength Level	ft-# =	225.4

Moment.....Allowable = 1,705.6

Shear.....Actual

Service Level	psi =	
Strength Level	psi =	6.6

Shear.....Allowable psi = 75.0

Anet (Masonry) in2 =

Wall Weight psf = 75.0

Rebar Depth 'd' in = 3.00

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	60,000.0



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City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 2'-6" - GABLE - FRONT ELEV

Concrete Stem Rebar Area Details

	<u>Vertical Reinforcing</u>	<u>Horizontal Reinforcing</u>	
Bottom Stem			
As (based on applied moment) :	0.0187 in2/ft		
(4/3) * As :	0.0249 in2/ft	Min Stem T&S Reinf Area 0.360 in2	
200bd/fy : 200(12)(3)/60000 :	0.12 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	=====	<u>One layer of :</u> <u>Two layers of :</u>	
Required Area :	0.1296 in2/ft	#4@ 16.67 in	#4@ 33.33 in
Provided Area :	0.1333 in2/ft	#5@ 25.83 in	#5@ 51.67 in
Maximum Area :	0.4064 in2/ft	#6@ 36.67 in	#6@ 73.33 in

Footing Data

Toe Width	=	0.58 ft
Heel Width	=	1.08
Total Footing Width	=	1.67
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.58 ft
f _c =	2,500 psi	F _y = 60,000 psi
Footing Concrete Density	=	150.00 pcf
Min. As %	=	0.0018
Cover @ Top	2.00	@ Btm.= 3.00 in

Footing Design Results

	<u>Toe</u>	<u>Heel</u>	
Factored Pressure	= 2,008	317 psf	
Mu' : Upward	= 308	88 ft-#	
Mu' : Downward	= 53	100 ft-#	
Mu: Design	= 255 OK	13 ft-#	OK
phiMn	= 2,500	2,500 ft-#	
Actual 1-Way Shear	= 0.37	0.11 psi	
Allow 1-Way Shear	= 40.00	40.00 psi	
Toe Reinforcing	= None Spec'd		
Heel Reinforcing	= None Spec'd		
Key Reinforcing	= None Spec'd		
Footing Torsion, Tu	=	0.00 ft-lbs	
Footing Allow. Torsion, phi Tu	=	0.00 ft-lbs	

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: $\phi Mn = \phi * 5 * \lambda * \sqrt{f_c} * S_m$

Heel: $\phi Mn = \phi * 5 * \lambda * \sqrt{f_c} * S_m$

Key: No key defined

Min footing T&S reinf Area	0.43	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:

#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

If two layers of horizontal bars:

#4@ 18.52 in
#5@ 28.70 in
#6@ 40.74 in



524 CLEVELAND BLVD. #230
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 City and State: Valley County, Idaho

Cantilevered Retaining Wall

Project File: 05 Beams.ec6

LIC# : KW-06013353, Build:20.24.02.03

SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 2'-6" - GABLE - FRONT ELEV

Summary of Overturning & Resisting Forces & Moments

Item	.....OVERTURNING.....			.....RESISTING.....				
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#			
HL Act Pres (ab water tbl)	214.4	1.17	250.1	Soil Over HL (ab. water tbl)	160.4	1.38	220.6		
HL Act Pres (be water tbl)				Soil Over HL (bel. water tbl)		1.38	220.6		
Hydrostatic Force				Water Table					
Buoyant Force	=			Sloped Soil Over Heel	=				
Surcharge over Heel	=	55.7	1.75	97.4	Surcharge Over Heel	=	29.2	1.38	40.1
Surcharge Over Toe	=			Adjacent Footing Load	=				
Adjacent Footing Load	=			Axial Dead Load on Stem	=	243.0	0.83	202.5	
Added Lateral Load	=			* Axial Live Load on Stem	=	450.0	0.83	375.0	
Load @ Stem Above Soil	=			Soil Over Toe	=	64.2	0.29	18.7	
	=			Surcharge Over Toe	=				
				Stem Weight(s)	=	187.5	0.83	156.3	
				Earth @ Stem Transitions	=				
Total	=	270.1	O.T.M. =	347.5	Footing Weight	=	250.0	0.83	208.3
				Key Weight	=			0.58	
				Vert. Component	=				
Resisting/Overturning Ratio			=	2.44	Total =	934.3 lbs	R.M.=	846.5	
Vertical Loads used for Soil Pressure	=	1,028.9	lbs						

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus 250.0 pci
 Horizontal Defl @ Top of Wall (approximate only) 0.060 in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.



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SNAKE RIVER ENGINEERING

(c) ENERCALC INC 1983-2023

DESCRIPTION: 2'-6" - GABLE - FRONT ELEV

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	18.72 in
Development length for #4 bar specified in this stem design segment =	14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	8.16 in
As Provided =	0.1333 in/ft
As Required =	0.1296 in/ft



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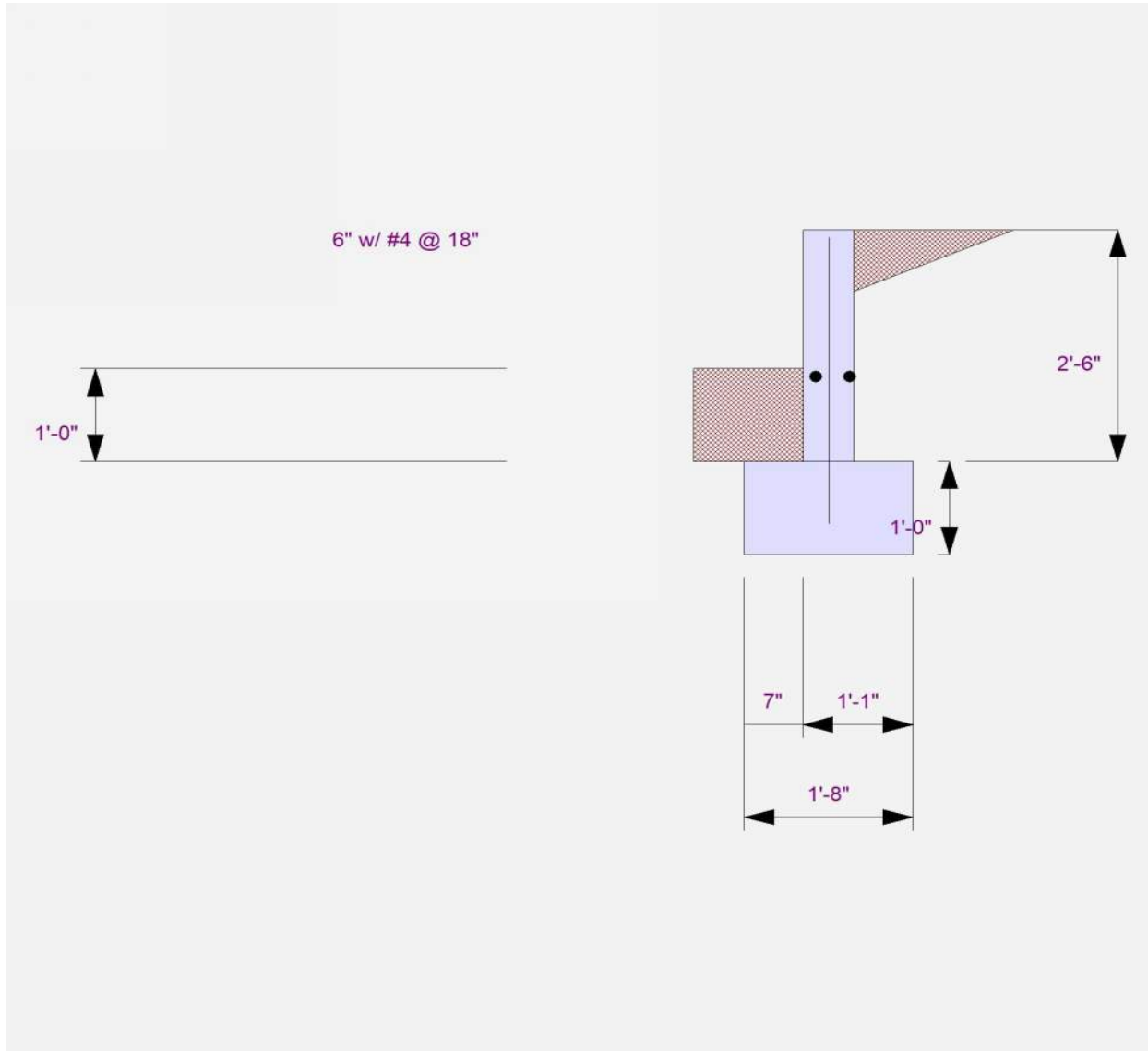
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LIC# : KW-06013353, Build:20.24.02.03

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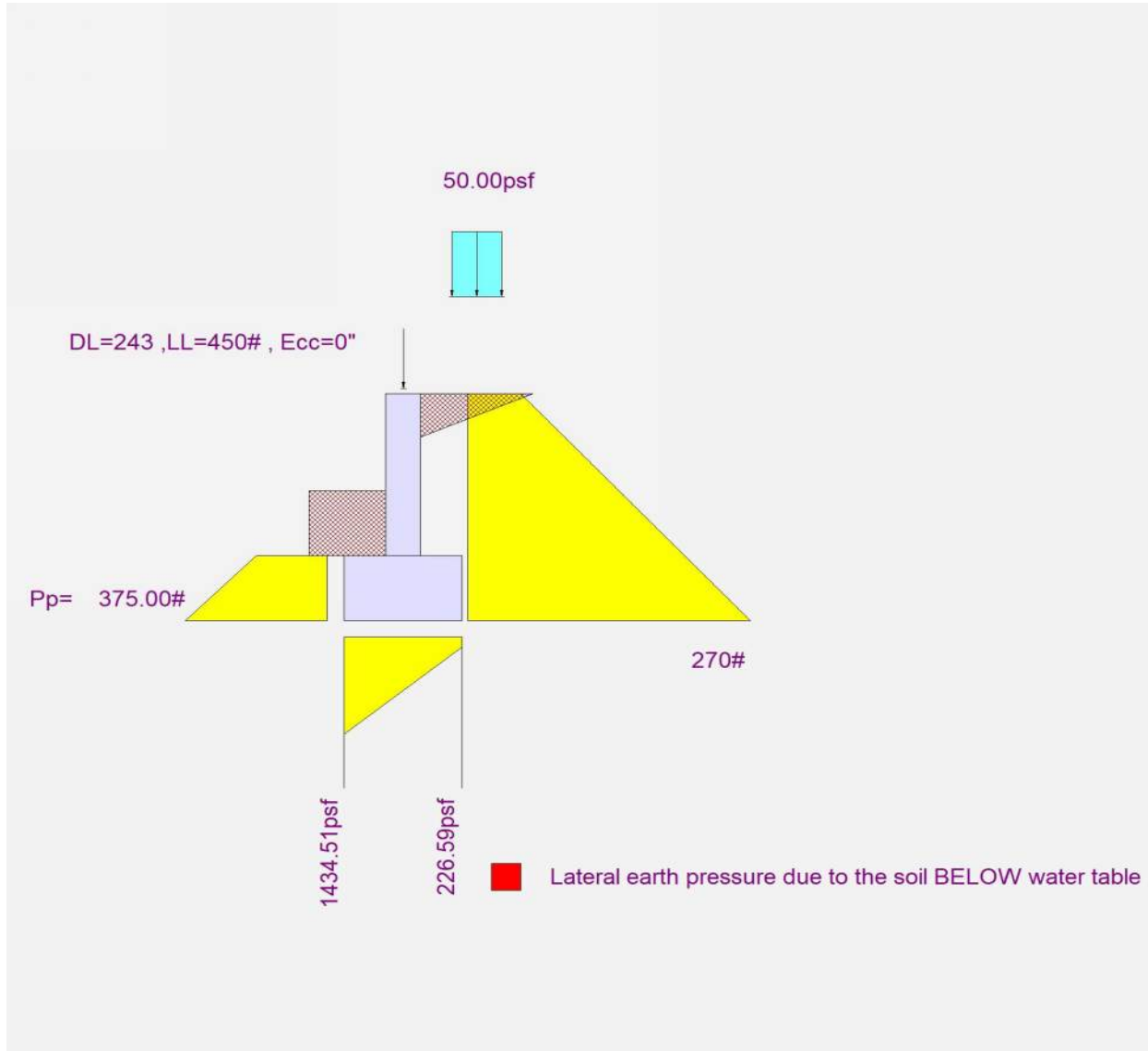
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Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

CF (1) Individual Footing Design

Program: Continuous Footing

Soil Bearing Pressure: 1500psf

<i>Roof</i>			
Roof Dead	(17psf)	(18.0ft)	= 306plf
Snow Live	(150psf)	(18.0ft)	= 2700plf

<i>Upper Floor</i>			
Floor Dead	(12psf)	(.0ft)	= plf
Floor Live	(40psf)	(.0ft)	= plf

<i>Main Floor</i>			
Floor Dead	(12psf)	(.0ft)	= plf
Floor Live	(40psf)	(.0ft)	= plf

<i>Deck Cover</i>			
Roof Dead	(17psf)	(.0ft)	= plf
Snow Live	(150psf)	(.0ft)	= plf

<i>Deck Floor</i>			
Floor Dead	(12psf)	(.0ft)	= plf
Snow Live	(150psf)	(.0ft)	= plf

<i>Misc</i>			
Wall Load:	(12psf)	(16.0ft)	= 192plf
Conc Stem:	(145pcf)	(5 x .5ft)	= 363plf
Misc Load:	(.0ft)	(.0ft) (.0ft)	= plf

3560plf

Use Footing Width:	36	x	10	in
W/		(3)	#4	Cont.



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 Review/Check: ARA

Project Name: Foster RV Garage
 SRE Project #: 2024-7401
 City and State: Valley County, Idaho

CF (2) Individual Footing Design

Program: Continuous Footing

Soil Bearing Pressure: 1500psf

<i>Roof</i>				
Roof Dead	(17psf)	(3.0ft)	=	51plf
Snow Live	(150psf)	(3.0ft)	=	450plf

<i>Upper Floor</i>				
Floor Dead	(12psf)	(.0ft)	=	plf
Floor Live	(40psf)	(.0ft)	=	plf

<i>Main Floor</i>				
Floor Dead	(12psf)	(.0ft)	=	plf
Floor Live	(40psf)	(.0ft)	=	plf

<i>Deck Cover</i>				
Roof Dead	(17psf)	(.0ft)	=	plf
Snow Live	(150psf)	(.0ft)	=	plf

<i>Deck Floor</i>				
Floor Dead	(12psf)	(.0ft)	=	plf
Snow Live	(150psf)	(.0ft)	=	plf

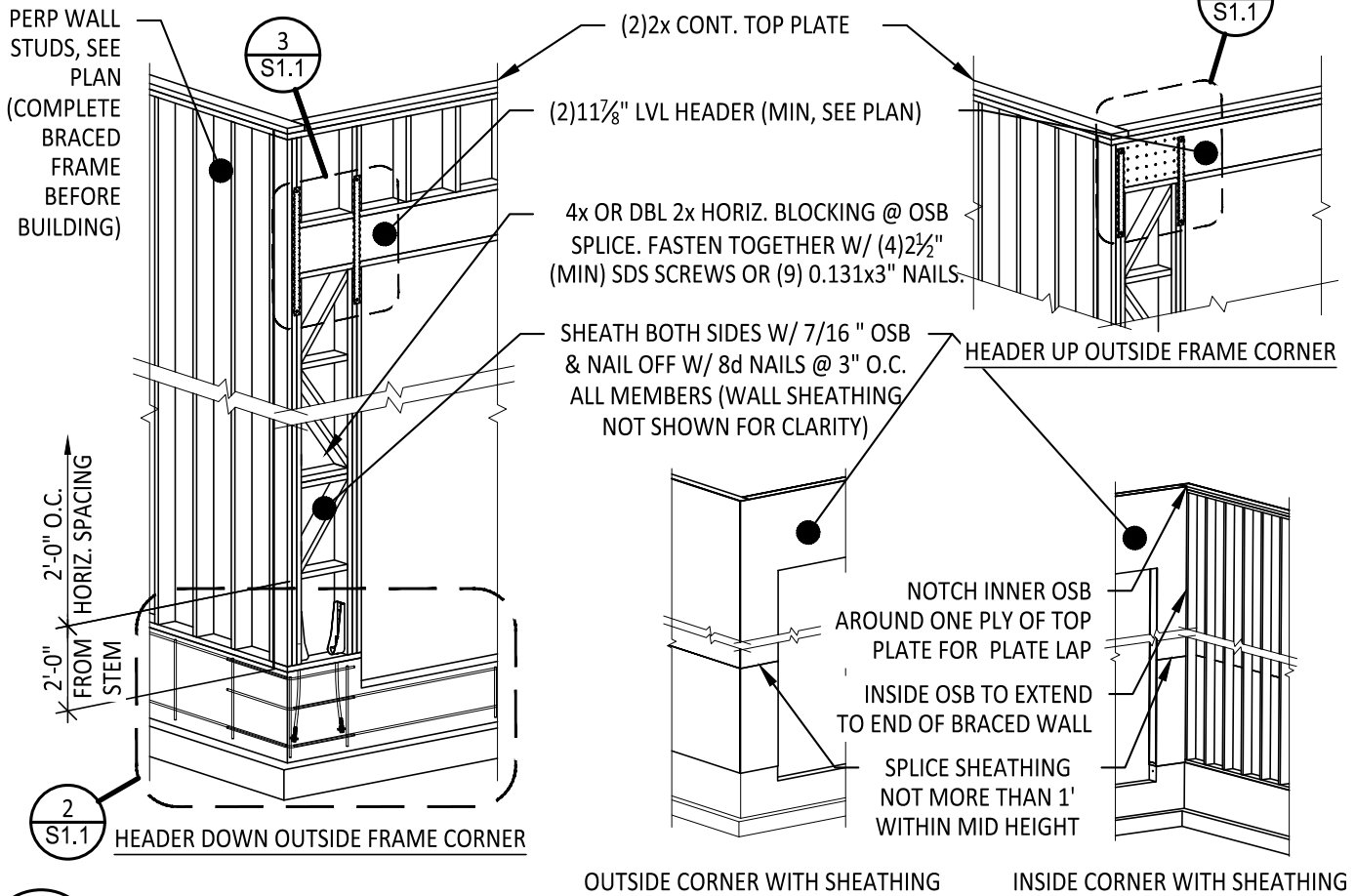
<i>Misc</i>				
Wall Load:	(12psf)	(16.0ft)	=	192plf
Conc Stem:	(145pcf)	(5 x .5ft)	=	363plf
Misc Load:	(.0ft)	(.0ft) (.0ft)	=	plf

1055plf

Use Footing Width:	12	x	8	in
W/	(2)	#4	Cont.	



MIRRORED @ OPPOSITE SIDE OF OPENING



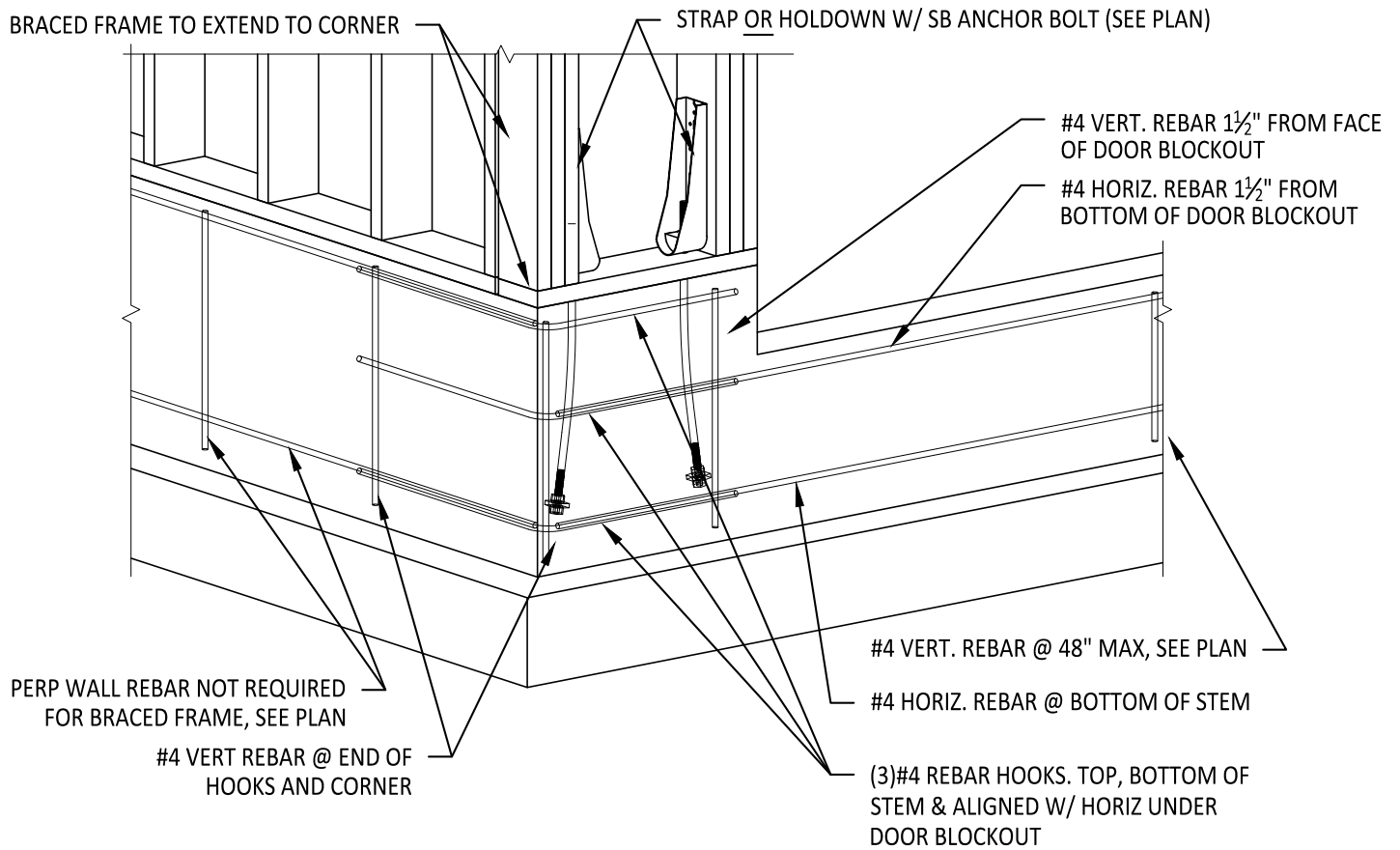
1
S1.1 **ENG. BRACE FRAME**
SCALE: 1/4" = 1'-0"



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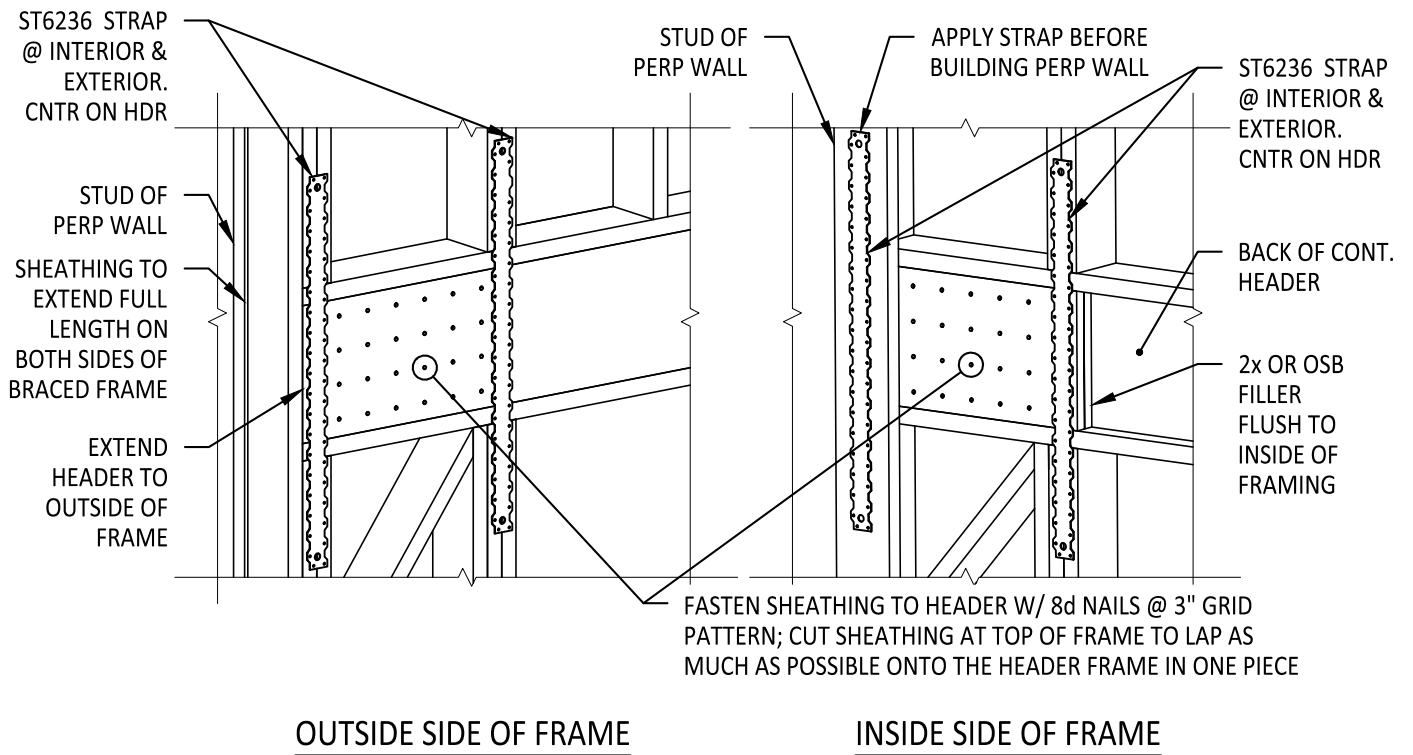
2 ENG. BRACE FRAME
 S1.1 SCALE: 3/4" = 1'-0"



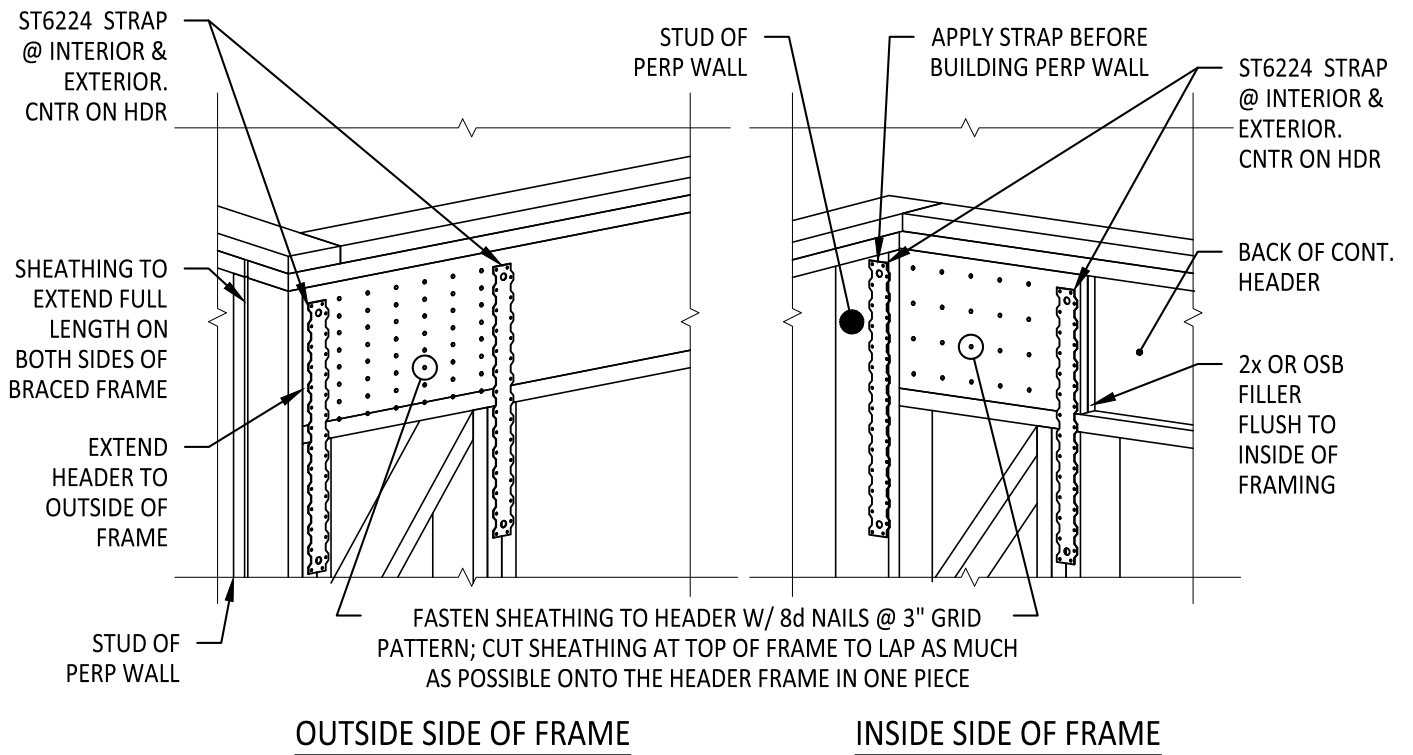
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3 ENG. BRACE FRAME
 S1.1 SCALE: 3/4" = 1'-0"



4 ENG. BRACE FRAME
S1.1 SCALE: 3/4" = 1'-0"



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Project Name: Foster RV Garage
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City and State: Valley County, Idaho

OSB SHEAR WALL SCHEDULE:

MARK	SHEATHING	SIDES OF WALL	SHEET NAILING PERIMETER / FIELD		SHEET STAPLING PERIMETER / FIELD	BLKG	NAILING (UNO) BOTTOM PLATE INTO RIM
SW1	7/16" APA RATED	1	8d @ 6 / 12	OR	16ga x 1-1/2" @ 3 / 12	YES	(2) 16d NAILS PER 16" BAY
BF	7/16" APA RATED	2	8d @ 3 / 12	(3-2x6 STUDS @ SHEATHING PERIMETER, MIN.)		YES	(SEE ATTACHED DETAIL)

TYP. NOTES:

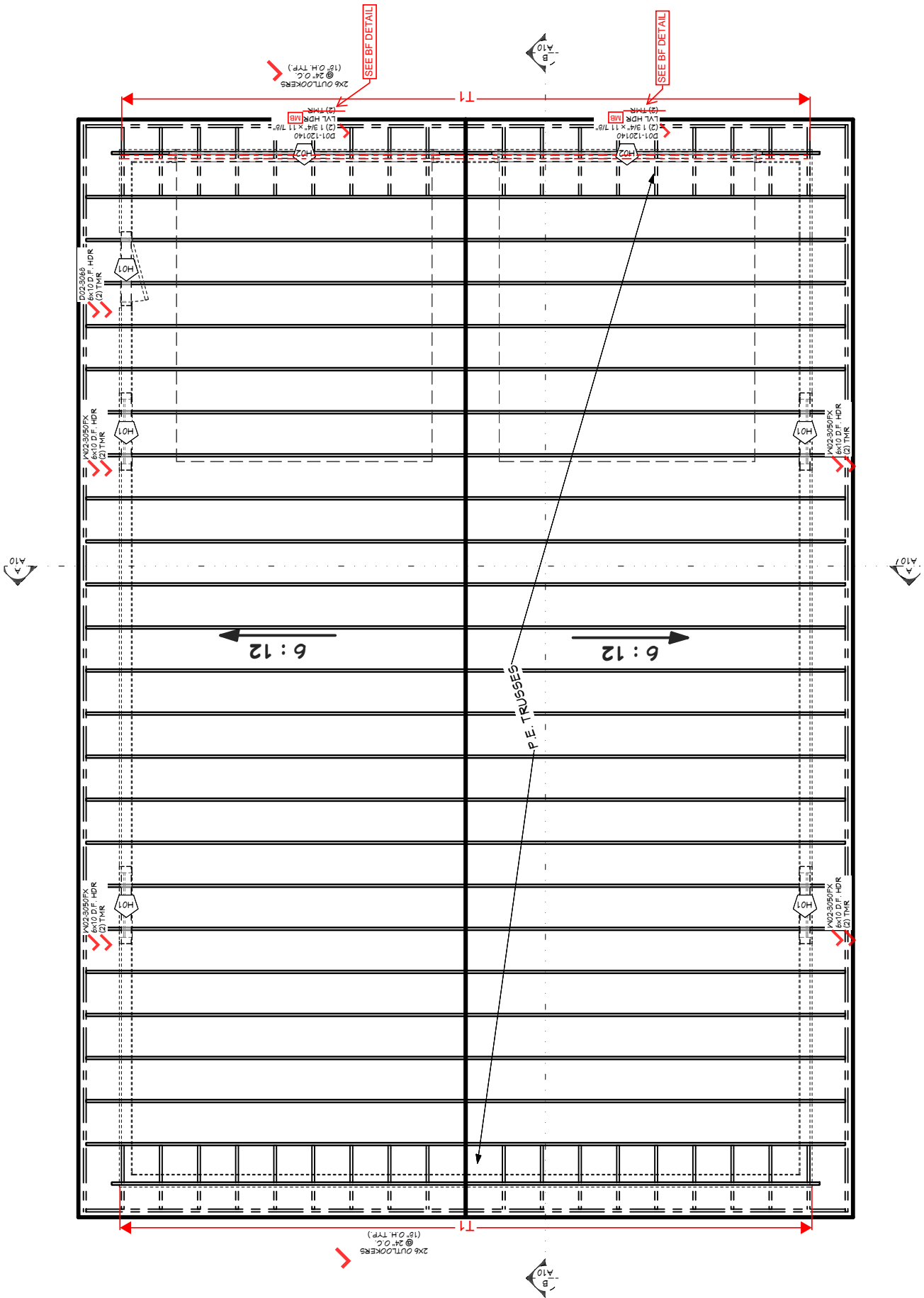
- 1 ALL SHEATHING PANEL EDGES SHALL BE BLOCKED UNO
- 2 PROVIDE SAME NAILING PATTERN ABOVE AND BELOW OPENINGS AS ADJACENT SHEAR PANEL.
- 3 ALL EXTERIOR WALLS SHALL BE SHEARWALL "SW1" WITHOUT BLKG UNO
- 4 FASTEN GABLE/RIM TO SHEAR WALLS BELOW W/ 10d TOENAILS @ 12" O.C. UNO
- 5 FASTEN TRUSS HEELS TO SHEAR WALLS W/ H2.5A AND (2) 10d TOENAILS @ EACH
- 6 GYP BOARD SHEAR WALLS MAY BE SUBSTITUTED WITH AN SW1 SHEAR WALL @ CONTRACTOR'S OPTION
- 7 WALL SHEATHING CAN BE APPLIED TO EITHER SIDE OF THE WALL. (UNLESS NOTED OTHERWISE)

HOLDOWN SCHEDULE:

MARK	STRAP TYPE	STRAP FASTENERS	# OF STUDS		ANCHOR BOLT TYPE	# OF STUDS	ANCHOR BOLT FASTENERS
HD3	STHD14 OR STHD14RJ W/ RIM	(30) 16d SINKERS	2	OR	HDU5-SDS2.5 W/ SB5/8x24 OR PAB5 @ INT. PONY WALLS	2	(14) 1/4"x2-1/2" SDS

GABLE / DRAG TRUSS OR RIM KEY NOTES:

T1	-	ATTACH GABLE / DRAG TRUSS OR RIM TO TOP PLATE W/ 10d TOENAILS @ 6" O.C., EDGE NAIL SHEATHING ABOVE TO TRUSS OR RIM
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524 CLEVELAND BLVD. #230
CALDWELL, IDAHO 83605
(208) 453-6512

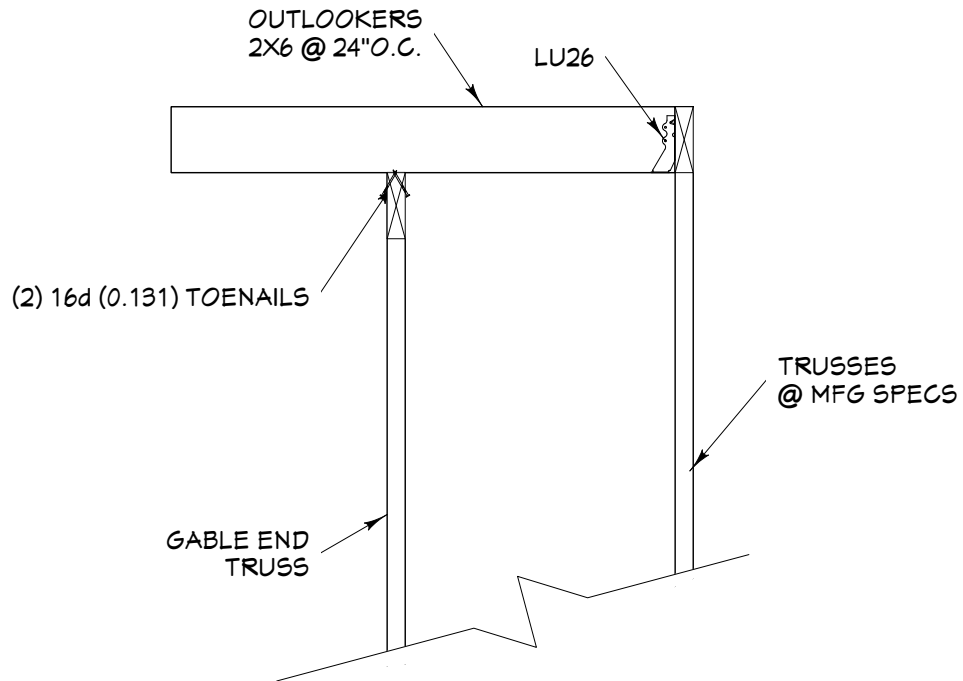
Completed by: ASF
Review/Check: ARA

Project Name: Foster RV Garage
SRE Project #: 2024-7401
City and State: Valley County, Idaho

HEADER SCHEDULE	
NO.	TYPE
H01	(1) 6X10 D.F.
H02	(2) 1 3/4 X 11 7/8 LVL



DF #2 or (2) 2x12 DF #2



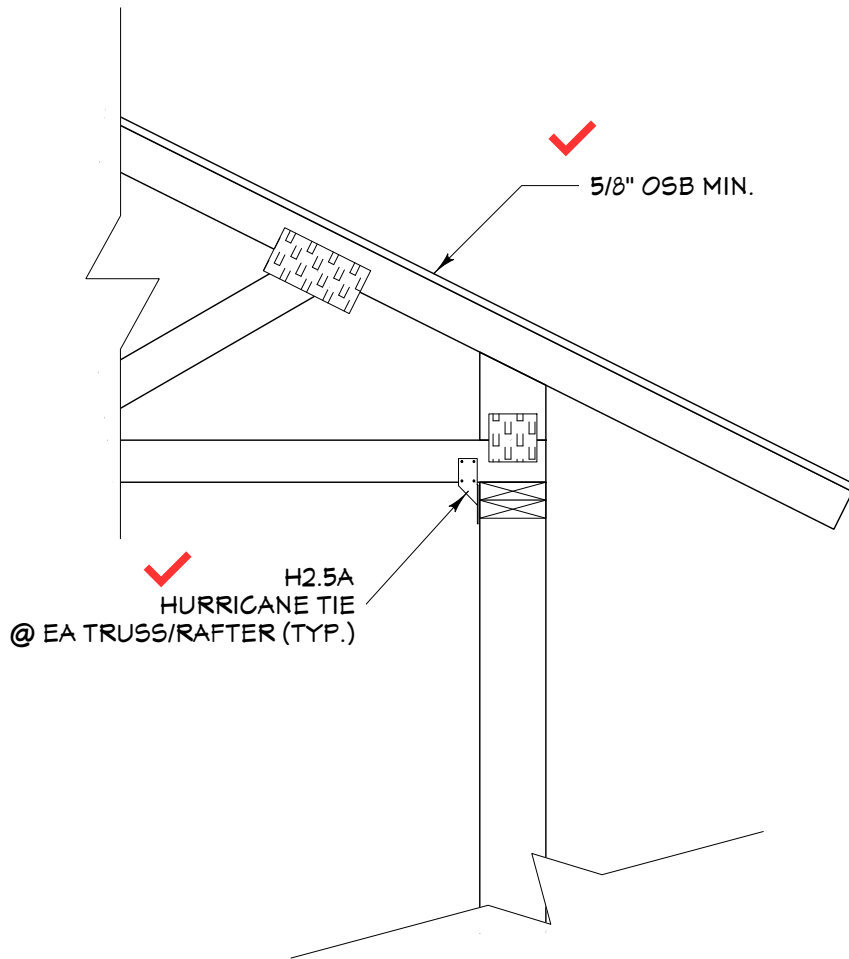
○ OUTLOOKER DETAIL
3/4 IN = 1 FT



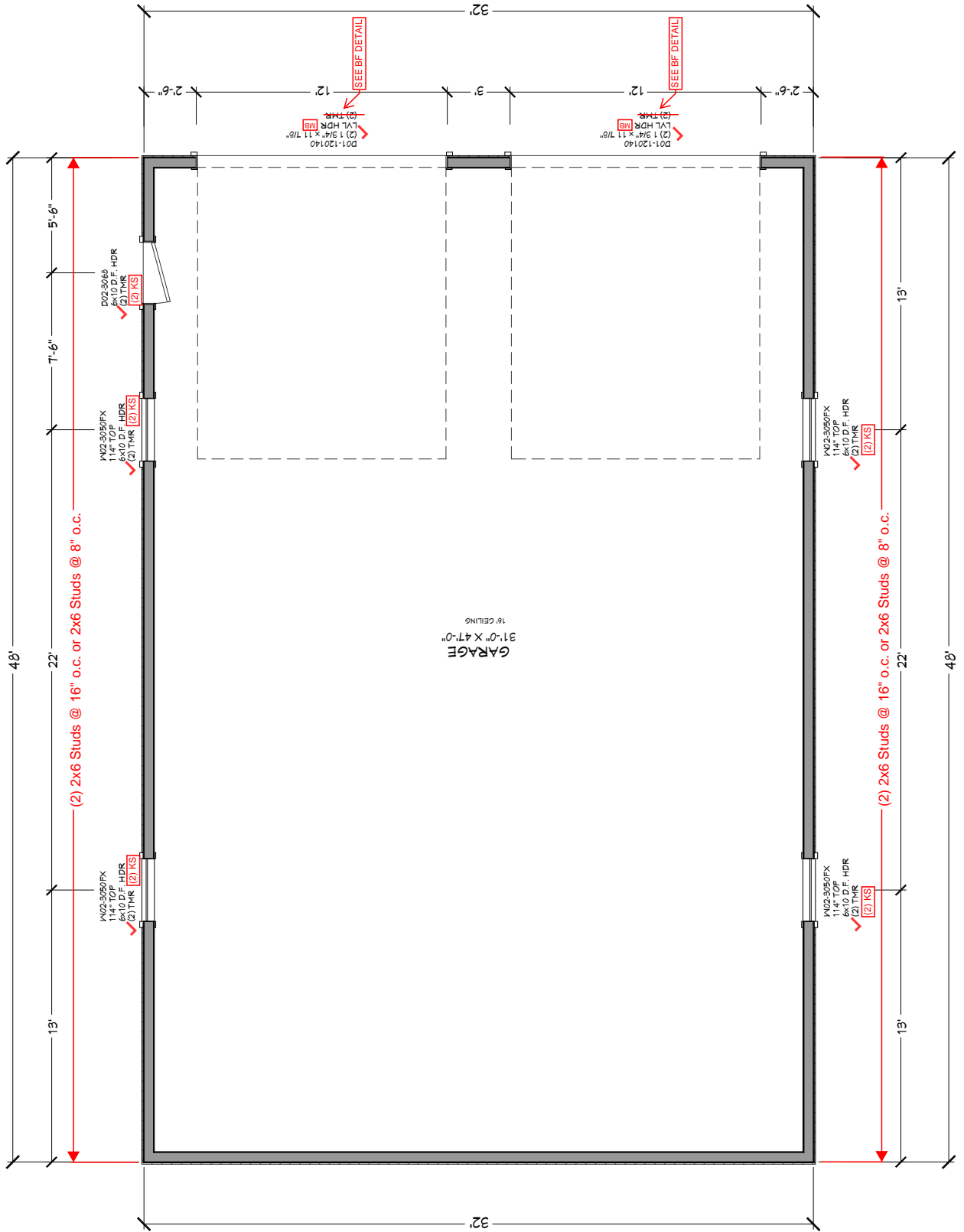
524 CLEVELAND BLVD. #230
CALDWELL, IDAHO 83605
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Review/Check: ARA

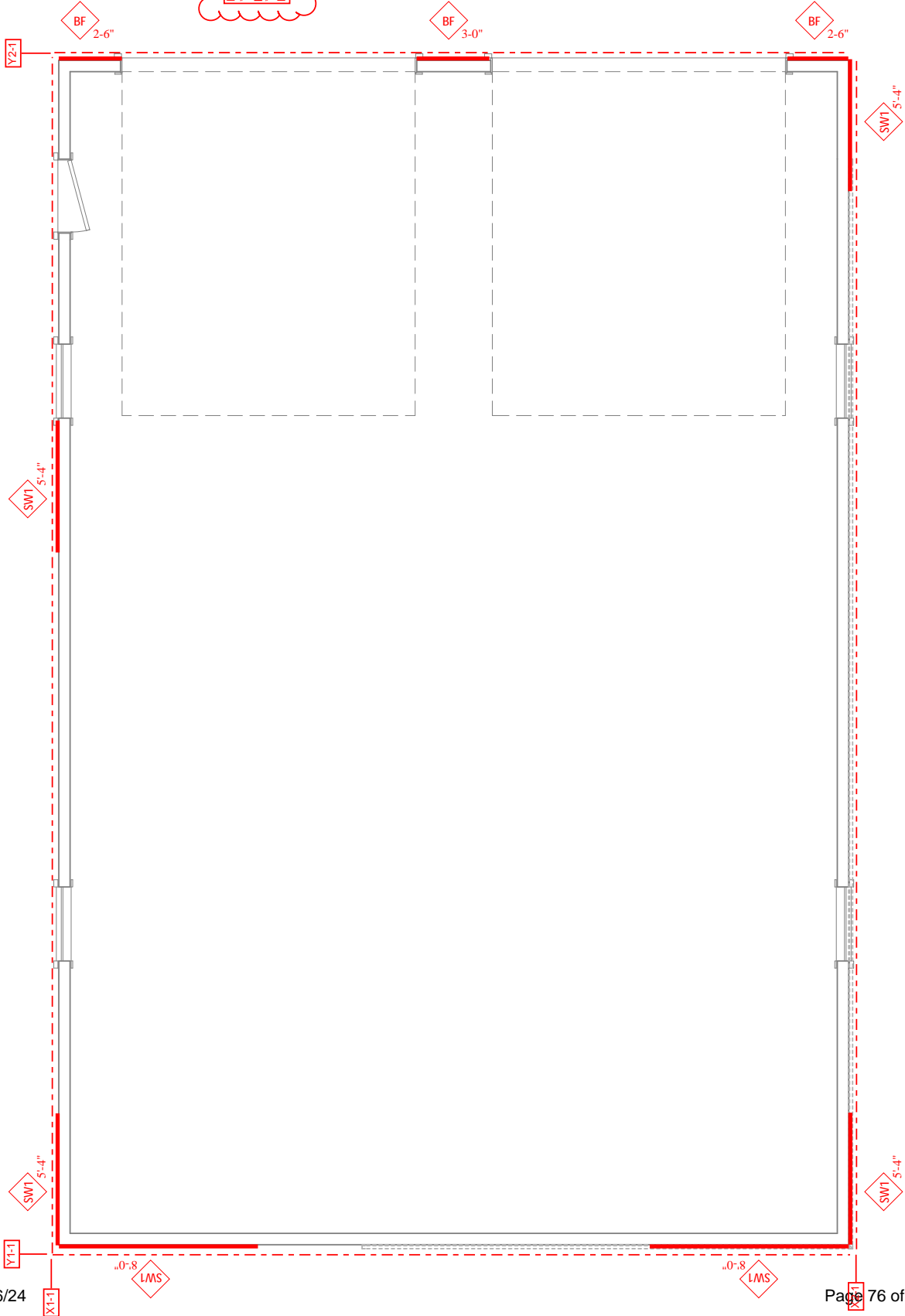
Project Name: Foster RV Garage
SRE Project #: 2024-7401
City and State: Valley County, Idaho

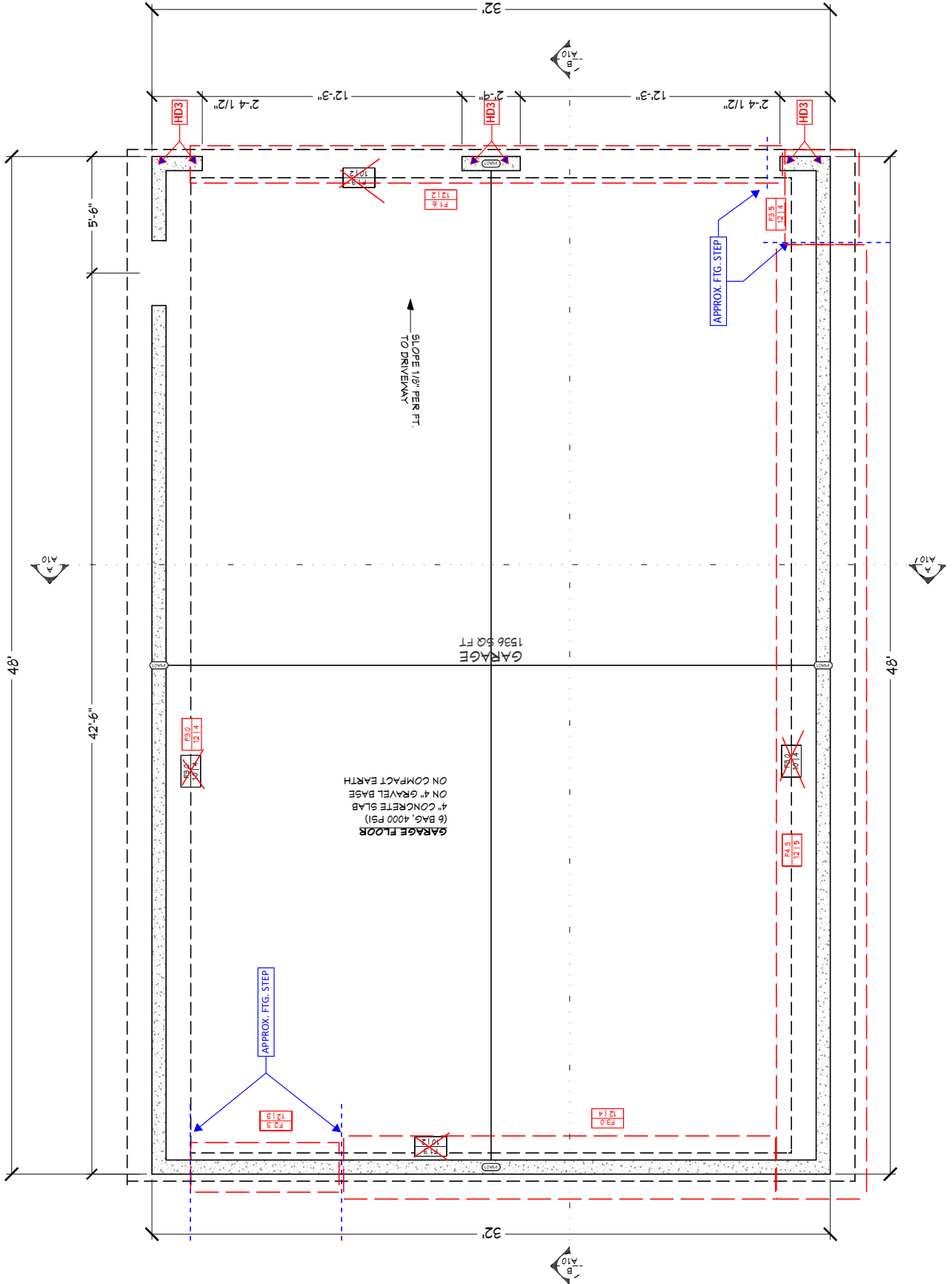


○ TRUSS TO TOP PLATE DETAIL
3/4 IN = 1 FT



DESIGNER NOTE:
 * (3) total brace frame panels
 * Continuous (2) 11-7/8" LVL HDR across penings



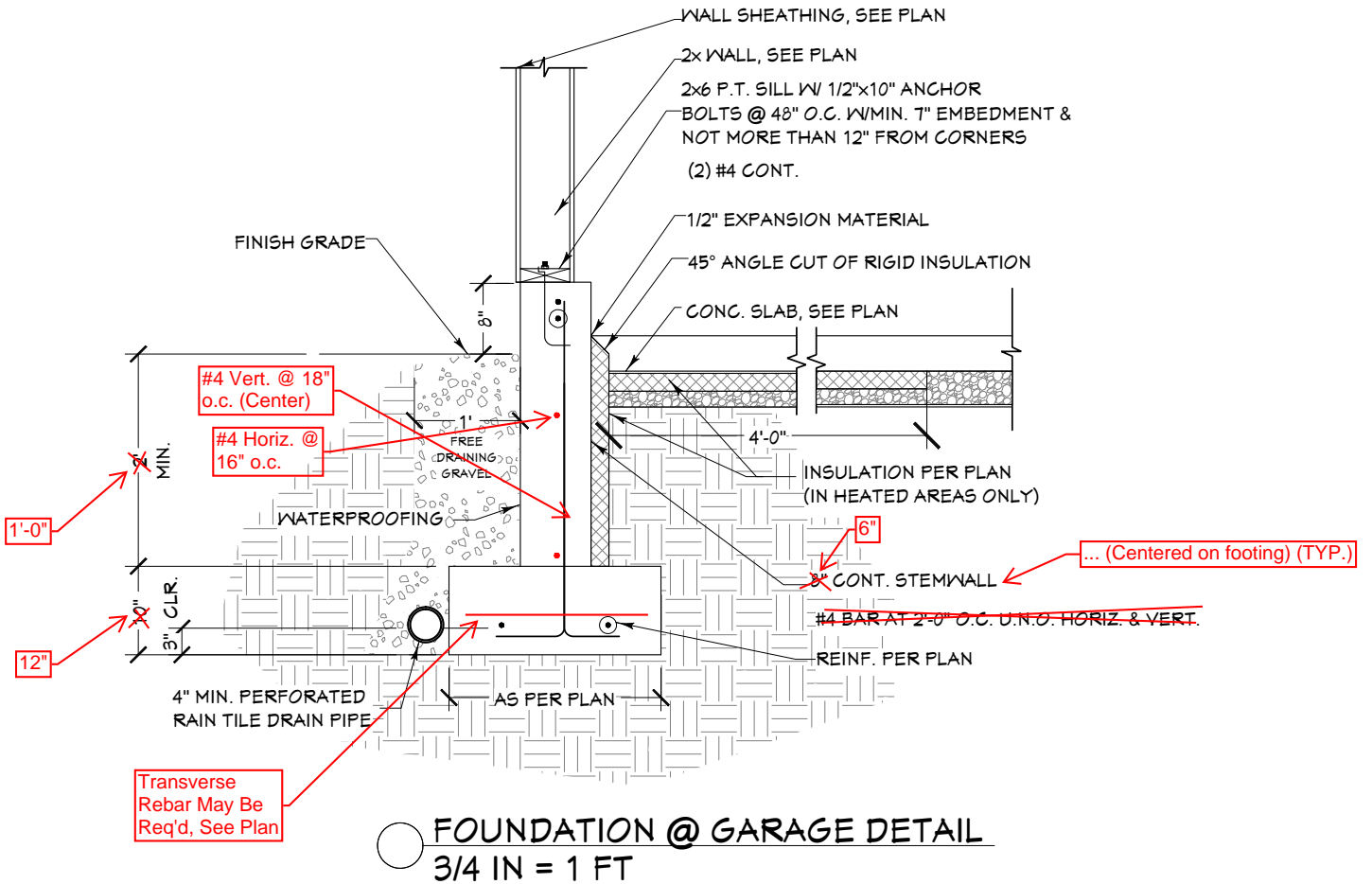




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FOUNDATION NOTES:

ALL ANGLE 45° UNO

6" ~~8"~~ THICK WALLS CONCRETE
FOUNDATION WALLS

ALL INTERIOR DIMENSIONS
ARE TO CENTER OF FOOTING

CONTINUOUS FOOTING SCHEDULE (ALL FOOTINGS
"F1.3" UNO)

CALLOUT	FOOTING SIZE	REINFORCEMENT
F1.3 10 | 2	16" X 10"	(2) #4 CONT. REBAR
F3.0 10 | 4	36" X 10"	(4) #4 CONT. REBAR

F1.6
12 | 2 — 20"x12 — (2) #4 Cont. Rebar

F2.3
12 | 3 — 28"x12 — (3) #4 Cont. Rebar

F3.0
12 | 4 — 36"x12 — (4) #4 Cont. Rebar

F3.5
12 | 4 — 42"x12 — (4) #4 Cont. Rebar

F4.3
12 | 5 — 52"x12 — (5) #4 Cont. Rebar
& #4 Transverse
Rebar @ 9" o.c.