Lateral and Foundation Calculations

Project Title: Teunissen Residence

Location: Canyon County, Idaho

Job #: 2024-8881

PROFESSIONAL ENGINEER
LICENSED
15386
1/8/2025
STATE OF IDAHO
KALEB JONES
For Teunissen Residence only

Disclaimer:

1. Calculations are not to be used for determining lengths of structural members.
2. Calculations are single use and location specific to property listed above.
3. Calulations shall not to be reproduced, reused, or altered in any way.
4. Calculations based on drawings received prior to stamp date. Any changes made after stamp date must be reviewed and approved by Engineer of Record prior to construction.
5. All work to conform to all local, state, and national codes.

Prepared in accordance with 2018 IBC. Calculations expire by: 1/8/2026

SITE SPECIFIC DESIGN CRITERIA:

Snow Criteria:

Roof Load (P_f)	25 psf	
Ground Load (P_g)	25 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		
Ss	0.28		Fa	1.58
S1	0.10		Fv	2.40
S_{DS}	0.30		S_{D1}	0.16
Risk Category	II	Other		
Seismic Importance (I_E)	1.0			
Seismic Design Category (SDC)	C			

Seismic Criteria (continued):

Wall Material	Design Base Shear	Response Coeff., R	
OSB	.05Wp	6.5	Typ @ Ext
GYP	.18Wp	2	Typ @ Int
Cant. Col.	.24Wp	1.5	

Soil Criteria:

Brg. Strength	1500 psf

STRUCTURE SPECIFIC DESIGN CRITERIA:

Live Loads:

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

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.

Interior Wall Dead Loads:

Studs	2.0
Gyp. Board	2.5
Misc	3.0
TOTAL	**8 psf**

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**

Deck Dead Load

Decking	4.4
Joist	2.0
	0.0
Misc	3.0
TOTAL	**10 psf**

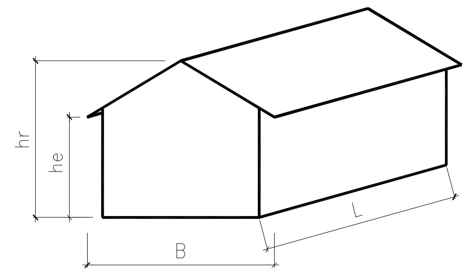
Deck not engineered for hot tub loading.

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 =	23.25 ft	ft
Building height to eave	h_e =	12.95 ft	ft
Building width	B =	93.00 ft	ft
Building length	L =	128.00 ft	ft
Overhang sloped width	O_h =	3.00 ft	ft
Effective area of components (or Solar Panel area)	A =	55.9 ft²	ft², <== Overhang? (Yes or No): Yes
Enclosed? (Y/N)		y	



ANALYSIS

Velocity pressure

$q_h = 0.00256\, K_z\, K_{zt}\, K_d\, K_e\, V^2$ = **25.41** 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 2 = **0.88**

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

h = mean roof height = **18.10** 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** psf (ASCE 7-16 28.3.4)

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

$G\,C_{p\,i}$ = 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, MAX[MIN(0.1B, 0.1L, 0.4h), MIN(0.04B, 0.04L), 3] = **7.24** ft

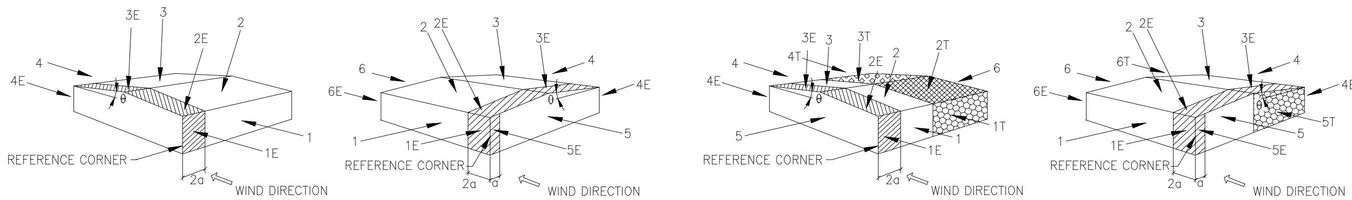
Net Pressures (psf), Basic Load Cases

Surface	Roof angle q = 18.43			Roof angle q = 18.43		
	$G\,C_{p\,f}$	Net Press. W/ (+$GC_{p\,i}$)	Net Press. W/ (-$GC_{p\,i}$)	$G\,C_{p\,f}$	Net Press. W/ (+$GC_{p\,i}$)	Net Press. W/ (-$GC_{p\,i}$)
1	0.52	8.55	17.70	-0.45	-16.01	-6.86
2	-0.69	-22.11	-12.96	-0.69	-22.11	-12.96
3	-0.47	-16.48	-7.33	-0.37	-13.98	-4.83
4	-0.42	-15.13	-5.98	-0.45	-16.01	-6.86
5				0.40	5.59	14.74
6				-0.29	-11.94	-2.80
1E	0.78	15.25	24.40	-0.48	-16.77	-7.62
2E	-1.07	-31.77	-22.62	-1.07	-31.77	-22.62
3E	-0.67	-21.69	-12.54	-0.53	-18.04	-8.89
4E	-0.62	-20.28	-11.13	-0.48	-16.77	-7.62
5E				0.61	10.93	20.08
6E				-0.43	-15.50	-6.35

Net Pressures (psf), Torsional Load Cases

Surface	Roof angle q = 18.43		
	$G\,C_{p\,f}$	Net Press. W/ (+$GC_{p\,i}$)	Net Press. W/ (-$GC_{p\,i}$)
1T	0.52	2.14	4.42
2T	-0.69	-5.53	-3.24
3T	-0.47	-4.12	-1.83
4T	0.00	-3.78	-1.50
Surface	**Roof angle q = 0.00**		
	$G\,C_{p\,f}$	Net Press. W/ (+$GC_{p\,i}$)	Net Press. W/ (-$GC_{p\,i}$)
5T	0.40	1.40	3.69
6T	-0.29	-2.99	-0.70

+ / - 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)

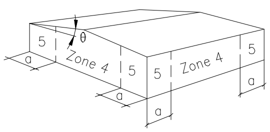
$G C_p$ = 1.00 external pressure coefficie

see table below. (ASCE 7-16 30.3.2)

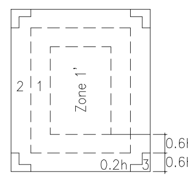
q = 18.43 °

$p_{overhang}$ = **-87.68** psf

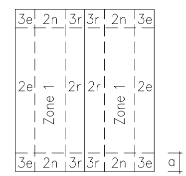
(ASCE 7-16 28.3.3)



Walls



Roof θ≤7°



Roof θ>7°

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	$-GC_p$
	2883	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	$-GC_p$		
	56	0.30	-2.50	0.30	-2.50	0.30	-1.80	0.97	-1.07	0.97	-1.34		

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*
	12.20	-24.91	12.20	-24.91	12.20	-60.49	12.20	-24.91	12.20	-29.99	12.20	-29.99
	Zone 3		Zone 3e		Zone 3r		Zone 4		Zone 5			
	Positive	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*	*Positive*	*Negative*	*(Max Pressure*	
	12.20	-68.11	12.20	-68.11	12.20	-50.32	24.88	-27.04	29.27	-38.73	***68.11*** *psf)*	

LOAD CASE 'A' FACTORED LOADS	
$0.6*W_r = (Z_2 + Z_3) * 0.6 =$	**3.4 psf**
$0.6*W_{rE} = (Z_{2E} + Z_{3E}) * 0.6 =$	**6.0 psf**
$0.6*W_w = (Z_1 + Z_4) * 0.6 =$	**14.2 psf**
$0.6*W_{wE} = (Z_{1E} + Z4E) * 0.6 =$	**21.3 psf**

LOAD CASE 'B' FACTORED LOADS	
$0.6*W_r = (Z_2 + Z_3) * 0.6 =$	**4.9 psf**
$0.6*W_{rE} = (Z_{2E} + Z_{3E}) * 0.6 =$	**8.2 psf**
$0.6*W_w = (Z_5 + Z_6) * 0.6 =$	**10.5 psf**
$0.6*W_{wE} = (Z_{5E} + Z_{6E}) * 0.6 =$	**15.9 psf**

ROOF COMPONENTS FACTORED LOAD	
$0.6*Z_{r,c\&c} =$	**18.0 psf**

WALL COMPONENTS FACTORED LOAD	
$0.6*Z_{w,c\&c} =$	**16.2 psf**

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Completed by: JDJ
Review/Check: KKJ

Project Name: Teunissen Residence
SRE Project #: 2025-8881
City and State: Canyon County, Idaho

OSB SEISMIC LOADING ANALYSIS

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

INPUT DATA

Typical floor height:	h =	12.948	*ft*
Typical floor weight:	w_x =	202.4	*kips*
Number of floors:	n =	1	
Importance factor (ASCE 11.5.1):	I_e =	1.00	
Design spectral response:	S_{DS} =	0.30	g
	S_{D1} =	0.16	g
Mapped spectral resp.:	S_1 =	0.10	g
Period Parameter, C_t: (ASCE Tab 12.8-2):	C_t =	0.020	
Resp. coefficient: (ASCE Tab. 12.2.1):	R =	6.5	
Seismic design category:	SDC =	C	
	h_n =	23.3	*ft*

DESIGN SUMMARY

$C_s = 1.2 * S_{DS} / (R / I_e)$ =	0.0547		**<= Applicable**
Period Parameter, x =	*0.75*	, ASCE Tab 12.8-2	
Period: $T_a = C_t (h_n)^x$ =	*0.21*	sec, ASCE 12.8.2.1	
$C_s < S_{D1} / [(R / I_e) T_a]$ =	*0.1172*	, ASCE Tab 12.8.1.1	**<= Not Applicable**
$C_s > 0.044 S_{DS} I_e$ =	*0.0130*	, ASCE Tab 12.8.1.1	**<= Not Applicable**
$C_s > 0.5 S_1 / (R / I_e)$ =	*0.0078*	, ASCE Tab 12.8.1.1	**<= Not Applicable**
k =	*2.28*	, (ASCE 12.8.3, page 91)	
$V = C_s W$ =	***0.0547***	W	
0.7 * V =	***0.0383***	W	
W =	***202***	*kips, total*	

SEISMIC COMPONENT & ANCHORING ANALYSIS

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

$$k_a = 1.0 + \frac{L_f}{100} \quad (12.11\text{-}2)$$

Lf: 10 ft   ka: 1.1

$$F_p = 0.4 S_{DS} k_a I_e W_p \quad (12.11\text{-}1)$$

= ***1.6*** psf   ***<= USE FOR O.O.P. WALL***

Where : W_p = 12.0 psf , I_e = 1.00

<u>For seismic design category C and above, flexible diaphragm (ASCE 7)</u>

$$F_{px} = 0.4 S_{DS} I_e w_{px} \quad (12.10\text{-}3)$$

= ***2.01*** psf   ***<= USE FOR ROOF FRAMING UPLIFT***

Where : W_{px} = 17.0 psf ,

GYP SEISMIC LOADING ANALYSIS

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

INPUT DATA

Typical floor height:	h =	12.948	*ft*
Typical floor weight:	w_x =	202.4	*kips*
Number of floors:	n =	1	
Importance factor (ASCE 11.5.1):	I_e =	1.00	
Design spectral response:	S_{DS} =	0.30	g
	S_{D1} =	0.16	g
Mapped spectral resp.:	S_1 =	0.10	g
Period Parameter, C_t : (ASCE Tab 12.8-2):	C_t =	0.020	
Resp. coefficient: (ASCE Tab. 12.2.1):	R =	2	
Seismic design category:	SDC =	C	
	h_n =	23.3	*ft*

DESIGN SUMMARY

C_s = 1.2 * S_{DS} / (R / I_e) =	0.1777		**<= Applicable**
Period Parameter, x =	*0.75*	, ASCE Tab 12.8-2	
Period: T_a = $C_t (h_n)^x$ =	*0.21*	sec, ASCE 12.8.2.1	
C_s < S_{D1} / [(R / I_e) T_a] =	*0.3809*	, ASCE Tab 12.8.1.1	**<= Not Applicable**
C_s > 0.044 S_{DS} I_e =	*0.0130*	, ASCE Tab 12.8.1.1	**<= Not Applicable**
C_s > 0.5 S_1 / (R / I_e) =	*0.0253*	, ASCE Tab 12.8.1.1	**<= Not Applicable**
k =	*2.28*	, (ASCE 12.8.3, page 91)	

V = C_s W = ***0.1777*** W

0.7 * V = ***0.1244*** W

W = ***202*** *kips, total*

SEISMIC COMPONENT & ANCHORING ANALYSIS

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

$$w_{1,seismic} = MAX\left(0.4 I S_{DS} W_p \ , 0.1 W_p\right)$$ = ***0.1*** W_p = ***0.1*** psf ***<= 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

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

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

Where : F_{min} = ***0.14*** plf, ***1.31*** W_p = ***118*** plf (Horizontal) ***<= Not Applicable***
(ASCE 7 Sec. 12.11.2 & 11.7.3)

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

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

= ***2.63*** W_p = ***118*** plf (Horizontal) ***<= Applicable***

<u>For connections (ASCE 7 Sec. 12.11.2.1)</u>

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

WIND / SEISMIC SHEAR FORCE CALCULATIONS:

From ASCE 7-16 Wind & Seismic Loading Analysis

	Roof / Floor					Wall					Load above				Loading		
Wall Line	Wind Force (psf)	Diaph. Weight	Wr, We truss trib (ft)	Area W (ft)	Area L (ft)	Wind Force (psf)	Wall DL (psf)	Wall ht (ft)	wall line dist (ft)	Upr. Flr Wall ht (ft)	Wind (#)	Seismic (#)	*C_s (Wp)	=	**Wind Force (kips)**	**Seismic Force (kips)**	**Lateral Control**
X1-1	9.6	17	13.3	52.0	86.0	16.2	12.0	10.0	52.0				0.04	=	**5.41**	**1.69**	**Wind**
X2-1	9.6	17	13.3	52.0	86.0	16.2	8.0	10.0	52.0				0.12	=	**8.76**	**6.93**	**Wind**
	9.6	17	6.9	45.0	26.0	16.5	8.0	10.0	45.0				0.12	=			
X3-1	9.6	17	6.9	45.0	26.0	16.5	12.0	10.0	45.0				0.04	=	**3.35**	**0.59**	**Wind**
X4-1	9.6	17	2.9	14.0	42.0	21.3	12.0	10.0	14.0				0.04	=	**1.86**	**0.31**	**Wind**
	9.6	17	6.5	15.0	16.0	21.1	12.0	10.0	15.0				0.04	=			
X5-1	9.6	17	6.5	15.0	16.0	21.1	12.0	10.0	15.0				0.04	=	**1.26**	**0.15**	**Wind**
X6-1	9.6	17	5.3	61.0	41.5	15.9	12.0	12.3	61.0				0.04	=	**2.91**	**0.75**	**Wind**
X7-1	9.6	17	8.5	30.0	16.5	17.6	12.0	10.0	30.0				0.04	=	**1.63**	**0.19**	**Wind**
Y1-1	9.6	17	5.3	46.0	48.0	16.4	12.0	12.0	46.0				0.04	=	**3.45**	**0.97**	**Wind**
Y2-1	9.6	17	5.3	46.0	48.0	16.4	8.0	12.0	46.0				0.12	=	**5.49**	**5.51**	**Seismic**
	9.6	17	6.9	26.0	86.0	18.2	8.0	10.0	26.0				0.12	=			
Y3-1	9.6	17	6.9	26.0	86.0	18.2	8.0	10.0	26.0				0.12	=	**3.04**	**3.63**	**Seismic**
	9.6	17	3.7	14.0	59.0	21.3	8.0	10.0	14.0				0.12	=			
Y4-1	9.6	17	3.7	14.0	59.0	21.3	12.0	10.0	14.0				0.04	=	**3.77**	**1.04**	**Wind**
	9.6	17	6.8	26.0	61.0	18.2	12.0	16.3	26.0				0.04	=			
Y5-1	9.6	17	6.8	26.0	61.0	18.2	12.0	16.3	26.0				0.04	=	**4.04**	**1.06**	**Wind**
	9.6	17	5.8	16.0	53.0	20.6	12.0	10.0	16.0				0.04	=			
Y6-1	9.6	17	5.8	16.0	53.0	20.6	12.0	10.0	16.0				0.04	=	**1.27**	**0.35**	**Wind**

SHEAR WALL CALCULATIONS:

		X1-1	X2-1	X2-1	X2-1	X3-1	X4-1
Shear Wall Forces							
Number of Panels		1	1	1	2	1	1
Total length of wall		78.46 ft	86.00 ft	86.00 ft	86.00 ft	26.00 ft	26.00 ft
Total length of shear wall	L =	58.62 ft	16.46 ft	17.50 ft	2.25 ft	22.00 ft	5.71 ft
Total length of full ht seg.	L_w =	30.17 ft	6.46 ft	17.50 ft	2.25 ft	17.46 ft	5.71 ft
height of shear wall	H =	10.00 ft	8.00 ft	14.34 ft	9.00 ft	14.30 ft	10.00 ft
Maximum opening height	H' =	10.00 ft	8.00 ft	0.00 ft	0.00 ft	14.30 ft	0.00 ft
Total force at top of wall	V_1 =	5412 lbs	1049 lbs	2840 lbs	2435 lbs	3346 lbs	1861 lbs
Self weight	$w_{DL\ self}$ =	120 plf	96 plf	172 plf	108 plf	172 plf	120 plf
Applied dead load	$w_{DL\ above}$ =	68 plf	68 plf	68 plf	68 plf	68 plf	213 plf
Prefered OSB thickness	in	7/16	7/16	7/16	7/16	7/16	7/16
Prefered Gyp thickness	in	1/2	1/2	1/2	1/2	1/2	1/2
Wall Connected to Concrete	y/n =	Y	Y	Y	Y	Y	Y
Shear Wall Segments							
		3.00	3.23	17.50	2.25	3.71	5.71
		4.00	3.23			3.75	
		4.00				10.00	
		4.00					
		4.00					
		7.00					
		4.17					
Shear Transfer to Concrete							
	T =	Not Req'd	813 lbs	1067 lbs	3500 lbs	1879 lbs	2689 lbs
1/2 Anchor Bolts @		72 " O.C.	72 " O.C.	72 " O.C.		72 " O.C.	72 " O.C.
Provide:		Code Min.	Code Min.	Code Min.		Code Min.	Code Min.
Min # of 1/2 Anchor Bolts		(6) Min	(2) Min	(3) Min		(4) Min	(2) Min
Load From Above		0.00	0.00	0.00	0.00	0.00	0.00
			HD1	**HD1**	**HD3**	**HD1**	**HD2**
Shear Resisting System							
Force Calculated		353.55	359.52	162.31	1082.06	270.76	325.85
		OSB	**OSB**	**Gyp.**	**P.F.**	**OSB**	**OSB**
Min Shear Wall Segment:		2.86 ft	2.29 ft	7.17 ft	1.33 ft	4.09 ft	2.86 ft
Provide:	Va=	**SW1**	**SW2**	**SWC**	**2653**	**SW1**	**SW1**
Min Shear Wall Segment:							
Provide:	Va=						
Blocking / Nailing Framing Attachment							
Blocking Unit Shear		69 plf	12 plf	33 plf	57 plf	129 plf	72 plf
Blocking		**NONE**	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**
Nailing		**See SCHED**	**See SCHED**	**See SCHED**	**See SCHED**	**See SCHED**	**See SCHED**
Unit Base Shear							
% of full height segments	%fh = L_w/L =	0.515	0.392	1.000	1.000	0.794	1.000
% of maximum opening height	%oh = H'/H =	1.000	1.000	0.000	0.000	1.000	0.000
Shear cap adj factor	SCAF =	0.51	0.45	1.00	1.00	0.71	1.00
Unit base shear	vbase V_1/L_w =	179 plf	162 plf	162 plf	1082 plf	192 plf	326 plf
Effective unit base shear	vreq=v_{base}/SCAF=	354 plf	360 plf	162 plf	1082 plf	271 plf	326 plf
Ovrtrn. mo. Ttl. length of wall	OTM =	106.7 k-ft	18.6 k-ft	40.7 k-ft	21.9 k-ft	67.6 k-ft	18.6 k-ft
Shear wall adjustment factor							
Resist moment total L. of wall	RM =	323.0 k-ft	22.2 k-ft	36.8 k-ft	0.4 k-ft	58.0 k-ft	5.4 k-ft
	r=	0.5146	0.3925	1.0000	1.0000	0.7936	1.0000
	C_O=	0.5074	0.4515	1.0000	1.0000	0.7079	1.0000

SHEAR WALL CALCULATIONS:

		X5-1	X6-1	X7-1	Y1-1	Y1-1	Y2-1
Shear Wall Forces							
Number of Panels		1	1	1	1	1	1
Total length of wall		16.00 ft	41.54 ft	8.00 ft	48.00 ft	48.00 ft	86.00 ft
Total length of shear wall	L =	9.00 ft	6.79 ft	8.00 ft	18.00 ft	30.00 ft	4.00 ft
Total length of full ht seg.	L_w =	9.00 ft	6.79 ft	8.00 ft	12.00 ft	8.00 ft	4.00 ft
height of shear wall	H =	11.50 ft	10.00 ft	13.50 ft	10.00 ft	12.00 ft	10.00 ft
Maximum opening height	H' =	0.00 ft	0.00 ft	0.00 ft	0.00 ft	2.50 ft	0.00 ft
Total force at top of wall	V_1 =	1258 lbs	2908 lbs	1630 lbs	2069 lbs	1379 lbs	536 lbs
Self weight	$w_{DL\ self}$ =	138 plf	120 plf	162 plf	120 plf	144 plf	120 plf
Applied dead load	$w_{DL\ above}$ =	68 plf	68 plf	68 plf	68 plf	68 plf	68 plf
Prefered OSB thickness	in	7/16	7/16	7/16	7/16	7/16	7/16
Prefered Gyp thickness	in	1/2	1/2	1/2	1/2	1/2	1/2
Wall Connected to Concrete	y/n =	Y	Y	Y	Y	Y	Y
Shear Wall Segments							
		9.00	6.79	8.00	4.00	4.00	4.00
					4.00	4.00	
					4.00		
Shear Transfer to Concrete							
	T =	1052 lbs	3900 lbs	2199 lbs	201 lbs	Not Req'd	1113 lbs
1/2 Anchor Bolts @		72 '' O.C.	36 '' O.C.	72 '' O.C.	72 '' O.C.	72 '' O.C.	48 '' O.C.
Provide:		Code Min.	A3	Code Min.	Code Min.	Code Min.	A4
Min # of 1/2 Anchor Bolts		(2) Min	(3) Min	(2) Min	(2) Min	(2) Min	(2) Min
Load From Above		0.00	0.00	0.00	0.00	0.00	0.00
Holdown		**HD1**	**HD3**	**HD2**	**Perp. Wall**		**HD1**
Shear Resisting System							
Force Calculated		139.81	428.27	203.77	172.38	172.38	133.89
		OSB	**OSB**	**OSB**	**OSB**	**OSB**	**OSB**
Min Shear Wall Segment:		3.29 ft	2.86 ft	3.86 ft	2.86 ft	3.43 ft	2.86 ft
Provide:	Va=	**SW1**	**SW2**	**SW1**	**SW1**	**SW1**	**SW1**
Min Shear Wall Segment:							
Provide:	Va=						
Blocking / Nailing Framing Attachment							
Blocking Unit Shear		79 plf	70 plf	204 plf	43 plf	29 plf	6 plf
Blocking		**NONE**	**NONE**	**B1**	**NONE**	**NONE**	**NONE**
Nailing		**See SCHED**	**See SCHED**	**T1**	**See SCHED**	**See SCHED**	**See SCHED**
Unit Base Shear							
% of full height segments	%fh = L_w/L =	1.000	1.000	1.000	0.667	0.267	1.000
% of maximum opening height	%oh = H'/H =	0.000	0.000	0.000	0.000	0.208	0.000
Shear cap adj factor	SCAF =	1.00	1.00	1.00	1.00	1.00	1.00
Unit base shear	vbase V_1/L_w =	140 plf	428 plf	204 plf	172 plf	172 plf	134 plf
Effective unit base shear	$v_{req}=v_{base}$/SCAF=	140 plf	428 plf	204 plf	172 plf	172 plf	134 plf
Ovrtrn. mo. Ttl. length of wall	OTM =	14.5 k-ft	29.1 k-ft	22.0 k-ft	20.7 k-ft	16.5 k-ft	5.4 k-ft
Shear wall adjustment factor							
Resist moment total L. of wall	RM =	8.3 k-ft	4.3 k-ft	7.4 k-ft	30.5 k-ft	95.4 k-ft	1.5 k-ft
	r=	1.0000	1.0000	1.0000	1.0000	0.6358	1.0000
	C_O=	1.0000	1.0000	1.0000	1.4998	1.3793	1.0000

SHEAR WALL CALCULATIONS:

		Y2-1	Y2-1	Y3-1	Y3-1	Y4-1	Y4-1
Shear Wall Forces							
Number of Panels		1	3	1	1	1	1
Total length of wall		86.00 ft	86.00 ft	90.00 ft	90.00 ft	59.00 ft	59.00 ft
Total length of shear wall	L =	21.50 ft	8.54 ft	22.38 ft	21.50 ft	2.00 ft	11.00 ft
Total length of full ht seg.	L_w =	11.50 ft	8.54 ft	22.38 ft	11.92 ft	2.00 ft	11.00 ft
height of shear wall	H =	12.00 ft	10.00 ft	10.00 ft	14.38 ft	9.00 ft	10.00 ft
Maximum opening height	H' =	8.00 ft	0.00 ft	0.00 ft	14.38 ft	0.00 ft	0.00 ft
Total force at top of wall	V_1 =	1540 lbs	1143 lbs	2372 lbs	1263 lbs	1586 lbs	2181 lbs
Self weight	$w_{DL\ self}$ =	144 plf	120 plf	120 plf	173 plf	108 plf	120 plf
Applied dead load	$w_{DL\ above}$ =	68 plf	170 plf	204 plf	272 plf	34 plf	68 plf
Prefered OSB thickness	in	7/16	7/16	7/16	7/16	7/16	7/16
Prefered Gyp thickness	in	1/2	1/2	1/2	1/2	1/2	1/2
Wall Connected to Concrete	y/n =	Y	Y	Y	Y	Y	Y
Shear Wall Segments							
		6.00	8.54	22.38	6.21	2.00	11.00
		5.50			5.71		
Shear Transfer to Concrete							
	T =	Not Req'd	496 lbs	Not Req'd	Not Req'd	3500 lbs	1362 lbs
1/2 Anchor Bolts @		72 '' O.C.	72 '' O.C.	72 '' O.C.	72 '' O.C.		60 '' O.C.
Provide:		Code Min.	Code Min.	Code Min.	Code Min.		A5
Min # of 1/2 Anchor Bolts		(2) Min	(2) Min	(3) Min	(2) Min		(3) Min
Load From Above		0.00	0.00	0.00	0.00	0.00	0.00
			Perp. Wall			**HD3**	**HD1**
Shear Resisting System							
Force Calculated		196.16	133.89	105.99	200.43	792.92	198.23
		OSB	**Gyp.**	**Gyp.**	**OSB**	**P.F.**	**OSB**
Min Shear Wall Segment:		3.43 ft	5.00 ft	5.00 ft	4.11 ft	1.33 ft	2.86 ft
Provide:	Va=	**SW1**	**SWB**	**SWA**	**SW1**	**2254**	**SW1**
Min Shear Wall Segment:							
Provide:	Va=						
Blocking / Nailing Framing Attachment							
Blocking Unit Shear		18 plf	40 plf	26 plf	14 plf	27 plf	37 plf
Blocking		**NONE**	**NONE**	**NONE**	**NONE**	**NONE**	**NONE**
Nailing		**See SCHED**	**See SCHED**	**See SCHED**	**See SCHED**	**See SCHED**	**See SCHED**
Unit Base Shear							
% of full height segments	%fh = L_w/L =	0.535	1.000	1.000	0.554	1.000	1.000
% of maximum opening height	%oh = H'/H =	0.667	0.000	0.000	1.000	0.000	0.000
Shear cap adj factor	SCAF =	0.68	1.00	1.00	0.53	1.00	1.00
Unit base shear	vbase V_1/L_w =	134 plf	134 plf	106 plf	106 plf	793 plf	198 plf
Effective unit base shear	vreq=v_{base}/SCAF=	196 plf	134 plf	106 plf	200 plf	793 plf	198 plf
Ovrtrn. mo. Ttl. length of wall	OTM =	27.1 k-ft	11.4 k-ft	23.7 k-ft	34.3 k-ft	14.3 k-ft	21.8 k-ft
Shear wall adjustment factor							
Resist moment total L. of wall	RM =	49.0 k-ft	10.6 k-ft	81.1 k-ft	102.7 k-ft	0.3 k-ft	11.4 k-ft
	r=	0.6330	1.0000	1.0000	0.5544	1.0000	1.0000
	C_O=	0.6825	1.0000	1.0000	0.5288	1.0000	1.0000

SHEAR WALL CALCULATIONS:

		Y5-1	Y5-1	Y6-1			
Shear Wall Forces							
Number of Panels		1	1	1			
Total length of wall		61.00 ft	61.00 ft	53.00 ft			
Total length of shear wall	L =	8.00 ft	4.71 ft	40.67 ft			
Total length of full ht seg.	L_w =	8.00 ft	4.71 ft	11.42 ft			
height of shear wall	H =	21.50 ft	12.58 ft	10.00 ft			
Maximum opening height	H' =	0.00 ft	0.00 ft	6.00 ft			
Total force at top of wall	V_1 =	2545 lbs	1498 lbs	1271 lbs			
Self weight	$w_{DL\ self}$ =	258 plf	151 plf	120 plf			
Applied dead load	$w_{DL\ above}$ =	272 plf	187 plf	183 plf			
Prefered OSB thickness	in	7/16	7/16	7/16			
Prefered Gyp thickness	in	1/2	1/2	1/2			
Wall Connected to Concrete	y/n =	Y	Y	Y			
Shear Wall Segments							
		8.00	4.71	4.42			
				4.00			
				3.00			
Shear Transfer to Concrete							
	T =	5567 lbs	3524 lbs	Not Req'd			
1/2 Anchor Bolts @		48 '' O.C.	48 '' O.C.	72 '' O.C.			
Provide:		A4	A4	Code Min.			
Min # of 1/2 Anchor Bolts		(3) Min	(2) Min	(2) Min			
Load From Above		0.00	0.00	0.00			
Holdown		**HD3**	**HD3**				
Shear Resisting System							
Force Calculated		318.08	318.08	175.37			
		OSB	**OSB**	**OSB**			
Min Shear Wall Segment:		6.14 ft	3.59 ft	2.86 ft			
Provide:	Va=	**SW1**	**SW1**	**SW1**			
Min Shear Wall Segment:							
Provide:	Va=						
Blocking / Nailing Framing Attachment							
Blocking Unit Shear		42 plf	25 plf	24 plf			
Blocking		**NONE**	**NONE**	**NONE**			
Nailing		**See SCHED**	**See SCHED**	**See SCHED**			
Unit Base Shear							
% of full height segments	%fh = L_w/L =	1.000	1.000	0.281			
% of maximum opening height	%oh = H'/H =	0.000	0.000	0.600			
Shear cap adj factor	SCAF =	1.00	1.00	0.63			
Unit base shear	vbase V_1/L_w =	318 plf	318 plf	111 plf			
Effective unit base shear	vreq=v_{base}/SCAF=	318 plf	318 plf	175 plf			
Ovrtrn. mo. Ttl. length of wall	OTM =	54.7 k-ft	18.8 k-ft	20.0 k-ft			
Shear wall adjustment factor							
Resist moment total L. of wall	RM =	17.0 k-ft	3.7 k-ft	250.7 k-ft			
	r=	1.0000	1.0000	0.3942			
	C_O=	1.0000	1.0000	0.6348			

Minimum Width (in.)	Maximum Height (ft)	Allowable Design (ASD) Values per Frame Segment		Load Factor
		Shear[e,f] (lbf)	Deflection (in.)	
16	8	850	0.33	3.09
	10	625	0.44	2.97
24	8	1,675	0.38	2.88
	10	1,125	0.51	3.42

Foundation for Wind or Seismic Loading[a,b,c,d]

(a) Design values are based on the use of Douglas-fir or Southern pine framing. For other species of framing, multiply the above shear design value by the specific gravity adjustment factor = (1 – (0.5 – SG)), where SG = specific gravity of the actual framing. This adjustment shall not be greater than 1.0.

(b) For construction as shown in Figure 1.

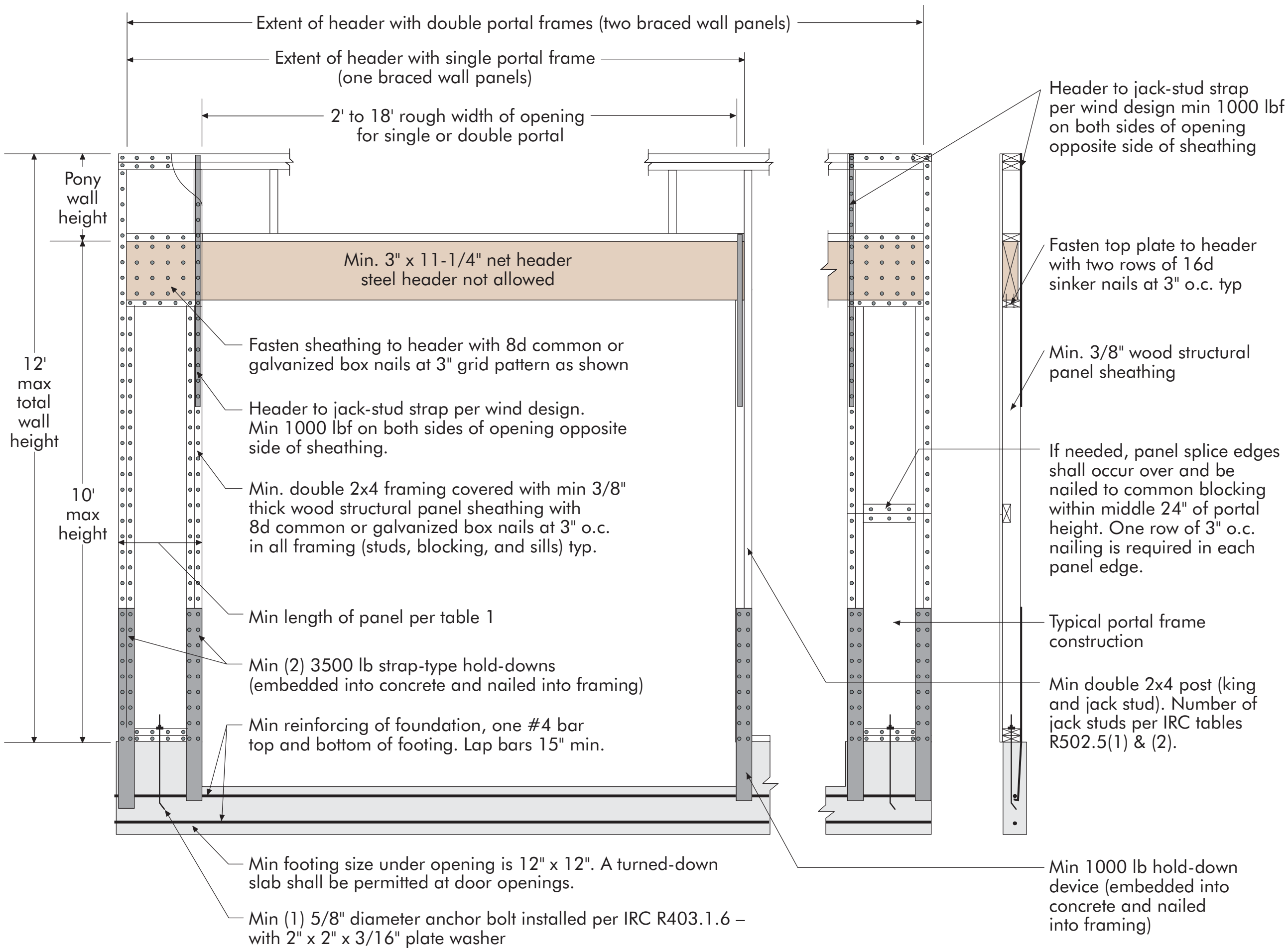
(c) Values are for a single portal-frame segment (one vertical leg and a portion of the header). For multiple portal-frame segments, the allowable shear design values are permitted to be multiplied by the number of frame segments (e.g., two = 2x, three = 3x, etc.).

(d) Interpolation of design values for heights between 8 and 10 feet, and for portal widths between 16 and 24 inches, is permitted.

(e) The allowable shear design value is permitted to be multiplied by a factor of 1.4 for wind design.

(f) If story drift is not a design consideration, the tabulated design shear values are permitted to be multiplied by a factor of 1.15. This factor is permitted to be used cumulatively with the wind-design adjustment factor in Footnote (e) above.

Figure 1. Construction Details for APA Portal-Frame Design with Hold Downs



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

Completed by: JDJ
Review/Check: KKJ

Project Name: Teunissen Residence
SRE Project #: 2025-8881
City and State: Canyon County, Idaho

TALL WALL CALCULATIONS:

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

	12' Tall Wall	King Stud (4' Max Opening)	12' Trimmer	King Stud (10' Max Opening)	12' Trimmer	King Stud (12.5' Max Opening)
Description:						
Type:	*2x Lumber (2"-4")*	*2x Lumber (2"-4")*	*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*	*DF-L*	*DF-L*
Grade:	*No. 2*	*No. 2*	*No. 2*	*No. 2*	*No. 2*	*No. 2*
Nominal width, t =	*(1) 2*	*(1) 2*	*(1) 2*	*(2) 2*	*(1) 2*	*(3) 2*
Actual width =	1.50 in	1.50 in	1.50 in	3.00 in	1.50 in	4.50 in
Nominal depth, d =	*6*	*6*	*6*	*6*	*6*	*6*
Actual depth =	5.50 in	5.50 in	5.50 in	5.50 in	5.50 in	5.50 in
Span, L =	*12.000 ft*	*12.000 ft*	*12.000 ft*	*12.000 ft*	*12.000 ft*	*12.000 ft*
w/o Plates	11.750 ft	11.750 ft	11.750 ft	11.750 ft	11.750 ft	11.750 ft
Stud spacing, s =	*16 in*	*34 in*	*16 in*	*70 in*	*16 in*	*85 in*
Lat. Pressure, w_{wind} =	16.23 psf	16.23 psf	5.00 psf	16.23 psf	5.00 psf	16.23 psf
Axial load, P =	*630 lbs*	*50 lbs*	*945 lbs*	*50 lbs*	*840 lbs*	*50 lbs*
Eccentricity, e =	*0 in*	*0 in*	*0 in*	*0 in*	*0 in*	*0 in*
K_{cE} =	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*
c =	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*
w =	21.6 plf	46.3 plf	6.7 plf	95.0 plf	6.7 plf	115.3 plf
Fb	900 psi	900 psi	900 psi	900 psi	900 psi	900 psi
Fv	180 psi	180 psi	180 psi	180 psi	180 psi	180 psi
Fc-prll	1,350 psi	1,350 psi	1,350 psi	1,350 psi	1,350 psi	1,350 psi
Fc-perp	625 psi	625 psi	625 psi	625 psi	625 psi	625 psi
C_d	*1.60*	*1.60*	*1.15*	*1.60*	*1.15*	*1.60*
$C_{F,Fb}$	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*
$C_{F,Fcprll}$	*1.10*	*1.10*	*1.10*	*1.10*	*1.10*	*1.10*
C_r	*1.15*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
C_p	0.28	0.28	0.38	0.28	0.38	0.28
C_H	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*6.00*
C_b	*1.07*	*1.07*	*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	1,600,000 psi	1,600,000 psi
Emin	580,000 psi	580,000 psi	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**	**1872 psi**	**1346 psi**	**1872 psi**
F'_v = $F'_v C_d C_H$ =	**288 psi**	**288 psi**	**207 psi**	**288 psi**	**207 psi**	**1728 psi**
F^*_c = $F_c C_d C_F$ =	2376 psi	2376 psi	1708 psi	2376 psi	1708 psi	2376 psi
F_{cE} = $(K_{cE} E')/(l_e/d)2$ =	730 psi	730 psi	730 psi	730 psi	730 psi	730 psi
F'_c = $F_c C_d C_F C_p$ =	**676 psi**	**676 psi**	**650 psi**	**676 psi**	**650 psi**	**676 psi**
$F'_{c\,perp}$ = $F_{c\,perp}$ Cb =	**668 psi**	**668 psi**	**668 psi**	**668 psi**	**668 psi**	**668 psi**
E' = E =	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**
F_{bE} =	**2019 psi**	**2019 psi**	**2019 psi**	**8077 psi**	**2019 psi**	**18174 psi**
Slenderness Ratio:	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**
R_B =	**19**	**19**	**19**	**9**	**19**	**6**
Bending:	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**
M = $w L^2/8 + P e/12$ =	373 ft-lbs	799 ft-lbs	115 ft-lbs	1639 ft-lbs	115 ft-lbs	1989 ft-lbs
f_b = M/S =	**592 psi**	**1268 psi**	**183 psi**	**1301 psi**	**183 psi**	**1052 psi**
S =	8 in³	8 in³	8 in³	15 in³	8 in³	23 in³
Shear:	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**
V = w L/2 =	127 lbs	272 lbs	39 lbs	558 lbs	39 lbs	95 lbs
f_v = 1.5 V/A =	**23 psi**	**49 psi**	**7 psi**	**51 psi**	**7 psi**	**6 psi**
A =	8 in²	8 in²	8 in²	17 in²	8 in²	25 in²
Compression:	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**
f_c = P/A =	**76 psi**	**6 psi**	**115 psi**	**3 psi**	**102 psi**	**2 psi**
Compression (perp.):	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**
$f_{c\,perp}$ = P/A =	**76 psi**	**6 psi**	**115 psi**	**3 psi**	**102 psi**	**2 psi**
Combined:	**< 1.0 OK**					
(fc/Fc)2 + {fb/[Fb(1-(fc/FcE)]} =	0.32					
Deflection:	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**
D = $22.5\, w L^4/E' I$ =	**0.28 in**	**0.60 in**	**0.09 in**	**0.61 in**	**0.09 in**	**0.50 in**
I =	21 in^4	21 in^4	21 in^4	42 in^4	21 in^4	62 in^4
SPAN /	**506**	**236**	**1641**	**230**	**1641**	**285**

TALL WALL CALCULATIONS:

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

Description:	**15' Tall Wall**	**14.35' Tall Wall**	**King Stud (18' Max Opening)**	**14.35' Trimmer**	**King Stud (9.58' Max Opening)**	**14.35' Trimmer**
Type:	*2x Lumber (2"-4")*	*2x Lumber (2"-4")*	*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*	*DF-L*	*DF-L*
Grade:	*No. 2*	*No. 2*	*No. 2*	*No. 2*	*No. 2*	*No. 2*
Nominal width, t =	*(1) 2*	*(1) 2*	*(5) 2*	*(2) 2*	*(3) 2*	*(1) 2*
Actual width =	1.50 in	1.50 in	7.50 in	3.00 in	4.50 in	1.50 in
Nominal depth, d =	*6*	*6*	*6*	*6*	*6*	*6*
Actual depth =	5.50 in	5.50 in	5.50 in	5.50 in	5.50 in	5.50 in
Span, L =	*15.000 ft*	*14.350 ft*	*14.350 ft*	*14.350 ft*	*14.350 ft*	*14.350 ft*
w/o Plates	14.750 ft	14.100 ft	14.100 ft	14.100 ft	14.100 ft	14.100 ft
Stud spacing, s =	*16 in*	*16 in*	*118 in*	*16 in*	*68 in*	*16 in*
Lat. Pressure, w_{wind} =	16.23 psf	16.23 psf	16.23 psf	5.00 psf	16.23 psf	5.00 psf
Axial load, P =	*630 lbs*	*896 lbs*	*50 lbs*	*6048 lbs*	*50 lbs*	*504 lbs*
Eccentricity, e =	*0 in*	*0 in*	*0 in*	*0 in*	*0 in*	*0 in*
K_{cE} =	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*
c =	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*
w =	21.6 plf	21.6 plf	159.9 plf	6.7 plf	91.6 plf	6.7 plf
Fb	900 psi	900 psi	900 psi	900 psi	900 psi	900 psi
Fv	180 psi	180 psi	180 psi	180 psi	180 psi	180 psi
Fc-prll	1,350 psi	1,350 psi	1,350 psi	1,350 psi	1,350 psi	1,350 psi
Fc-perp	625 psi	625 psi	625 psi	625 psi	625 psi	625 psi
C_d	*1.60*	*1.60*	*1.60*	*1.15*	*1.60*	*1.15*
$C_{F,Fb}$	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*
$C_{F,Fcprll}$	*1.10*	*1.10*	*1.10*	*1.10*	*1.10*	*1.10*
C_r	*1.15*	*1.15*	*1.00*	*1.00*	*1.00*	*1.00*
C_p	0.19	0.20	0.20	0.28	0.20	0.28
C_H	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*6.00*
C_b	*1.07*	*1.07*	*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	1,600,000 psi	1,600,000 psi
Emin	580,000 psi	580,000 psi	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**	**2153 psi**	**1872 psi**	**1346 psi**	**1872 psi**	**1346 psi**
F'_v = $F'_v C_d C_H$ =	**288 psi**	**288 psi**	**288 psi**	**207 psi**	**288 psi**	**1242 psi**
F^*_c = $F_c C_d C_F$ =	2376 psi	2376 psi	2376 psi	1708 psi	2376 psi	1708 psi
F_{cE} = $(K_{cE} E')/(l_e/d)2$ =	463 psi	507 psi	507 psi	507 psi	507 psi	507 psi
F'_c = $F_c C_d C_F C_p$ =	**443 psi**	**483 psi**	**483 psi**	**471 psi**	**483 psi**	**471 psi**
$F'_{c\,perp}$ = $F_{c\,perp}$ Cb =	**668 psi**	**668 psi**	**668 psi**	**668 psi**	**668 psi**	**668 psi**
E' = E =	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**
F_{bE} =	**1609 psi**	**1683 psi**	**42070 psi**	**6731 psi**	**15145 psi**	**1683 psi**
Slenderness Ratio:	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**
R_B =	**21**	**20**	**4**	**10**	**7**	**20**
Bending:	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**
M = $w L^2/8 + P e/12$ =	588 ft-lbs	538 ft-lbs	3974 ft-lbs	166 ft-lbs	2276 ft-lbs	166 ft-lbs
f_b = M/S =	**934 psi**	**853 psi**	**1261 psi**	**131 psi**	**1204 psi**	**263 psi**
S =	8 in³	8 in³	38 in³	15 in³	23 in³	8 in³
Shear:	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**
V = w L/2 =	160 lbs	153 lbs	1127 lbs	47 lbs	646 lbs	35 lbs
f_v = 1.5 V/A =	**29 psi**	**28 psi**	**41 psi**	**4 psi**	**39 psi**	**6 psi**
A =	8 in²	8 in²	41 in²	17 in²	25 in²	8 in²
Compression:	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**
f_c = P/A =	**76 psi**	**109 psi**	**1 psi**	**367 psi**	**2 psi**	**61 psi**
Compression (perp.):	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**
$f_{c\,perp}$ = P/A =	**76 psi**	**109 psi**	**1 psi**	**367 psi**	**2 psi**	**61 psi**
Combined:	**< 1.0 OK**	**< 1.0 OK**				
(fc/Fc)2 + {fb/[Fb(1-(fc/FcE)]} =	0.55	0.55				
Deflection:	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**
D = $22.5\, w L^4/E'\, I$ =	**0.69 in**	**0.58 in**	**0.85 in**	**0.09 in**	**0.82 in**	**0.18 in**
I =	21 in^4	21 in^4	104 in^4	42 in^4	62 in^4	21 in^4
SPAN /	**256**	**293**	**198**	**1899**	**207**	**950**

TALL WALL CALCULATIONS:

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

Description:	**12.375' Tall Wall**	**King Stud (10' Max Opening)**	**12.375' Trimmer**	**King Stud (3' Max Opening)**	**12.375' Trimmer**	**12.375' Trimmer**
Type:	*2x Lumber (2"-4")*	*2x Lumber (2"-4")*	*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*	*DF-L*	*DF-L*
Grade:	*No. 2*	*No. 2*	*No. 2*	*No. 2*	*No. 2*	*No. 2*
Nominal width, t =	*(1) 2*	*(2) 2*	*(1) 2*	*(1) 2*	*(1) 2*	*(1) 2*
Actual width =	1.50 in	3.00 in	1.50 in	1.50 in	1.50 in	1.50 in
Nominal depth, d =	*6*	*6*	*6*	*6*	*6*	*6*
Actual depth =	5.50 in	5.50 in	5.50 in	5.50 in	5.50 in	5.50 in
Span, L =	*12.375 ft*	*12.375 ft*	*12.375 ft*	*12.375 ft*	*12.375 ft*	*12.375 ft*
w/o Plates	12.125 ft	12.125 ft	12.125 ft	12.125 ft	12.125 ft	12.125 ft
Stud spacing, s =	*16 in*	*70 in*	*16 in*	*28 in*	*16 in*	*16 in*
Lat. Pressure, w_{wind} =	16.23 psf	16.23 psf	5.00 psf	16.23 psf	5.00 psf	5.00 psf
Axial load, P =	*896 lbs*	*50 lbs*	*3360 lbs*	*50 lbs*	*805 lbs*	*504 lbs*
Eccentricity, e =	*0 in*	*0 in*	*0 in*	*0 in*	*0 in*	*0 in*
K_{cE} =	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*
c =	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*
w =	21.6 plf	95.0 plf	6.7 plf	38.2 plf	6.7 plf	6.7 plf
Fb	900 psi	900 psi	900 psi	900 psi	900 psi	900 psi
Fv	180 psi	180 psi	180 psi	180 psi	180 psi	180 psi
Fc-prll	1,350 psi	1,350 psi	1,350 psi	1,350 psi	1,350 psi	1,350 psi
Fc-perp	625 psi	625 psi	625 psi	625 psi	625 psi	625 psi
C_d	*1.60*	*1.60*	*1.15*	*1.60*	*1.15*	*1.15*
$C_{F,Fb}$	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*
$C_{F,Fcprll}$	*1.10*	*1.10*	*1.10*	*1.10*	*1.10*	*1.10*
C_r	*1.15*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
C_p	0.27	0.27	0.36	0.27	0.36	0.36
C_H	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*6.00*
C_b	*1.07*	*1.07*	*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	1,600,000 psi	1,600,000 psi
Emin	580,000 psi	580,000 psi	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**	**1872 psi**	**1346 psi**	**1346 psi**
F'_v = $F'_v C_d C_H$ =	**288 psi**	**288 psi**	**207 psi**	**288 psi**	**207 psi**	**1242 psi**
F^*_c = $F_c C_d C_F$ =	2376 psi	2376 psi	1708 psi	2376 psi	1708 psi	1708 psi
F_{cE} = $(K_{cE} E')/(l_e/d)2$ =	686 psi	686 psi	686 psi	686 psi	686 psi	686 psi
F'_c = $F_c C_d C_F C_p$ =	**639 psi**	**639 psi**	**616 psi**	**639 psi**	**616 psi**	**616 psi**
$F'_{c\ perp}$ = $F_{c\ perp}$ Cb =	**668 psi**	**668 psi**	**668 psi**	**668 psi**	**668 psi**	**668 psi**
E' = E =	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**
F_{bE} =	**1957 psi**	**7828 psi**	**1957 psi**	**1957 psi**	**1957 psi**	**1957 psi**
Slenderness Ratio:	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**
R_B =	**19**	**9**	**19**	**19**	**19**	**19**
Bending:	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**
M = $w L^2/8 + P e/12$ =	398 ft-lbs	1746 ft-lbs	123 ft-lbs	702 ft-lbs	123 ft-lbs	123 ft-lbs
f_b = M/S =	**631 psi**	**1385 psi**	**194 psi**	**1114 psi**	**194 psi**	**194 psi**
S =	8 in³	15 in³	8 in³	8 in³	8 in³	8 in³
Shear:	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**
V = w L/2 =	131 lbs	576 lbs	40 lbs	232 lbs	40 lbs	30 lbs
f_v = 1.5 V/A =	**24 psi**	**52 psi**	**7 psi**	**42 psi**	**7 psi**	**6 psi**
A =	8 in²	17 in²	8 in²	8 in²	8 in²	8 in²
Compression:	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**
f_c = P/A =	**109 psi**	**3 psi**	**407 psi**	**6 psi**	**98 psi**	**61 psi**
Compression (perp.):	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**
$f_{c\ perp}$ = P/A =	**109 psi**	**3 psi**	**407 psi**	**6 psi**	**98 psi**	**61 psi**
Combined:	**< 1.0 OK**					
(fc/Fc)2 + {fb/[Fb(1-(fc/FcE)]} =	0.38					
Deflection:	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**
D = $22.5 w L^4/E' I$ =	**0.32 in**	**0.69 in**	**0.10 in**	**0.56 in**	**0.10 in**	**0.10 in**
I =	21 in^4	42 in^4	21 in^4	21 in^4	21 in^4	21 in^4
SPAN /	**460**	**210**	**1493**	**261**	**1493**	**1493**

TALL WALL CALCULATIONS:

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

		12.58' Tall Wall	King Stud (9.5' Max Opening)	12.58' Trimmer	12.58' Trimmer	King Stud (6.25' Max Opening)	
Description:							
	Type:	*2x Lumber (2"-4")*	*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*	*DF-L*	
	Grade:	*No. 2*	*No. 2*	*No. 2*	*No. 2*	*No. 2*	
	Nominal width, t =	*(1) 2*	*(2) 2*	*(1) 2*	*(1) 2*	*(2) 2*	
	Actual width =	1.50 in	3.00 in	1.50 in	1.50 in	3.00 in	
	Nominal depth, d =	*6*	*6*	*6*	*6*	*6*	
	Actual depth =	5.50 in	5.50 in	5.50 in	5.50 in	5.50 in	
	Span, L =	*12.580 ft*	*12.580 ft*	*12.580 ft*	*12.580 ft*	*12.580 ft*	
	w/o Plates	12.330 ft	12.330 ft	12.330 ft	12.330 ft	12.330 ft	
	Stud spacing, s =	*16 in*	*67 in*	*16 in*	*16 in*	*48 in*	
	Lat. Pressure, w_{wind} =	16.23 psf	16.23 psf	5.00 psf	5.00 psf	16.23 psf	
	Axial load, P =	*616 lbs*	*50 lbs*	*1386 lbs*	*693 lbs*	*50 lbs*	
	Eccentricity, e =	*0 in*	*0 in*	*0 in*	*0 in*	*0 in*	
	K_{cE} =	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	
	c =	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*	
	w =	21.6 plf	90.9 plf	6.7 plf	6.7 plf	64.6 plf	
	Fb	900 psi	900 psi	900 psi	900 psi	900 psi	
	Fv	180 psi	180 psi	180 psi	180 psi	180 psi	
	Fc-prll	1,350 psi	1,350 psi	1,350 psi	1,350 psi	1,350 psi	
	Fc-perp	625 psi	625 psi	625 psi	625 psi	625 psi	
	C_d	*1.60*	*1.60*	*1.15*	*1.15*	*1.60*	
	$C_{F,Fb}$	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*	
	$C_{F,Fcprll}$	*1.10*	*1.10*	*1.10*	*1.10*	*1.10*	
	C_r	*1.15*	*1.00*	*1.00*	*1.00*	*1.00*	
	C_p	0.26	0.26	0.35	0.35	0.26	
	C_H	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	
	C_b	*1.07*	*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	1,600,000 psi	
	Emin	580,000 psi	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**	**1346 psi**	**1872 psi**	
F'_v =	$F'_v C_d C_H$ =	**288 psi**	**288 psi**	**207 psi**	**207 psi**	**288 psi**	
F^*_c =	$F_c C_d C_F$ =	2376 psi	2376 psi	1708 psi	1708 psi	2376 psi	
F_{cE} =	$(K_{cE} E')/(l_e/d)2$ =	663 psi	663 psi	663 psi	663 psi	663 psi	
F'_c =	$F_c C_d C_F C_p$ =	**620 psi**	**620 psi**	**599 psi**	**599 psi**	**620 psi**	
$F'_{c\,perp}$ =	$F_{c\,perp}$ Cb =	**668 psi**	**668 psi**	**668 psi**	**668 psi**	**668 psi**	
E' =	E =	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**	
	F_{bE} =	**1924 psi**	**7697 psi**	**1924 psi**	**1924 psi**	**7697 psi**	
	Slenderness Ratio:	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**	
	R_B =	**19**	**10**	**19**	**19**	**10**	
	Bending:	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**	
M =	$w L^2/8 + P e/12$ =	411 ft-lbs	1728 ft-lbs	127 ft-lbs	127 ft-lbs	1227 ft-lbs	
f_b =	M/S =	**652 psi**	**1371 psi**	**201 psi**	**201 psi**	**973 psi**	
	S =	8 in³	15 in³	8 in³	8 in³	15 in³	
	Shear:	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**	
V =	w L/2 =	133 lbs	561 lbs	41 lbs	41 lbs	398 lbs	
f_v =	1.5 V/A =	**24 psi**	**51 psi**	**7 psi**	**7 psi**	**36 psi**	
	A =	8 in²	17 in²	8 in²	8 in²	17 in²	
	Compression:	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	
f_c =	P/A =	**75 psi**	**3 psi**	**168 psi**	**84 psi**	**3 psi**	
	Compression (perp.):	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	
$f_{c\,perp}$ =	P/A =	**75 psi**	**3 psi**	**168 psi**	**84 psi**	**3 psi**	
	Combined:	**< 1.0 OK**					
	(fc/Fc)2 + {fb/[Fb(1-(fc/FcE)]} =	0.36					
	Deflection:	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**	
	$D = 22.5\ w L^4/E'\ I$ =	**0.34 in**	**0.71 in**	**0.10 in**	**0.10 in**	**0.50 in**	
	I =	21 in^4	42 in^4	21 in^4	21 in^4	42 in^4	
	SPAN /	**438**	**208**	**1420**	**1420**	**293**	

TALL WALL CALCULATIONS:

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

Description:	**10' Tall Wall**	**King Stud (22' Max Opening)**	**10' Trimmer**	**King Stud (18' Max Opening)**	**10' Trimmer**	**10' Trimmer**
Type:	*2x Lumber (2"-4")*	*2x Lumber (2"-4")*	*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*	*DF-L*	*DF-L*
Grade:	*No. 2*	*No. 2*	*No. 2*	*No. 2*	*No. 2*	*No. 2*
Nominal width, t =	*(1) 2*	*(2) 2*	*(2) 2*	*(2) 2*	*(2) 2*	*(1) 2*
Actual width =	1.50 in	3.00 in	3.00 in	3.00 in	3.00 in	1.50 in
Nominal depth, d =	*6*	*6*	*6*	*6*	*6*	*6*
Actual depth =	5.50 in	5.50 in	5.50 in	5.50 in	5.50 in	5.50 in
Span, L =	*10.000 ft*	*10.000 ft*	*10.000 ft*	*10.000 ft*	*10.000 ft*	*10.000 ft*
w/o Plates	9.750 ft	9.750 ft	9.750 ft	9.750 ft	9.750 ft	9.750 ft
Stud spacing, s =	*16 in*	*142 in*	*16 in*	*118 in*	*16 in*	*16 in*
Lat. Pressure, w_{wind} =	16.23 psf	16.23 psf	5.00 psf	16.23 psf	5.00 psf	5.00 psf
Axial load, P =	*1400 lbs*	*50 lbs*	*5544 lbs*	*50 lbs*	*6048 lbs*	*2016 lbs*
Eccentricity, e =	*0 in*	*0 in*	*0 in*	*0 in*	*0 in*	*0 in*
K_{cE} =	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*	*0.3*
c =	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*
w =	21.6 plf	192.3 plf	6.7 plf	159.9 plf	6.7 plf	6.7 plf
Fb	900 psi	900 psi	900 psi	900 psi	900 psi	900 psi
Fv	180 psi	180 psi	180 psi	180 psi	180 psi	180 psi
Fc-prll	1,350 psi	1,350 psi	1,350 psi	1,350 psi	1,350 psi	1,350 psi
Fc-perp	625 psi	625 psi	625 psi	625 psi	625 psi	625 psi
C_d	*1.60*	*1.60*	*1.15*	*1.60*	*1.15*	*1.15*
$C_{F,Fb}$	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*	*1.30*
$C_{F,Fcprll}$	*1.10*	*1.10*	*1.10*	*1.10*	*1.10*	*1.10*
C_r	*1.15*	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*
C_p	0.39	0.39	0.51	0.39	0.51	0.51
C_H	*1.00*	*1.00*	*1.00*	*1.00*	*1.00*	*6.00*
C_b	*1.07*	*1.07*	*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	1,600,000 psi	1,600,000 psi
Emin	580,000 psi	580,000 psi	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**	**1872 psi**	**1346 psi**	**1346 psi**
F'_v = $F'_v C_d C_H$ =	**288 psi**	**288 psi**	**207 psi**	**288 psi**	**207 psi**	**1242 psi**
F^*_c = $F_c C_d C_F$ =	2376 psi	2376 psi	1708 psi	2376 psi	1708 psi	1708 psi
F_{cE} = $(K_{cE} E')/(l_e/d)2$ =	1061 psi	1061 psi	1061 psi	1061 psi	1061 psi	1061 psi
F'_c = $F_c C_d C_F C_p$ =	**938 psi**	**938 psi**	**876 psi**	**938 psi**	**876 psi**	**876 psi**
$F'_{c\ perp}$ = $F_{c\ perp}$ Cb =	**668 psi**	**668 psi**	**668 psi**	**668 psi**	**668 psi**	**668 psi**
E' = E =	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**	**1600000 psi**
F_{bE} =	**2434 psi**	**9734 psi**	**9734 psi**	**9734 psi**	**9734 psi**	**2434 psi**
Slenderness Ratio:	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**	**< 50 OK**
R_B =	**17**	**8**	**8**	**8**	**8**	**17**
Bending:	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**	**< F'b OK**
M = $w L^2/8 + P e/12$ =	257 ft-lbs	2286 ft-lbs	79 ft-lbs	1900 ft-lbs	79 ft-lbs	79 ft-lbs
f_b = M/S =	**408 psi**	**1813 psi**	**63 psi**	**1507 psi**	**63 psi**	**126 psi**
S =	8 in³	15 in³	15 in³	15 in³	15 in³	8 in³
Shear:	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**	**< F'v OK**
V = w L/2 =	105 lbs	938 lbs	33 lbs	779 lbs	33 lbs	24 lbs
f_v = 1.5 V/A =	**19 psi**	**85 psi**	**3 psi**	**71 psi**	**3 psi**	**4 psi**
A =	8 in²	17 in²	17 in²	17 in²	17 in²	8 in²
Compression:	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**
f_c = P/A =	**170 psi**	**3 psi**	**336 psi**	**3 psi**	**367 psi**	**244 psi**
Compression (perp.):	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**	**< F'c OK**
$f_{c\ perp}$ = P/A =	**170 psi**	**3 psi**	**336 psi**	**3 psi**	**367 psi**	**244 psi**
Combined:	**< 1.0 OK**					
(fc/Fc)2 + {fb/[Fb(1-(fc/FcE)]} =	0.26					
Deflection:	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**	**> 180 OK**
D = 22.5 w L^4/E' I =	**0.13 in**	**0.59 in**	**0.02 in**	**0.49 in**	**0.02 in**	**0.04 in**
I =	21 in^4	42 in^4	42 in^4	42 in^4	42 in^4	21 in^4
SPAN /	**885**	**199**	**5744**	**239**	**5744**	**2872**

TALL WALL CALCULATIONS:

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

		King Stud (10' Max Opening)	10' Trimmer				
Description:							
	Type:	*2x Lumber (2"-4")*	*2x Lumber (2"-4")*				
	Species:	*DF-L*	*DF-L*				
	Grade:	*No. 2*	*No. 2*				
	Nominal width, t =	*(1) 2*	*(1) 2*				
	Actual width =	1.50 in	1.50 in				
	Nominal depth, d =	*6*	*6*				
	Actual depth =	5.50 in	5.50 in				
	Span, L =	*10.000 ft*	*10.000 ft*				
	w/o Plates	9.750 ft	9.750 ft				
	Stud spacing, s =	*70 in*	*16 in*				
	Lat. Pressure, w_{wind} =	16.23 psf	5.00 psf				
	Axial load, P =	*50 lbs*	*3360 lbs*				
	Eccentricity, e =	*0 in*	*0 in*				
	K_{cE} =	*0.3*	*0.3*				
	c =	*0.8*	*0.8*				
	w =	95.0 plf	6.7 plf				
	Fb	900 psi	900 psi				
	Fv	180 psi	180 psi				
	Fc-prll	1,350 psi	1,350 psi				
	Fc-perp	625 psi	625 psi				
	C_d	*1.60*	*1.15*				
	$C_{F,Fb}$	*1.30*	*1.30*				
	$C_{F,Fcprll}$	*1.10*	*1.10*				
	C_r	*1.00*	*1.00*				
	C_p	0.39	0.51				
	C_H	*1.00*	*1.00*				
	C_b	*1.07*	*1.07*				
	E	1,600,000 psi	1,600,000 psi				
	Emin	580,000 psi	580,000 psi				
	Allowable Stress:						
F'_b =	$F_b\ C_d\ C_F\ C_r$ =	**1872 psi**	**1346 psi**				
F'_v =	$F'_v\ C_d\ C_H$ =	**288 psi**	**207 psi**				
F^*_c =	$F_c\ C_d\ C_F$ =	2376 psi	1708 psi				
F_{cE} =	$(K_{cE}\ E')/(l_e/d)2$ =	1061 psi	1061 psi				
F'_c =	$F_c\ C_d\ C_F\ C_p$ =	**938 psi**	**876 psi**				
$F'_{c\ perp}$ =	$F_{c\ perp}$ Cb =	**668 psi**	**668 psi**				
E' =	E =	**1600000 psi**	**1600000 psi**				
	F_{bE} =	**2434 psi**	**2434 psi**				
	Slenderness Ratio:	**< 50 OK**	**< 50 OK**				
	R_B =	**17**	**17**				
	Bending:	**< F'b OK**	**< F'b OK**				
M =	$w\ L^2/8 + P\ e/12$ =	1129 ft-lbs	79 ft-lbs				
f_b =	M/S =	**1791 psi**	**126 psi**				
	S =	8 in³	8 in³				
	Shear:	**< F'v OK**	**< F'v OK**				
V =	w L/2 =	463 lbs	33 lbs				
f_v =	1.5 V/A =	**84 psi**	**6 psi**				
	A =	8 in²	8 in²				
	Compression:	**< F'c OK**	**< F'c OK**				
f_c =	P/A =	**6 psi**	**407 psi**				
	Compression (perp.):	**< F'c OK**	**< F'c OK**				
$f_{c\ perp}$ =	P/A =	**6 psi**	**407 psi**				
	Combined:						
	(fc/Fc)2 + {fb/[Fb(1-(fc/FcE)]} =						
	Deflection:	**> 180 OK**	**> 180 OK**				
	$D = 22.5\ w\ L^4/E'\ I$ =	**0.58 in**	**0.04 in**				
	I =	21 in^4	21 in^4				
	SPAN /	**202**	**2872**				

CF (1) Individual Footing Design

Program: ***Continuous Footing***

Soil Bearing Pressure: *1500psf*

Roof				
Roof Dead	*(17psf)*	*(16.0ft)*	=	**272plf**
Snow Live	*(25psf)*	*(16.0ft)*	=	**400plf**

Main Floor				
Floor Dead	*(12psf)*	*(1.0ft)*	=	**12plf**
Floor Live	*(40psf)*	*(1.0ft)*	=	**40plf**

Misc					
Wall Load:	*(12psf)*		*(21.5ft)*	=	**258plf**
Conc Stem:	*(145pcf)*		*(x .5ft)*	=	**plf**
Misc Load:	*(.0ft)*	*(.0ft)*	*(.0ft)*	=	**plf**

942plf

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

Cantilevered Retaining Wall

Code References

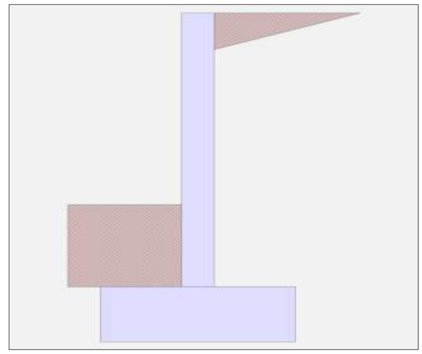
Calculations per IBC 2018 1807.3, CBC 2019, SDPWS 2015

Criteria

Retained Height	=	5.00 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	18.00 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	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	542.0 lbs
Axial Live Load	=	440.0 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 (Strength Level)	=	0.0 psf

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

Cantilevered Retaining Wall

Design Summary

Wall Stability Ratios

Overturning	=	3.03	OK
Sliding	=	2.48	OK
Global Stability	=	2.86	

Total Bearing Load	=	2,539 lbs	
...resultant ecc.	=	3.73 in	

Eccentricity within middle third

Soil Pressure @ Toe	=	1,460 psf	OK
Soil Pressure @ Heel	=	341 psf	OK
Allowable	=	1,500 psf	

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	2,043 psf	
ACI Factored @ Heel	=	477 psf	
Footing Shear @ Toe	=	6.6 psi	OK
Footing Shear @ Heel	=	0.4 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	630.0 lbs	
less 100% Passive Force	-	656.3 lbs	
less 100% Friction Force	= -	904.3 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

		Bottom				
		Stem OK				
Design Height Above Ftg	ft =	0.00				
Wall Material Above "Ht"	=	Concrete				
Design Method	=	SD	SD	SD	SD	SD
Thickness	=	6.00				
Rebar Size	=	# 4				
Rebar Spacing	=	18.00				
Rebar Placed at	=	Center				
Design Data						
fb/FB + fa/Fa	=	**0.684**				
Total Force @ Section						
Service Level	lbs =					
Strength Level	lbs =	700.0				
Moment....Actual						
Service Level	ft-# =					
Strength Level	ft-# =	1,166.7				
Moment.....Allowable	=	1,705.6				
Shear.....Actual						
Service Level	psi =					
Strength Level	psi =	19.4				
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				

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.0967 in2/ft		
(4/3) * As :	0.1289 in2/ft	Min Stem T&S Reinf Area 0.720 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 :	
	============	One layer of :	Two layers of :
Required Area :	0.12 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	=	1.25 ft
Heel Width	=	1.75
Total Footing Width	=	3.00
Footing Thickness	=	12.00 in

f'c =	3,000 psi	Fy =	60,000 psi
Footing Concrete Density	=		150.00 pcf
Min. As %	=		0.0018
Cover @ Top	2.00	@ Btm.=	3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	2,043	477	psf
Mu' : Upward	=	1,426	543	ft-#
Mu' : Downward	=	295	656	ft-#
Mu: Design	=	1,131	113	ft-#
φ Mn	=	2,739	2,739	ft-#
Actual 1-Way Shear	=	6.58	0.38	psi
Allow 1-Way Shear	=	43.82	43.82	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, φ Tn	=		0.00	ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: phiMn = phi*5*lambda*sqrt(fc)*Sm

Heel: phiMn = phi*5*lambda*sqrt(fc)*Sm

Key: No key defined

Min footing T&S reinf Area	0.78	in2
Min footing T&S reinf Area per foot	0.26	in2 /ft

If one layer of horizontal bars:	If two layers 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

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		630.0	2.00	1,260.0
HL Act Pres (be water tbl)				
Hydrostatic Force				
Buoyant Force	=			
Surcharge over Heel	=			
Surcharge Over Toe	=			
Adjacent Footing Load	=			
Added Lateral Load	=			
Load @ Stem Above Soil	=			
	=			
Total	=	630.0	**O.T.M.** =	1,260.0

Resisting/Overturning Ratio = **3.03**
Vertical Loads used for Soil Pressure = 2,538.8 lbs

		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Soil Over HL (ab. water tbl)		687.5	2.38	1,632.8
Soil Over HL (bel. water tbl)			2.38	1,632.8
Water Table				
Sloped Soil Over Heel	=			
Surcharge Over Heel	=			
Adjacent Footing Load	=			
Axial Dead Load on Stem	=	542.0	1.50	813.0
* Axial Live Load on Stem	=	440.0	1.50	660.0
Soil Over Toe	=	206.3	0.63	128.9
Surcharge Over Toe	=			
Stem Weight(s)	=	375.0	1.50	562.5
Earth @ Stem Transitions	=			
Footing Weight	=	450.0	1.50	675.0
Key Weight	=			
Vert. Component	=			
	Total =	2,260.8 lbs	**R.M.=**	3,812.2

* 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.

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom

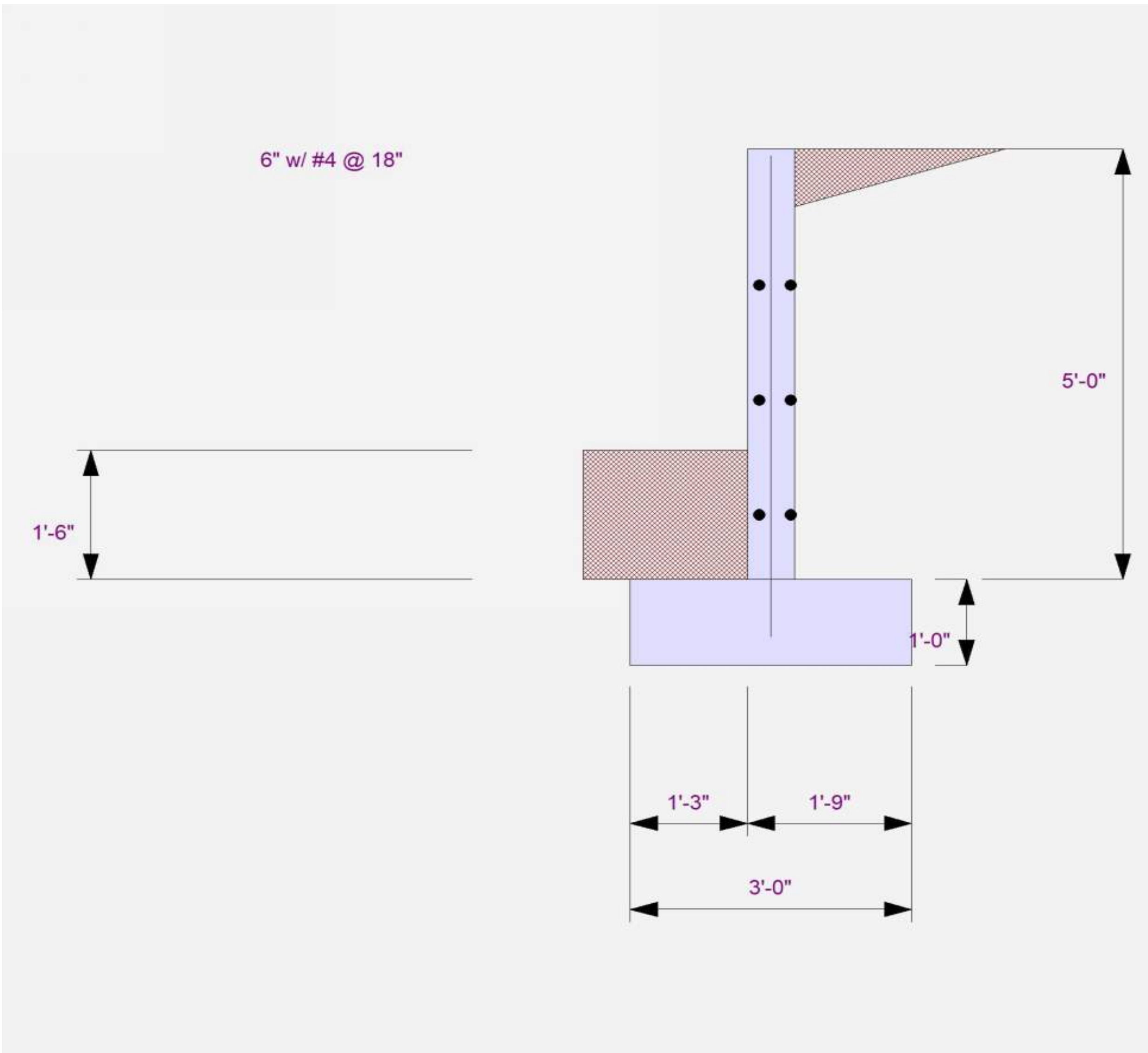
Stem Design Height: 0.00 ft above top of footing

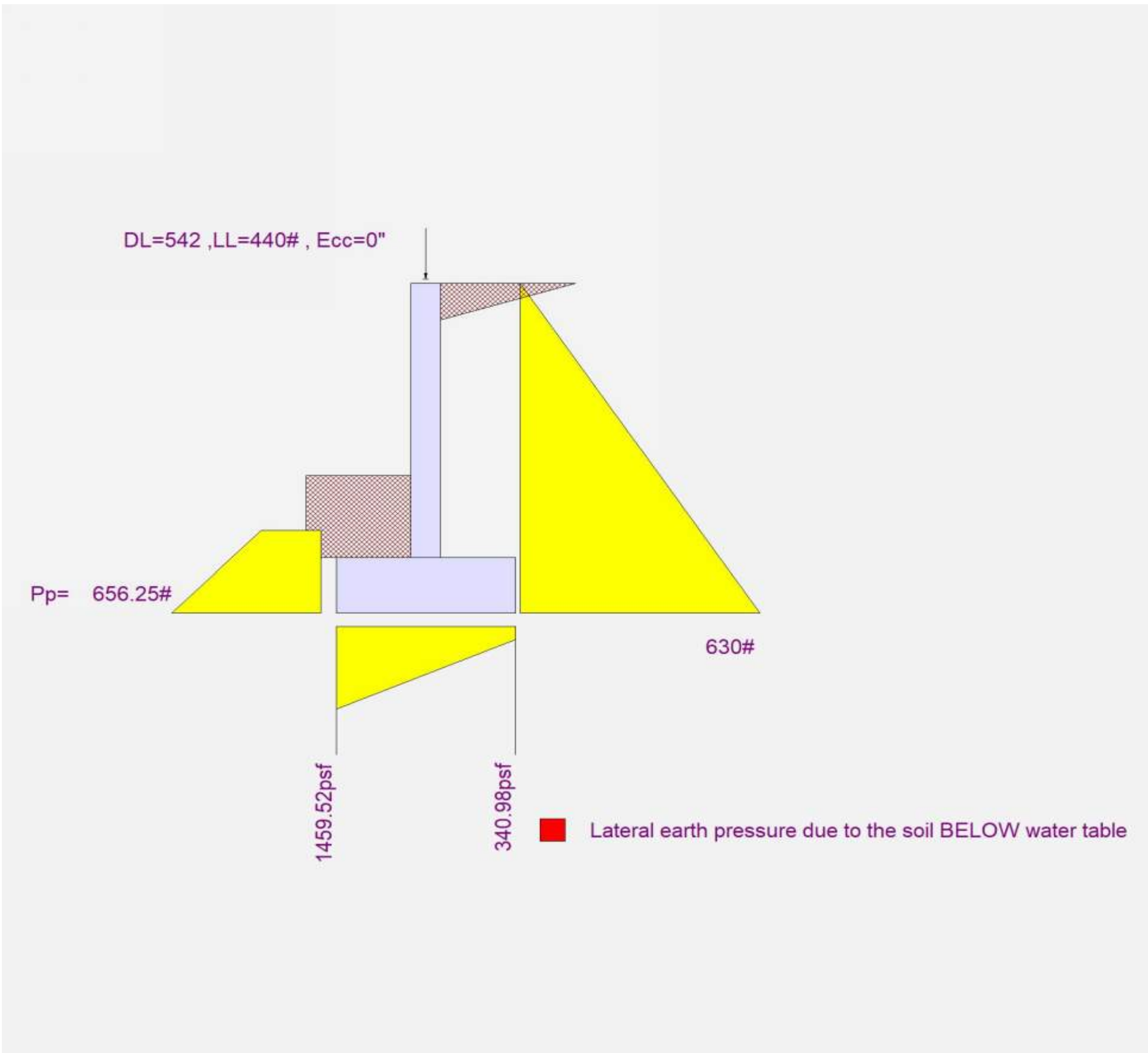
Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	18.72 in
Development length for #4 bar specified in this stem design segment =	14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	7.67 in
As Provided =	0.1333 in2/ft
As Required =	0.1200 in2/ft

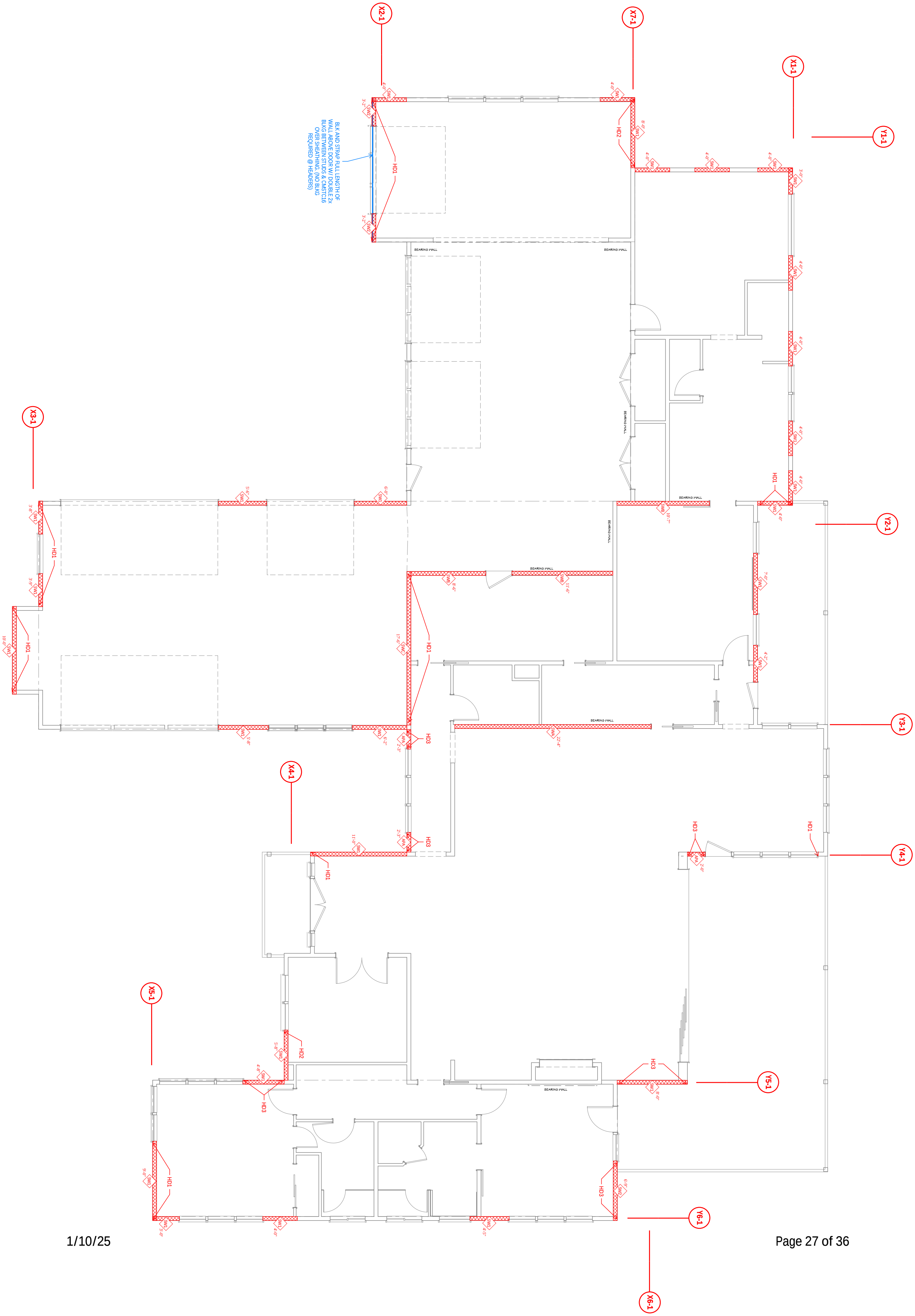
Cantilevered Retaining Wall

Project File: Stem Wall.ec6

LIC# : KW-06013353, Build:20.24.10.03 SNAKE RIVER ENGINEERING (c) ENERCALC, LLC 1982-2025

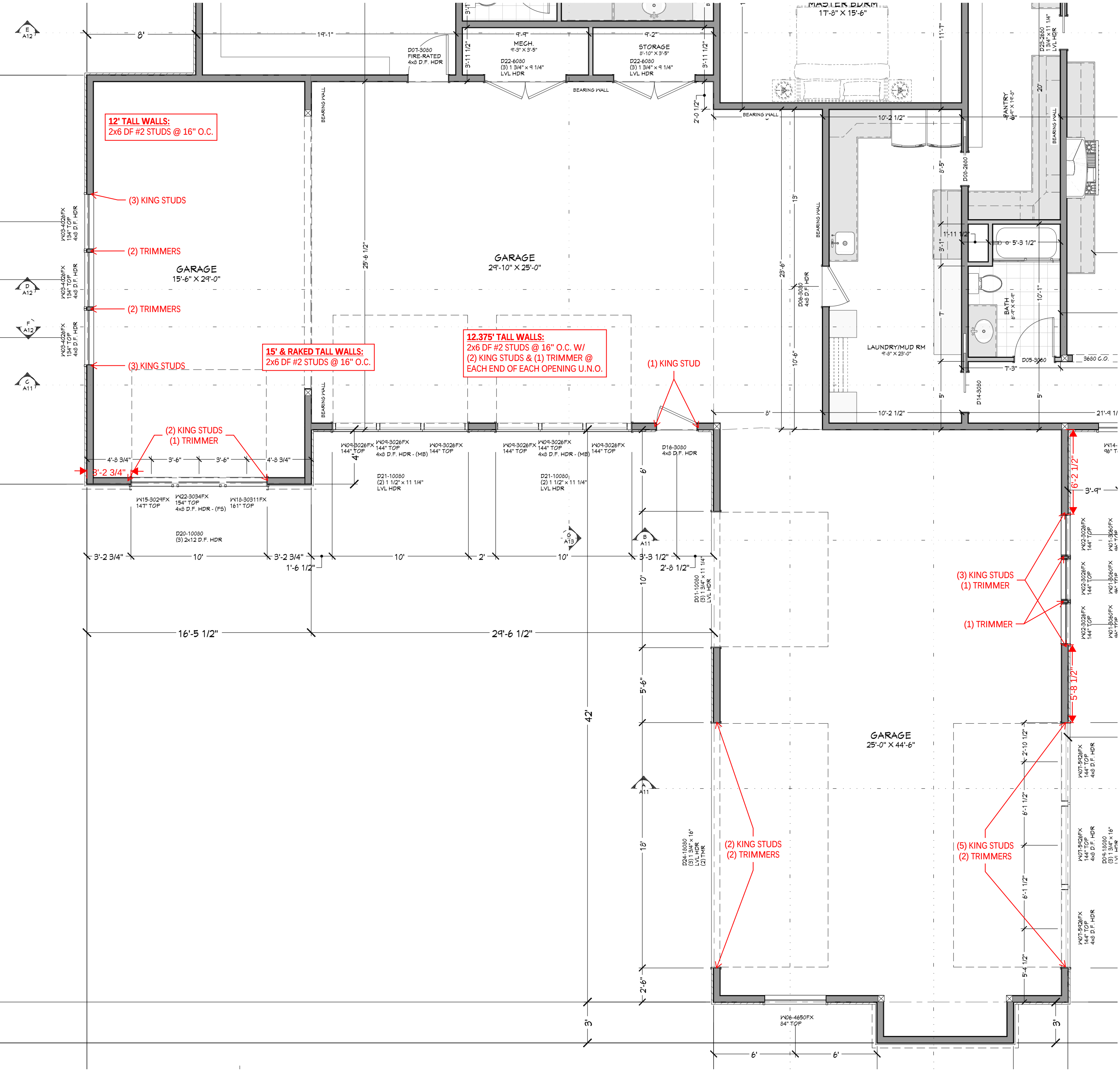


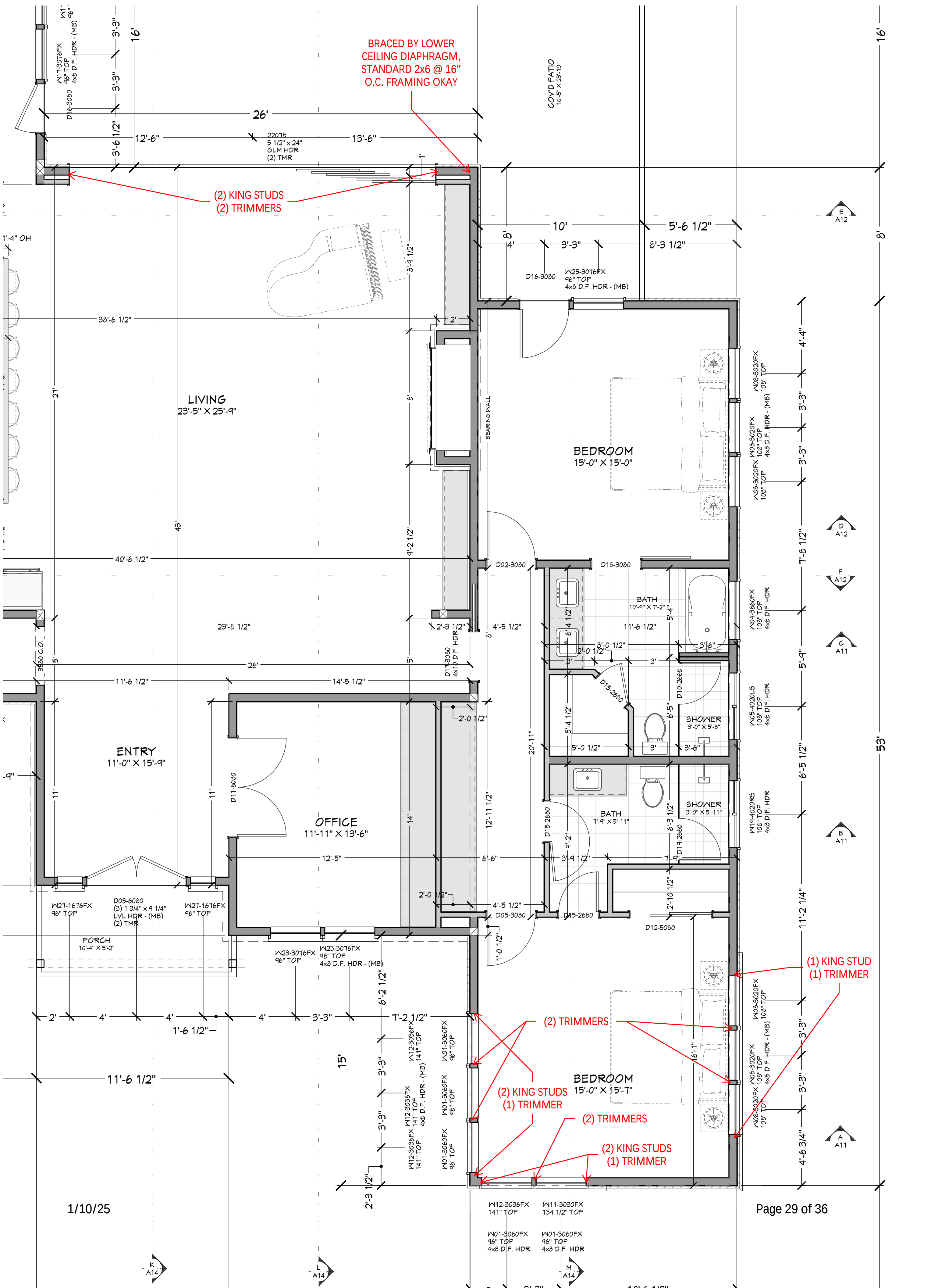

DL=542 ,LL=440# , Ecc=0"
Pp= 656.25#
630#
1459.52psf
340.98psf
Lateral earth pressure due to the soil BELOW water table

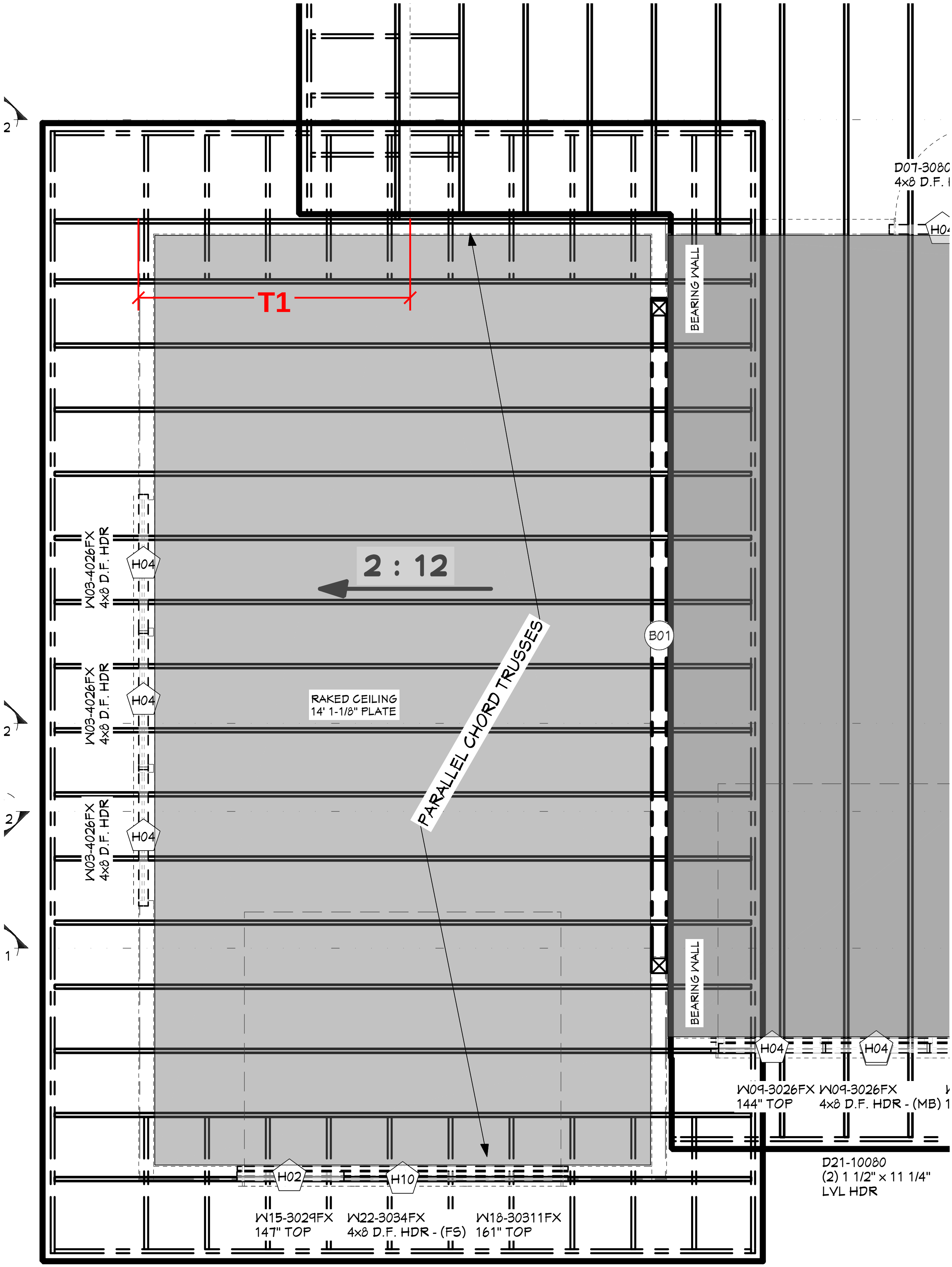


X2-1
X7-1
X1-1
Y1-1
BLK AND STRAP FULL LENGTH OF WALL ABOVE DOOR W/ DOUBLE 2X BLKG BETWEEN STUDS & CMSTC16 OVER SHEATHING. (NO BLKG REQUIRED @ HEADERS)
HD1
HD2
BEARING WALL
X3-1
Y2-1
HD3
Y3-1
X4-1
Y4-1
X5-1
Y5-1
Y6-1
X6-1

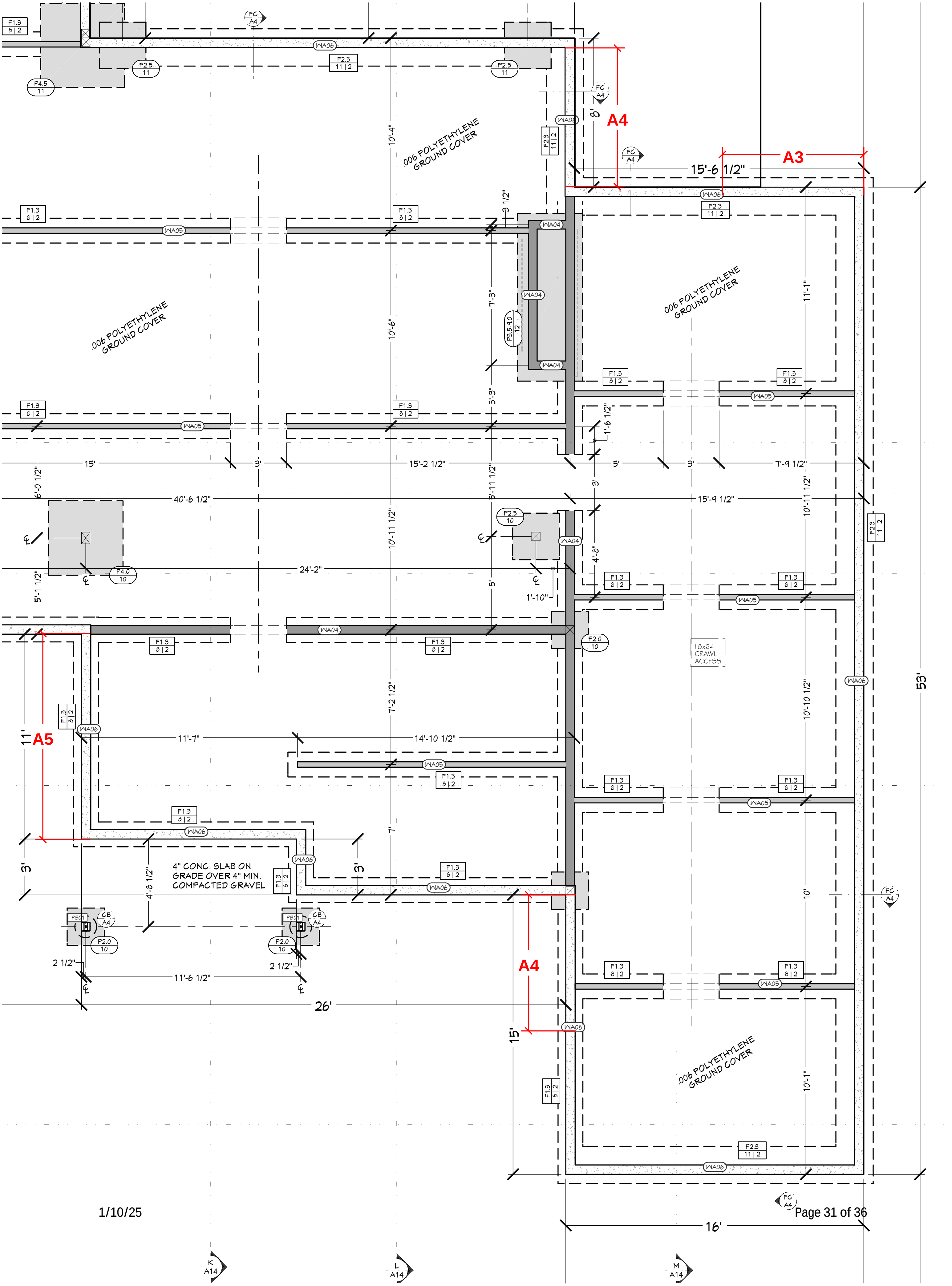
SNAKE RIVER ENGINEERING 524 CLEVELAND BLVD. #230 CALDWELL, IDAHO 83605 (208) 453-6512	**Completed by:** JDJ **Review/Check:** KKJ	**Project Name:** Teunissen Residence **SRE Project #:** 2025-8881 **City and State:** Canyon County, Idaho

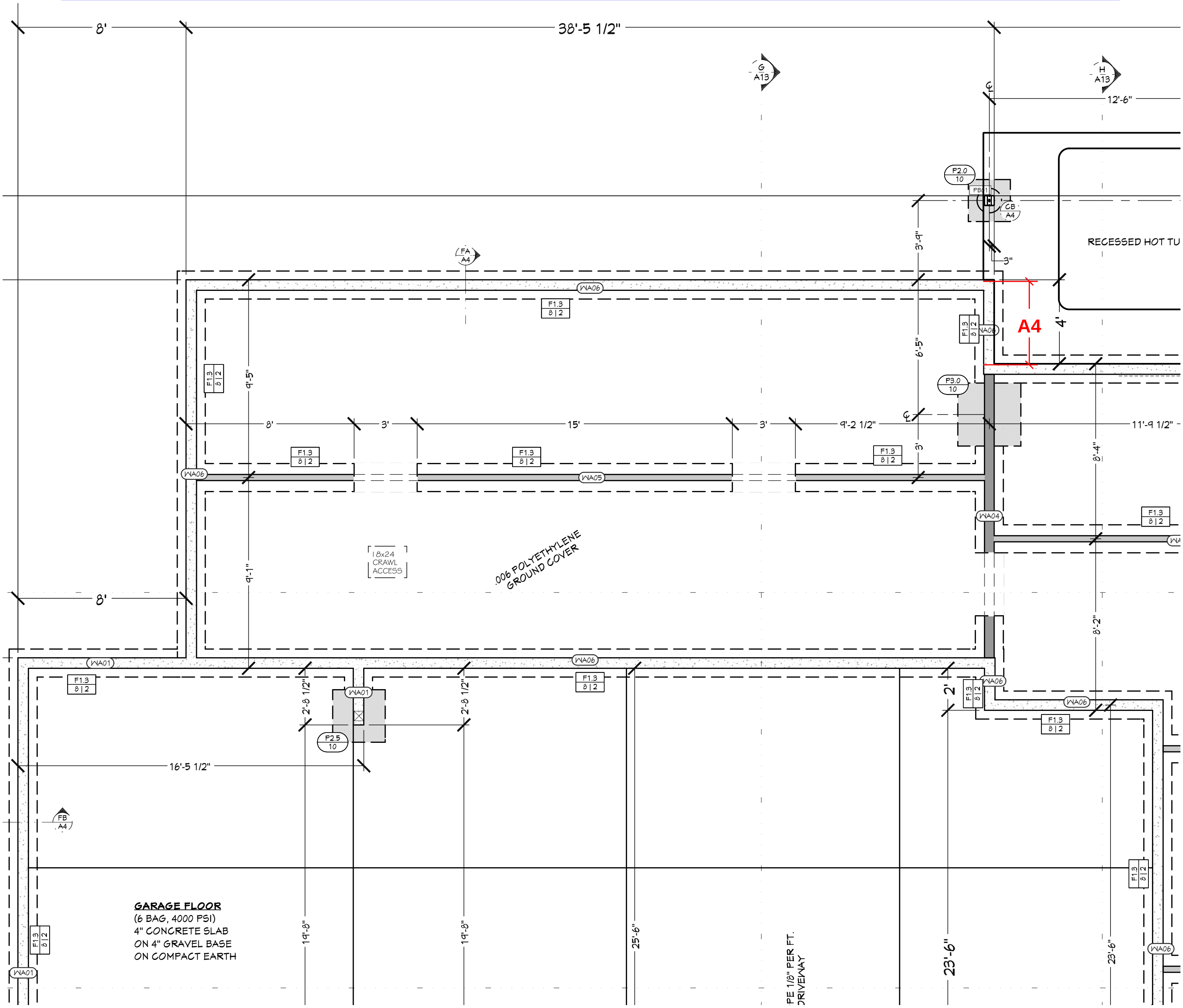


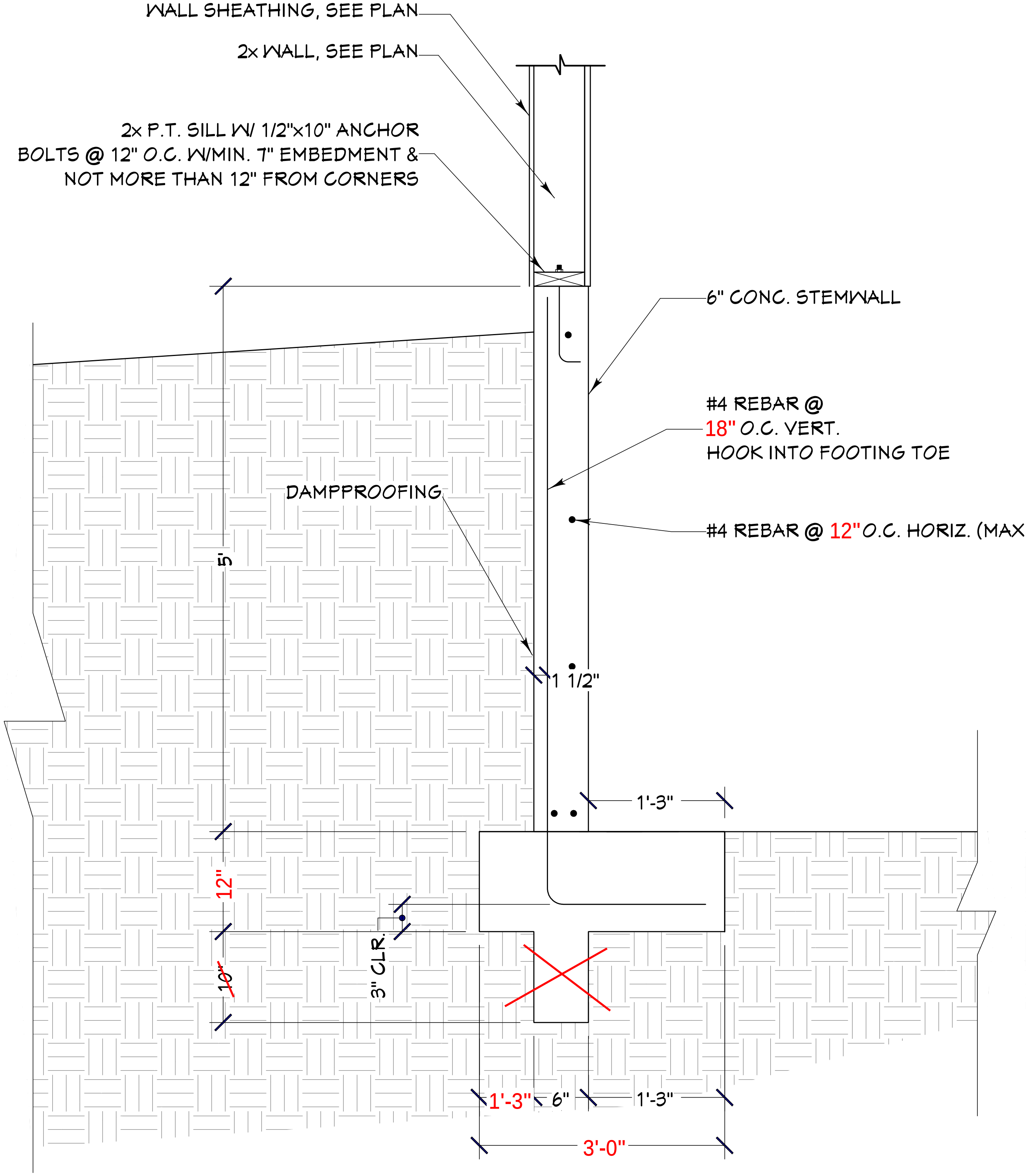

BRACED BY LOWER CEILING DIAPHRAGM, STANDARD 2x6 @ 16" O.C. FRAMING OKAY
(2) KING STUDS
(2) TRIMMERS
22078
5 1/2" x 24"
GLM HDR
(2) TMR
26'
12'-6"
13'-6"
16'
COV'D PATIO
10'-5" X 23'-10"
W17-3076FX
96" TOP
4x8 D.F. HDR - (MB)
D16-3080
1'-4" OH
10'
5'-6 1/2"
8'
4'
3'-3"
8'-3 1/2"
D16-3080
W25-3076FX
96" TOP
4x8 D.F. HDR - (MB)
38'-6 1/2"
2'
8'-9 1/2"
LIVING
23'-5" X 25'-9"
27'
43'
BEARING WALL
BEDROOM
15'-0" X 15'-0"
W08-3020FX
108" TOP
4x8 D.F. HDR - (MB)
4'-4"
3'-3"
7'-8 1/2"
40'-6 1/2"
9'-2 1/2"
D02-3080
D18-3080
BATH
10'-9" X 7'-2"
W04-3660FX
108" TOP
4x8 D.F. HDR
23'-8 1/2"
2'-3 1/2"
4'-5 1/2"
11'-6 1/2"
D17-3080
4x10 D.F. HDR
2'-0 1/2"
3'-6"
3'
D15-2680
D10-2668
SHOWER
3'-0" X 5'-8"
W05-4020LS
108" TOP
4x8 D.F. HDR
5'-9"
3680 C.O.
26'
11'-6 1/2"
14'-5 1/2"
2'-0 1/2"
5'-4 1/2"
6'-5"
5'-0 1/2"
20'-11"
ENTRY
11'-0" X 15'-9"
D11-6080
OFFICE
11'-11" X 13'-6"
14'
12'-11 1/2"
BATH
7'-9" X 5'-11"
SHOWER
3'-0" X 5'-11"
W19-4020RS
108" TOP
4x8 D.F. HDR
6'-5 1/2"
53'
D15-2680
D19-2668
9'-2"
6'-3 1/2"
12'-5"
6'-6"
3'-9 1/2"
7'-9"
11'-2 1/4"
2'-10 1/2"
2'-0 1/2"
4'-5 1/2"
D05-3080
D15-2680
D12-5080
W27-1676FX
96" TOP
D03-6080
(3) 1 3/4" x 9 1/4"
LVL HDR - (MB)
(2) TMR
W27-1676FX
96" TOP
PORCH
10'-4" X 5'-2"
W23-3076FX
96" TOP
W23-3076FX
96" TOP
4x8 D.F. HDR - (MB)
1'-0 1/2"
(1) KING STUD
(1) TRIMMER
6'-2 1/2"
2'
4'
4'
4'
3'-3"
7'-2 1/2"
1'-6 1/2"
(2) TRIMMERS
W12-3036FX
141" TOP
4x8 D.F. HDR - (MB)
W01-3060FX
96" TOP
15'
11'-6 1/2"
BEDROOM
15'-0" X 15'-7"
(2) KING STUDS
(1) TRIMMER
(2) TRIMMERS
(2) KING STUDS
(1) TRIMMER
16'-1"
4'-6 3/4"
2'-3 1/2"
W12-3036FX
141" TOP
W11-3030FX
134 1/2" TOP
W01-3060FX
96" TOP
4x8 D.F. HDR
W01-3060FX
96" TOP
4x8 D.F. HDR
E A12
D A12
F A12
C A11
B A11
A A11
K A14
L A14
M A14



T1
2 : 12
PARALLEL CHORD TRUSSES
RAKED CEILING
14' 1-1/8" PLATE
BEARING WALL
BEARING WALL
B01
H04
H04
H04
W03-4026FX
4x8 D.F. HDR
W03-4026FX
4x8 D.F. HDR
W03-4026FX
4x8 D.F. HDR
D07-3080
4x8 D.F.
H04
H04
W09-3026FX
144" TOP
W09-3026FX
4x8 D.F. HDR - (MB)
D21-10080
(2) 1 1/2" x 11 1/4"
LVL HDR
H02
H10
W15-3029FX
147" TOP
W22-3034FX
4x8 D.F. HDR - (FS)
W18-30311FX
161" TOP
2
2
2
1
D20-10080
(3) 2x12 D.F. HDR


.006 POLYETHYLENE GROUND COVER
.006 POLYETHYLENE GROUND COVER
.006 POLYETHYLENE GROUND COVER
.006 POLYETHYLENE GROUND COVER
4" CONC. SLAB ON GRADE OVER 4" MIN. COMPACTED GRAVEL
18x24 CRAWL ACCESS
A3
A4
A4
A5
15'-6 1/2"
40'-6 1/2"
15'-9 1/2"
24'-2"
26'
16'
53'
15'
11'-7"
14'-10 1/2"
11'-6 1/2"
WA04
WA05
WA06
F1.3 8 | 2
F2.3 11 | 2
P2.5 11
P4.5 11
P2.0 10
P4.0 10
P3.5-9.0 12
FC A4
CB A4
K A14
L A14
M A14


38'-5 1/2"
8'
12'-6"
RECESSED HOT TU
A4
4'
3'-9"
6'-5"
3"
9'-5"
9'-1"
8'
3'
15'
3'
9'-2 1/2"
11'-9 1/2"
8'-4"
8'-2"
18x24
CRAWL
ACCESS
.006 POLYETHYLENE
GROUND COVER
16'-5 1/2"
2'-8 1/2"
2'-8 1/2"
2'
GARAGE FLOOR
(6 BAG, 4000 PSI)
4" CONCRETE SLAB
ON 4" GRAVEL BASE
ON COMPACT EARTH
19'-8"
19'-8"
25'-6"
23'-6"
23'-6"
PE 1/8" PER FT.
DRIVEWAY
F1.3
WA01
WA04
WA05
WA06
P2.0
P2.5
P3.0

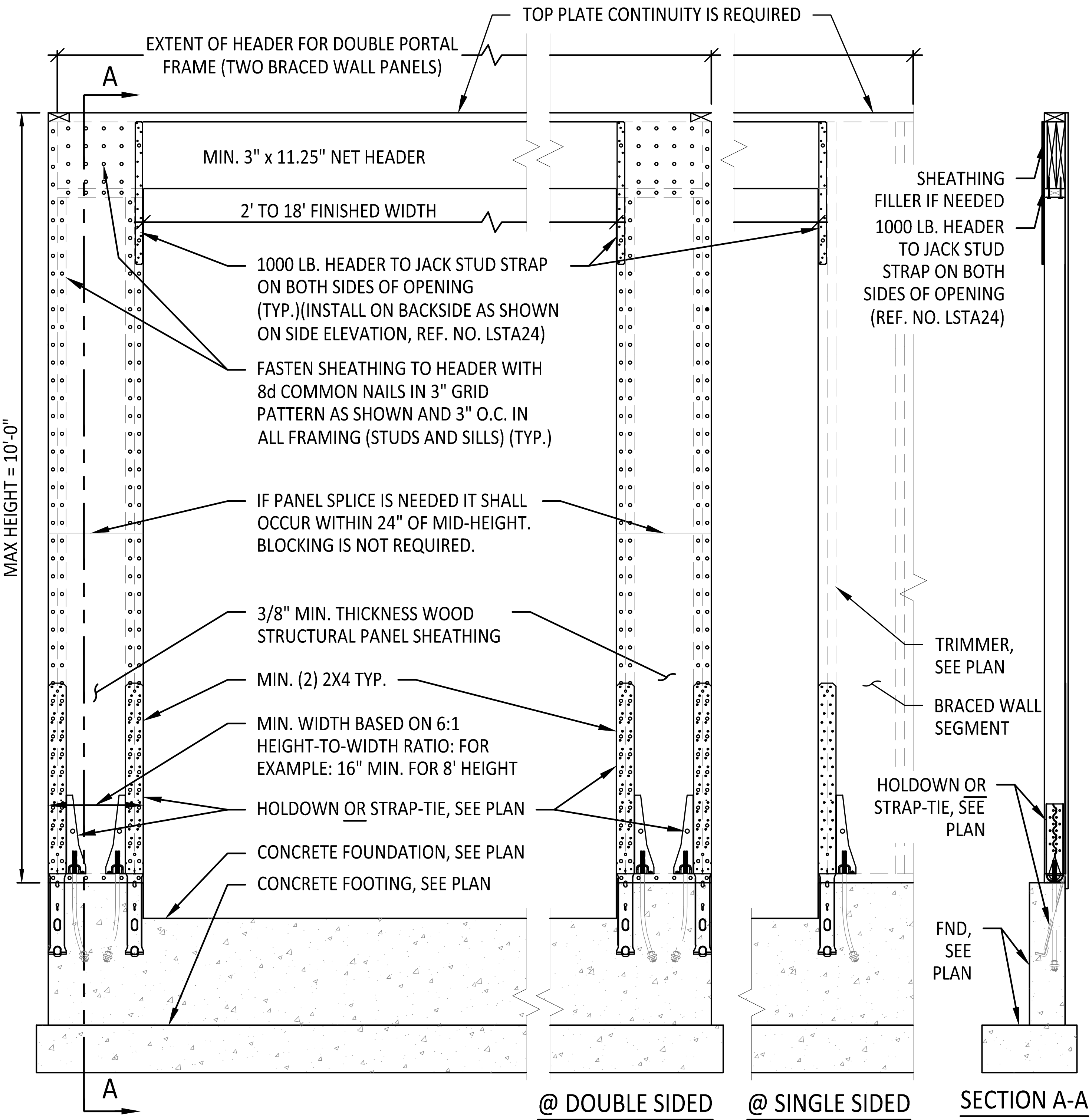


FC RETAINING WALL #1 DETAIL
3/4 IN = 1 FT

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

Completed by: JDJ
Review/Check: KKJ

Project Name: Teunissen Residence
SRE Project #: 2025-8881
City and State: Canyon County, Idaho



OUTSIDE ELEVATION

PF
SD1.0

PORTAL FRAME DETAIL

SCALE: 1/4" = 1'-0"

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 (NOT FOR WALLS >10')	YES	(2) 16d NAILS PER 16" BAY
SW2	7/16" APA RATED	1	8d @ 4 / 12	OR	16ga x 1-1/2" @ 2 / 12 (NOT FOR WALLS >10')	YES	(3) 16d NAILS PER 16" BAY
APA	7/16" APA RATED	1	8d @ 3 / 12		APA TETSED PORTAL FRAME ASSEMBLY	YES	(SEE ATTACHED DETAIL)

GYP. SHEAR WALL SCHEDULE:

MARK	SHEATHING	SIDES OF WALL	SHEET NAILING PERIMETER / FIELD		SHEET STAPLING PERIMETER / FIELD	BLKG	NAILING (UNO) BOTTOM PLATE INTO RIM
SWA	1/2" GYP. BOARD	1	5d COOLER @ 6 / 6	OR	#6 TYPE S OR W DRYWALL SCREWS 1-1/4" LONG 6 / 6	NO	(2) 16d NAILS PER 16" BAY
SWB	1/2" GYP. BOARD	1	5d COOLER @ 6 / 6	OR	#6 TYPE S OR W DRYWALL SCREWS 1-1/4" LONG 6 / 6	YES	(2) 16d NAILS PER 16" BAY
OR	1/2" GYP. BOARD	1	5d COOLER @ 4 / 4	OR	#6 TYPE S OR W DRYWALL SCREWS 1-1/4" LONG 4 / 4	NO	(2) 16d NAILS PER 16" BAY
SWC	1/2" GYP. BOARD	1	5d COOLER @ 4 / 4	OR	#6 TYPE S OR W DRYWALL SCREWS 1-1/4" LONG 4 / 4	YES	(2) 16d NAILS PER 16" BAY

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)

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

HOLDOWN SCHEDULE:

MARK	STRAP TYPE	STRAP FASTENERS	# OF STUDS		ANCHOR BOLT TYPE	# OF STUDS	ANCHOR BOLT FASTENERS
HD1	LSTHD8 OR LSTHD8RJ W/ RIM	(20) 16d SINKERS	2	OR	DTT2Z W/1/2Øx10"	2	(8) 1/4"x1-1/2" SDS
HD2	STHD10 OR STHD10RJ W/ RIM	(24) 16d SINKERS	2	OR	HDU2- SDS2.5 W/ SB5/8x24 OR PAB5 @ INT. PONY WALLS	2	(6) 1/4"x2-1/2" SDS
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

ANCHOR BOLT KEY NOTES:

A3	-	1/2"Ø ANCHOR BOLTS @ 36" O.C.
A4	-	1/2"Ø ANCHOR BOLTS @ 48" O.C.
A5	-	1/2"Ø ANCHOR BOLTS @ 60" O.C.