

Structural Calculations for:

East Mercer Residence – Parcel 3

East Mercer Way, Mercer Island, WA, 98040

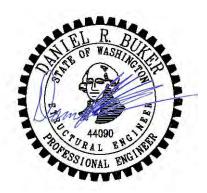
Client: Ripple Design Studio Inc.

Code: 2015 International Building Code

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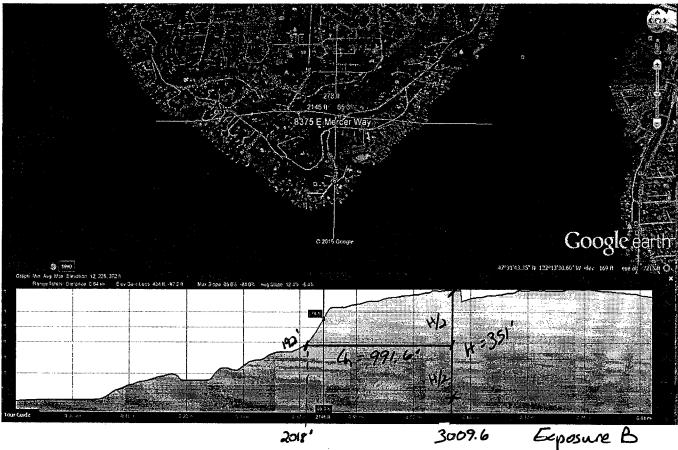
- C1 Design Criteria
- L1 L20 Lateral Calculations
- F1 F15 Framing Calculations
- Ret1 Ret40 Retaining Wall Calculations

Scope: Single Family Residence (Formerly Known as Zheng Residence 3)



July 27, 2017 Revised October 6, 2017

or a Wood Framed Structure			
RISK CATEGORY II OCCUPANCY CAT. II	Table 1-1		
IMP. FACTOR 1	Table 11.5-1		
SITE CLASS D	Table 20.3-1	SEISMIC	
R = 6:5	Table 12.2-1	DESIGN CATEGOR	Y D 11.6.1.1
S _s = 1.461			
S ₁ = 0.556			
F _a = 1.00	Table 11.4-1		
F _v = 1.50	Table 11.4-2	Seismic Dead Load:	15 ^{pst} Roof
S _{DS} = 0.974			10 ^{psr} Floor
S _{D1} = 0.556			20 ^{psr} Walls
Cs _{ULT} = 0.150	Eqn. 12.8-2		W _{roof} =15 + 1= 25 ^{psf}
Cs _{ASD} = 0.107		W _{floor} =	=10 + 10 + 10= 30 ^{psf}
/ertical Design Load	_		
SCE 7-10		· .	
ASCE 7-10 BC 2012 Roof (Composit) 2 1/2" Ply 1 Rafter/Truss Insulation 5/8" GWB 3 Misc./Mech.	.1 psf	Flooring 1 psf Sheathing 2.3 psf Joist 2.6 psf 5/8" GWB 3.1 psf Misc. Mech 1 psf 10 psf	
ASCE 7-10 BC 2012 Dead Loads Roof (Composit) 2 1/2" Ply 1 Rafter/Truss Insulation 5/8" GWB Misc./Mech. 12 Use .ive Loads House Snow	5 psf 2 psf 1 psf 1 psf 2 psf	Sheathing2.3 psfJoist2.6 psf5/8" GWB3.1 psfMisc. Mech1 psf	
1/2" Ply Rafter/Truss Insulation 5/8" GWB Misc./Mech. 12 Use .ive Loads Snow	.5 psf 2 psf 1 psf 1 psf 2 psf .1 psf 15 psf 25 psf	Sheathing2.3 psfJoist2.6 psf5/8" GWB3.1 psfMisc. Mech1 psf10 psf	
ASCE 7-10 <u>BC 2012</u> Dead Loads Roof (Composit) 2 1/2" Ply Rafter/Truss Insulation 5/8" GVVB Misc./Mech. 12 Use 12 Use 12 0 12 12 12 12 12 12 12 12 12 12	5 psf 2 psf 1 psf <u>2 psf</u> <u>2 psf</u> .1 psf 15 psf 25 psf 40 psf	Sheathing2.3 psfJoist2.6 psf5/8" GWB3.1 psfMisc. Mech1 psf10 psf	Date: 1/15/2016



2018

Exposure B

$$\frac{H}{L_{h}} = \frac{351}{99\%6} = 0.3.5 \pm 0.2$$

$$\therefore K_{2e} = (1 + k_1 K_2 K_3)^2 = (1 + (0.455 \times 0.366 \times 0.9))^2 = \overline{1.32} = K_{2e}$$

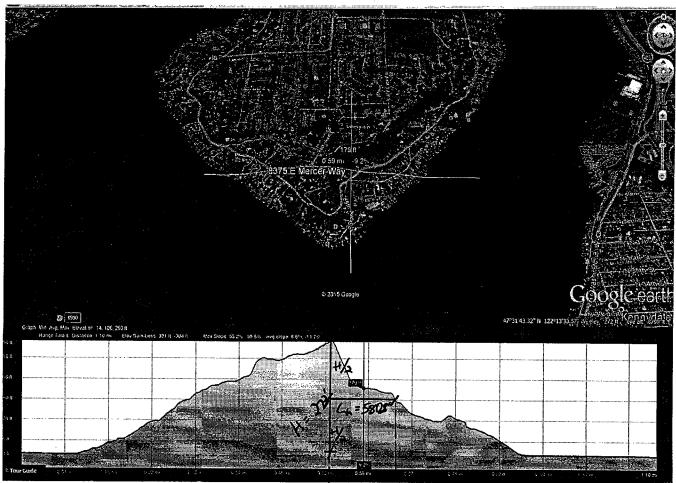
$$K_1 = 0.455 \qquad \text{Figure } \geq 6.8 - 1$$

$$K_2 = (1 - \frac{1 \times 1}{4L_{h}}) = (1 - \frac{866.6}{1.5(991.6)}) = 0.366$$

$$K_3 = e^{-\frac{3}{2}/L_{h}} = e^{-3(34.5)/991.6'} = 0.90$$

I

LI



2851,2' 3432'

$$\frac{1}{44} = \frac{273'}{580.8} = 0.47 \ge 0.2$$

$$K_{24} = (1 + K_1 K_2 K_3)^2 = (1 + 0.61/61/320.837)^2 = \overline{1.84 - K_{26}}$$

$$K_1 = 0.611$$

$$K_2 = (1 - \frac{264}{1.5(580.8)}) = 0.697$$

$$K_3 = e^{-3(34.5)/580.8} = 0.831$$

1

therefor use K2+= 1.84

Zheng Residence 3

LZ

	rocedure - Pa		<u>CE 7-10)</u>				
K _d = I=	110 n 0.85	nph -	Table 26.6-1 26.9	Bottom of ro	Roof Angle = nd to top of roof of to top of roof roof height) h=	35.68 5	degrees ft ft ft
						Pressure Co from Figur	
	K _{zt} = 1	84			·	Bidg Face	C _p
	rvzt− į	.07			Ň	Nindward Wall	 0.8
					, i	Leeward Wall	-0.5
					v	Vindward Roof	0.3
						Leeward Roof	-0.6
					*Note	Cp values are = Cp values are	
Pressures: Ht 0-15 15-20 20-25 25-30	K _z 0.85 0.9 0.94 0.98	q _z 41.18 43.60 45.54 47.48	P _{ww walls} 28.00 29.65 30.97 32.28	P _{Iwwalls} 21.41 21.41 21.41 21.41 21.41	Ultimate P _{walls} (psf) 49.42 51.06 52.38 53.70	Allowable P _{walls} (psf) 29.65 30.64 31.43 32.22	
30-40	1.04	50.38	34.26	21.41	55.67	33.40	
		Г	P _{ww roof}	P _{lw roof}	P _{roof} (psf)	P _{roof} (psf)	
		F	12.85	25.70	38.54	23.13	
		ι	Jse 34 psf on	projected wind	surfaces		
			Project:	Zheng Re	sidence 3	Date: Design:	10/6/2017 CRB

USGS Design Maps Summary Report

User-Specified Input

 Report Title
 Seismic Response Fri January 15, 2016 17:33:13 UTC

 Building Code Reference Document
 2012 International Building Code (which utilizes USGS hazard data available in 2008)

 Site Coordinates
 47.52873°N, 122.2253°W

 Site Soil Classification
 Site Class D = "Stiff Soil"

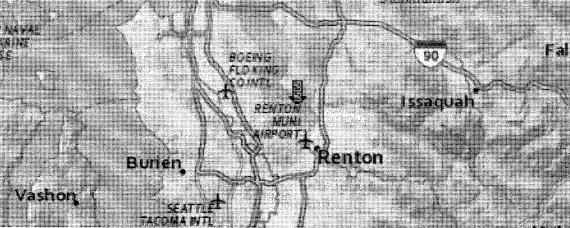
 Risk Category
 I/II/III

 Seattle
 Bellevue
 Lake Saturn annish

 Bellevue
 Lake

 Soil Mark
 Bellevue
 Lake

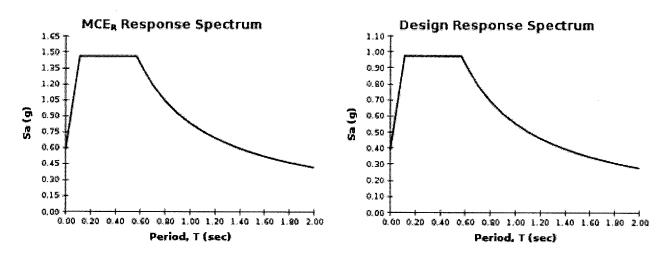
 Seattle
 Bellevue
 Lake



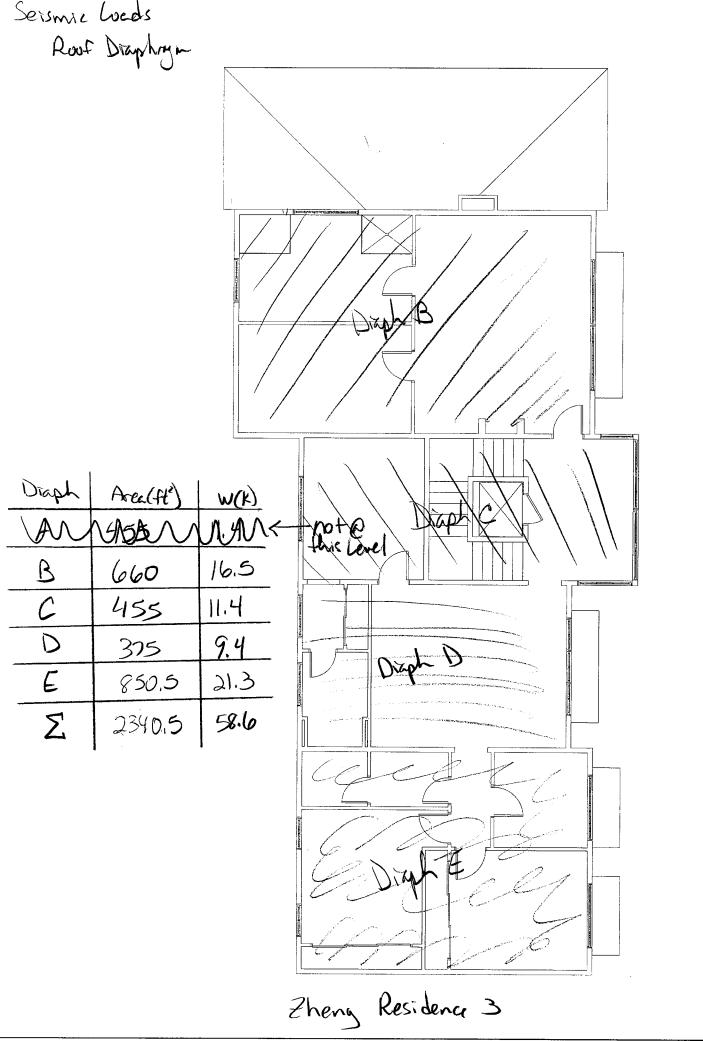
USGS-Provided Output

$S_s =$	1.462 g	S _{мs} =	1.462 g	S _{DS} =	0.974 g
S 1 =	0.556 g	S _{M1} =	0.833 g	S _{D1} =	0.556 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.



Zhenny Residence 3



Seismic Loads 2nd Flour Dizphryn	
2nd Flour Disphryn	
Draph Area(Ht') W(k) F 11 22 33.7 G 168 5.04 H 147 4.41 T 400 12 J 567 1701 Z 2404 72.2 Bring Residence 3	
ching here and	

L6

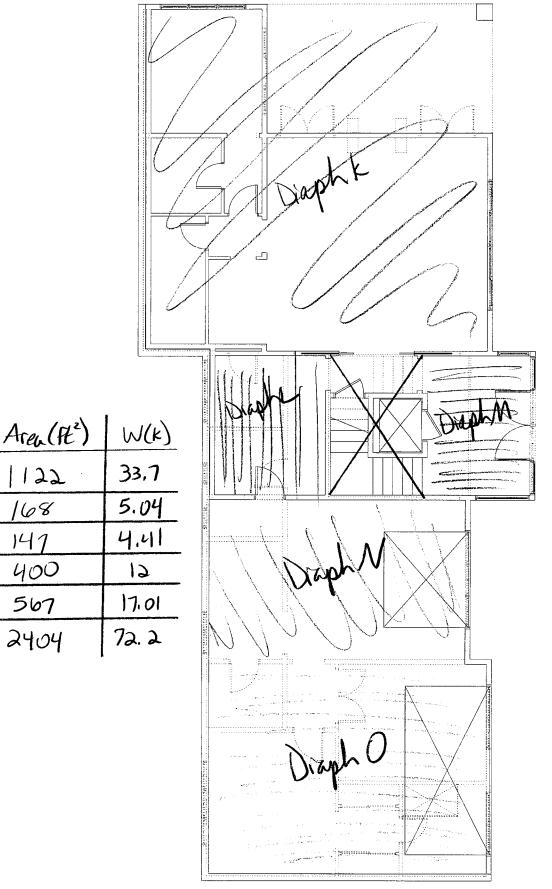
Seismic Load 1st Flour Draph

Diaph

K

M N

<u>0</u> Σ



Zheng Residence 3

Seismic Analysis (ASCE 7-10)

S _s = 1.461	$F_a = 1.00$	S _{ms} = 1.46	S _{Ds} = 0.97
S ₁ = 0.56	$F_v = 1.50$	$S_{m1} = 0.834$	S _{D1} = 0.56

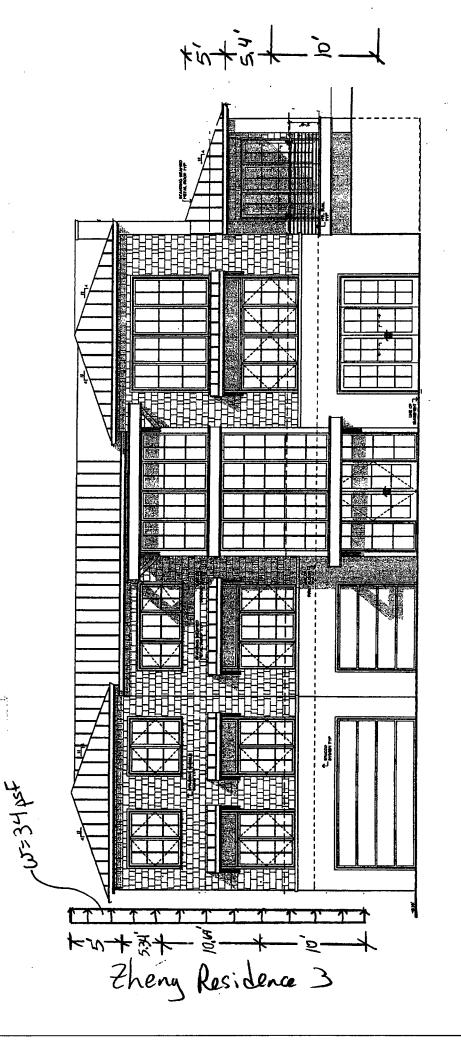
D	
33.18	ft
0.28	sec
6.5	
1.0	
1.0	
0.150	
203.00	К
21.30	К
	D 33.18 0.28 6.5 1.0 1.0 0.150 203.00 21.30

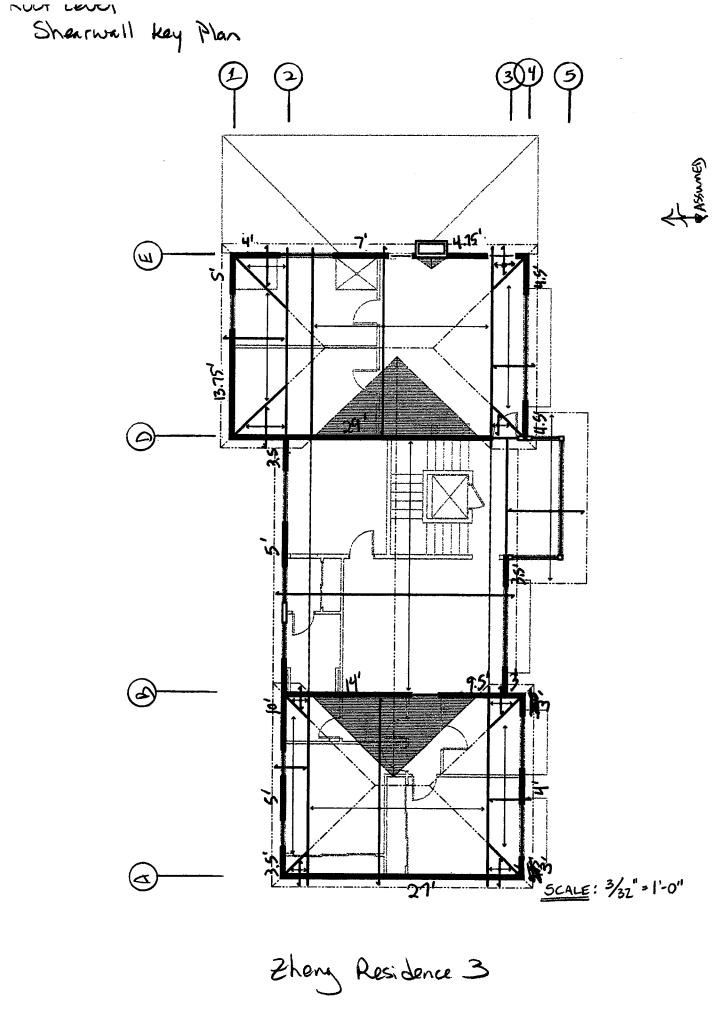
House

Level	Wx (K)	hx (ft)	Wxhx	Сvх	Fx (K)
Roof	58.6	30.68	179	8 0.46	9.8
Second	72.2	20	144	4 0.37	7.9
First	72.2	9.3	67	1 0.17	3.7
Sum	203		391	3 1.0	21.3

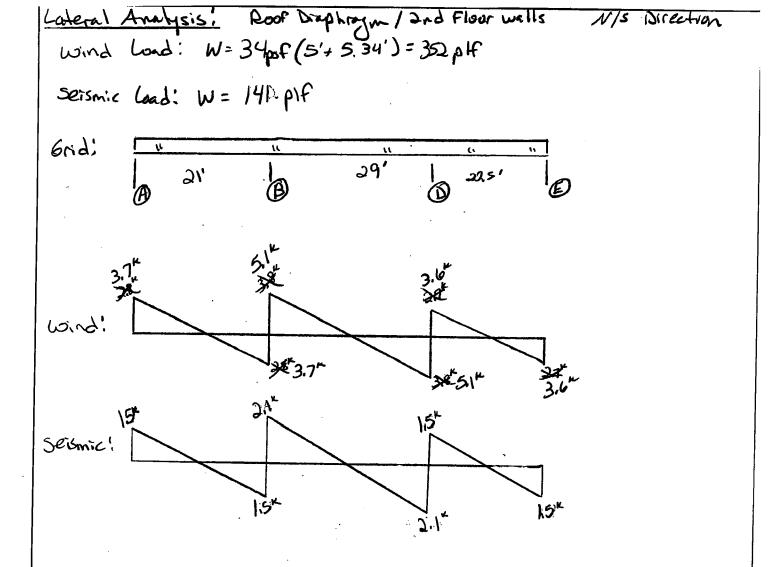


Zhong Residence 3





LID



Grid	A	В	D	F
Vwind (kips)		8.9	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	E
Vseismic (kips)	15	3.6	3,6	50
Length of wall (ft)	27		*	***************************************
v_wind (p/f)	137	379	300	15.75
v_siesmic (p/l)**	56	153	124	229
h (ft)	9.25	925	9.25	
OTF_Wind (lbs)*	1268	3503	2775	9.25
OTF_Seismic (lbs)*	514	1417	1148	2114
Length of shortest wall pier (ft)	27	9.5	29	881
Apect Ratio Reduction for Seismic Loads	0.34	0.97	0.32	4
Siesmic Penalty	1.0	1.0		2.31
Shearwall	W6	1.0 	1.0	0.86
Holdown	CS16		W6	W6
	0310	MSTC66	MSTC66	MSTC66

*OTF does not take into account dead load and weight of the wall uno **v_siesmic includes penalty



Project Residence 3

Project #



Date

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Lateral Analysis Counts Roof Dia	shran	2nd F	oor walls	El W Direc
wind had: W= 352pif (s	Le pg LI	ı)		
	- 10)		
Selsmic: $V = 9.8^{k}$				
Grid!	n p	I		
0 6' 27!	41,5 344	;)		
1.14 300 4.84	1.6K			
vindi brindi				
ber r		ak		
4.2	ye'u	۶,		
	-14-			
0.4	0.74			
Seismic:	$ \longrightarrow $			
0.4"				
	4,2"			
	~			
•				
Grid		100000000000000000000000000000000000000		
Vwind (kips)	1	2 5.9	384	
Vseismic (kips)	0.4		614 4:9	
Length of wall (ft)	18.75	4.0 27	25.5	
v_wind (p/f)	59	219		
v_siesmic (p/l)**	21	219	<u>251</u> 296	
h (ft)	9.25	9.25	9.25	
OTF_Wind (lbs)*	543	2021	2322	
OTF_Seismic (lbs)*	197	1576	1777	
Length of shortest wall pier (ft)	5	3.5	3	
Apect Ratio Reduction for Seismic Loads	1.85	2.64	3.08	
Siesmic Penalty	1.0	0.76	0.65	
	W6	W6	 	
Shearwall				
Holdown	CS16	MSTC66	I MSIC66 I	
Holdown		MSTC66	MSTC66	
Holdown *OTF does not take into account dead lo				

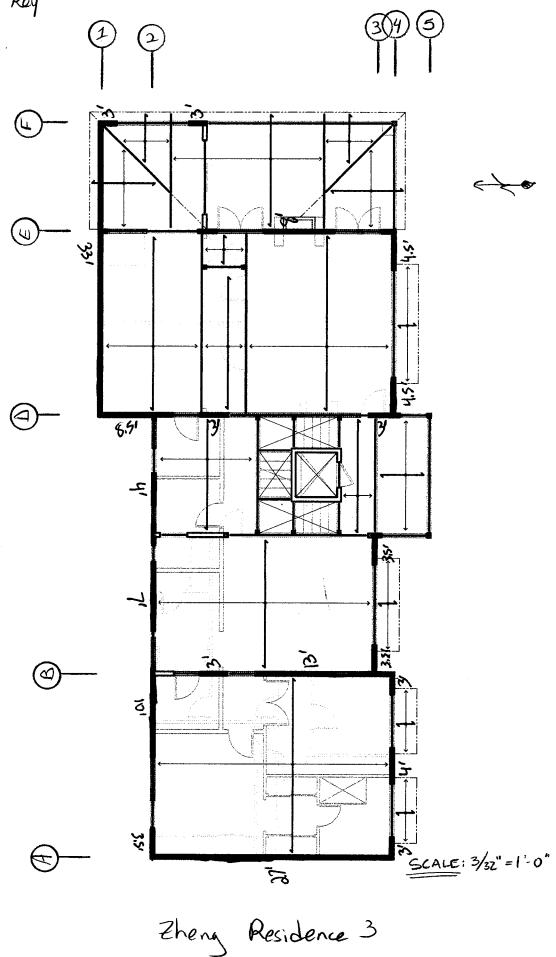


Project





Shearwall Key



aderal Analysis (con't) and f	floor dr	aph/Firs.	floor w	alls /	VIS Directio
\sim	U~r/10	(a) =	2111 ,10		
und Load: 2 story W= 3	7 psr (10)		JOHIDI		
1 stary W = 34	fpsf(5'	+ 5.4') =	354plf		
· · ·	•				
$a_{1} = \frac{1}{2} \frac{1}$					
Seismic Lond: W= 96plf					
•			Islay	From typ	
		l.	- Horace		Story
brid!	14		~		
Λ_{-} rol Λ_{-}	29'	<u>^</u>	· 20,5 '	12/2	
8 3 1	9K	6	·	E '	10
3.8 3.1 43 10055	8		5,75	264	•
SAN SAN		21	. 14	Sizk	
Jind:		34	21	e V	
14-18	r l				
26 310		Lave	34	182 K	2.1
1,5K J 3,6K				37	<i>o</i> e ¹¹
1.4 ^k		13.6K		(1.5 ^K	
eismic: 1.0*		LOK			
20mic.					
			0.6	Ň	
	$\overline{}$		0,6		
	$\overline{}$		0.0		J _{0.6"}
1.0 ^x			0.0		J _{0.6} *
		1.414	0.0	1.0 ^K	J _{0.6} «
		I.41K	0.15	1.0 ^K	J _{0.6} «
		1.414	0.15	1.0 [#]	J _{0.6} «
		1.414	0.15	1.0 ^K	J _{0.6} «
1.0 ^x				1.0 ^K	
Grid		В		E	F
Grid Vwind (kips)		B	D 17.7	E 9,4	F 2.1
Grid Vwind (kips) Vseismic (kips)		B 14.9 6.0	D 17.7 6.0	E 9.4 3.1	F 2.1 0.6
Grid Vwind (kips) Vseismic (kips) Length of wall (ft)	27	B 14.9 6.0 16	D 17.7 6.0 14.5	E 9:4 3:1 8	F 2.1 0.6 6
Grid Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f)	27 278	B 14.9 6:0 16 931	D 17.7 6.0 14.5 1221	E 9,4 3,1 8 1175	F 2.1 0.6 6 350
Grid Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)**	27 278 93	B 14.9 6:0 16 931 631	D 17.7 6.0 14.5 1221 697	E 9,4 3,1 8 <u>1175</u> 388	F 2.1 0.6 6 350 168
Grid Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft)	27 278 93 10.1	B 14.9 6.0 16 931 631 10.1	D 17.7 6.0 14.5 1221 697 10.1	E 9.4 3.1 8 <u>1175</u> 388 10.1	F 2.1 0.6 6 350
Grid Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)*	27 278 93 10.1 2806	B 14.9 6.0 16 931 631 10.1 9406	D 17.7 6.0 14.5 1221 697 10.1 12329	E 9.4 3.1 8 1175 388 10.1 11868	F 2.1 0.6 6 350 168 10.1 3535
Grid Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)*	278 278 93 10.1 2806 935	B 14.9 6.0 16 931 631 10.1 9406 3788	D 17.7 6.0 14.5 1221 697 10.1	E 9.4 3.1 8 <u>1175</u> 388 10.1	F 2.1 0.6 6 350 168 10.1
Grid Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)* Length of shortest wall pier (ft)	27 278 93 10.1 2806	B 14.9 6.0 16 931 631 10.1 9406	D 17.7 6.0 14.5 1221 697 10.1 12329 4179	E 9.4 3.1 8 1175 388 10.1 11868 3914	F 2.1 0.6 6 350 168 10.1 3535 1010
Grid Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)*	27 278 93 10.1 2806 935 27	B 14.9 6:0 16 931 631 10.1 9406 3788 3	D 17.7 6.0 14.5 1221 697 10.1 12329 4179 3	E 9,4 3,1 8 1175 388 10,1 11868 3914 8	F 2.1 0.6 6 350 168 10.1 3535 1010 3
Grid Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)* Length of shortest wall pier (ft) Apect Ratio Reduction for Seismic Loads	278 93 10.1 2806 935 27 0.37	B 14.9 6.0 16 931 631 10.1 9406 3788 3 3.37	D 17.7 6.0 14.5 1221 697 10.1 12329 4179 3 3.37	E 9,4 3,1 8 1175 388 10,1 11868 3914 8 1,26	F 2.1 0.6 6 350 168 10.1 3535 1010 3 3.37

*OTF does not take into account dead load and weight of the wall uno <code>**v_siesmic</code> includes penalty



Zheny Residence 3

Project # (RA



Date

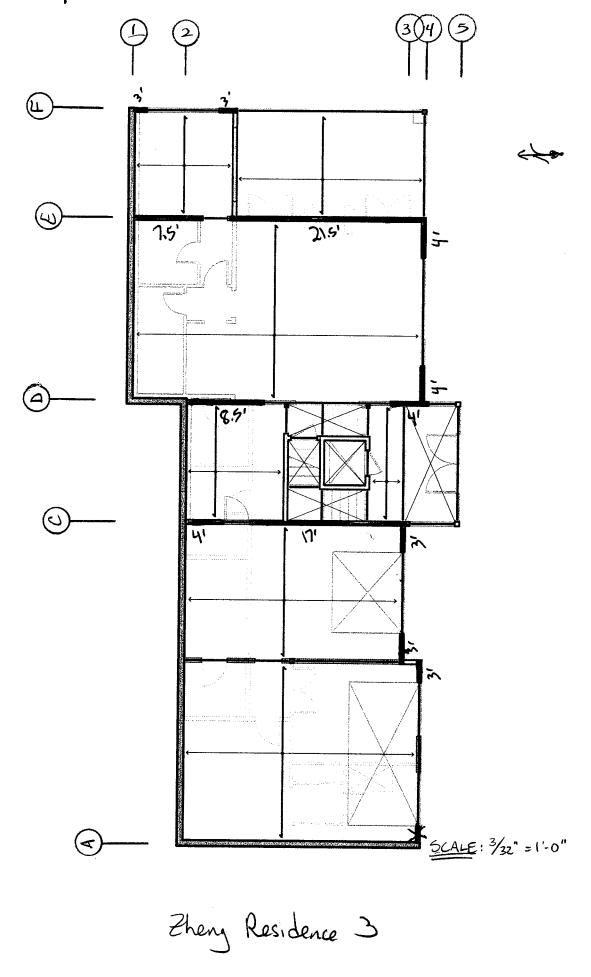
wind: a_{μ}^{μ}	Selismic: $V = 7.9^{\text{M}}$ Grid: $V = 7.9^{\text{M}}$ $V = 10^{\text{M}}$ $V = 10^{$		the lysis (Ounit) and Floordi	aph/1=flo	or wells	E/W Direction
Selismic : $V = 7.9^{4}$ Grid: Grid: u^{4}	Selismic: $V = 7.9^{\text{A}}$ Grid: $V = 7.9^{\text{A}}$ $V = 1.0^{\text{A}}$ $V = 1.0^{$	wind 4	oads: W=364 plf			
$ \begin{array}{c c} \hline Grid i & \hline & \hline & & \hline & & & & & & & & & & & &$	$ \begin{array}{c} \hline Grid \\ \hline Grid \\ \hline H $			Enson about	jl	
$\frac{1}{1000} \int_{10}^{10} \int_{10$	$\frac{\sqrt{10}}{\sqrt{10}} + \frac{\sqrt{10}}{\sqrt{10}} + \frac{\sqrt{10}}{\sqrt$	Grid:	47 JL 41	<u> </u>		
$\frac{6 \pi d}{V_{wind} (kips)} + \frac{4 \pi u}{4 \pi} + $	$\frac{563}{\sqrt{10}} + \frac{56}{\sqrt{10}} + 5$		10' 27'	451		
$\frac{1}{\sqrt{1 + \sqrt{1 + 1 - 1 } } } } } } } } } } } } } } } } }$	$\frac{Grid}{V_{4}} \xrightarrow{0} \sqrt{\frac{1}{4}} \xrightarrow{1} \sqrt{\frac{1}{4$		der Laery.9"	6.4		
$\frac{\sqrt{1000}}{\sqrt{1000}} \sqrt{1000} $	$\frac{1}{\sqrt{10}} \frac{1}{\sqrt{10}} \frac{1}$	wind: 19		Da		
Stismici $\frac{6rd}{4wind}$ $\frac{6rd}{4wind}$ $\frac{1}{$	Setsmic i $\frac{6rd}{6t}$ $\frac{1}{2k}$ $\frac{2}{34^{4}}$ $\frac{6rd}{10}$ $\frac{1}{2k}$ $\frac{2}{34^{4}}$ $\frac{6rd}{10}$ $\frac{1}{2k}$ $\frac{2}{34^{4}}$ $\frac{10}{10}$ $\frac{10}{6k}$ $\frac{10}{8}$ 10	\•	Det il	4.9*		
Stismici $\frac{6rd}{46}$ $\frac{1}{34^{4}}$ $\frac{1}{34^{4}$	Setsmic i $\frac{\sqrt{10}}{00}$ $\frac{\sqrt{10}}{24}$ $\frac{\sqrt{10}}{34}$ Setsmic i $\frac{\sqrt{10}}{00}$ $\frac{\sqrt{10}}{24}$ $\frac{\sqrt{10}}{34}$ $\frac{\sqrt{10}}{34}$ $\frac{\sqrt{10}}{12.2}$ $\frac{\sqrt{11}}{11.9}$ $\frac{\sqrt{12.2}}{12.2}$ $\frac{\sqrt{11}}{11.9}$ $\frac{\sqrt{12.2}}{12.8}$ $\frac{\sqrt{11}}{12.8}$ $\frac{\sqrt{10}}{12.8}$ $\frac{\sqrt{10}}{1$		19.4" 34"	. µак		
Grid 1 2 3&4 Vwind (kips) 2.2 11.9 12.8 Vseismic (kips) 1.0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Seismic (lbs)* 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	Grid 1 2 364 Wind (kips) 2.2 11.9 12.6 Vseismic (kips) 1.0 6.6 6.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (kips) 10.1 10.1 10.1 OTF_Wind (ibs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apeet Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	~~ · · ·	2.6	1		
Grid 1 2 364 Vwind (kips) 2.2 11.9 12.8 Vseismic (kips) 1.0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (bs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	Grid 1 2 3&4 Vwind (kips) 2.2 11.9 12.8 Vseismic (kips) 1.0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/) 67 486 492 v_siesmic (p/)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Vind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.6 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall Web W2 W2 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	Seismici		>		
Vwind (kips) 2.2 11.9 12.8 Vseismic (kips) 1.0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	Vwind (kips) 2.2 11.9 12.8 Vseismic (kips) 1.0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (bs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66		UNU	3,4m		
Vwind (kips) 2.2 11.9 12.8 Vseismic (kips) 1.0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	Vwind (kips) 2.2 11.9 12.8 Vseismic (kips) 1.0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (bs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66					
Vwind (kips) 2.2 11.9 12.8 Vseismic (kips) 1.0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	Vwind (kips) 2.2 11.9 12.8 Vseismic (kips) 1.0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66					
Vwind (kips) 2:2 11.9 12.8 Vseismic (kips) 1.0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	Vwind (kips) 2:2 11:9 12.8 Vseismic (kips) 1:0 8.6 8.9 Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66 *OTF does not take into account dead load and weight of the wall uno **v_siesmic includes penalty			•		
Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	Length of wall (ft) 33 24.5 26 v_wind (p/f) 67 486 492 v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	i	Grid	1 1	2	384
v_wind (p/f) 67 486 492 v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W/6 W/2 W/2 Holdown HDU2 HDU11 (2)MSTC66	v_wind (p/f) 67 486 492 v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66		Vwind (kips)		119	
v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W/6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66	v_siesmic (p/l)** 30 506 576 h (ft) 10.1 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66 *OTF does not take into account dead load and weight of the wall uno **v_siesmic includes penalty		Vwind (kips) Vseismic (kips)	10	11.9 8.6	12.8 8:9
h (ft)10.110.110.1OTF_Wind (lbs)*67349064972OTF_Seismic (lbs)*30635453457Length of shortest wall pier (ft)333.53Apect Ratio Reduction for Seismic Loads0.312.893.37Siesmic Penalty1.00.690.59ShearwallW6W2W2HoldownHDU2HDU11(2)MSTC66*OTF does not take into account dead load and weight of the wall uno	h (ft) 10.1 10.1 10.1 OTF_Wind (lbs)* 673 4906 4972 OTF_Seismic (lbs)* 306 3545 3457 Length of shortest wall pier (ft) 33 3.5 3 Apect Ratio Reduction for Seismic Loads 0.31 2.89 3.37 Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66 *OTF does not take into account dead load and weight of the wall uno **v_siesmic includes penalty		Vwind (kips) Vseismic (kips) Length of wall (ft)	1.0	11.9 8.6 24.5	12.8 8:9 26
OTF_Wind (lbs)*67349064972OTF_Seismic (lbs)*30635453457Length of shortest wall pier (ft)333.53Apect Ratio Reduction for Seismic Loads0.312.893.37Siesmic Penalty1.00.690.59ShearwallW6W2W2HoldownHDU2HDU11(2)MSTC66*OTF does not take into account dead load and weight of the wall uno	OTF_Wind (lbs)*67349064972OTF_Seismic (lbs)*30635453457Length of shortest wall pier (ft)333.53Apect Ratio Reduction for Seismic Loads0.312.893.37Siesmic Penalty1.00.690.59ShearwallW6W2W2HoldownHDU2HDU11(2)MSTC66*OTF does not take into account dead load and weight of the wall uno**v_siesmic includes penalty		Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f)	1.0 33 67	11.9 8.6 24.5 486	12.8 8.9 26 492
OTF_Seismic (lbs)*30635453457Length of shortest wall pier (ft)333.53Apect Ratio Reduction for Seismic Loads0.312.893.37Siesmic Penalty1.00.690.59ShearwallW6W2W2HoldownHDU2HDU11(2)MSTC66*OTF does not take into account dead load and weight of the wall uno	OTF_Seismic (lbs)*30635453457Length of shortest wall pier (ft)333.53Apect Ratio Reduction for Seismic Loads0.312.893.37Siesmic Penalty1.00.690.59ShearwallW6W2W2HoldownHDU2HDU11(2)MSTC66*OTF does not take into account dead load and weight of the wall uno**v_siesmic includes penalty		Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft)	10 33 67 30	11.9 8.6 24.5 486 506	12 8 8 9 26 492 576
Apect Ratio Reduction for Seismic Loads0.312.893.37Siesmic Penalty1.00.690.59ShearwallW6W2W2HoldownHDU2HDU11(2)MSTC66*OTF does not take into account dead load and weight of the wall uno	Apect Ratio Reduction for Seismic Loads0.312.893.37Siesmic Penalty1.00.690.59ShearwallW6W2W2HoldownHDU2HDU11(2)MSTC66*OTF does not take into account dead load and weight of the wall uno**v_siesmic includes penalty		Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)*	1.0 33 67 30 10:1	11.9 8.6 24.5 486 506 10.1	12 8 8:9 26 492 576 10:1
Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66 *OTF does not take into account dead load and weight of the wall uno	Siesmic Penalty 1.0 0.69 0.59 Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66 *OTF does not take into account dead load and weight of the wall uno **v_siesmic includes penalty		Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)*	1.0 33 67 30 10:1 673 306	11.9 8.6 24.5 486 506 10.1 4906	12.8 8:9 26 492 576 10:1 4972
Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66 *OTF does not take into account dead load and weight of the wall uno	Shearwall W6 W2 W2 Holdown HDU2 HDU11 (2)MSTC66 *OTF does not take into account dead load and weight of the wall uno **v_siesmic includes penalty		Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)* Length of shortest wall pier (ft)	10 33 67 30 10:1 673 306 33	11.9 8.6 24.5 486 506 10.1 4906 3545 3.5	128 8.9 26 492 576 101 4972 3457 3
Holdown HDU2 HDU11 (2)MSTC66 *OTF does not take into account dead load and weight of the wall uno	Holdown HOU2 HDU11 (2)MSTC66 *OTF does not take into account dead load and weight of the wall uno **v_siesmic includes penalty		Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)* Length of shortest wall pier (ft) Apect Ratio Reduction for Seismic Loads	1.0 33 67 30 10.1 673 306 33 0.31	11.9 8.6 24.5 486 506 10.1 4906 3545 3.5 2.89	128 8:9 26 492 576 10:1 4972 3457 3 3.37
*OTF does not take into account dead load and weight of the wall uno	*OTF does not take into account dead load and weight of the wall uno **v_siesmic includes penalty		Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)* Length of shortest wall pier (ft) Apect Ratio Reduction for Seismic Loads Siesmic Penalty	1.0 33 67 30 10:1 673 306 33 0.31 1.0	11.9 8.6 24.5 486 506 10.1 4906 3545 3.5 2.89 0.69	12.8 8.9 26 492 576 10.1 4972 3457 3457 3 3.37 0.59
	Then Dulla 3		Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)* Length of shortest wall pier (ft) Apect Ratio Reduction for Seismic Loads Siesmic Penalty Shearwall	1.0 33 67 30 10:1 673 306 33 0.31 1.0 VV6	11.9 8.6 24.5 486 506 10.1 4906 3545 3.5 2.89 0.69 W2	12.8 8.9 26 492 576 10.1 4972 3457 3457 3 3.37 0.59 W2
	Then Deile 3		Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)* Length of shortest wall pier (ft) Apect Ratio Reduction for Seismic Loads Siesmic Penalty Shearwall Holdown *OTF does not take into account dead log	1.0 33 67 30 10.1 673 306 33 0.31 1.0 W6 HDU2	11.9 8.6 24.5 486 506 10.1 4906 3545 3.5 2.89 0.69 W2 HDU11	12.8 8.9 26 492 576 10.1 4972 3457 3 3.37 0.59 W2 (2)MSTC66
	Then Duile 3		Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)* Length of shortest wall pier (ft) Apect Ratio Reduction for Seismic Loads Siesmic Penalty Shearwall Holdown *OTF does not take into account dead log	1.0 33 67 30 10.1 673 306 33 0.31 1.0 W6 HDU2	11.9 8.6 24.5 486 506 10.1 4906 3545 3.5 2.89 0.69 W2 HDU11	12.8 8.9 26 492 576 10.1 4972 3457 3457 3 3.37 0.59 W2 (2)MSTC66
Project #			Vwind (kips) Vseismic (kips) Length of wall (ft) v_wind (p/f) v_siesmic (p/l)** h (ft) OTF_Wind (lbs)* OTF_Seismic (lbs)* Length of shortest wall pier (ft) Apect Ratio Reduction for Seismic Loads Siesmic Penalty Shearwall Holdown *OTF does not take into account dead log	10 33 67 30 10:1 673 306 33 0.31 1.0 W6 HDU2 bad and weight	11.9 8.6 24.5 486 506 10.1 4906 3545 3.5 2.89 0.69 W2 HDU11	128 8.9 26 492 576 10.1 4972 3457 3457 3457 33 3.37 0.59 W2 (2)MSTC66







Shearwall key Plan



Lateral analysis (cont)! First (Fluor Dr	xph/Ba	sement u	salls.	NIS Directio	~ ~
Wind Wad! W= 34 psf (11	o') = 34	10 plf		-		
Seismic Load: w= 45plf w!		•	- hour	e		
Grid: 11 15 15	.0 5' 1 10 10	13,5'	TYP 2015	N	10	
wind:	A THE	Jak Kit	17×	20-120-	3,1 104" 10-27=492 Black	Jeff
0.5 5.04	1.35×	0.5	JUP 3,3"	3.54 3.14	Jon Da	ph
Seismic:	0.8 ^K		0.3"	0,5%	0,3*	
Grid	-	C	less n	E		
Vwind (kips)	19.8		23.5	E 14,9	<u> </u>	
Vseismic (kips)	5.8	4.6	6.8	3.9	0.9	
Length of wall (ft)	Concrete		19	29	6	
v_wind (p/f)	Concrete	814	1237	514	683	
v_siesmic (p/l)**	Concrete	253	414	134	231	
h (ft)	9,25	9,25	9.25	9,25	9 25	
OTF_Wind (lbs)*	Concrete	7532	11441	4753	6321	
OTF Seismic (lbs)*	Concrete	2026	3311	1244	1388	
Length of shortest wall pier (ft)	Concrete	4	4	7.5	3	
Apect Ratio Reduction for Seismic Loads	Concrete	2.31	2.31	1.23	3.08	
Siesmic Penalty	Concrete	0.86	0.86	1.0	0.65	
Shearwall	Concrete	W2	2W2	2W3	W2	
Holdown	Concrete	HDU11	(2) HDU14	HD19	HDU11	
*OTF does not take into account dead lo					Land	

*OTF does not take into account dead load and weight of the wall uno $\space{1.5} \space{1.5} \space{$

Zheng Residence 3





Date

Lateral Analysis (con't): First Fl	our draph	Basemen.	t Walls	ElW Direct
wind had: w= 340 plr	•			
Seismic Load: V= 3.7k				
followe typ	1.5% 1.9% 1.5% 1.9% 1.5% 1.9% 1.0%	`		·
Grid		2	384	
Vwind (kips)	64	17.6	18:9	
Vseismic (kips)	13		10.3	
Length of wall (ft)	Concrete	Concrete	13:0	
v_wind (p/f)	Concrete	Concrete	1112	
v_siesmic (p/l)**	Concrete	Concrete	979	-1
h (ft)	9,25	9.25	9.25	
OTF_Wind (lbs)*	Concrete	Concrete	10284	
OTF_Seismic (lbs)*	Concrete	Concrete	5876	
Length of shortest wall pier (ft)	Concrete	Concrete	3070	
Apect Ratio Reduction for Seismic Loads	Concrete	Concrete	3.08	
Siesmic Penalty	Concrete	Concrete	0.65	-1
Shearwall	Concrete	Concrete	2W3	-1
Holdown	Concrete	Concrete	HD19	4
*OTF does not take into account dead lo **v_siesmic includes penalty				_]



Zhen Residence





Cateral (seismic Beams) 5 DS = 0,974 Par 134.5' 108' Bab 10.75' ۶.د= مم ما=م ۲. م 2=12' Bas Wy+WS (W1 + W3 - P. 035' P.@las' l=14'_ 12' IR2 7′ 1 17-WDL = 10pst(10')+ (2+ 15,35) 15pst = 365plf w, ~ レン2+して、 WIL = (30/ + 1535) 40 pif = 7050 H 14 P= 3788* (E) 8396* (W) DL WI = 10psf (10') = 100p1F Load Cise 5_ W W2 = 20.5 (15p)= 15 4p1F Www= (1+0.14(0.974)) 365plf = 415plf Le W3 = 20,5 (40,05F) = 410 pif P = 0,7(2,5)(3788) = 6629# Wu = 13.5% (15psf) = 102p1F $R_1 = 5390$ $R_2 = -411$ M= 13.341 P= 4179*(E) 9125*(W) Load ase 6 Land Case 5 WoL = (1+0.18(0,974)) 365p1F = 403p1F W, = (1 + 0.14 (0.974)) 100p1F = 114p1F Ww = (0.75)(705pH) = 529pIF $W_2 = (1 + 0.14(0.974))$ 154pif = 175pif P = 0. 525 (2.5) (3788) = 4972* W4 = (1+0.14 (0.974)) 102 p1F = /16p1F $M = 18,4^{*-1}$ $R_1 = 3420^{*}$ $R_2 = 7770^{*}$ P. = 4179* (2.5)(0.7) = 7314* $M = 11.6^{\mu-1}$ $R = 4^{\mu}$ $R_2 = -176^{*}$ Load Case 6 Load Case 8 W, = (1+0.105(0.974)) 100plf = 110plf W51= (0,6-0,14 (0,974))365plf= 170plf W2 = (1+0.105 (0.974)) 154pif = 170pif p= 0.7(2.5)(4179) = 6629 # $W_3 = (0.75)(410) = 308 \, \text{plf}$ Wu= (1+0.105 (0.974)) 102 = 112 plf $M = 6.4^{\kappa-1}$ $R_1 = -1880^{\#} R_2 = 3920^{\#}$ Ws = (0.75) 270 pif = 203 pif P. = 0, 525 (2.5) (4179=) = 5485# 1. use 5 1/4 x 14 PSL M = 20.04-1 R = 1780* R2 = 7260* Ma = 40.7" Va = 14.2" Okan Load Case 8 $w_1 = (0.6 - 0.14(0.974)) 100 \mu = 47 \mu F$ W2 = (0.6 - 0.14(0.974)) 154pif = 72pif WH= (0.6-0.14(0.974)) / Japif = 48pie P. = 4179 (2.5)(0.7) = 7314 # $M = 9.1^{\mu-1}$ R = -1300* R = 2880* 1. use 5/4× 14 PSL Ma= 40.7K-1 Va= 14.2K Zheng Residence 3







Shearwall Capacity Table! Based on Table 4.3A, AWC SDAWS-2008											
Shearwall Type	DF(Wind	PIF) Seis	TOPP	Late (PLF) Dx OTLSL	Buce Plate ATWOON ATCONC.						
wb	365	260	162@6"0C 242	1	AT WOOD (PLF) 160 @ 6*00 242	(PLF) 518"\$ABB@48"bc 372					
W4	532	380	(2) Rous 160 6 " 0 C (184	1	CalRows lod D 6" de U 84	5/8' AADE 32'bc 558					
W3	685	490	(2) Rauss 162@ 6"0c 484	A35@ 12"0C 595	(2) Rows 16d 6" 0c 484	518'0ABO 14'02 1116					
W 2	895	640	(2) 2005 162@43.00 645	A35@9"06 793	(2) Rows 16d @445"0C 645	5/8/04BQ.12 "oc 1488					
2W3	1370	980	N/A	A35@6"0c 1190	(2) Rows 16d @3"04 968	518"OABEIB"OL 1416					
2~2	1790	1280	NIA	HGA 10 TK Q 8" OC 1747	(1) Anns 162 @ 200 1452	718" ØABED"OL 1888					

East Mercer Parcel 3





620

Date

Lateral (seismic pams)
Rim Joist

$$l = 6.5' 3' \frac{3.5'1}{R_1} \frac{1}{R_1} \frac{1}{R_1} \frac{1}{6.5'} \frac{1}{1}$$

 $D_{DL} = (1.35 + \frac{24.5'}{3.5})(5psf + 10(10) = 303p)f$
 $D_{LL} = (1.35 + \frac{24.5'}{3.5})(40psf = 540p)f$
 $P = 1576^{#}$
Cond case 5
 $W_{DL} = (1 + 0.14(0.974)) 303p)f = 345p)f$
 $P = 0.7(2.5)(576^{#}) = 2758^{#}$
 $M = 6.3^{H-1} R_1 = 2610^{#} R_2 = -3647^{#}$
Cond case 6
 $W_{DL} = (1 + 0.105(0.974)) 303p)f = 334p)f$
 $W_{LC} = 0.75(540p)f) = 405p)f$
 $P = 0.525(2.5)(1576^{H}) = 2069^{H}$
 $M = 7.22^{H-1} R_1 = 3520^{H} R_2 = 1290^{H}$
Lond case 8
 $W_{DL} = (0.6 - 0.14(0.974)) 303p)f = 141p)f$
 $P = 0.7(2.5)(1576) = 2758^{H}$
 $M = 5.2^{H-1} R_1 = 1940^{H} R_2 = -1030^{H}$
.: Use $3^{1/2} \times 14$ CSL
for Rim Joist.
 $M_0 = 21.8^{H-1}$, $V_n = 10.1^{A}$



Zheny Residence 3

Project # Designer



DESIGN PROPERTIES

Allowable Design Properties⁽¹⁾ (100% Load Duration)

ZHENG RESIDENCE 3

FI

Protect product from sun and water

PRODUCT

DESIGN PROPERTIES

Design Stresses⁽¹⁾ (100% Load Duration)

				425 D.GUN									cular to face and loaded			ст of 670 psi.	on page 26.) ESR-1387, Table 1,	
				9									(7) Specific gravity of 0.58 may be used for holts installed nernendicular to face and loaded			(9) For members less than 13% thick and in plank orientation, use $F_{e,L}$ of 670 psi. NDS ³⁰ bearing area factor $G_{h} = 1.0$.	(10) Value accounts for large hole capabilities. See Allowable Holes on page 26.	_	(12) For column applications, use F _{al} of 500 psi. Alternatively, refer to ESR-1387, Table 1, footnote 15.	
				ę		906				11157		ion design only.	0.58 may be used	ain.	cness up to 31/2".	than 1 %" thick an factor $C_h = 1.0$.	large hole capabi	(11) Value shown is for plank orientation.	tions, use F _{all} of 5	
				941		LUNCH		1		1.1	A SAN	(6) For lateral connection design only.	Decific gravity of	perpendicular to grain.	(8) Values are for thickness up to 31/5 [*] .	rr members less t DS® bearing area	ilue accounts for	ilue shown is for	For column applica footnote 15.	
L.		and the second secon		1,700		222	Marallan ^{di} (M.	2,600	Paralian ^{is} 951.				(1) Sr	ä	(8) Va	(9) Fo NI	(10) Va	(11) Va	(12) Fo fo	
				60'13)		787,605		1,016,555		914, BBD		n of load are perm		itions, per NDS®.	as foliows:				pplications.	
			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	lax Ha		1.65 x 10 ⁶		2.9 x IDF		jii x ii		resses for duratio		n stability calcula	ppropriate factor a				r most standard a	
			200.00		8,250	36,875		125,000		112,500		nent to the design stresses for duration of load are permitted	ole code.	for beam and column stability calculations, per NDS®.	multiply F_b by the appropriate factor as follows:	by [12] 0.092 F 12 70.136		by [4]	the volume effects for most standard applications. Iration of load.	
												noted, adjustmer		us of elasticity for	r other depths, m	- For TimberStrand® LSL, muttipfy by	- For Microlam® LVL, multiply by [PSL, multiply by [sted to reflect the creased for durat	
												(1) Unless otherwise noted, adjustm	in accordance with	(2) Reference nodulus of elasticity	(3) For 12" depth. For other depths,	- For TimberStran	– For Microliam®	- For Parallam® PSL, multiply b	(4) F_t has been adjusted to reflect t (5) $F_{c.t}$ may not be increased for du	

General Assumptions for Trus Joist[®] Beams

- Lateral support is required at bearing and along the span at 24" on-center, maximum.
- Bearing lengths are based on each product's bearing stress for applicable grade and orientation.
 - All members 74^{*} and less in depth are restricted to a maximum deflection of 46^{*} .
 - Beams that are 134" x 16" and deeper require multiple plies.
 - No camber.
- Beams and columns must remain straight to within 5134608 (in.) of true alignment. L is the unrestrained length of the member in feet.

For applications not covered in this brochure, contact your Weyerhaeuser representative.







Column Orientation

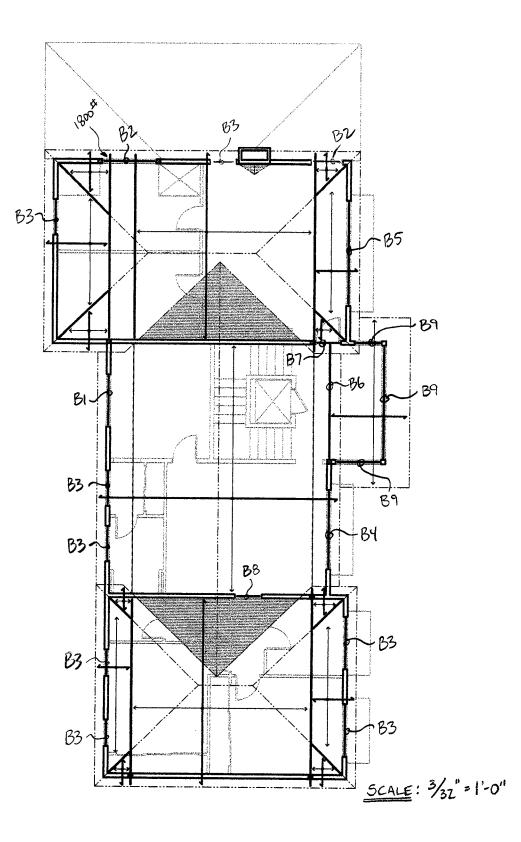


Plank Orientation

					-		Hem-Fir No. 2			
	b (i n)	d (in)	Sx (in³)	lx (in⁴)		M(#-ft)	Cd=1.0	Cd=1.15	Cd=1.6	
2x4	1.5	3.5	3.06	5.36		(2)2x4	651	748	1,041	
2x6	1.5	5,5	7.56	20,80		(2)2x6	1,393	1,602	2,228	
2x8	1.5	7.25	13.14	47.63		(2)2x8	2,234	2,569	3,574	
2x10	1,5	9,25	21.39	98.93		(2)2x10	3,333	3,833	5,333	
2x12	1.5	11.25	31.64	177.98		(2)2x12	4,482	5,155	7,172	
2x14	1,5	13.25	43.89	290.78		(2)2x14	5,596	6,435	8,954	
								DF-L No. 2		
3x4	2.5	3.5	5.10	8.93		3x4	574	660	919	
3x6	2.5	5.5	12.60	34.66		3x6	1,229	1,413	1,966	
3x8	2.5	7.25	21.90	79.39		3x8	1,971	2,267	3,154	
3x10	2,5	9:25	35,65 -	164.89		3x10	2,941	3,382	4,706	
3x12	2.5	11.25	52.73	296.63	a an	3x12	3,955	4,548	6,328	
3x14	2.5	13.25	73.15	484.63		3x14	4,938	5,678	7,900	
								DF-L No. 2		
4 x4	3.5	3.5	7.15	12.51	19.17513-19-17	4x4	804	924	1,286	
4x6	3.5	5.5	. ,17.65	. 48.53 .		4x6	1,720	1,979	2,753	
4x8	3.5	7.25	30.66	111.15	80.00 (20 2 0)	4x8	2,989	3,438	4,783	
4x10	3.5	9.25	49.91	230.84		4x10	4,492	5,166	7,187	
4x12	3.5	11.25	73.83	415.28	Section 14	4x12	6,091	7,004	9,745	
4x14	3.5	13.25	102.41	678;48		4x14	7,681	8,833	12,289	
			07.70	76.06				DF-L No. 1		
6x6	5.5	5.5	27.73	76.26	Kataka	6x6	3,120	3,587	4,991	
6x8	5.5	7.5	51.56	193.36		6x8	5,801	6,671	9,281	
6x10	5.5	9.5	82.73	392.96	1 1878-1372	6x10	9,307	10,703	14,891	
6x12	5.5	11.5	121.23	697.07		6x12	13,638	Construction of the Construction of the	21,821	
6x14	5.5	13.5	167.06	1127.67	TAR D	6x14	18,550	21,333	29,680	
6x16 ·	5,5	15.5	220:23	1706:78		6x16	24,081	27,693	38,530	

ZHENG RESIDENCE 3

F3



ROOF FRAMING Di= 1Spsf, Si= 2Spsf BI B3 B5_ $\begin{array}{c|c} \mu & \mu \\ \mu & \mu \\ \uparrow & \mu \\ \downarrow = 6' & \uparrow \\ \uparrow \\ \downarrow = 6' & \downarrow \\$ T L=41 T 1 L=11.51 7 W= (27)(40) = 540pla W= (27)(40)= 540pb W= (5)(40)+40 R= 1920 # M=2.43k-1 = 140plf R=1080# M=1.08k" *fb*=951psi ≤ 1346psi R= 805 # M=Z.31k-1 fb= 493psi fu: 75psi fb= 904psi fu= 113psi $\Delta_{TL} = 0.03'' = l/1600$ ATL= 0.08" = 1/900 fu= 48psi USE: (2) 2×8 DTL= 0.31" = \$ 445 USE: 4×8 * BAJED ON WORST-USE: 4×8 CASE LOADING BZ 1800# SCENARIO, B6 $\frac{1}{\mathbf{1}_{\mathbf{R}}} = \frac{1}{\mathbf{1}_{\mathbf{R}}} = \frac{1}$ BY 1 L=13' ["""] 1 L=9' 1 $W = \left(\frac{23}{7}\right) (40) = 460 \text{ plf}$ W= 540p lf $R_1 = 2880^{\text{H}}$, $R_2 = 1680^{\text{H}}$ $W = \left(\frac{27}{2}\right) (46) = 540 \text{ plf}$ R= 3510# M= 11,4k" N= 3.07k-1 R=2430# M=5.476fb=1128psi fv= 85psi f_b = 1200 psi ≤ 1346psi fb= 889psi fu= 93psi DTL= 0.31 "= \$/503 fu= 170psi = 207psi STL= 0.12" = 1/900 USE : 6 × 12 ATL = 0.11" = 1/655 USE: 4x12 USE: 4×8

ZHENG RESIDENCE 3



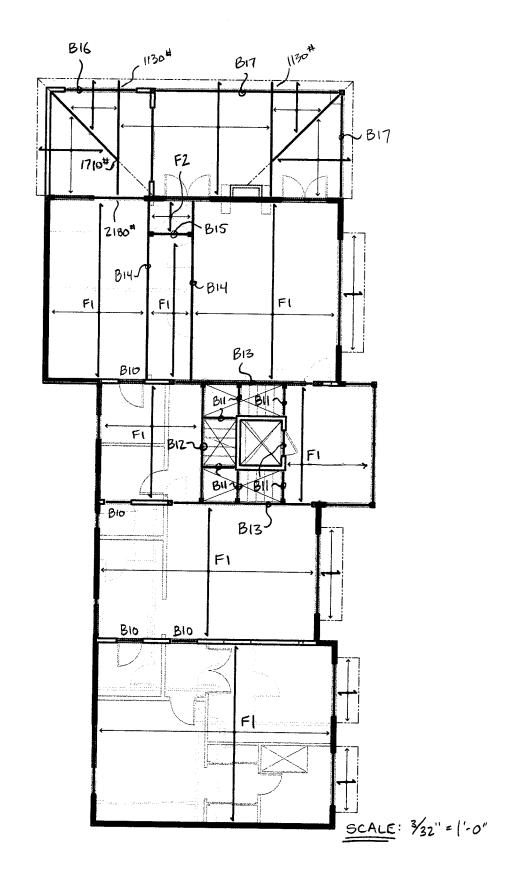
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Date

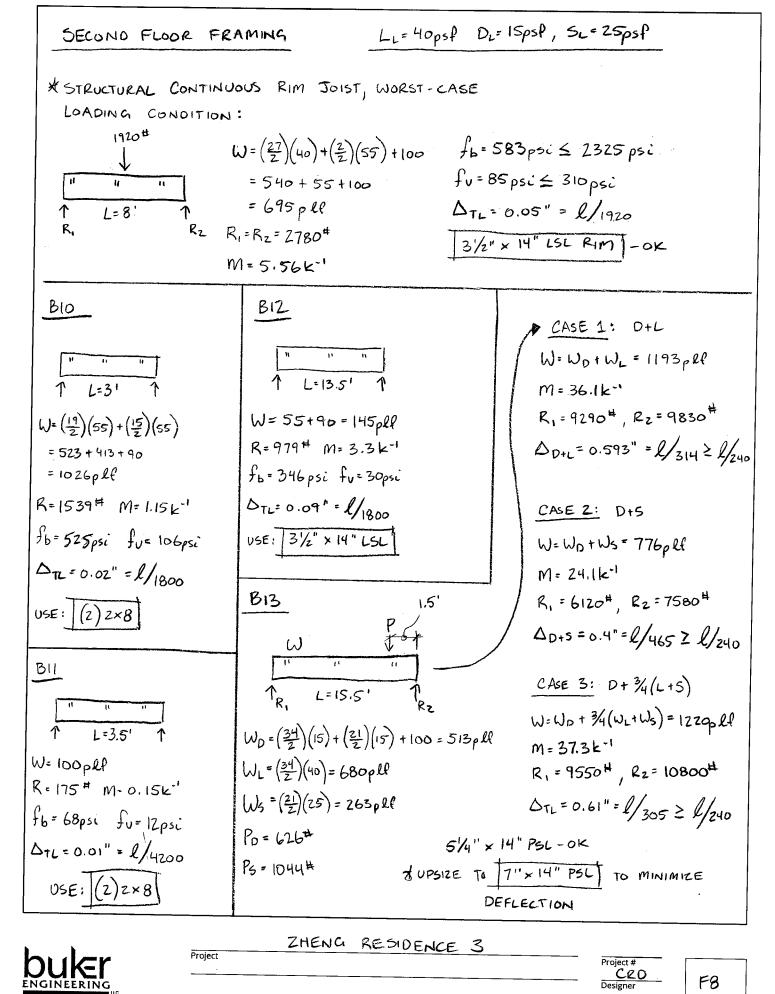
ROOF FRAMING, CON	TD_1= 15ps	$f, S_L = 25 psf$
$B7 = 3510^{44}$ $T_{R_1} = L^{-3} + T_{R_2}$ $W^{-}(T_{Z})(40) = 140p lf$ $R_{1} = 1670^{44} = R_2 = 2260^{44}$ $M = 2.71 k^{-1}$ $f_{b} = 1060psi = f_{U} = 133psi$ $\Delta_{TL} = 0.03^{44} = l/1600$	$\frac{B9}{1}$ $\frac{1}{1} = 13' \qquad 1$ $W = \left(\frac{12}{2}\right)(40) = 240plf$ $R = 1560^{H} \qquad M = 5.07k^{-1}$ $f_{b} = 12.19psi \leq 1346psi$ $f_{v} = 72psi \leq 180psi$ $\Delta_{TL} = 0.41'' = l/380$	
$USE: 4 \times 8$ $B8$ $T = 3 T$ $W = (\frac{22}{2})(40) = 440plP$ $R = 660 \# M = 0.5 k^{-1}$	USE: 4X10	
$f_{b} = 228 \text{ psi}$ $f_{v} = 45 \text{ psi}$ $\Delta_{TL} = 0.01'' = \frac{1}{3600}$ $USE : (2) Z \times 8$		
	ZHENG RESIDENCE	3 Project # CRO Designer F6

SECOND FLOOR FRAMING KEYPLAN



ZHENG RESIDENCE 3

F7



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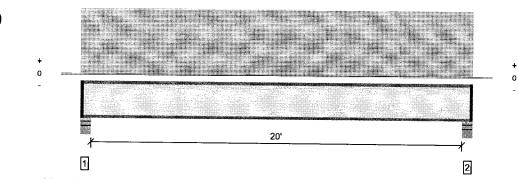
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F9

Date

Overall Length: 20' 11"



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

Design Results	AGURÍ@LCERTON	Monei	रिस्डारि	(UDF	(kerth@mbhatten(Ratten)
Member Reaction (lbs)	756 @ 4 1/2"	1485 (3.50")	Passed (51%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	733 @ 5 1/2"	1945	Passed (38%)		1.0 D + 1.0 L (All Spans)
Moment (Ft-Ibs)	3728 @ 10' 5 1/2"	4990	Passed (75%)		1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.366 @ 10' 5 1/2"	0.504	Passed (L/661)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.503 @ 10' 5 1/2"	1.008	Passed (L/481)		1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	45	45	Passed		

System : Floor Member Type : Joist Building Use : Residential Building Code : IBC Design Methodology : ASD

Deflection criteria: LL (L/480) and TL (L/240).

• Bracing (Lu): All compression edges (top and bottom) must be braced at 4' 2 1/2" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.

A structural analysis of the deck has not been performed.

Deflection analysis is based on composite action with a single layer of 23/32" Panel (24" Span Rating) that is glued and nailed down.

Additional considerations for the TJ-Pro[™] Rating include: 1/2" Gypsum ceiling.

방법법이 있었다. 이상이 가방에 가장되었다. 문제 방법이 강성하지 않는 것 같이 있다.		Certioler					
SIMME	ার্ত্রন	/মহালিগত	रिव्युपार्ट्स	চিন্দ্রট	निल्लू आण्य	ন্তনি	STREES STREES
1 - Stud wall - DF	5.50"	3.75"	1.75"	209	558	767	1 3/4" Rim Board
2 - Stud wali - DF	5.50"	3.75"	1.75"	209	558	767	1 3/4" Rim Board

Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

1 - Uniform (PSF)	0 to 20' 11"	16"	15.0		Residential - Living Areas	ł
junis	ത്തെ	ണ്ടെന്നം	QEI() (O-QO)	TOT 1900 (00.10)	ശ്നനങ്ങൾ	

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

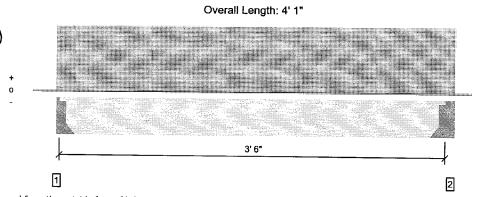
	Forte Software Operator	Job Notes			
	Craig Donison Buker Engineering (425) 289-89 craig@bukerengineering.com	ZHENG	RESIDENCE	3	
1		I			

SUSTAINABLE FORESTRY INITIATIVE



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

Design Results	AGITE (OLICENTION	Allowed	Result	î Dî	ເພາະມີ ເພາະ ເພາະ ເພາະ ເພາະ ເພາະ ເພາະ ເພາະ ເພາະ
Member Reaction (lbs)	128 @ 1 3/4"	1969 (1.50")	Passed (7%)		1.0 D + 1.0 L (All Spans)
Shear (lbs)	70 @ 11 1/4"	3159	Passed (2%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	112 @ 1' 10 3/4"	6123	Passed (2%)		
Live Load Defl. (in)	0.001 @ 1' 10 3/4"	0.087	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.002 @ 1' 10 3/4"	0.175	Passed (L/999+)		1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	75	45	Passed		

System : Floor Member Type : Joist Building Use : Residential Building Code : IBC Design Methodology : ASD

Deflection criteria: LL (L/480) and TL (L/240).

 Bracing (Lu): All compression edges (top and bottom) must be braced at 3' 6" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member stability.
 4.4% interaction is the property there a block and a stability.

• A 4% increase in the moment capacity has been added to account for repetitive member usage.

• A structural analysis of the deck has not been performed.

• Deflection analysis is based on composite action with a single layer of 23/32" Panel (24" Span Rating) that is glued and nailed down.

Additional considerations for the TJ-Pro™ Rating include: 1/2" Gypsum ceiling.

Supports	লিহা	Avallable	Recentived	िल्हार्च	700F	লিলে	America
1 - Hanger on 9 1/2" LSL beam	1.75"	Hangeri	1.50"	38	101	139	See note 1
2 - Hanger on 9 1/2" PSL beam	5.25"	Hanger ¹	1.50"	44	117	161	See note 1

• 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.

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ŚŢŢŊŊĊŔ	Moriel	Seitlemin	ରାଙ୍କମିଙ୍କ	ି ଅଟନ୍ତ୍ରମିହାଡ଼	Member Reits	Arrestrict
1 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10d x 1-1/2	2-10d x 1-1/2	
2 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10d x 1-1/2	2-10d x 1-1/2	

Picoli	location	SECO	0000 (0000)	ന്ന് നാല് (സ്സ്)	Commente
1 - Uniform (PSF)	0 to 4' 1"	16"	15.0	40.0	Residential - Living Areas

Wayadhansa Noles

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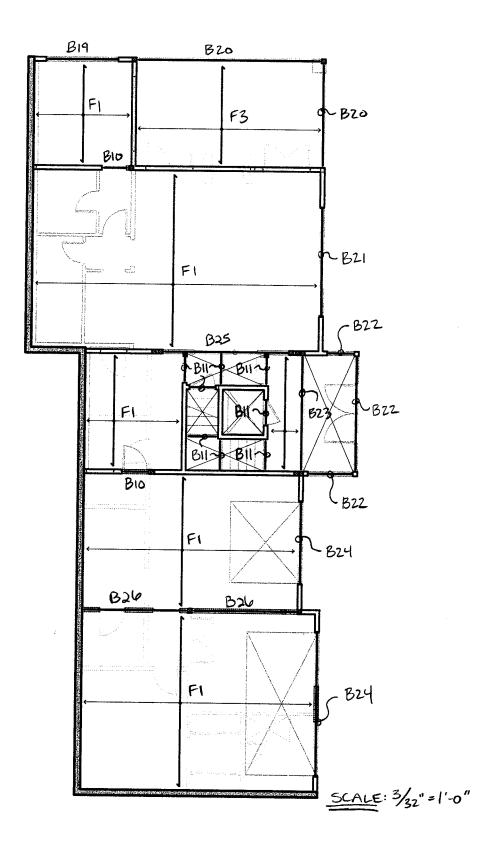
The product application, input design loads, dimensions and support information have been provided by Forte Software Operator

Forte Software Operator	Job Notes		
Craig Donison Buker Engineering (425) 289-89 craig@bukerengineering.com	ZHENG	RESIDENCE 3	

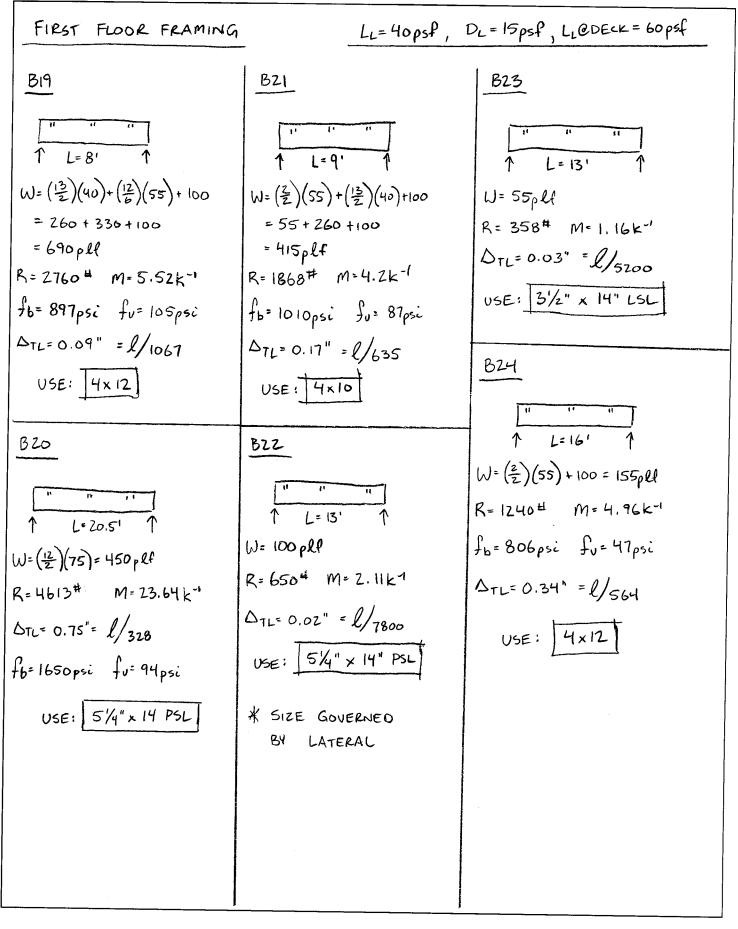
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ZHENG RESIDENCE 3

Project





F13

Date

F3)					
Deck Joists	5		7 m		
L =	12 ft 0 in	Γ	Lumber Type =	DEL#	2
w _{DL} =	15 psf	1	F _b =	900	psi
W _{LL}	60 psf		F _v =	180	psi
Spacing =	12 in o.c.		E =	1,600,000	psi
Joist Size	2×8		C _D =	1	
S =	17.02 in ³		C _r =	1.15	
=	70.19 in⁴		С _F =	1.2	
A =	12.38 in ²		incised	yes	
M =	1350 #-ft				
R1 = R2 =	450 #		E' =	1520000 psi]
f _b =	952 psi		F _b ' =	994 psi	ок
f _v =	54.5 psi		F _v ' =	144 psi	ок
Δ _{DL} =	0.066 in	=	L/	2195	
Δ _{LL} =	0.262 in	=	Ľ	549	
Δ _{TL} =	0.328 in	=	L/	439	

Ledger Connection @ Grid E P.T. ZX12 LEDGER $-(\frac{12'}{2})(15760) = 450 plf$ use (2) 1/4" \$ × 4/2" SDS @ 12"ac. (a pacity = (3)(280) (12)= 630 #/ ZHENG RESIDENCE 3 Project Project # F15 Designer

buker ENGINEERING

Date

Title Job # 3' Cantilever Wall w/Slab on Grade Dsgnr: CRB : Description

Page: _____ Date: 2 OCT 2014

Cantilever Retaining Wall w/Slab on Grade

This Wall in File: hylasteining well calculatio -lastain! 1-1

cense : KW-06060889 cense To : Buker Engi	neerii	10.14.9.29 ng, LLC	Cantilevered Retaining	Wall	Desigr	Code: IBC 2012,A	CI 3	18-11,ACI 53
Criteria			Soil Data					
Retained Height Wall height above soil Slope Behind Wall	=	3.00 ft 0.50 ft 0.00 : 1	Equivalent Fluid Pressure Metho Heel Active Pressure = =		0 psf 0 psf/ft			
Height of Soil over Toe	=	0.00 in	Passive Pressure =	250.0) psf/ft			
Water height over heel	=	0.0 ft	Soil Density, Heel = Soil Density, Toe = Footing Soil Friction =	110.00 0.00 0.400) pcf	Berrie		/
			Soil height to ignore for passive pressure =	12.00	in	12/s.2icet		257.13#
Surcharge Loads			Lateral Load Applied to	Sterr	1	Adjacent Footing I	oad	d
Surcharge Over Heel	=	0.0 psf	Lateral Load =	0.0 #	/ft	Adjacent Footing Load	=	0.0 lbs
Used To Resist Sliding			Height to Top =	0.00 ft		Footing Width	=	0.00 ft
Surcharge Over Toe Used for Sliding & Ove	= erturni	0.0 psf	Height to Bottom =	0.00 ft		Eccentricity	=	0.00 in
	_	-	The above lateral load has been increased	1.00		Wall to Ftg CL Dist	=	0.00 ft
Axial Load Applie	d to	Stem	by a factor of	1.00		Footing Type Base Above/Below Soil		Line Load
Axial Dead Load	=	0.0 lbs	Wind on Exposed Stem =	0.0 p	sf	at Back of Wall	=	0.0 ft
Axial Live Load Axial Load Eccentricity	Ξ	0.0 lbs 0.0 in		0.0 p		Poisson's Ratio	=	0.300
Design Summary			Stem Construction		Top Stem			
all Stability Ratios			Design Height Above Ftg	ft=	Stem OK 0.00			
Overturning	=	1.77 OK	Wall Material Above "Ht		Concrete			
Slab Resist	s All S		Thickness	=	8.00			
			Rebar Size	=	# 4			
otal Bearing Load	=	675 lbs	Rebar Spacing	=	12.00			
resultant ecc.	=	4.52 in	Rebar Placed at	=	Edge			
oil Pressure @ Toe	=	1,204 psf OI	Design Data	-	0.047			
oil Pressure @ Heel	=	0 psf Ol		= lbs =	252.0			
Allowable	=	2,000 psf	MomentActual	ft-#=	252.0			
Soil Pressure Less			MomentAllowable	=	5,412.6			
CI Factored @ Toe	=	1,445 psf	ShearActual	psi=	3,412.0			
CI Factored @ Heel		0 psf	Chaor Allowable	psi=	75.0			
ooting Shear @ Toe ooting Shear @ Heel	=	0.0 psi Ol	Mall Maight	=	100.0			
Allowable	-	2.5 psi Oł 75.0 psi	Rebar Depth 'd'	in =	6.25			
ding Calcs Slab Resis			LAP SPLICE IF ABOVE		18.72			
ateral Sliding Force	=	257.2 lbs	LAP SPLICE IF BELOW					
		201.2 103	HOOK EMBED INTO FT	G in =	6.00			
			Masonry Data		nt reduced	by stress ratio		
			fm	psi=				
			Fs Solid Grouting	psi= =				
ad Factors			Modular Ratio 'n'	=				
Building Code	IE	3C 2012,ACI	Short Term Factor	=				
Dead Load		1.200	Equiv. Solid Thick.	=		In in his		
Live Load		1.600	Masonry Block Type		Medium V	veight		
Earth, H		1.600	Masonry Design Method Concrete Data	-	ASD			
Wind, W		1.000	fc	psi=	2,500.0			
Seismic, E		1.000						

Page: 2 OCT 2014

This Wall in File: h:\retaining wall calculations\retaining wall - slab on grade\cantilever retainin

RetainPro 10 (c) 1987-2014, Build 10.14.9.29 License : KW-06060889 License To : Buker Engineering, LLC Cantilevered Retaining Wall Design Code: IBC 2012, ACI 318-11, ACI 530-11

Footing Dim	nension	ns & S	Strengths
Toe Width		=	0.42 ft
Heel Width		=	1.08
Total Footing W	/idth	=	1.50
Footing Thickne	ss	=	10.00 in
Key Width		=	0.00 in
Key Depth		=	0.00 in
Key Distance fro	om Toe	=	0.00 ft
fc = 2,50	Opsi	Fy =	60,000 psi
Footing Concret	te Density	y =	150.00 pcf
Min. As %		=	0.0018
Cover @ Top	2.00	@ 8	3tm.= 3.00 in

Footing Desig	In	Results		
		Toe	Heel	
Factored Pressure	=	1,445	0	psf
Mu': Upward	=	110	0	ft-#
Mu': Downward	=	13	47	ft-#
Mu: Design	=	97	47	ft-#
Actual 1-Way Shear	=	0.00	2.52	psi
Allow 1-Way Shear	=	75.00	75.00	psi
Toe Reinforcing	=	None Spec'd		-
Heel Reinforcing	=	None Spec'd		
Key Reinforcing	=	None Spec'd		
Other Acceptable S Toe: Not req'd, M Heel: Not req'd, M	u <	S*Fr		

Key: No key defined

Summary of Overturning & Resisting Forces & Moments

Sec. 1		OV	ERTURNING				RE	SISTING	
tem		Force lbs	Distance ft	Moment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	257.2	1.28	328.6	Soil Over Heel	=	137.4	1.29	177.5
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Surcharge Over Toe	=				Surcharge Over Heel	=			
Adjacent Footing Load	=				Adjacent Footing Load	=			
Added Lateral Load	=				Axial Dead Load on Ste	m=			
oad @ Stem Above So	il =				* Axial Live Load on Sten	n =			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
Total	-	257.2	O.T.M.	328.6	Stem Weight(s)	=	350.0	0.75	262.6
Total		257.2	0.1.141.	320.0	Earth @ Stem Transitio	ns=			
	=		=		Footing Weight	=	187.5	0.75	140.6
Resisting/Overturnin	g Rat	io	=	1.77	Key Weight	=			
Vertical Loads used f	or So	I Pressure	= 674.	9 lbs	Vert. Component	=			
					Tot	tal =	674.9	s R.M.=	580.7

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

East Mercer Parcel3

18-11,ACI 530-1
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 Title
 3' Cantilever Wall w/Slab on Grade

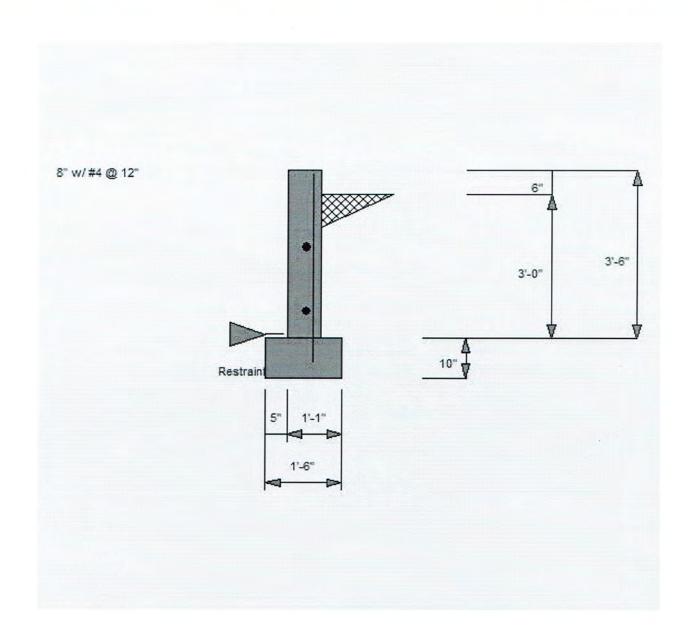
 Job #
 :
 Dsgnr:
 CRB
 I

 Description....
 Cantilever Retaining Wall w/Slab on Grade

Page: _____ Date: 2 OCT 2014

This Wall in File: h:\retaining wall calculations\retaining wall - slab on grade\cantilever retainin RetainPro 10 (c) 1987-2014, Build 10.14.9.29

License : KW-06060889 License To : Buker Engineering, LLC	Cantilevered Retaining Wall Design	Code: IBC 2012,ACI 318-11,ACI 530-11
--	------------------------------------	--------------------------------------



Title 4' Ca Job # : Description.... 4' Cantilever Wall w/Slab on Grade Dsgnr: CRB :

Page: _____ Date: 2 OCT 2014

Cantilever Retaining Wall w/Slab on Grade

etainPro 10 (c) 1987-2014, cense : KW-06060889 icense To : Buker Engil			C	antilevered Retaining	Wall	Design	Code: IBC 2012,	ACI 318-11,ACI 530
Criteria				Soil Data				
Retained Height Wall height above soil Slope Behind Wall	=	4.00 ft 0.50 ft 0.00 : 1		Allow Soil Bearing = Equivalent Fluid Pressure Metho Heel Active Pressure = =		0 psf 0 psf/ft		
Height of Soil over Toe	=	0.00 in		Passive Pressure =	250.0	0 psf/ft		
Water height over heel	=	0.0 ft	1	Soil Density, Heel = Soil Density, Toe = Footing Soil Friction = Soil height to ignore for passive pressure =	110.00 0.00 0.400	0 pcf	Notes -	
Ourseland and			- r		01	r	517.43ear	
Surcharge Loads				Lateral Load Applied to	Sten	1	Adjacent Footing	Load
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Ove	= rturnir	0.0 psf		Lateral Load = Height to Top = Height to Bottom = The above lateral load has been increased	0.0 # 0.00 ft 0.00 ft 1.00		Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist	= 0.0 lbs = 0.00 ft = 0.00 in = 0.00 ft
Axial Load Applie	d to a	and the second se		by a factor of	1.00		Footing Type Base Above/Below Soil	Line Load
Axial Dead Load Axial Live Load Axial Load Eccentricity	=	0.0 lbs 0.0 lbs 0.0 in		Wind on Exposed Stem =	0.0 p	sf	at Back of Wall Poisson's Ratio	= 0.0 ft = 0.300
Design Summary				Stem Construction		Top Stem		
Slab Resist	=	894 lbs 5.03 in		Wall Material Above "Ht" Thickness Rebar Size Rebar Spacing Rebar Placed at Design Data		Concrete 8.00 # 4 12.00 Edge		
Soil Pressure @ Toe Soil Pressure @ Heel	-	957 psf 0 psf		fb/FB + fa/Fa	=	0.110		
Allowable	=	2,000 psf		Total Force @ Section MomentActual	lbs = ft-# =	448.0 597.3		
Soil Pressure Less				MomentAllowable	=	5,412.6		
ACI Factored @ Toe ACI Factored @ Heel	-	1,149 psf 0 psf		ShearActual	psi=	6.0		
Footing Shear @ Toe	=	5.0 psi	ок	ShearAllowable	psi=	75.0		
Footing Shear @ Heel	=	3.0 psi		Wall Weight	=	100.0		
Allowable	=	75.0 psi		Rebar Depth 'd' LAP SPLICE IF ABOVE	in =	6.25 18.72		
iding Calcs Slab Resis ateral Sliding Force	ts All	Sliding ! 408.8 lbs		LAP SPLICE IF BELOW HOOK EMBED INTO FT	in =	6.00		
				Masonry Data Hook emb	bedmei	nt reduced	by stress ratio	
				fm	psi=			
				Fs Solid Grouting	psi= =			
oad Factors		0.0040.101		Modular Ratio 'n' Short Term Factor	=			
Building Code Dead Load	IB	C 2012,ACI 1.200		Equiv. Solid Thick.	=			
Live Load		1.600		Masonry Block Type		Medium V	leight	
Earth, H		1.600		Masonry Design Method Concrete Data	- 5	ASD		
Wind, W		1.000		fc	psi=	2,500.0		
Seismic, E		1.000		Fy	nei=	60,000.0		

Min. As %

Cover @ Top

This Wall in File: h:\retaining wall calculations\retaining wall - slab on grade\cantilever retainin

etainPro 10 (c) 1987-2014, Build 10.14.9.29 icense : KW-06060889 icense To : Buker Engineering, LLC		Cantilevered Retain	in	g Wall Des	sign	Code: IBC 2012,ACI 318-11,ACI 530-11	
Footing Dimensio	ns & S	strengths	Footing Desig	n	Results		
Toe Width	=	1.00 ft			Toe	Heel	
Heel Width	=	1.08	Factored Pressure	=	1,149	0 p	sf
Total Footing Width	= -	2.08	Mu': Upward	=	472	1 ft	-#
Footing Thickness	=	10.00 in	Mu': Downward Mu: Design	=	13 459	59 ft 58 ft	
Key Width	=	0.00 in	Actual 1-Way Shear	=	5.04	3.00 p	
Key Depth	=	0.00 in	Allow 1-Way Shear	-		75.00 p	
Key Distance from Toe	=	0.00 ft	Toe Reinforcing		None Spec'd	70.00 p	
fc = 2,500 psi Footing Concrete Densi	Fy = ty =	60,000 psi 150.00 pcf	Heel Reinforcing Key Reinforcing		None Spec'd None Spec'd		

Other Acceptable Sizes & Spacings

Toe: Not req'd, Mu < S * Fr

Heel: Not req'd, Mu < S * Fr

Key: No key defined

Summary of Overturning & Resisting Forces & Moments

0.0018

@ Btm.= 3.00 in

=

2.00

		OV	ERTURNING.				RE	SISTING	AND ADD
Item		Force	Distance ft	Moment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	408.8	1.61	658.7	Soil Over Heel	=	183.2	1.87	343.4
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Surcharge Over Toe	=				Surcharge Over Heel	=			
Adjacent Footing Load	=				Adjacent Footing Load	=			
Added Lateral Load	=				Axial Dead Load on Ste	m=			
Load @ Stem Above So	il =				* Axial Live Load on Sten	n =			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
Tetal		408.8	O.T.M.	658.7	Stem Weight(s)	=	450.0	1.33	600.0
Total		408.8	0.1.M.	000.7	Earth @ Stem Transitio	ns=			
	=		=		Footing Weight	=	260.4	1.04	271.2
Resisting/Overturning	g Rat	io	=	1.84	Key Weight	=			
Vertical Loads used f	or So	I Pressure	= 893.6	bs	Vert. Component	=	-		
					To	tal =	893.6	bs R.M.=	1,214.6

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

East Mercer Parcel 3

RetainPro 10 (c) 1987-2014, Build 10.14.9.29 License : KW-06060889 License To : Buker Engineering, LLC	Cantilevered Retaining Wall Design	Code: IBC 2012,ACI 318-11,ACI 530-1		
Rebar Lap & Embedment Lengths	Information			
Stem Design Segment: Bottom				
Stem Design Height: 0.00 ft above top of	f footing			
Lap Splice length for #4 bar specified in this	stem design segment =	18.72 in		
Development length for #4 bar specified in t	his stem design segment =	14.40 in		
Hooked embedment length into footing for #	6.00 in			

East Mercer Parcel 3

 4' Cantilever Wall w/Slab on Grade

 Job #
 Dsgnr:

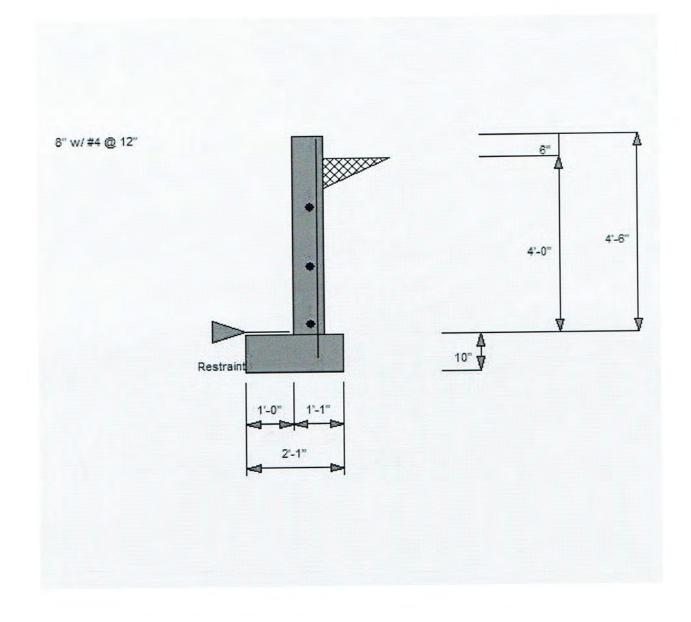
 CRB

 Description....

 Cantilever Retaining Wall w/Slab on Grade

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East Mercer Parcel 3

cense : KW-06060889 cense To : Buker Engir	leering, LLC			Design		
Criteria		Soil Data				
Retained Height	= 5.00 ft	Allow Soil Bearing	= 2,000.	0 psf		
Wall height above soil	= 0.50 ft	Equivalent Fluid Pr Heel Active Pressu	re = 35.1	0 psf/ft		
Slope Behind Wall	= 0.00 : 1		=			
Height of Soil over Toe	= 0.00 in	Passive Pressure		0 psf/ft		
Water height over heel	= 0.0 ft	Soil Density, Heel	= 110.0			
		Soil Density, Toe		0 pcf		
		Footing Soil Frictio		0	Restart	
		Soil height to ignor for passive press) in	547 72541	105 «34
Surcharge Loads		Lateral Load	Applied to Ster	n 📕	Adjacent Footing L	oad
Surcharge Over Heel	= 0.0 ps	f Lateral Load	= 0.0 #	#/ft	Adjacent Footing Load	= 0.0 lbs
Used To Resist Sliding	& Overturning	Height to Top	= 0.00 f	ft	Footing Width	= 0.00 ft
Surcharge Over Toe Used for Sliding & Ove	= 0.0 ps	ioigni to Dotton			Eccentricity Wall to Ftg CL Dist	= 0.00 in = 0.00 ft
		The above lateral has been increa			Footing Type	Line Load
Axial Load Applie		by a factor of			Base Above/Below Soil	= 0.0 ft
Axial Dead Load	= 0.0 lb		Stem = 0.0 j		at Back of Wall	
Axial Live Load Axial Load Eccentricity	= 0.0 lb = 0.0 in				Poisson's Ratio	= 0.300
Design Summary		Stem Constr	uction _	Top Stem Stem OK		
Vall Stability Ratios		Design Heig	ght Above Ftg ft =			
Overturning	= 1.70		rial Above "Ht" =			
Slab Resist	s All Sliding !	Thickness				
Tatal Decrine Load	= 1,102	bs Rebar Size				
Total Bearing Load resultant ecc.	= 6.66		loning			
		Design Data	a			
Soil Pressure @ Toe Soil Pressure @ Heel		osf OK fb/FB + fa/ osf OK Tatal Fara				
Allowable	= 2,000	Total Ford	e @ Section lbs =			
Soil Pressure Less		Women	Actual ft-# = Allowable =	and the second		
ACI Factored @ Toe	= 1,197	Shear A				
ACI Factored @ Heel		Shear A				
Footing Shear @ Toe		DSI OK				
Footing Shear @ Heel Allowable	= 3.7 = 75.0	Rebar Dep	oth 'd' in =	6.25		
liding Calcs Slab Resi		LAP SPLIC	CE IF ABOVE in =			
Lateral Sliding Force	= 595.5		CE IF BELOW in =			
		HOOK EM	IBED INTO FTG in =			
		Masonry Da	ata Hook embedmo		by stress ratio	
		fm Fs	psi=			
		Solid Grou				
Load Factors		Modular R				
Building Code	IBC 2012,4	CI Short Terr				
Dead Load	1.2	00 Equiv. Sol Masonry F		= Medium V	Veight	
Live Load		00 Masonry [= ASD		
Earth, H		00 Concrete D				
Wind, W Seismic, E		00 fc 00 Ev	psi=			
	1.0	OO Fy	DSI	= 60,000.0		

etainPro 10 (c) 1987-2014, Build 10.14.9.29 cense : KW-06060889 cense To : Buker Engineering, LLC								Code: IBC 2012,ACI 318-11,ACI 530-11
Footing Dimensio	ns & S	Strengths		Footing Desig	n R	esults		
Toe Width	=	1.50 ft				Toe	Heel	
Heel Width	=	1.08		Factored Pressure	=	1,197	0 ps	sf
Total Footing Width	= -	2.58		Mu': Upward	=	1,042	0 ft-	#
Footing Thickness	=	10.00 in		Mu' : Downward Mu: Design	=	75 967	70 ft- 70 ft-	
Key Width	=	0.00 in		Actual 1-Way Shear	=	9.68	3.74 ps	si
Key Depth	=	0.00 in		Allow 1-Way Shear	=	75.00	75.00 ps	
		0 00 0		Anon I may onour				

Key Depth		=	0.	00 in	
Key Distance fro	om Toe	=	0.	00 ft	
fc = 2,50 Footing Concret	0 psi F e Density	y =	60,0 150	00 psi .00 pcf	
Min. As % Cover @ Top	2.00	= @ E	0.00		

Toe Reinforcing = None Spec'd = None Spec'd Heel Reinforcing = None Spec'd Key Reinforcing Other Acceptable Sizes & Spacings Toe: Not req'd, Mu < S * Fr

Heel: Not req'd, Mu < S * Fr

Key: No key defined

Summary of Overturning & Resisting Forces & Moments

		OV	ERTURNIN	G			RE	SISTING	
ltem		Force	Distance	Moment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	-	595.5	1.94	1,157.9	Soil Over Heel	=	229.0	2.37	543.8
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Surcharge Over Toe	=				Surcharge Over Heel	=			
Adjacent Footing Load	=				Adjacent Footing Load	=			
Added Lateral Load	=				Axial Dead Load on Ste	em =			
Load @ Stem Above So	= lic				* Axial Live Load on Ster	m =			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
1000				1 457.0	Stem Weight(s)	=	550.0	1.83	1,008.3
Total		595.5	O.T.M.	1,157.9	Earth @ Stem Transitio	ons=			
	=		-		Footing Weight	=	322.9	1.29	417.0
Resisting/Overturnin	g Rat	io	=	1.70	Key Weight	=			
Vertical Loads used t			= 1,10	1.9 lbs	Vert. Component	=		and the second	
					То	tal =	1.101.9 lb	s R.M.=	1,969.1

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

East Mercer Parcel 3

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Rebar Lap & Embedment Lengths Information								
Stem Design Segment: Bot	tom							
Stem Design Height: 0.	00 ft above top o	f footing						
Lap Splice length for #4 bar	specified in this	18.72 in						
Development length for #4	har specified in th	nis stem design segment =	14.40 in					
Hooked embedment length	into footing for #	6.00 in						

East Mercer Parcel 3-

 S' Cantilever Wall w/Slab on Grade

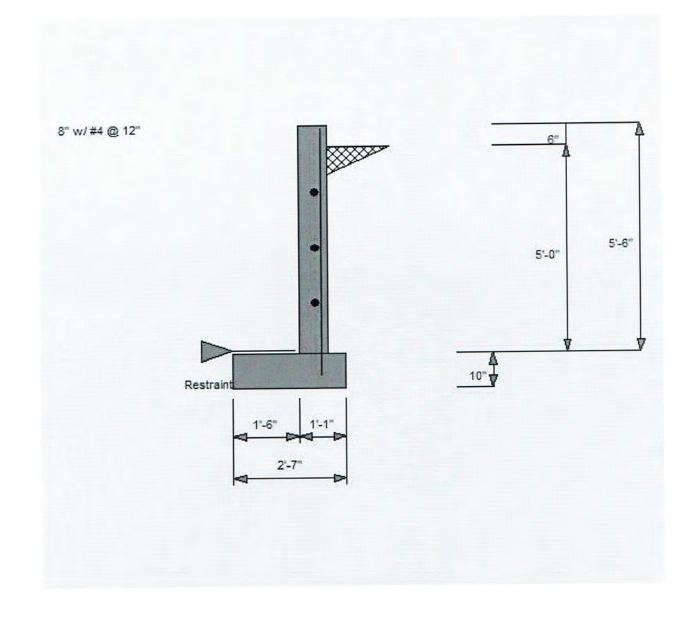
 Job #
 Dsgnr: CRB

 Description....

 Cantilever Retaining Wall w/Slab on Grade

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East Mercer Parcel 3

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tainPro 10 (c) 1987-2014, E ense : KW-06060889 cense To : Buker Engin	Build 1	0.14.9.29 g, LLC	Cantilevered Retaining Wa	II D	esign	Code: IBC 2012,AC	CI 318	3-11,ACI 530-
Criteria		3,	Soil Data					
Retained Height Wall height above soil Slope Behind Wall Height of Soil over Toe Water height over heel		6.00 ft 0.50 ft 0.00 : 1 0.00 in 0.0 ft	= Passive Pressure = Soil Density, Heel = Soil Density, Toe = Footing Soil Friction = Soil height to ignore	0.0 p 5.0 p 0.0 p .00 p .00 p	osf/ft osf/ft ocf ocf	Rest		517.154
Surcharge Loads			Lateral Load Applied to Sto	em		Adjacent Footing L	.oad	
Surcharge Over Heel Used To Resist Slidin Surcharge Over Toe Used for Sliding & Over Axial Load Applie	= erturn	0.0 psf ing	Height to Top = 0.0	0 #/ft 0 ft 0 ft 0 ft		Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type Base Above/Below Soil		0.0 lbs 0.00 ft 0.00 in 0.00 ft Line Load
Axial Dead Load Axial Live Load Axial Load Eccentricity	=	0.0 lbs 0.0 lbs 0.0 in		0 psf	f	at Back of Wall Poisson's Ratio	=	0.0 ft 0.300
Design Summary			Stem Construction	To	Stem OK			
Wall Stability Ratios Overturning Slab Resis	= its All =	1.56 OK Sliding ! 1.310 lbs	Design Height Above Ftg Wall Material Above "Ht" Thickness Rebar Size Rebar Spacing	ft = = = =	0.00 Concrete 8.00 # 4 12.00			
Total Bearing Load resultant ecc.	=	8.98 in	Rebar Placed at Design Data	=	Edge		_	
Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Les	= = =	1,101 psf (0 psf (2,000 psf	K Total Force @ Section lb MomentActual ft-	= s = # =	0.372 1,008.0 2,016.0			
ACI Factored @ Toe ACI Factored @ Heel	s ma = =	1,321 psf 0 psf		= si =	5,412.6 13.4 75.0			
Footing Shear @ Toe Footing Shear @ Heel Allowable		14.3 psi 4.4 psi 75.0 psi	K Wall Weight K Rebar Depth 'd'	si = = in =	100.0 6.25			
Sliding Calcs Slab Res Lateral Sliding Force	sists A =		LAP SPLICE IF ABOVE LAP SPLICE IF BELOW HOOK EMBED INTO FTG	in =	18.72 6.00			
			Masonry Data Hook ember	dmen	nt reduced	by stress ratio		
			fm P	si = si = =				
Load Factors			Modular Ratio 'n' Short Term Factor	=				
Building Code Dead Load Live Load Earth, H		IBC 2012,ACI 1.200 1.600 1.600	Equiv. Solid Thick. Masonry Block Type Masonry Design Method Concrete Data		Medium ASD	Weight		
Wind, W Seismic, E		1.000 1.000	fc	osi = osi =	2,500. 60,000.			

etainPro 10 (c) 1987-2014, E cense : KW-06060889 cense To : Buker Engin		Cantilevered Reta	ining Wall Des	ign Code: IBC 2012,ACI 3	18-11,ACI 530-11
Footing Dimension		hs Footing Des	ign Results		
Toe Width Heel Width Total Footing Width	= 2.00 = 1.08 = 3.08	0 ft B Factored Pressure B Mu' : Upward	= 1,902	Heel 0 psf 0 ft-# 82 ft-#	
Footing Thickness	= 10.00	Mu: Design	= 175 = 1,727	82 ft-#	
Key Width Key Depth Key Distance from Toe	= 0.00 = 0.00 = 0.00	D in Allow 1-Way Shea D ft Toe Reinforcing		4.36 psi 75.00 psi	
fc = 2,500 psi Footing Concrete Densit		0 pcf Key Reinforcing	= None Spec'd		
Min. As % Cover @ Top 2.00	= 0.0018 @ Btm.= 3.	00 in Toe: #4@ 11.1 Heel: Not req'd,	Mu < S * Fr	6@ 24.44 in, #7@ 33.33 in, #8@ 4	3.89 in, #9@ 5

Key: No key defined

Summary of Overturning & Resisting Forces & Moments

Summary of Ove		the second se	ERTURNIN					ISTING	Mamont
		Force	Distance	Moment ft-#			Force lbs	Distance ft	Moment ft-#
tem	-		2.28	1,861.3	Soil Over Heel	=	274.8	2.87	789.9
Heel Active Pressure	=	817.2	2.20	1,001.5	Sloped Soil Over Heel	=			
Surcharge over Heel	=				Surcharge Over Heel	-			
Surcharge Over Toe	=								
Adjacent Footing Load	=				Adjacent Footing Load				
Added Lateral Load	=				Axial Dead Load on Ste				
oad @ Stem Above Sc	= lic				* Axial Live Load on Ster	m =			
•	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
					Stem Weight(s)	=	650.0	2.33	1,516.7
Total		817.2	O.T.M.	1,861.3	Earth @ Stem Transition	ons=			
	=		=		Footing Weight	=	385.4	1.54	594.1
	a Dat	in	-	1.56	Key Weight	=			
Resisting/Overturnin Vertical Loads used	for So	il Dressure :	= 1.310	0.2 lbs	Vert. Component	=			
venical Loads used	101 30	ressure	- 1,010			otal =	1,310.2 lb		2,900.7

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

East Mercer Parcel 3

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Rebar Lap & Embedment Lengths I	nformation	
Stem Design Segment: Bottom Stem Design Height: 0.00 ft above top of	footing	
Lap Splice length for #4 bar specified in this s	tem design segment =	18.72 in
Development length for #4 bar specified in thi	14.40 in 6.00 in	
Hooked embedment length into footing for #4	bar specified in this stem design segment =	0.00 m

East Mercer Parcel 3

Ret 15

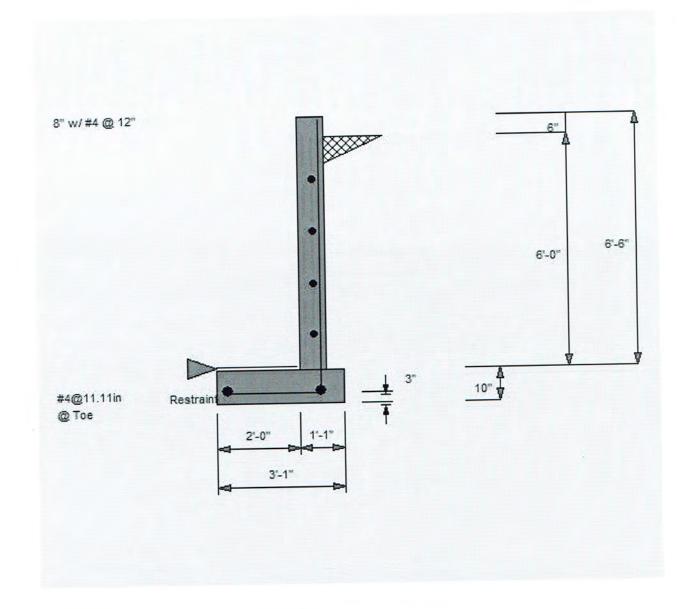
 Title
 6' Cantilever Wall w/Slab on Grade

 Job #
 Dsgnr:
 CRB
 Date:

 Description....
 Cantilever Retaining Wall w/Slab on Grade

Page: _____ 2 OCT 2014

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Electrice i e i e e		



East Mercer Parcel 3

is Wall in File: h:\retainin tainPro 10 (c) 1987-2014, I ense : KW-06060889 cense To : Buker Engir	Build 1	0.14.9.29		ilevered Retair				Code: IBC 2012,A	CI 31	8-11,ACI 530
Criteria		5,	So	il Data					-	
Retained Height Nall height above soil Slope Behind Wall Height of Soil over Toe Nater height over heel		7.00 ft 0.50 ft 0.00 : 1 0.00 in 0.0 ft	Equi Hee Pass Soil Soil Foo Soil	w Soil Bearing ivalent Fluid Pressure I Active Pressure Density, Heel Density, Toe ting Soil Friction height to ignore or passive pressure	e Metho = = =	2,000.0 p d 35.0 p 250.0 p 110.00 p 0.00 p 0.400 12.00 in	sf/ft osf/ft ocf	4123.744		152162
Surcharge Loads			La	teral Load Appli	ied to	Stem	- L	Adjacent Footing		
Surcharge Over Heel Used To Resist Slidin Surcharge Over Toe Used for Sliding & Ov	g & O = erturn	0.0 pst ing	H H	eral Load leight to Top leight to Bottom e above lateral load nas been increased		0.0 #/ft 0.00 ft 0.00 ft 1.00		Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type		0.0 lbs 0.00 ft 0.00 in 0.00 ft Line Load
Axial Load Applie	d to	and the second	t	by a factor of		. S	1.5	Base Above/Below Soil at Back of Wall	=	0.0 ft
Axial Dead Load Axial Live Load Axial Load Eccentricity		0.0 lbs 0.0 lbs 0.0 in	W	ind on Exposed Stem	1 =	0.0 pst		Poisson's Ratio	=	0.300
Design Summary			5	Stem Construction	on		Stem OK			
Wall Stability Ratios Overturning Slab Resis	= sts All	1.67 OK Sliding !		Design Height Al Wall Material Ab Thickness Rebar Size	bove Ft	ig ft= t" = =	0.00 Concrete 8.00 # 4			
Total Bearing Load	=	1,786 lbs 9.40 in		Rebar Spacing Rebar Placed at		=	12.00 Edge			
Soil Pressure @ Toe Soil Pressure @ Heel Allowable	= =	1,134 psf 0 psf 2,000 psf		Design Data — fb/FB + fa/Fa Total Force @ S MomentActua		= lbs = ft-# =	0.59 1,372.0 3,201.3	0		
Soil Pressure Les ACI Factored @ Toe ACI Factored @ Heel	s Tha = =	an Allowable 1,360 psf 0 psf		MomentAllov ShearActual	wable	= psi =	5,412.0 18.3	3		
Footing Shear @ Toe Footing Shear @ Heel Allowable	=	18.4 psi 8.8 psi 75.0 psi		ShearAllowa Wall Weight Rebar Depth 'd LAP SPLICE IF	r	psi = = in = =	75. 100. 6.2 18.7	0 5		
Sliding Calcs Slab Re Lateral Sliding Force	sists A =	All Sliding ! 1,073.8 lbs		LAP SPLICE IF HOOK EMBED	BELO	N in =	6.0			
				Masonry Data	Hook er	nbedmer	nt reduce	d by stress ratio		
				fm Fs Solid Grouting		psi = psi = =				
Load Factors		IBC 2012,ACI		Modular Ratio ' Short Term Fac	ctor	-				
Building Code Dead Load Live Load Earth, H		1.200 1.600 1.600		Equiv. Solid Th Masonry Block Masonry Desig Concrete Data	Type In Meth	=	Medium ASD			
Wind, W Seismic, E		1.000 1.000		fc Fy		psi = psi =	2,500 60,000			

East Mercer Parcel 3

Retin

tainPro 10 (c) 1987-2014, ense : KW-06060889 cense To : Buker Engi			Cantilevered Retaining Wall Design Code: IBC 2012,ACI 318-11,ACI 530-1
Footing Dimensio			Footing Design Results
Toe Width Heel Width Total Footing Width Footing Thickness Key Width Key Depth Key Distance from Toe fc = 2,500 psi Footing Concrete Dens	= = = = = Fy =	2.25 ft 1.42 3.67 10.00 in 0.00 in 0.00 in 0.00 ft 60,000 psi 150.00 pcf	ToeHeelFactored Pressure=1,3600 psfMu': Upward=2,6241 ft.#Mu': Downward=126302 ft.#Mu: Design=2,498301 ft.#Actual 1-Way Shear=18.438.82 psiAllow 1-Way Shear=75.0075.00 psiToe Reinforcing=# 4 @ 11.11 inHeel Reinforcing=None Spec'dKey Reinforcing=None Spec'd
Min. As % Cover @ Top 2.00	=	0.0018 tm.= 3.00 in	Other Acceptable Sizes & Spacings Toe: #4@ 11.11 in, #5@ 17.22 in, #6@ 24.44 in, #7@ 33.33 in, #8@ 43.89 in, #9@ 5 Heel: Not req'd, Mu < S * Fr Key: No key defined

Summary of Overturning & Resisting Forces & Moments

C. C	ه ک	01	ERTURNING				R	SISTING	a data da se
		Force	Distance	Moment ft-#			Force lbs	Distance ft	Moment ft-#
tem	-				Soil Over Heel	=	577.8	3.29	1,901.9
leel Active Pressure	=	1,073.8	2.61	2,803.9	Sloped Soil Over Heel	=			
Surcharge over Heel	=					=			
Surcharge Over Toe	=				Surcharge Over Heel				
Adjacent Footing Load	=				Adjacent Footing Load	=			
dded Lateral Load	=				Axial Dead Load on Ste	em =			
oad @ Stem Above So	= lic				* Axial Live Load on Sten	n =			
	=				Soil Over Toe	=			
	-				Surcharge Over Toe	=			
	_				Stem Weight(s)	=	750.0	2.58	1,937.5
Total		1,073.8	O.T.M.	2,803.9	Earth @ Stem Transitio	ons=			
	=		=		Footing Weight	=	458.4	1.83	840.4
			-	1.67	Key Weight	=			
Resisting/Overturnin	ig Rai	IIO	= 1.786		Vert. Component	=			
Vertical Loads used	tor So	Il Plessule	- 1,700	.1 103		tal =	1.786.1	Ibs R.M.=	4,679.8
					* Avial live load NOT incl				or overturni

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

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RetainPro 10 (c) 1987-2014, Build 10.14.9.29 License : KW-0606889 License To : Buker Engineering, LLC	Cantilevered Retaining Wall Design	Code: IBC 2012,ACI 318-11,ACI 530-11
Rebar Lap & Embedment Lengths	Information	
Stem Design Segment: Bottom Stem Design Height: 0.00 ft above top of	f footing	
Lap Splice length for #4 bar specified in this	stem design segment =	18.72 in
		14.40 in
Development length for #4 bar specified in the Hooked embedment length into footing for #	4 bar specified in this stem design segment =	6.00 in

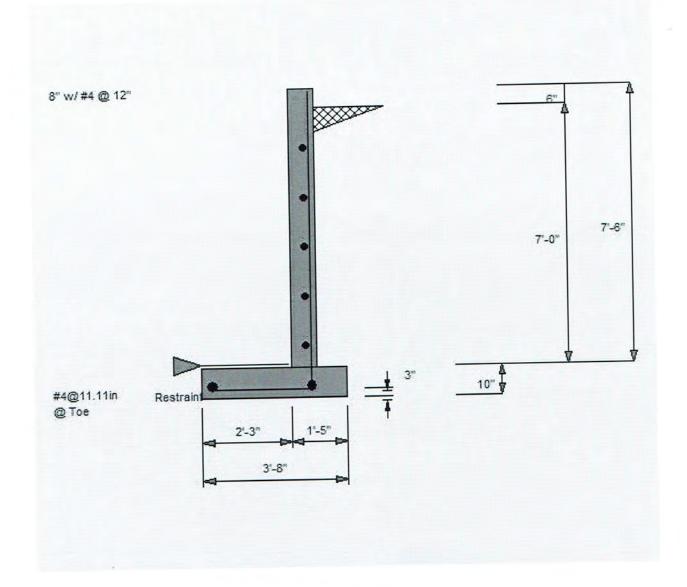
East Mercer Parcel 3

 Title
 7' Cantailever Wall w/Slab on Grade
 Page:

 Job #
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 Dsgnr:
 CRB
 Date:
 2 OCT 2014

 Description....
 Cantilever Retaining Wall w/Slab on Grade

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License To : Buker Engineering, LLC	



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Retal

ainPro 10 (c) 1987-2014, Build 10.14.9.29 ense : KW-06060889 ense To : Buker Engineering, LLC	Cantilevered Retaining Wall Design	Code: IBC 2012,ACI 318-11,ACI 530-
Criteria	Soil Data	
Retained Height=8.00 ftWall height above soil=0.50 ftSlope Behind Wall=0.00 : 1Height of Soil over Toe=0.00 inWater height over heel=0.0 ft	Allow Soil Bearing= 2,000.0 psfEquivalent Fluid Pressure MethodHeel Active Pressure= 35.0 psf/ft=Passive Pressure= 250.0 psf/ftSoil Density, Heel= 110.00 pcfSoil Density, Toe= 0.00 pcfFooting Soil Friction= 0.400Soil height to ignore for passive pressure= 12.00 in	Here Bar
Surcharge Loads		Adjacent Footing Load
Surcharge Over Heel = 0.0 psf Used To Resist Sliding & Overturning Surcharge Over Toe = 0.0 psf Used for Sliding & Overturning	Height to Tor = 0.00 ft Height to Bottom = 0.00 ft The above lateral load has been increased 1.00	Adjacent Footing Load=0.0 lbsFooting Width=0.00 ftEccentricity=0.00 inWall to Ftg CL Dist=0.00 ftFooting TypeLine Load
Axial Load Applied to Stem		Base Above/Below Soil = 0.0 ft at Back of Wall
Axial Dead Load=0.0 lbsAxial Live Load=0.0 lbsAxial Load Eccentricity=0.0 in	Wind on Exposed Stem = 0.0 psf	Poisson's Ratio = 0.300
Design Summary	Stem Construction Top Stem Design Height Above Ftg ft = 0.00	
Vall Stability Ratios Overturning = 1.77 OF Slab Resists All Sliding ! Total Bearing Load = 2,393 lbs resultant ecc. = 10.06 in Soil Pressure @ Toe = 1,164 psf Soil Pressure @ Heel = 0 psf Allowable = 2,000 psf Soil Pressure @ Toe = 1,397 Allowable = 0 psf ACI Factored @ Toe = 1,397 Footing Shear @ Toe = 17.4 psi Footing Shear @ Toe = 17.4 psi Footing Shear @ Toe = 10.1 psi Allowable = 75.0 psi Silding Calcs Slab Resists All Sliding ! Lateral Sliding Force = 1,417.5 lbs	Thickness=8.00Rebar Size=#5Rebar Spacing=12.00Rebar Placed at=EdgeDesign Data=0.588OKfb/FB + fa/Fa=0.588OKTotal Force @ Sectionlbs =1,792.0MomentActualft #=4,778.7MomentAllowable=8,121.3ShearActualpsi =24.1OKShearAllowablepsi =OKWall Weight=IAP SPLICE IF ABOVEin =6.19LAP SPLICE IF BELOWin =HOOK EMBED INTO FTG in =6.02	
	Masonry Data Hook embedment reduced	by stress ratio
	fm psi = Fs psi = Solid Grouting =	
Load Factors Building Code IBC 2012,AC Dead Load 1.200 Live Load 1.600 Earth, H 1.600	Modular Ratio 'n' = Short Term Factor = Equiv. Solid Thick. = Masonry Block Type = Medium ' Masonry Design Method = ASD Concrete Data	
Wind, W 1.000	fc psi = 2,500.	0

ainPro 10 (c) 1987-2014, Build 10.14.9.29 ense : KW-06060889 sense To : Buker Engineering, LLC			Cantilevered Retaining Wall Design Code: IBC 2012,ACI 318-11,ACI 530-
Footing Dimensio			Footing Design Results
Toe Width Heel Width Total Footing Width Footing Thickness Key Width Key Depth Key Distance from Toe fc = 2,500 psi Footing Concrete Dens	= = = = = Fy =	2.75 ft 1.67 4.42 12.00 in 0.00 in 0.00 in 0.00 ft 60,000 psi 150.00 pcf	Toe Heel Factored Pressure = 1,397 0 psf Mu': Upward = 4,104 19 ft.# Mu': Downward = 185 618 ft.# Mu: Design = 3,918 599 ft.# Actual 1-Way Shear = 17.41 10.13 psi Allow 1-Way Shear = 75.00 75.00 psi Toe Reinforcing = # 7 @ 16.00 in Heel Reinforcing = # 6 @ 16.00 in Key Reinforcing = None Spec'd
Min. As % Cover @ Top 2.00	=	0.0018 stm.= 3.00 in	Other Acceptable Sizes & Spacings Toe: #4@ 9.26 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.78 in, #8@ 36.57 in, #9@ 46 Heel: Not req'd, Mu < S * Fr Key: No key defined

Summary of Overturning & Resisting Forces & Moments

Summary of Ove	- States			and the second se			RE	SISTING	
		Force	ERTURNING Distance ft	Moment ft-#			Force lbs	Distance ft	Moment ft-#
tem	_	lbs			-	=	880.3	3.92	3,448.0
Heel Active Pressure	=	1,417.5	3.00	4,252.5	Soil Over Heel		000.0		18.260
Surcharge over Heel	=				Sloped Soil Over Heel	-			
Surcharge Over Toe	=				Surcharge Over Heel				
Adjacent Footing Load	=				Adjacent Footing Load				
Added Lateral Load	-				Axial Dead Load on St				
oad @ Stem Above So	il =				* Axial Live Load on Ste	em =			
.0ad @ Stern Above So	=				Soil Over Toe	=			
	-				Surcharge Over Toe	=			
	-				Stem Weight(s)	=	850.0	3.08	2,620.8
Total		1,417.5	O.T.M.	4,252.5	Earth @ Stem Transit	ions=			
	=	2000	=		Footing Weight	=	662.6	2.21	1,463.2
					Key Weight	=			
Resisting/Overturnin	g Rat	tio	=	1.77		-			
Vertical Loads used	for So	il Pressure	= 2,392	.8 lbs	Vert. Component	otal =	2 392 8	bs R.M.=	7.532.0
					* Axial live load NOT in	cluded in	total display	ed, or used fo	or overturning

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

Retai

East Mercer Parcel 3

RetainPro 10 (c) 1987-2014, Build 10.14.9.29 License : KW-06060889 License To : Buker Engineering, LLC	Cantilevered Retaining Wall Design	Code: IBC 2012,ACI 318-11,ACI 530-11
Rebar Lap & Embedment Lengths	Information	
Stem Design Segment: Bottom Stem Design Height: 0.00 ft above top of	of footing	
Lap Splice length for #5 bar specified in this	s stem design segment =	23.40 in
		18.00 in
Development length for #5 bar specified in Hooked embedment length into footing for a	#5 bar specified in this stem design segment =	6.00 in

East Mercer Parcel 3

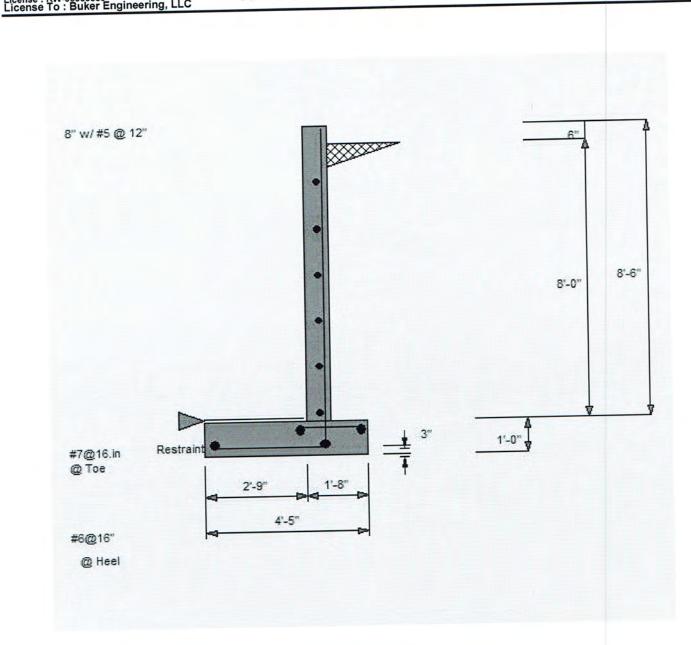
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 Bit Cantilever Wall w/Slab on Grade
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 Date:
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 Description....
 Cantilever Retaining Wall w/Slab on Grade

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RetainPro 10 (c) 1987-2014, Build 10.14.9.29 License : KW-06060889	Cantilevered Retaining Wall Design	Code: IBC 2012,ACI 318-11,ACI 530-11



East Mercer Parcel 3

Cantilever Retaining Wall w/Slab on Grade

This Wall in File: h:\retaining wall calculations\retaining wall - slab on grade\cantilever retainin Code: IBC 2012,ACI 318-11,ACI 530-11 RetainPro 10 (c) 1987-2014, Build 10.14.9.29 Cantilevered Retaining Wall Design License : KW-06060889 License To : Buker Engineering, LLC Soil Data Criteria 2,000.0 psf Allow Soil Bearing = 9.00 ft **Retained Height** Equivalent Fluid Pressure Method 0.50 ft Wall height above soil = = 35.0 psf/ft **Heel Active Pressure** 0.00:1 = = Slope Behind Wall 250.0 psf/ft = Passive Pressure 0.00 in = Height of Soil over Toe 110.00 pcf = Soil Density, Heel 0.0 ft = Water height over heel 0.00 pcf Soil Density, Toe = 0.400 Footing||Soil Friction = Soil height to ignore 12.00 in for passive pressure = Adjacent Footing Load Lateral Load Applied to Stem Surcharge Loads 0.0 lbs Adjacent Footing Load = 0.0 #/ft 0.0 psf = Surcharge Over Heel Lateral Load 0.00 ft = Footing Width 0.00 ft Used To Resist Sliding & Overturning ...Height to Top = = 0.00 in Eccentricity 0.0 psf ...Height to Bottom = 0.00 ft Surcharge Over Toe 0.00 ft Wall to Ftg CL Dist = Used for Sliding & Overturning The above lateral load Line Load 1.00 Footing Type has been increased Axial Load Applied to Stem by a factor of Base Above/Below Soil 0.0 ft at Back of Wall 0.0 lbs 0.0 psf Axial Dead Load Wind on Exposed Stem = 0.300 Poisson's Ratio 0.0 lbs Axial Live Load = 0.0 in = Axial Load Eccentricity **Top Stem** Stem Construction **Design Summary** Stem OK 0.00 **Design Height Above Ftg** ft = Wall Stability Ratios Wall Material Above "Ht" = Concrete = 1.87 OK Overturning 8.00 -Thickness Slab Resists All Sliding ! # 5 = **Rebar Size** 12.00 = **Rebar Spacing** 3,027 lbs = Total Bearing Load = Edge Rebar Placed at ...resultant ecc. = 10.33 in Design Data = 0.838 1,172 psf OK = Soil Pressure @ Toe fb/FB + fa/Fa 0 psf OK 2,268.0 = Total Force @ Section lbs = Soil Pressure @ Heel 2,000 psf ft-# = 6,804.0 Allowable Moment....Actual Soil Pressure Less Than Allowable Moment.....Allowable 8.121.3 -ACI Factored @ Toe 1,406 psf = Shear....Actual psi= 30.5 = 0 psf ACI Factored @ Heel 75.0 Shear Allowable psi= 18.9 psi OK Footing Shear @ Toe = 100.0 Wall Weight 12.0 psi OK Footing Shear @ Heel = 6.19 in = Rebar Depth 'd' 75.0 psi Allowable = LAP SPLICE IF ABOVE in = 23.40 Sliding Calcs Slab Resists All Sliding ! LAP SPLICE IF BELOW in = Lateral Sliding Force = 1.779.3 lbs HOOK EMBED INTO FTG in = 8.70 Hook embedment reduced by stress ratio Masonry Data psi= fm psi= Fs = Solid Grouting Modular Ratio 'n' = = Load Factors Short Term Factor IBC 2012,ACI **Building Code** Equiv. Solid Thick. = 1.200 Medium Weight Dead Load = Masonry Block Type 1.600 Masonry Design Method Live Load = ASD 1.600 Earth, H Concrete Data 1.000 2,500.0 psi= Wind, W fc psi= 60,000.0 1.000 Fy Seismic, E

tainPro 10 (c) 1987-2014, I ense : KW-06060889 cense To : Buker Engir			Can	ntilevered Retain	ing	Wall Desi	ign	Co	ode: IBC 2012,ACI 318-11,ACI 530-
Footing Dimensio				Footing Desig	n R	esults			
Toe Width Heel Width Total Footing Width		3.25 ft 1.92 5.17 13.00 in		Factored Pressure Mu' : Upward Mu' : Downward		<u>Toe</u> 1,406 5,869 237	89 1,081	psf ft-# ft-#	
Footing Thickness Key Width Key Depth Key Distance from Toe fc = 2,500 psi	= = = Fv =	0.00 in 0.00 in 0.00 ft 60,000 psi		Mu: Design Actual 1-Way Shear Allow 1-Way Shear Toe Reinforcing Heel Reinforcing	=	5,631 18.90 75.00 # 5 @ 12.00 in None Spec'd	992 12.03 75.00	psi	
Footing Concrete Densi Min. As % Cover @ Top 2.00	ty = =	150.00 pcf 0.0018 Btm.= 3.00 ir	n	Key Reinforcing Other Acceptable S Toe: #4@ 8.55 in Heel: Not req'd, M	ize , #5	@ 13.25 in, #60	@ 18.8	80 in,	n, #7@ 25.64 in, #8@ 33.76 in, #9@ 42

Key: No key defined

Summary of Overturning & Resisting Forces & Moments

Summary of Ove			ERTURNING	A DESCRIPTION OF A DESC				SISTING	
		Force	Distance	Moment ft-#			Force lbs	Distance ft	Moment ft-#
tem	-			5,980.4	Soil Over Heel	-	1,237.8	4.54	5,622.0
Heel Active Pressure	=	1,779.3	3.36	5,960.4	Sloped Soil Over Heel	=	11210-02		
Surcharge over Heel	=					=			
Surcharge Over Toe	=				Surcharge Over Heel				
Adjacent Footing Load	=				Adjacent Footing Load				
Added Lateral Load	=				Axial Dead Load on St	em =			
oad @ Stem Above So	il =				* Axial Live Load on Ste	m =			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
	-				Stem Weight(s)	=	950.0	3.58	3,404.2
Total		1,779.3	O.T.M.	5,980.4	Earth @ Stem Transiti	ons=			
	-		=		Footing Weight	=	839.6	2.58	2,169.2
				1.87	Key Weight	=			
Resisting/Overturnin	g Rat	lio	- 2.027		Vert. Component	=			
Vertical Loads used	for Sc	Il Pressure	= 3,027	.5 lbs		otal =	3 027 5	bs R.M.=	11,195.4
					t Avial live load NOT in		-,		or overturning

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

East Mercer Parcel 3.

Retab

Page: ______ e: 2 OCT 2014

Code: IBC 2012,ACI 318-11,ACI 530-11
23.40 in
18.00 in 6.00 in

East Mercer Parcel 3.

 Title
 9' Cantilever Wall w/Slab on Grade
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 Dsgnr:
 CRB
 Date:
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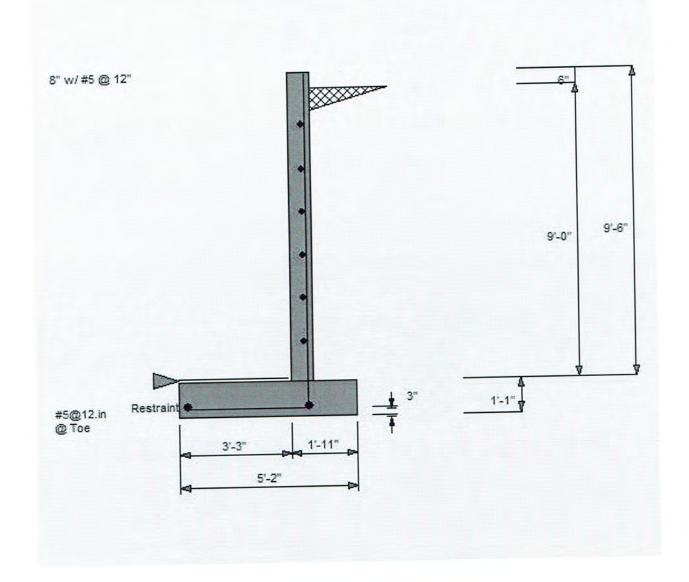
 Description....
 Cantilever Retaining Wall w/Slab on Grade

Page: _____ 2 OCT 2014

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RetainPro 10 (c) 1987-2014, Build 10.14.9.29	Cantilevered Retaining Wall Design	Code: IBC 2012,ACI 318-11,ACI 530-11
License : KW-06060889 License To : Buker Engineering, LLC	Califievered Retaining that 2003	



ninPro 10 (c) 1987-2014, Build 10.14.9.29 nse : KW-06060889 ense To : Buker Engineering, LLC	retaining wall - slab on grade\cantilever retainin Cantilevered Retaining Wall Design	Code: IBC 2012,ACI 318-11,ACI 530-
Criteria	Soil Data	
Retained Height=10.00 ftVall height above soil=0.50 ftSlope Behind Wall=0.00 : 1Height of Soil over Toe=0.00 inVater height over heel=0.0 ft	Allow Soil Bearing= 2,000.0 psfEquivalent Fluid Pressure MethodHeel Active Pressure= 35.0 psf/ftPassive Pressure= 250.0 psf/ftSoil Density, Heel= 110.00 pcfSoil Density, Toe= 0.00 pcfFooting Soil Friction= 0.400Soil height to ignore for passive pressure= 12.00 in	Restor 1242 Jaget
Surcharge Loads	Lateral Load Applied to Stem	Adjacent Footing Load
Surcharge Over Heel = 0.0 psf Used To Resist Sliding & Overturning Surcharge Over Toe = 0.0 psf Used for Sliding & Overturning	Lateral Load = 0.0 #/ft Height to Top = 0.00 ft Height to Bottom = 0.00 ft The above lateral 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 Line Load
Axial Load Applied to Stem		Base Above/Below Soil = 0.0 ft
Axial Dead Load=0.0 lbsAxial Live Load=0.0 lbsAxial Load Eccentricity=0.0 in	Wind on Exposed Stem = 0.0 psf	at Back of Wall Poisson's Ratio = 0.300
Design Summary	Stem Construction Top Stem	
Allowable = 2,000 p Soil Pressure Less Than Allowable ACI Factored @ Toe = 1,498 p ACI Factored @ Heel = 42 p Footing Shear @ Toe = 18.8 p Footing Shear @ Heel = 13.0 p	Thickness = 8.00 Rebar Size = $\# 6$ Rebar Spacing = 12.00 Rebar Placed at = Edge Design Data	
Allowable = 75.0 g liding Calcs Slab Resists All Sliding !	LAP SPLICE IF ABOVE in = 28.08	
Lateral Sliding Force = 2,214.8 l	s LAP SPLICE IF BELOW in = HOOK EMBED INTO FTG in = 11.53	6
	Hook embedment reduced	by stress ratio
	Masonry Data from psi = fm psi = Fs psi = Solid Grouting =	
Load Factors Building Code IBC 2012,A Dead Load 1.2 Live Load 1.6 Earth, H 1.6	00 Masonry Block Type = Medium 00 Masonry Design Method = ASD 00 Concrete Data	
Wind, W 1.0 Seismic, E 1.0	00 fc psi = 2,500.	

East Mercer Porcel3

Ret 29

etainPro 10 (c) 1987-2014, Build 10.14.9.29 cense : KW-06060889 icense To : Buker Engineering, LLC				ntilevered Retain	ing	g Wall Des	ign	Co	ode: IBC 2012,ACI 318-11,ACI 530-1
Footing Dimensio			1	Footing Desig	n F	Results			
Toe Width Heel Width Total Footing Width Footing Thickness Key Width Key Depth Key Distance from Toe fc = 2,500 psi Footing Concrete Dens	= = = = = = Fy =	3.75 ft 2.15 5.90 15.00 in 0.00 in 0.00 in 0.00 ft 60,000 psi 150.00 pcf		Factored Pressure Mu': Upward Mu': Downward Mu: Design Actual 1-Way Shear Allow 1-Way Shear Toe Reinforcing Heel Reinforcing Key Reinforcing	=	<u>Toe</u> 1,498 8,365 333 8,032 18.79 75.00 # 7 @ 16.00 in # 6 @ 16.00 in None Spec'd	179 1,693 1,514 13.03 75.00	psf ft-# ft-# ft-# spsi	
Min. As % = 0.0018 Cover @ Top 2.00 @ Btm.= 3.00 in				Other Acceptable S Toe: #4@ 7.41 in Heel: Not req'd, M Key: No key defir	, #8 u <	6@ 11.48 in, #6 S * Fr	@ 16.3	30 in,	#7@ 22.22 in, #8@ 29.26 in, #9@ 37

Summary of Overturning & Resisting Forces & Moments

	014	EDTUDNING				RE	SISTING	
	Force	Distance	Moment			Force lbs	Distance ft	Moment ft-#
_				Call Quer Heal	-	1 628 4	5.16	8,397.2
=	2,214.8	3.75	8,305.7			1,020.1		
=					- E -			
=					-			
=								
-				Axial Dead Load on Ste	em =			
- 1				* Axial Live Load on Ster	m =			
					=			
=					=			
					=	1.050.0	4.08	4,287.5
	2.214.8	O.T.M.	8,305.7		ons=			
						1 105 7	2.95	3,260.1
=		-	Contact of the					
g Rat	io	=			- 2			
or So	il Pressure	= 3,784	.1 lbs		-			45 044 5
				Тс	otal =			15,944.8
	= = = = = = g Rat	Force lbs = 2,214.8 = = = iii = = 2,214.8 = g Ratio	Force Distance lbs ft = 2,214.8 3.75 = = = = = 2,214.8 O.T.M. = = = g Ratio =	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	Force lbs ft Moment ft-# = 2,214.8 3.75 8,305.7 = Soil Over Heel Surcharge Over Heel Adjacent Footing Load Axial Dead Load on Ster Soil Over Toe Surcharge Over Toe Surcharge Over Toe Surcharge Over Toe Surcharge Over Toe Stem Weight(s) Earth @ Stem Transitie Footing Weight Key Weight Vert. Component Key Weight Vert. Component To	Force lbs Distance ft Moment ft-# = 2,214.8 3.75 8,305.7 = Sloped Soil Over Heel = = Surcharge Over Heel = = Adjacent Footing Load = = Axial Dead Load on Stem = = Soil Over Toe = 2,214.8 O.T.M. 8,305.7 Stem Weight(s) = = Stem Weight(s) = g Ratio = 1.92 Key Weight = or Soil Pressure 3,784.1 lbs Vert. Component =	Force Distance Moment Force Ibs ibs ft ft.# ibs ibs = 2,214.8 3.75 8,305.7 Soil Over Heel = 1,628.4 = Sloped Soil Over Heel = Adjacent Footing Load = Axial Dead Load on Stem = Axial Dead Load on Stem = Soil Over Toe = 2,214.8 O.T.M. 8,305.7 Stem Weight(s) = 1,050.0 = = = Stem Weight(s) = 1,050.0 g Ratio = 1.92 Key Weight = 1,105.7 g Ratio = 1.92 Vert. Component = or Soil Pressure 3,784.1 Ibs Vert. Component =	Force lbsDistance ftMoment ft+#Ibsft=2,214.8 3.75 $8,305.7$ Soil Over Heel= $1,628.4$ 5.16 ==Sloped Soil Over Heel= $1,628.4$ 5.16 ==Adjacent Footing Load==Axial Dead Load on Stem== $2,214.8$ $0.T.M.$ $8,305.7$ Stem Weight(s)= $1,050.0$ 4.08 ===Stem Weight(s)= $1,050.0$ 4.08 g Ratio= 1.92 Key Weight= $2,95$ or Soil Pressure $3,784.1$ lbsVert. Component= 2.95

resistance, but is included for soil pressure calculation.

Ret30

East Mercer Parcel 3

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Rebar Lap & Embedment Length	s Information	
Stem Design Segment: Bottom Stem Design Height: 0.00 ft above top	of footing	
Lap Splice length for #6 bar specified in th	is stem design segment =	28.08 in
Development length for #6 bar specified in		21.60 in 6.00 in

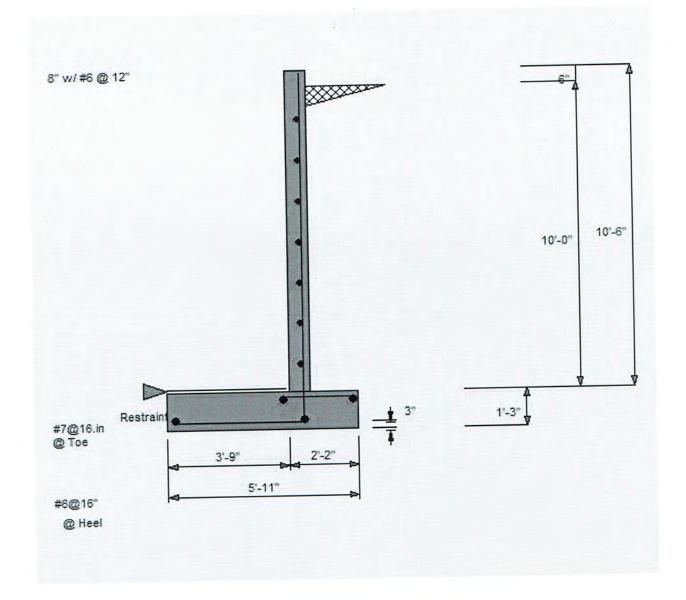
 Title
 10' Cantilever Wall w/Slab on Grade
 Page:

 Job #
 :
 Dsgnr:
 CRB
 Date:
 2 OCT 2014

 Description....
 Cantilever Retaining Wall w/Slab on Grade
 Cantilever
 Cantilever

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Ret32

tainPro 10 (c) 1987-2014, B ense : KW-06060889 :ense To : Buker Engine	uild 10.14.9.29	etaining wall - slab on grade\cantilever r Cantilevered Retaining W	all D	Design Code: IBC 2012,ACI 318-11,ACI 530-
Criteria		Soil Data		
Retained Height Wall height above soil Slope Behind Wall Height of Soil over Toe Water height over heel	= 11.00 ft = 0.50 ft = 0.00 : 1 = 0.00 in = 0.0 ft	Equivalent Fluid Pressure Method Heel Active Pressure = Passive Pressure = 2 Soil Density, Heel = 1 ² Soil Density, Toe = Footing Soil Friction = 0 Soil height to ignore	35.0 p 35.0 p 250.0 p 10.00 p 0.00 p 0.400 2.00 ir	psf/ft psf/ft pcf pcf
Surcharge Loads		Lateral Load Applied to S	stem	Adjacent Footing Load
Surcharge Over Heel Used To Resist Sliding Surcharge Over Toe Used for Sliding & Over	= 0.0 psf erturning	Height to Tor = 0 Height to Bottom = 0 The above lateral load has been increased 1	0.0 #/ft 0.00 ft 0.00 ft	Footing Width = 0.00 it Eccentricity = 0.00 in Wall to Ftg CL Dist = 0.00 ft Footing Type Line Load
Axial Load Applie	and the second sec	by a factor of		Base Above/Below Soil = 0.0 ft at Back of Wall
Axial Dead Load Axial Live Load Axial Load Eccentricity	= 0.0 lbs = 0.0 lbs = 0.0 in		0.0 psf	Poisson's Ratio = 0.300
Design Summary		Stem Construction		Stem OK
Wall Stability Ratios Overturning Slab Resis	= 2.44 O ts All Sliding !	Design Height Above Ftg Wall Material Above "Ht" Thickness Rebar Size	=	0.00 Concrete 10.00 # 6
Total Bearing Loadresultant ecc.	= 5,185 lbs = 6.84 in	Rebar Spacing Rebar Placed at Design Data	-	12.00 Edge
Soil Pressure @ Toe Soil Pressure @ Heel Allowable Soil Pressure Less	= 1,086 ps = 379 ps = 2,000 ps s Than Allowable	OK fb/FB + fa/Fa OK Total Force @ Section	= lbs = ft-# = =	0.883 3,388.0 12,422.7 14,069.5
ACI Factored @ Toe ACI Factored @ Heel	= 1,303 ps = 454 ps	ShearActual	psi = psi =	37.0 75.0
Footing Shear @ Toe Footing Shear @ Heel Allowable	= 21.0 ps = 14.7 ps = 75.0 ps	OK Wall Weight	= in =	125.0 7.63
Bliding Calcs Slab Res Lateral Sliding Force	ists All Sliding ! = 2,626.1 lbs	LAP SPLICE IF BELOW	in =	
		Masonry Data Hook emb	bedmer	ent reduced by stress ratio
		fm Fs Solid Grouting	psi= psi= =	
Load Factors Building Code Dead Load Live Load	IBC 2012,AC 1.20 1.60	Modular Ratio 'n' Short Term Factor Equiv. Solid Thick. Masonry Block Type		
Earth, H Wind, W Seismic, E	1.60 1.00 1.00	Concrete Data	psi=	= 2,500.0

East Mercer Parcel 3.

Ret33

fc =

Min. As %

Cover @ Top

2.00

Footing Concrete Density

=

=

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etainPro 10 (c) 1987-2014, Build 10.14.9.29 icense : KW-06060889 icense To : Buker Engineering, LLC			Cantilevered Retain	sign	Code: IBC 2012,ACI 318-11,ACI 530-1		
Footing Dimensio	ons & S	strengths	Footing Desig	n F	lesults		
	=	4.25 ft			Toe	Heel	
Toe Width	-	2.83	Factored Pressure	=	1,303	454 p	sf
Heel Width Total Footing Width		7.08	Mu': Upward	=	10,232	1,068 ft	
Footing Thickness	-	15.00 in	Mu' : Downward	=	120	3,353 ft	
Fooling mickness	-		Mu: Design	=	10,113	2,285 ft	
Key Width	=	0.00 in	Actual 1-Way Shear	=	21.00	14.70 p	osi
Key Depth	=	0.00 in	Allow 1-Way Shear	=	75.00	75.00 p	osi
Key Distance from Toe	=	0.00 ft	Toe Reinforcing		# 5 @ 8.00 in		
fc = 2,500 psi	Fy =	60,000 psi	Heel Reinforcing		None Spec'd		

Heel Reinforcing = None Spec'd = None Spec'd Key Reinforcing

Other Acceptable Sizes & Spacings

Toe: #4@ 7.41 in, #5@ 11.48 in, #6@ 16.30 in, #7@ 22.22 in, #8@ 29.26 in, #9@ 37 Heel: Not req'd, Mu < S * Fr Key: No key defined

Summary of Overturning & Resisting Forces & Moments

150.00 pcf

0.0018

@ Btm.= 3.00 in

And the second division of the second divisio	-	01/1	RTURNING				RES	STING	
		Force	Distance	Moment ft-#			Force lbs	Distance ft	Moment ft-#
tem	-				Soil Over Heel	=	2.419.6	6.08	14,718.8
Heel Active Pressure	=	2,626.1	4.08	10,723.2	Sloped Soil Over Heel	-	-,		
Surcharge over Heel	=					2			
Surcharge Over Toe	=				Surcharge Over Heel	-			
Adjacent Footing Load	=				Adjacent Footing Load	=			
Added Lateral Load	-				Axial Dead Load on Ster	m =			
					* Axial Live Load on Stem	n =			
Load @ Stem Above So	- 10				Soil Over Toe	=			
	=				Surcharge Over Toe	=			
			S		Stem Weight(s)	=	1.437.5	4.67	6,708.3
Total		2,626.1	O.T.M.	10,723.2	Earth @ Stem Transition		1,401.0		
					Footing Weight	=	1,328.1	3.54	4,703.3
	-					=	1,02011		1000
Resisting/Overturnin	g Rat	io	=	2.44	Key Weight				
Vertical Loads used t	for So	il Pressure	= 5,185	.2 lbs	Vert. Component	=		a marine to	
					Tot	tal =	5,185.2 lbs	8 R.M.=	26,130.5

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

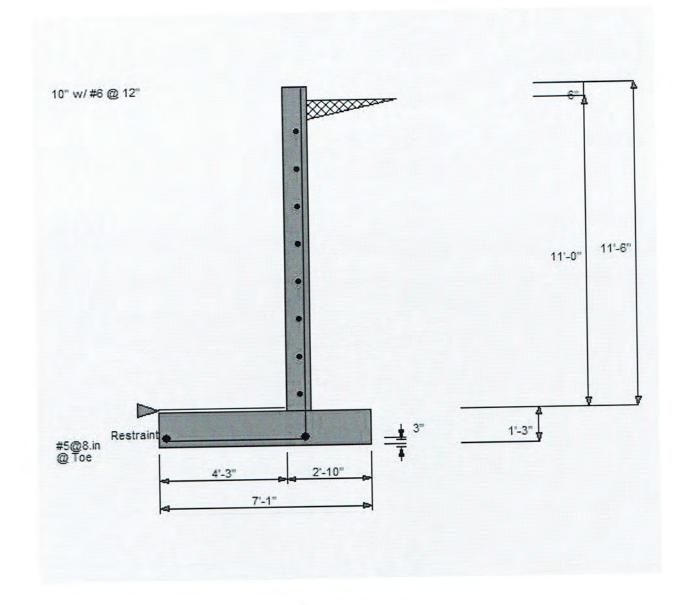
East Mercer Parcel 3.

Re+ 34

RetainPro 10 (c) 1987-2014, Build 10.14. License : KW-9606889 License To : Buker Engineering, Li	9.29 Outilessand Detaining Wall Design	Code: IBC 2012,ACI 318-11,ACI 530-11
Rebar Lap & Embedment Le	engths Information	
Stem Design Segment: Bottom Stem Design Height: 0.00 ft abo	ove top of footing	
Lap Splice length for #6 bar specifie	ed in this stem design segment =	28.08 in
Development length for #6 bar spec	cified in this stem design segment = ting for #6 bar specified in this stem design segment =	21.60 in 6.00 in

East Mercer Parcel3

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s Wall in File: h:\retaining wall calculations ainPro 10 (c) 1987-2014, Build 10.14.9.29 ense : KW-06060889 ense To : Buker Engineering, LLC	Cantilevered Retaining W		Code: IBC 2012,AC	I 318-11,ACI 530
Criteria	Soil Data			T
Retained Height=12.00 ftNall height above soil=0.50 ftSlope Behind Wall=0.00 : 1Height of Soil over Toe=0.00 inNater height over heel=0.0 ft	Equivalent Fluid Pressure Method Heel Active Pressure = Passive Pressure = 2 Soil Density, Heel = 11 Soil Density, Toe = Footing Soil Friction = 0 Soil beight to ignore	00.0 psf 35.0 psf/ft 50.0 psf/ft 0.00 pcf 0.00 pcf .400 2.00 in	National data Split	5072344
Surcharge Loads	Lateral Load Applied to S	tem	Adjacent Footing L	oad
Surcharge Over Heel = 0.0 psf Used To Resist Sliding & Overturning Surcharge Over Toe = 0.0 psf Used for Sliding & Overturning	Height to Tor = 0. Height to Bottom = 0. The above lateral load	0.0 #/ft 00 ft 00 ft 00	Adjacent Footing Load Footing Width Eccentricity Wall to Ftg CL Dist Footing Type	= 0.0 lbs = 0.00 ft = 0.00 in = 0.00 ft Line Load
Axial Load Applied to Stem	by a factor of		Base Above/Below Soil at Back of Wall	= 0.0 ft
Axial Dead Load=0.0 lbsAxial Live Load=0.0 lbsAxial Load Eccentricity=0.0 in	Wind on Exposed Stem =	0.0 psf	Poisson's Ratio	= 0.300
Design Summary	Stem Construction Design Height Above Ftg	ft = 0.0	ĸ	
Vall Stability Ratios Overturning = 2.49 Slab Resists All Sliding ! Total Bearing Load = 6,001 II resultant ecc. = 6.65 ii	K Wall Material Above "Ht" Thickness Rebar Size Rebar Spacing Rebar Placed at	= Concre = 10.0 = # = 9.0 = Edg	6 6	
Allowable = 2,000 p Soil Pressure Less Than Allowable ACI Factored @ Toe = 1,310 p	of OK Total Force @ Section MomentActual MomentAllowable	= 0.8 lbs = 4,032 ft-# = 16,128 = 18,302 psi = 44	.0 .0 .4	
ACI Factored @ Heel = 529 p Footing Shear @ Toe = 24.6 p Footing Shear @ Heel = 17.5 p Allowable = 75.0 p	si OK ShearAllowable si OK Wall Weight si OK Rebar Depth 'd' si LAP SPLICE IF ABOVE	psi = 75 = 125 in = 7. in = 28.	6.0 6.0 63	
Iding Calcs Slab Resists All Sliding ! Lateral Sliding Force = 3,072.3	S LAP SPLICE IF BELOW HOOK EMBED INTO FT		96	
	Masonry Data Hook emb	edment reduc	ed by stress ratio	
	fm Fs Solid Grouting	psi= psi= =		
Load Factors Building Code IBC 2012,A Dead Load 1.2 Live Load 1.6 Earth, H 1.6	0 Masonry Block Type 0 Masonry Design Method	= = = Mediur = ASD	n Weight	
Wind, W 1.0	00 fc	psi= 2,50	0.0	

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Ret37

Footing Dimensio	ns & S	Strengths	Footing Design Results	
Toe Width Heel Width Total Footing Width Footing Thickness Key Width Key Depth Key Distance from Toe fc = 2,500 psi Footing Concrete Dens	= = = = = Fy =	4.75 ft 3.08 7.83 15.00 in 0.00 in 0.00 in 0.00 ft 60,000 psi 150.00 pcf	Toe Heel Factored Pressure = 1,310 529 psf Mu': Upward = 12,994 1,528 ft-# Mu': Downward = 134 4,578 ft-# Mu: Design = 12,860 3,050 ft-# Actual 1-Way Shear = 24.61 17.52 psi Allow 1-Way Shear = 75.00 75.00 psi Toe Reinforcing = # 5 @ 8.00 in Heel Reinforcing Heel Reinforcing = None Spec'd Key Reinforcing	
Min. As % Cover @ Top 2.00	=	0.0018 Btm.= 3.00 in	Other Acceptable Sizes & Spacings Toe: #4@ 7.05 in, #5@ 10.93 in, #6@ 15.52 in, #7@ 21.16 in, #8@ 27.86 in, #9@ 35 Heel: Not req'd, Mu < S * Fr	

Key: No key defined

Summary of Overturning & Resisting Forces & Moments

rer Heel Soil Over Heel Irge Over Heel nt Footing Load		Force Ibs 2,969.6	SISTING Distance ft 6.71	Moment ft-# 19,920.3
Soil Over Heel	= =	2,969.6	6.71	19,920.3
Soil Over Heel	= =	-,		
rge Over Heel	=			
nt Footing Load				
	=			
ead Load on Ste	m=			
ive Load on Stem	n =			
ver Toe	=			
arge Over Toe	=			
Weight(s)	=	1,562.5	5.17	8,072.9
	ns=			
	=	1,468.7	3.92	5,752.1
-	=			
	=			
omponent	tal =	6.000.7	s R.M.=	33,745.3
N	ng Weight Veight Component To	Veight = Component = Total =	ng Weight = 1,468.7 Veight = Component = Total = 6,000.7	ng Weight = 1,468.7 3.92 Veight = Component =

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

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Rebar Lap & Embedn	nent Lengths	Information	
Stem Design Segment: Bo Stem Design Height: 0	ttom .00 ft above top of	footing	
Lap Splice length for #6 ba	r specified in this	stem design segment =	28.08 in
Development length for #6 bar specified in this stem design segment = Hooked embedment length into footing for #6 bar specified in this stem design segment =		21.60 in 6.00 in	

East Mercer Parcel 3

Ret39

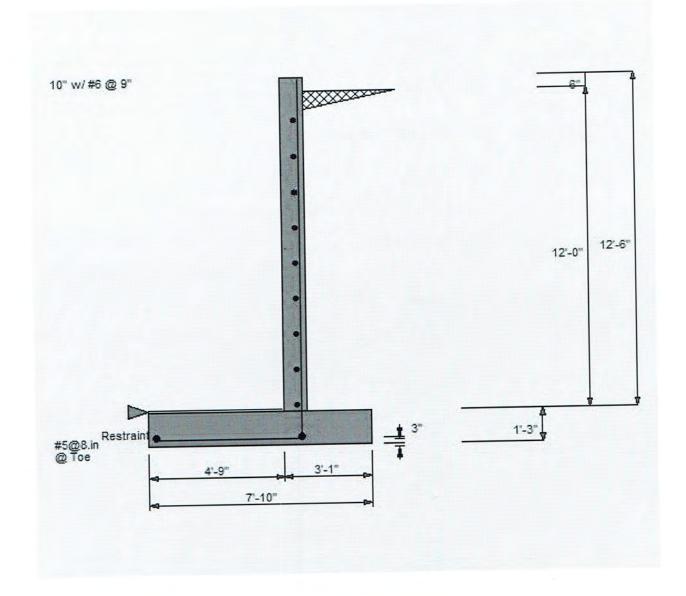
 Title
 12' Cantilever Wall w/Slab on Grade
 Page:

 Job #
 :
 Dsgnr:
 CRB
 Date:
 2 OCT 2014

 Description....
 Cantilever Retaining Wall w/Slab on Grade

This Wall in File: h:\retaining wall calculations\retaining wall - slab on grade\cantilever retainin

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