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Structural Calculations for:

East Mercer Residence – Parcel 1

8375 East Mercer Way, Mercer Island, WA

Client: Ripple Design Studio Inc.

Code: 2015 International Building Code

Table of Contents

Scope: Single Family Residence Addition
        (Formerly Known as Zheng Residence 1)

July 17, 2017
Revised October 5, 2017

Seismic Design Loads (ASCE 7-10)

for 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
$R = 6.5$ Table 12.2-1

SEISMIC
DESIGN CATEGORY 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
$S_{DS} = 0.974$
$S_{D1} = 0.556$

Seismic Dead Load: 15 ^{psf} Roof
10 ^{psf} Floor
20^{psf} Walls

$Cs_{ULT} = 0.150$ Eqn. 12.8-2
$Cs_{ASD} = 0.107$

$W_{roof} = 15 + 1 = 25^{psf}$
$W_{floor} = 10 + 10 + 10 = 30^{psf}$

Vertical Design Loads

Criteria
ASCE 7-10
IBC 2012

Dead Loads

Roof			Floor		
Roof (Composit)	2.5	psf	Flooring	1	psf
1/2" Ply	1.5	psf	Sheathing	2.3	psf
Rafter/Truss	2	psf	Joist	2.6	psf
Insulation	1	psf	5/8" GWB	3.1	psf
5/8" GWB	3.1	psf	Misc. Mech	1	psf
Misc./Mech.	2	psf		10	psf
	12.1	psf			
Use	15	psf	Use	15	psf

Live Loads

House
Snow   25 psf
floor   40 psf

Soil Bearing

0 psf

C1

≋USGS Design Maps Summary Report

User–Specified Input
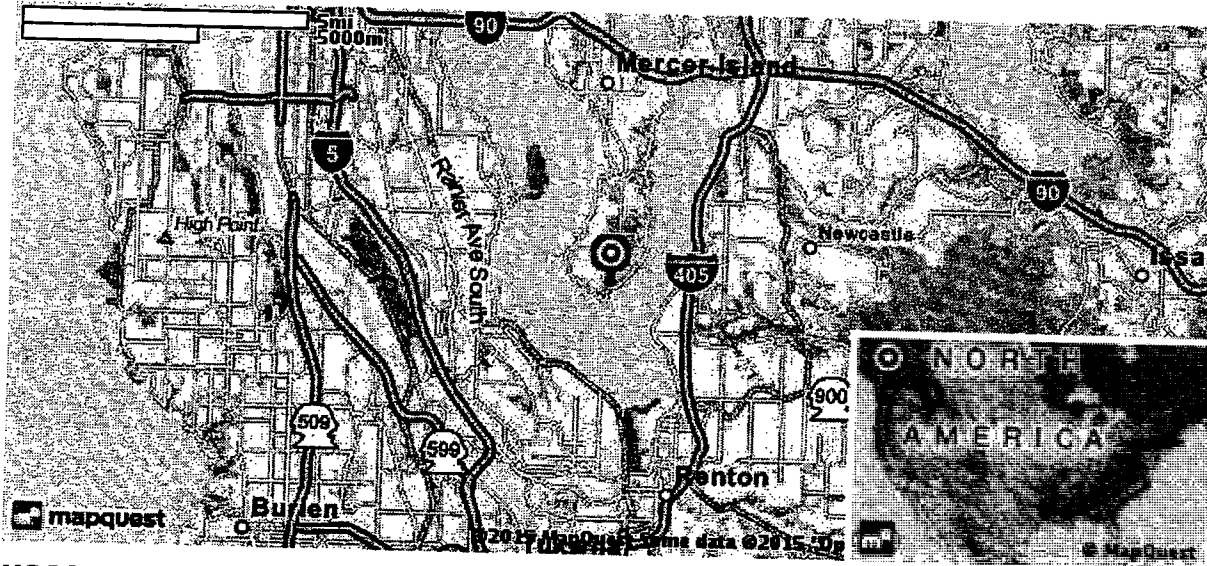
|	
Report Title	Seismic Response
	Thu October 29, 2015 00:30:10 UTC
Building Code Reference Document	2012 International Building Code
	(which utilizes USGS hazard data available in 2008)
Site Coordinates	47.52901°N, 122.22515°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

S_S = 1.461 g	S_{MS} = 1.461 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.

MCE$_R$ Response Spectrum

Design Response Spectrum

LI
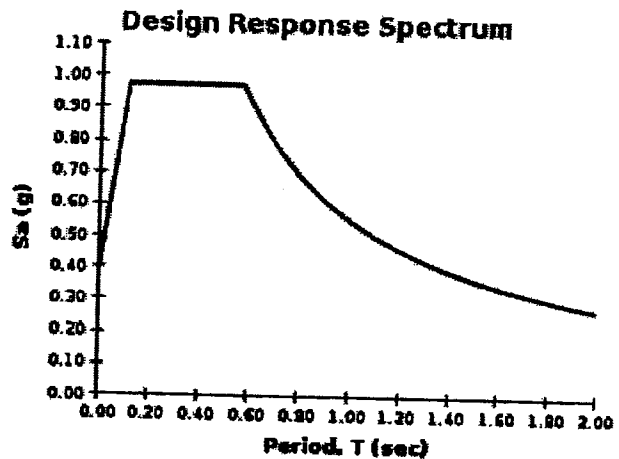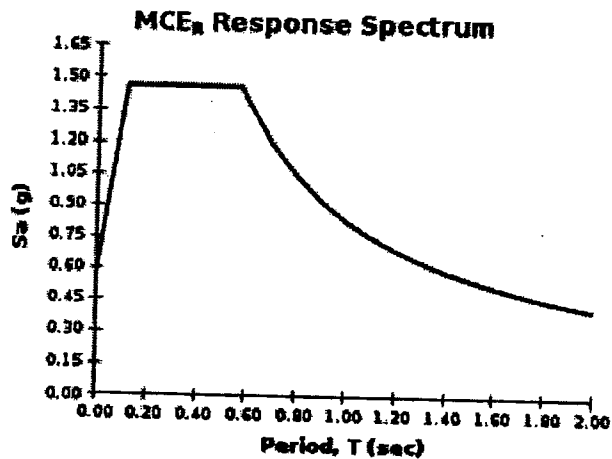
Roof Diaphragm

Diaph A
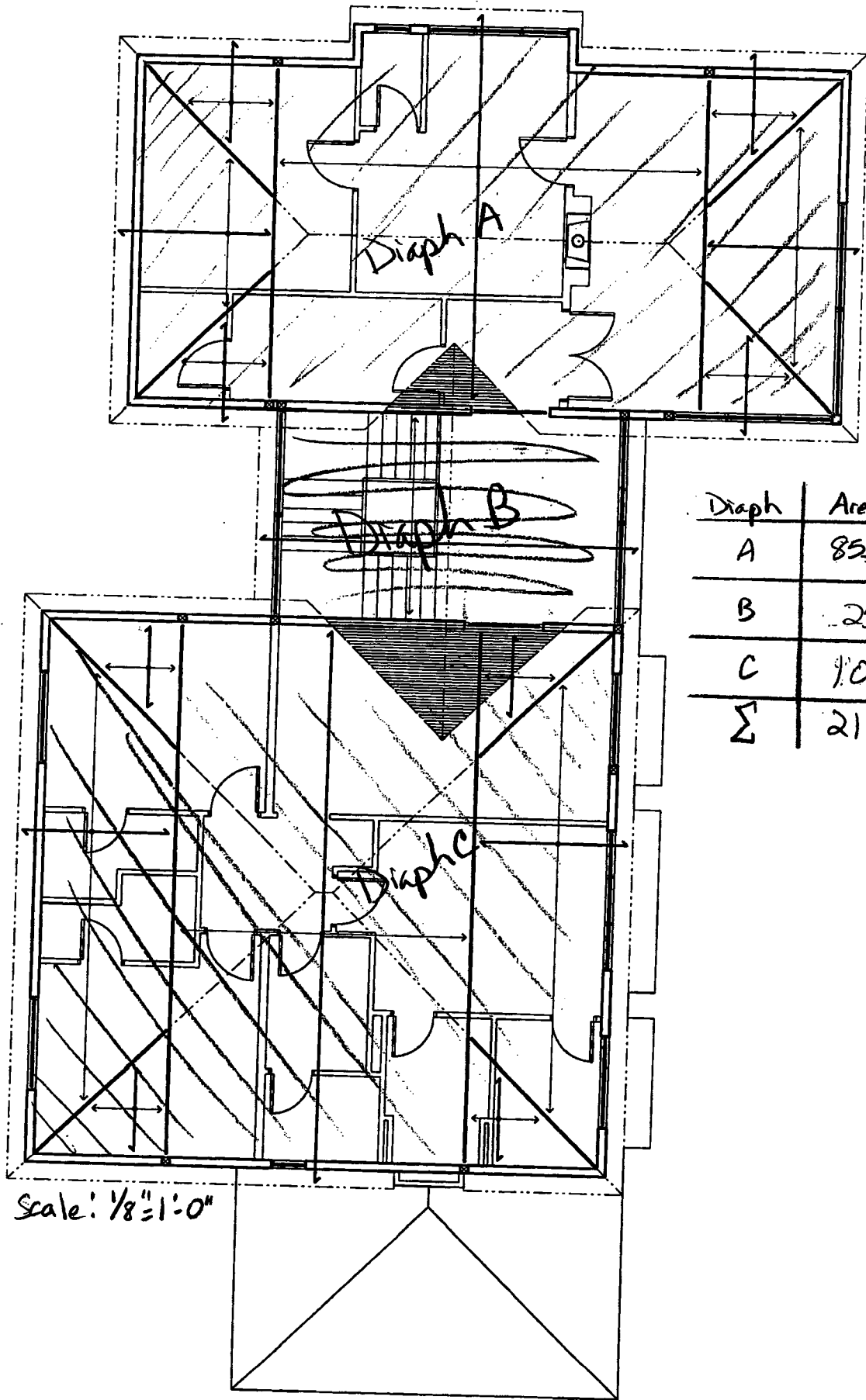
Diaph B

Diaph C

Diaph	Area (ft²)	W(k)
A	855	21.38
B	252	6.6
C	1,092	27.3
Σ	2199	54.98

Scale: ⅛"=1'-0"

Zheng Residence 1

L2

Second Floor Diaph

Diaph D

Diaph E

Diaph F
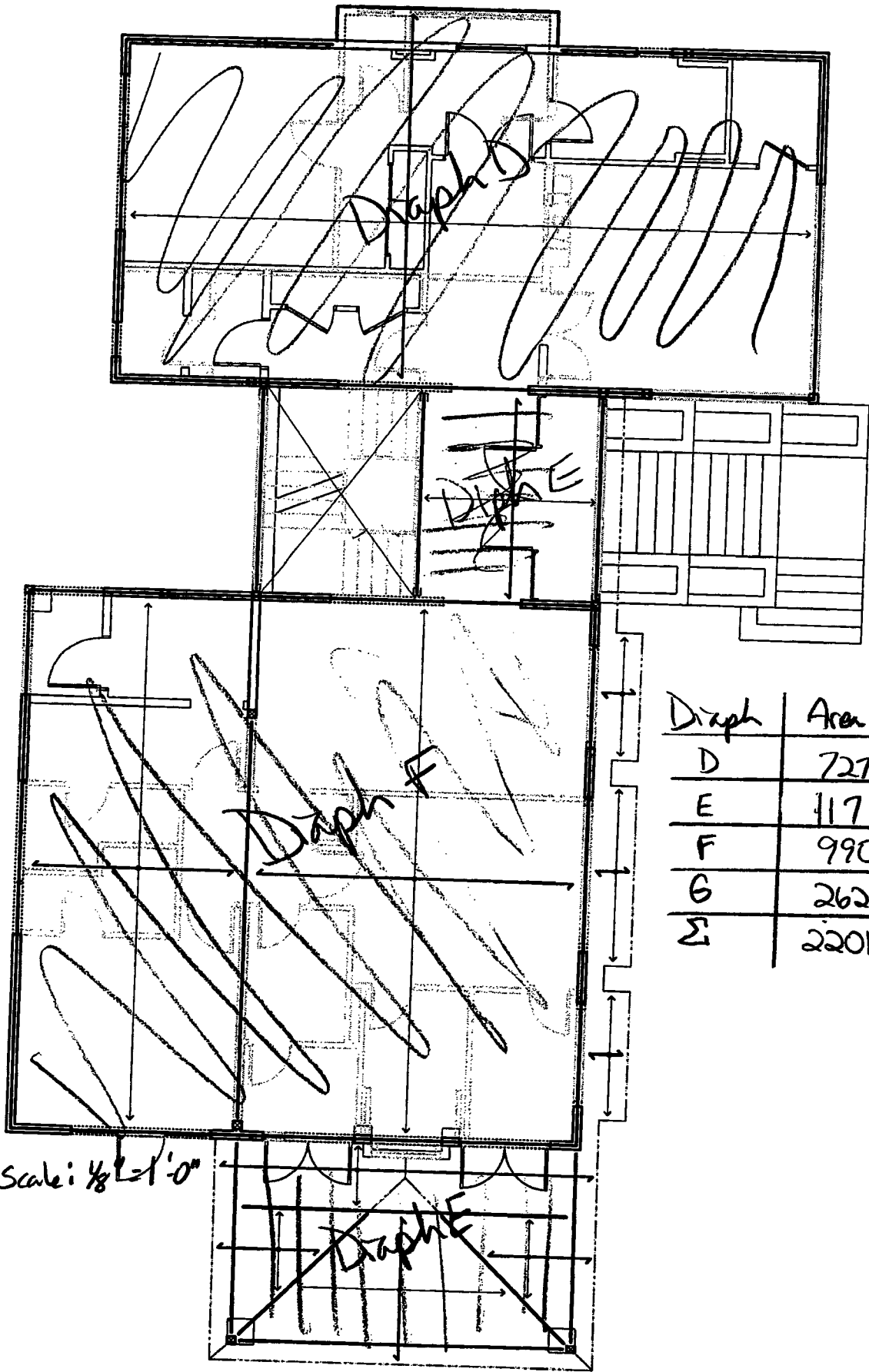
Diaph E

Scale: 1/8"=1'-0"

Diaph	Area (Ft²)	W(k)
D	727	21.81
E	117	3.51
F	990	29.7
G	262.5	7.88
Σ	2201.5	62.9

Zheng Residence 1

L3

First Floor Diaph

Diaph H

Diaph I

Diaph J

Diaph	Area (ft²)	W(k)
H	703	21.09
I	222	6.66
J	924	27.72
Σ	1849	55.47

Scale: ⅛"=1'-0"

Zheng Residence 1

L4

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

Site Class =	D	
Mean Roof Height =	32.5	ft
T =	0.27	sec
R =	6.5	
I =	1.0	
rho =	1.0	
Cs =	0.150	
W =	173.35	K
Allowable Base Shear V =	18.19	K

House

Level	Wx (K)	hx (ft)	Wxhx	Cvx	Fx (K)
Roof	54.98	30.5	1677	0.47	8.6
Second	62.9	20.5	1289	0.36	6.6
First	55.47	10.5	582	0.16	3.0
Sum	173.35		3549	1.0	18.2

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Full House Load

Zheng Residence 1

L5

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

Site Class =	D	
Mean Roof Height =	32.5	ft
$T =$	0.27	sec
$R =$	6.5	
$I =$	1.0	
rho =	1.0	
$C_s =$	0.150	
$W =$	101.02	K
Allowable Base Shear $V =$	10.60	K

House

Level	Wx (K)	hx (ft)	Wxhx	Cvx	Fx (K)
Roof	30.63	30.5	934	0.45	4.8
Second	39.34	20.5	806	0.39	4.1
First	31.05	10.5	326	0.16	1.7
Sum	101.02		2067	1.0	10.6

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West Side of Home

Zheng Residence 1

L6

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

Site Class =	D	
Mean Roof Height =	32.5	ft
T =	0.27	sec
R =	6.5	
I =	1.0	
rho =	1.0	
Cs =	0.150	
W =	72.67	K
Allowable Base Shear V =	7.63	K

House

Level	Wx (K)	hx (ft)	Wxhx	Cvx	Fx (K)
Roof	24.68	30.5	753	0.50	3.8
Second	23.57	20.5	483	0.32	2.5
First	24.42	10.5	256	0.17	1.3
Sum	72.67		1492	1.0	7.6

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East Side of Home

Zheng Residence 1

L7

8375 E Mercer Way

47°31'43.35" N 122°13'30.66" W elev 169 ft eye alt 7215 ft
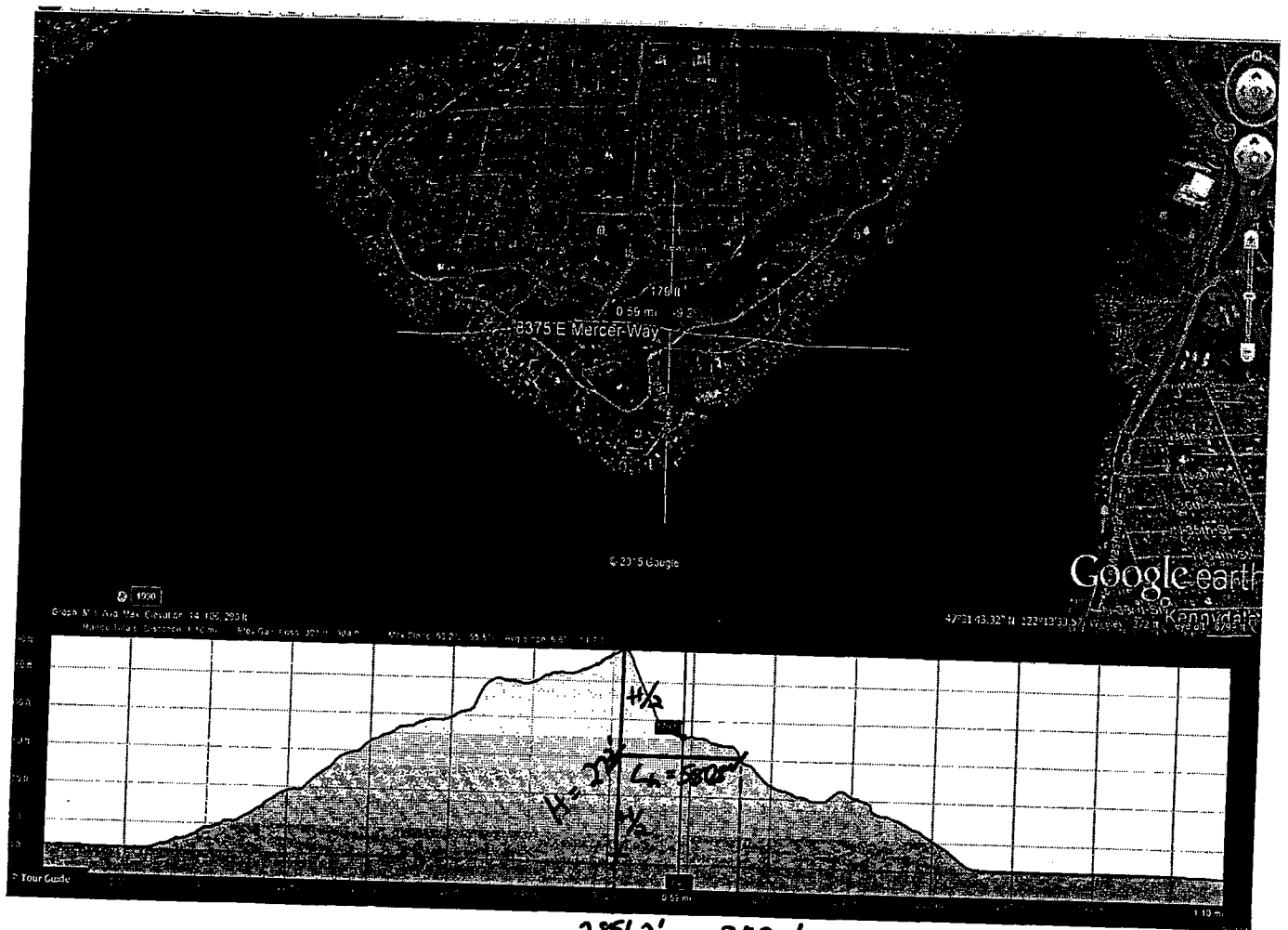
2018'   3009.6   Exposure B
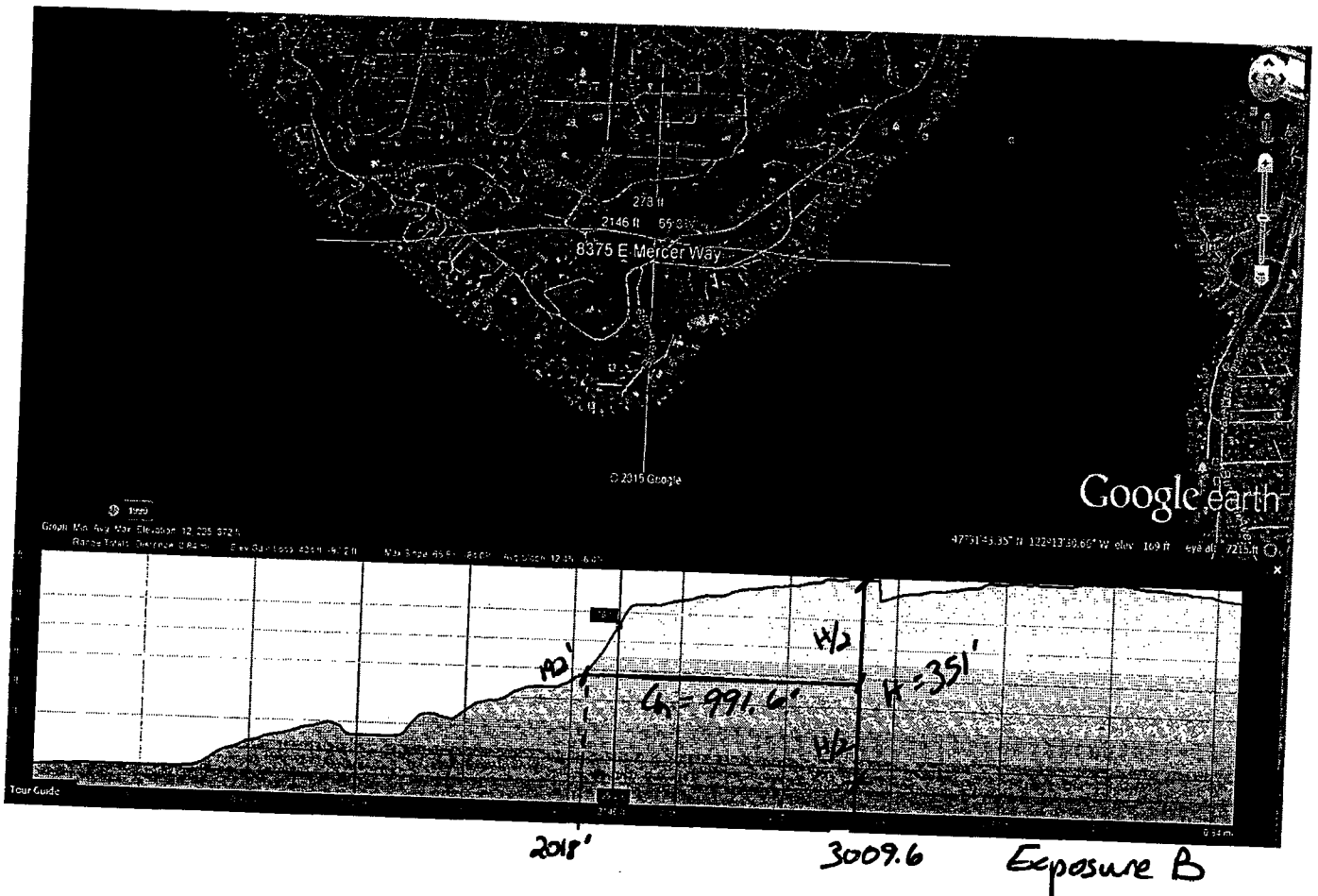
$$\frac{H}{L_h} = \frac{351}{991.6} = 0.35 \geq 0.2$$

$$\therefore K_{zt} = (1 + k_1 k_2 k_3)^2 = (1 + (0.455)(0.366)(0.9))^2 = \boxed{1.32 = K_{zt}}$$

$k_1 = 0.455 \qquad \text{Figure 26.8-1}$

$$k_2 = \left(1 - \frac{|x|}{\mu L_h}\right) = \left(1 - \frac{866.6}{1.5(991.6)}\right) = 0.366$$

$$k_3 = e^{-\gamma z/L_h} = e^{-3(34.5')/991.6'} = 0.90$$

L8

2851.2'   3932'

$$\frac{H}{L_h} = \frac{273'}{580.8} = 0.47 > 0.2$$

$$K_{zt} = (1 + k_1 k_2 k_3)^2 = (1 + 0.616(697)(0.837))^2 = \boxed{1.84 - k_{zt}}$$

$$k_1 = 0.611$$

$$k_2 = \left(1 - \frac{264}{1.5(580.8)}\right) = 0.697$$

$$k_3 = e^{-3(31.5)/580.8} = 0.837$$

therefor use $\underline{\underline{K_{zt} = 1.84}}$

Wind Design Loads (ASCE 7-10)

Directional Procedure - Part 1

Exposure **C**

$V=$ **110** mph

$K_d=$ **0.85**

$I=$ **1**

$G=$ **0.85**

Table 26.6-1

26.9

Roof Angle = **19.98** degrees

Ground to top of roof **34.5** ft

Bottom of roof to top of roof **4** ft

(mean roof height) h= **32.5** ft

$K_{zt}=$ **1.84**

Pressure Coefficients from Figure 27.4-1:

Bldg Face	C_p
Windward Wall	0.8
Leeward Wall	-0.5
Windward Roof	0.3
Leeward Roof	-0.6

*Note= Cp values are conservative worst case values

Pressures:

Ht	K_z	q_z	$P_{ww\ walls}$	$P_{lw\ walls}$	Ultimate P_{walls} (psf)	Allowable P_{walls} (psf)
0-15	0.85	41.18	28.00	21.41	49.42	**29.65**
15-20	0.9	43.60	29.65	21.41	51.06	**30.64**
20-25	0.94	45.54	30.97	21.41	52.38	**31.43**
25-30	0.98	47.48	32.28	21.41	53.70	**32.22**
30-40	1.04	50.38	34.26	21.41	55.67	**33.40**

$P_{ww\ roof}$	$P_{lw\ roof}$	P_{roof} (psf)	P_{roof} (psf)
12.85	25.70	38.54	**23.13**

Use 34 **psf** on projected wind surfaces

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Date: 10/4/2017

Design: CRB

L10

Zheng Residence 1

L11
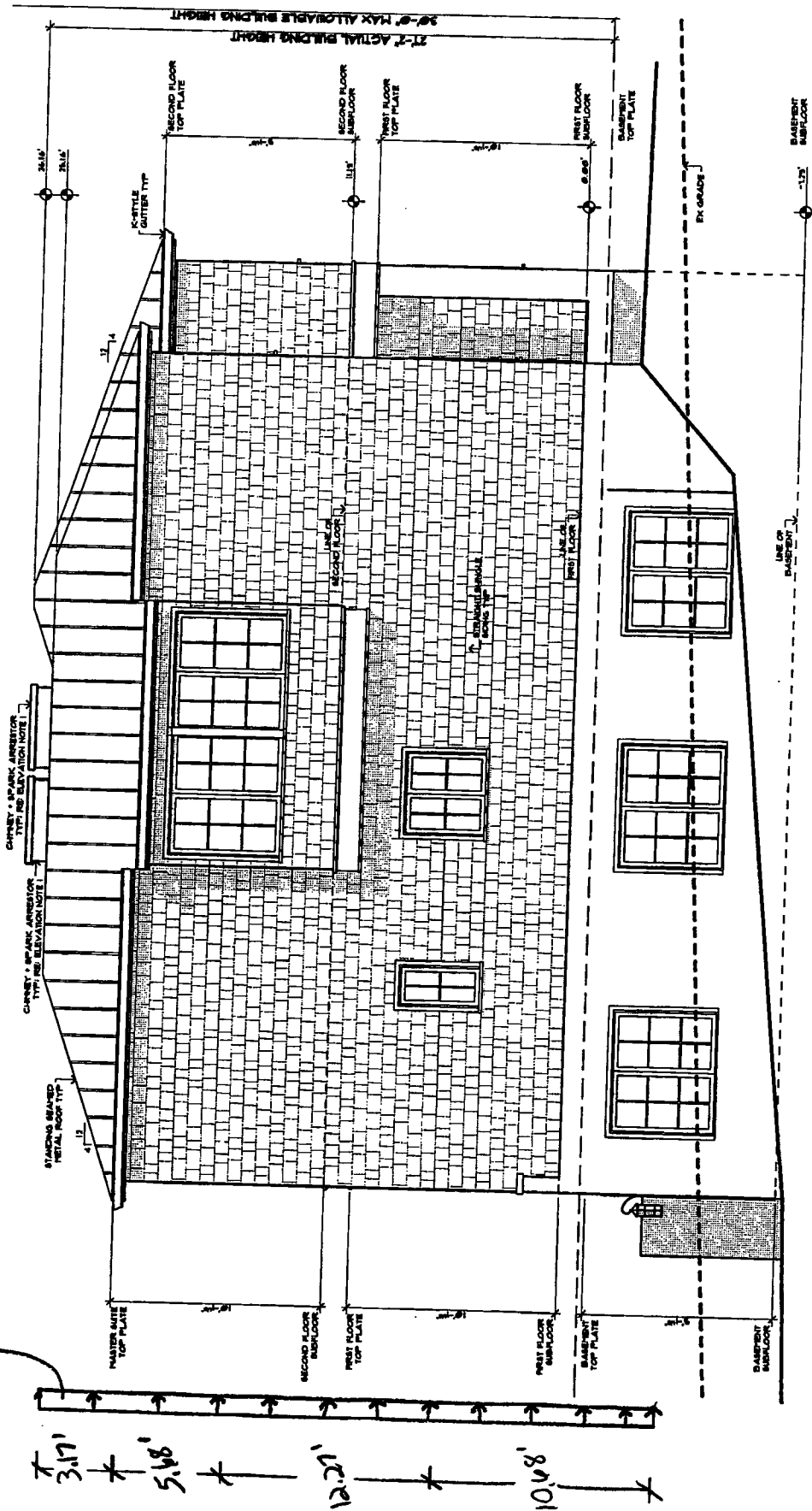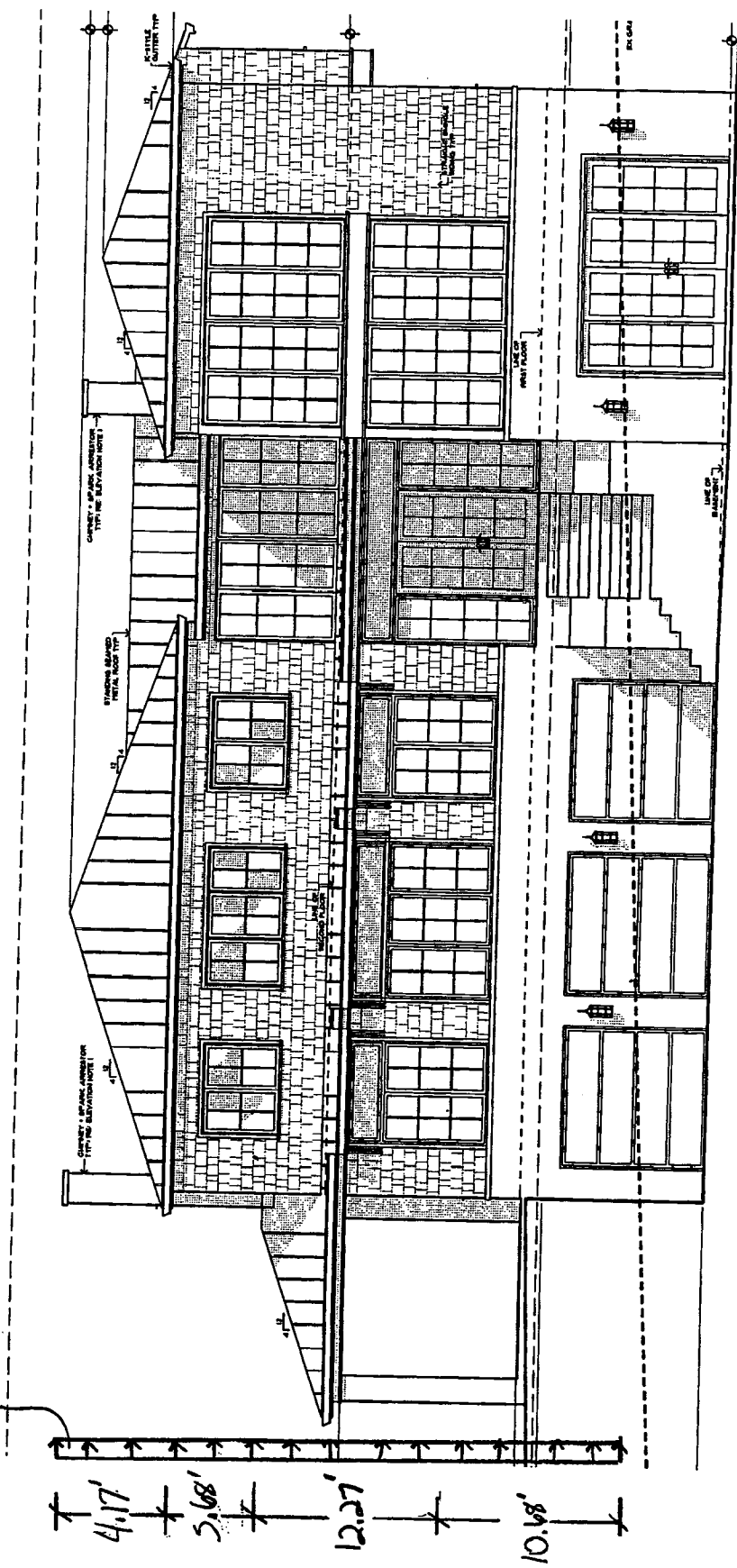
EAST ELEVATION
SCALE 1/4" = 1'-0"

1/8"=3/4"=1'-0"

Zheng Residence 1

4.17'
5.68'
12.27'
10.68'

L12

SHEARWALL KEYPLAN

ZHENG RESIDENCE 1

L13

Wind: $W = 34psf(4' + 5.7') = 343plf$
330 plf

Seismic: $W = 135 plf$

Grid:
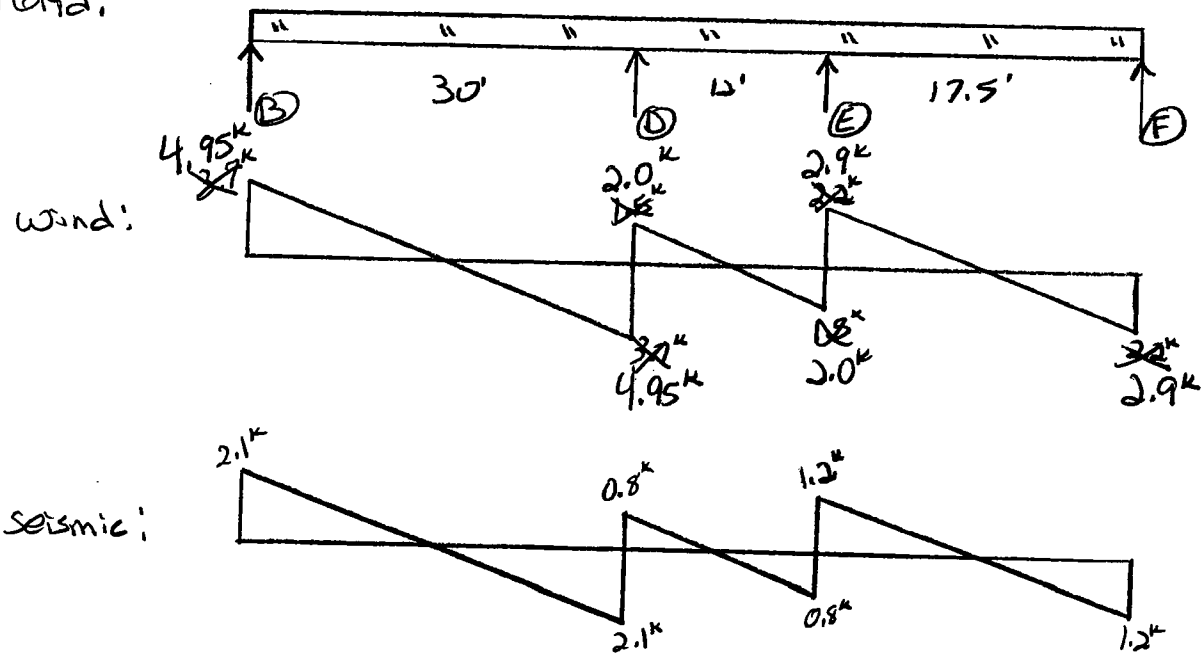
Wind:

Seismic:

Grid	B	D	E	F
Vwind (kips)	4.95	6.95	4.9	2.9
Vseismic (kips)	2.1	2.9	2.0	1.2
Length of wall (ft)	29	21.5	19.5	26
v_wind (p/f)	171	323	251	112
v_siesmic (p/l)**	72	152	103	46
h (ft)	9	9	10	10
OTF_Wind (lbs)*	1536	2909	2513	1115
OTF_Seismic (lbs)*	652	1214	1026	462
Length of shortest wall pier (ft)	13	4	6.5	12
Apect Ratio Reduction for Seismic Loads	0.69	2.25	1.54	0.83
Siesmic Penalty	1.0	0.89	1.0	1.0
Shearwall	W6	W6	W6	W6
Holdown	CS16	MSTC66	MSTC66	CS16

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

Loads/Roof

Roof Windward = ~~7.4 psf~~

Roof Leeward = ~~6.5 psf~~ 15.42
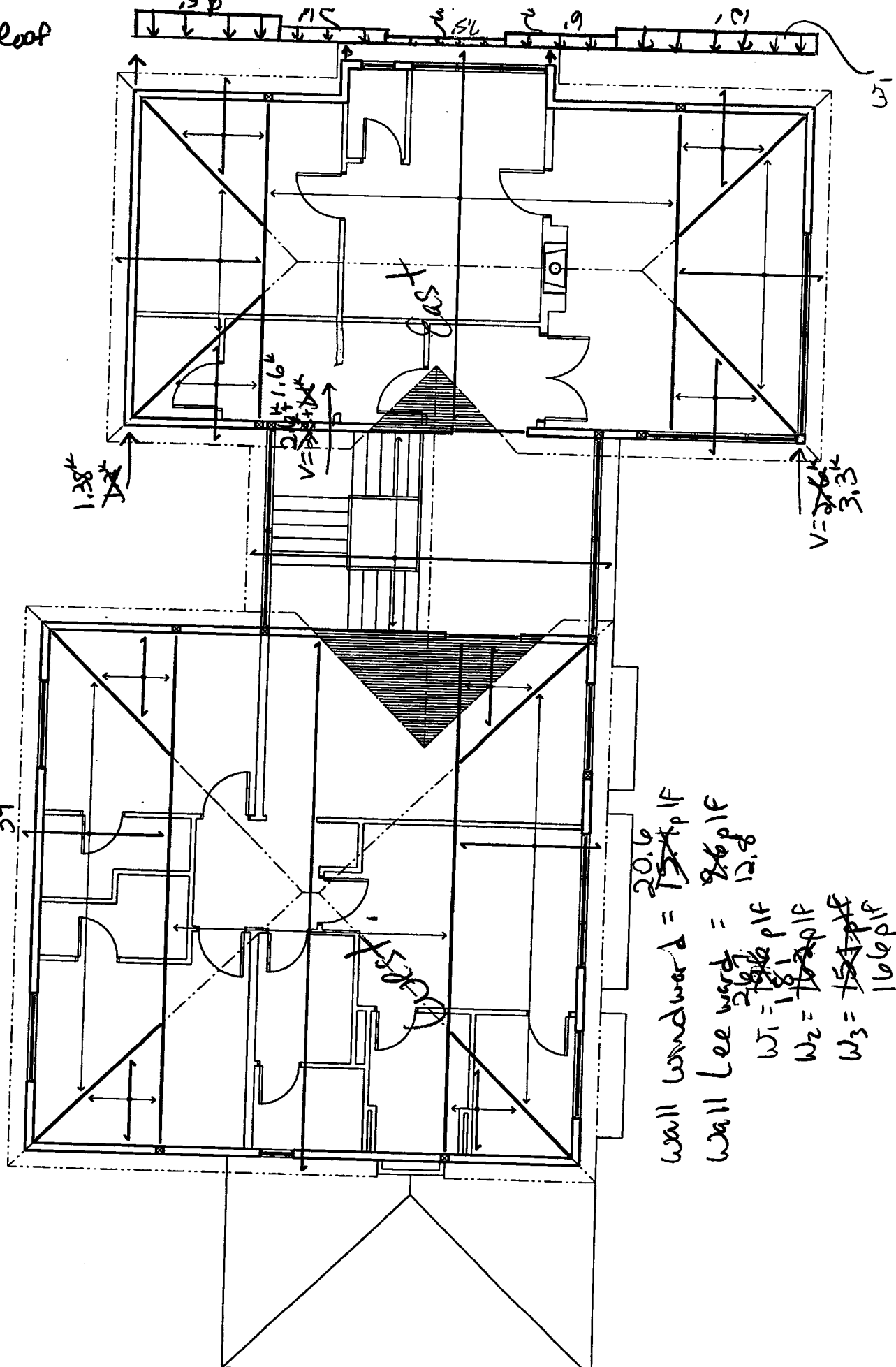
1.38ᵏ

V=2.6ᵏ+x=1.6ᵏ

8.25ᵏ

V=3.6ᵏ 3.3ᵏ

Roof Load = ~~23.13 psf~~

Wall Load = ~~34 psf~~

15.6ᵏ

Wall Windward = ~~20.6 plf~~

Wall Leeward = ~~12.8 plf~~

W_1 = ~~16.1 plf~~

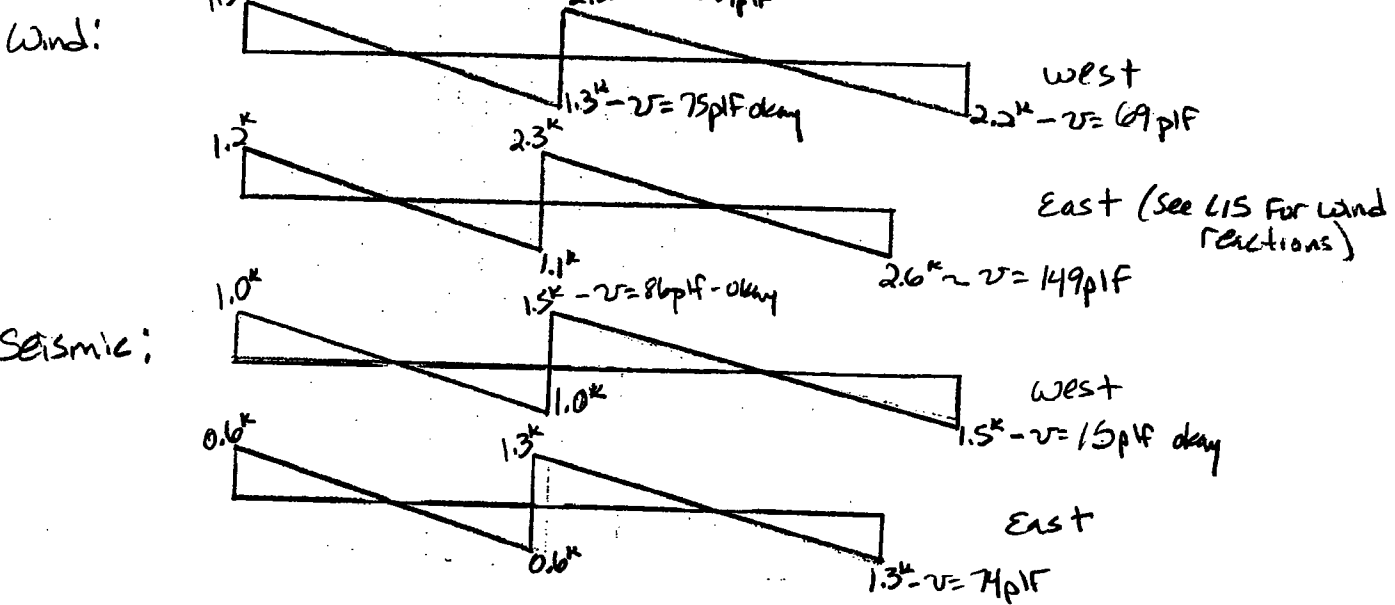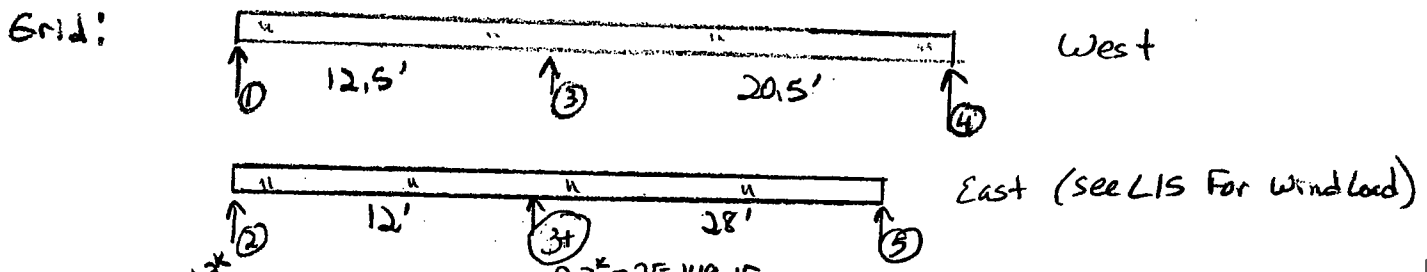W_2 = ~~10.9 plf~~

W_3 = ~~15.4 plf~~ 10.6 plf

Zheng Residence 1

L15

Lateral Analysis: Roof Diaphragm / 2nd Floor walls   E/W Direction

Wind: See pg L15 for East side   W = 213 plf
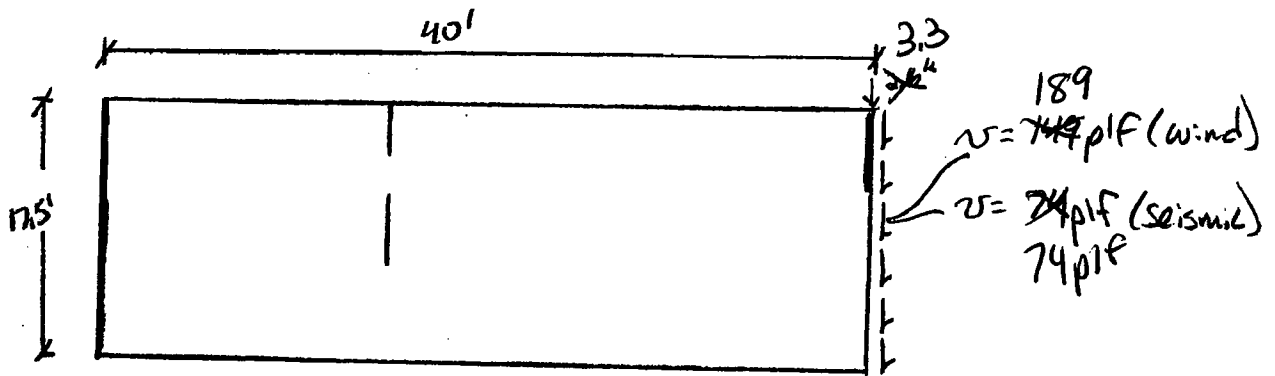
Seismic: East - W = 95 plf

West - W = 146 plf

Grid:

West

East (see L15 for wind load)

Wind:

West

East (see L15 for wind reactions)

Seismic:

West

East

1.3^k

$2.2^k - \upsilon = 149 plf$

$1.3^k - \upsilon = 75 plf$ okay

$2.2^k - \upsilon = 69 plf$

1.2^k

2.3^k

1.1^k

$1.5^k - \upsilon = 86 plf - okay$

$2.6^k \sim \upsilon = 149 plf$

1.0^k

1.5^k

1.0^k

$1.5^k - \upsilon = 15 plf$ okay

0.6^k

1.3^k

0.6^k

$1.3^k - \upsilon = 74 plf$

12.5'   20.5'   12'   28'

Grid	West			East		
	1	3	4	2	3+	5
Vwind (kips)	1.5	4.3	2.8	1.4	4.2	3.3
Vseismic (kips)	1.0	2.5	1.5	0.6	1.9	1.3
Length of wall (ft)	19.5	22	13	15	9.5	7
v_wind (p/f)	77	195	215	93	442	471
v_siesmic (p/l)**	66	114	160	40	286	186
h (ft)	9	9	9	10	10	10
OTF_Wind (lbs)*	692	1759	1938	933	4421	4714
OTF_Seismic (lbs)*	462	1023	1038	400	2000	1857
Length of shortest wall pier (ft)	3.5	10	3.25	15	3.5	7
Apect Ratio Reduction for Seismic Loads	2.57	0.90	2.77	0.67	2.86	1.43
Siesmic Penalty	0.78	1.0	0.72	1.0	0.70	1.0
Shearwall	W6	W6	W6	W6	W4	W4
Holdown	CS16	MSTC66	MSTC66	CS16	MSTC66	MSTC66

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

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Project: Zheng Residence

Project #

Designer: CRA

Date

Sheet: L16

Diaphragm forces:

40'

3.3

17.5'

189

$v = 749$ plf (wind)

$v = 74$ plf (seismic)

74 plf

Diaphragm Capacity (unblocked)

$v = 252$ plf (wind) } unblocked
$v = 190$ plf (seismic) } Diaphragm okay for loads

Load @ Top plate

$7'(267$ plf$) = \frac{1869}{1869}$ # @ shearwall

Load @ plate $= \frac{836}{895}$# ≤ 1000# (Top chord okay for loads)

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Zheng Residence 1
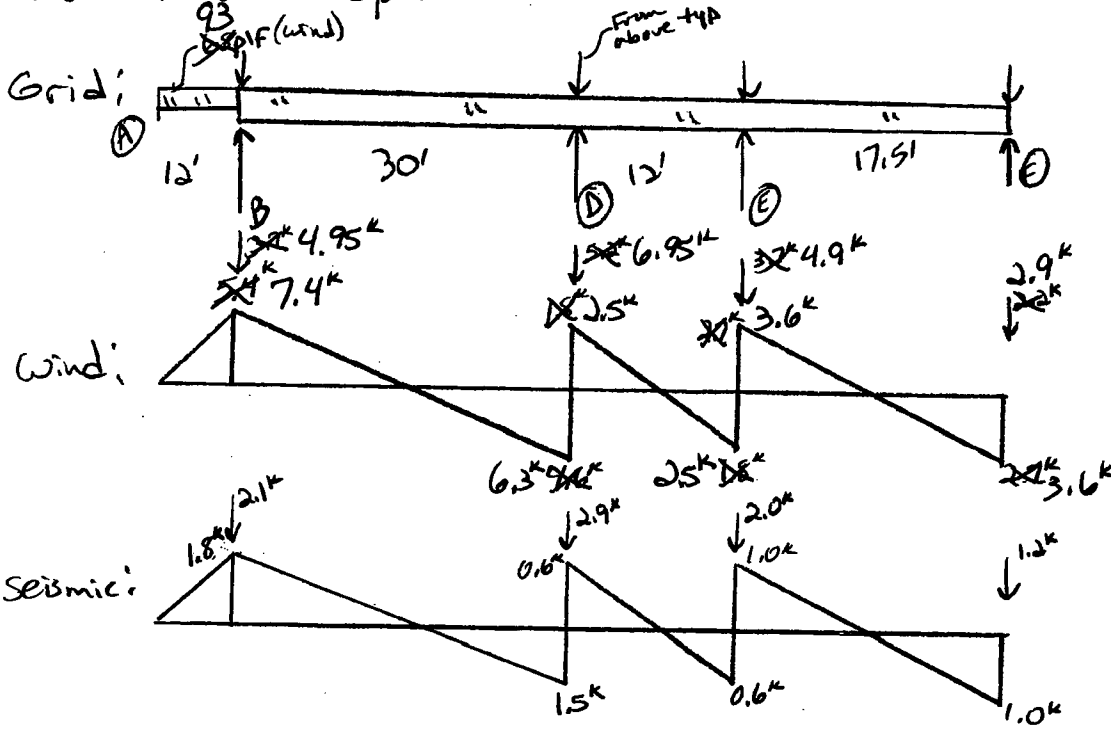Project

Project #
CRB
Designer

Date

L17
Sheet

ZHENG RESIDENCE 1

L18
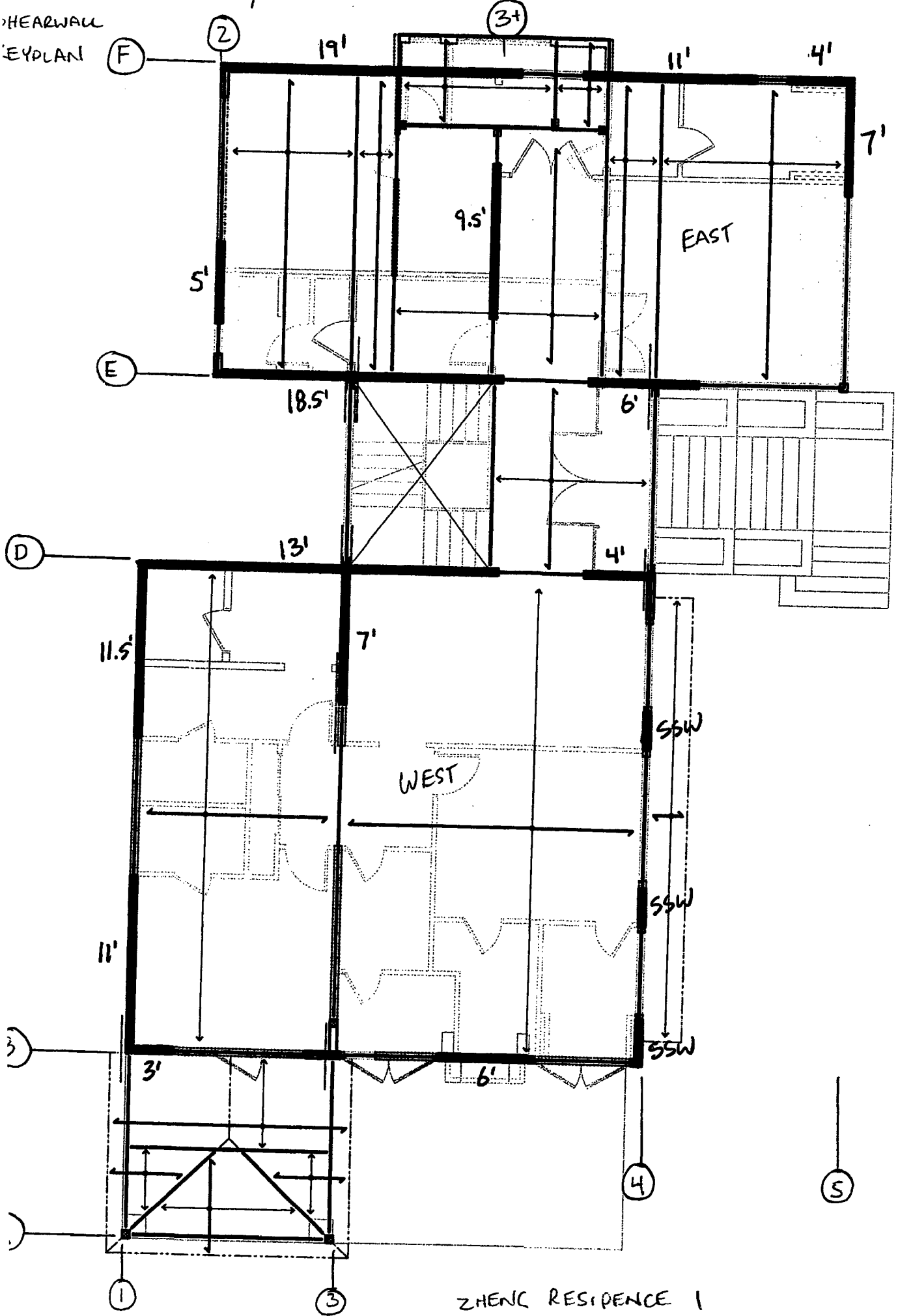
Lateral Analysis: 2nd Floor Diaphragm / First Floor walls   N/S Direction

Wind: $W = \cancel{34}\cancel{35} psf (12.27') = \cancel{322plf}$
                        417 plf

Seismic: $W = 103 plf$

Grid:
Ⓐ   12'   30'   Ⓓ 12' Ⓔ   17.5'   Ⓕ

Wind:

Seismic:

Grid	B	D	E	F
Vwind (kips)	12.35	15.75	11	6.5
Vseismic (kips)	3.9	5.0	3.6	2.2
Length of wall (ft)	9	31.25	24.5	34
v_wind (p/f)	1372	504	449	191
v_siesmic (p/l)**	722	200	147	81
h (ft)	10	10	10	10
OTF_Wind (lbs)*	13722	5040	4490	1912
OTF_Seismic (lbs)*	4333	1600	1469	647
Length of shortest wall pier (ft)	3	4	6	4
Apect Ratio Reduction for Seismic Loads	3.33	2.50	1.67	2.50
Siesmic Penalty	0.60	0.80	1.0	0.80
Shearwall	2W2	W4	W4	W6
Holdown	HD12	HDU11	HDU8	HDU4
		& CMST12	& CMST12	

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

Zheng Residence 1
Project

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L19
Sheet

Lateral Analysis: 2nd Floor diaphragm / First Floor walls   E/W Direction

Wind Load: West —   W = 3~~92~~ plf   418
　　　　　　　East — W_1 = 3~~82 plf~~ 418 plf
　　　　　　　　　　　　W_2 = ~~289~~ plf
　　　　　　　　　　　　253 plf

Seismic Load: West — W = 124 plf
　　　　　　　　East — W = 63 plf

Grid: West

East

Wind: West

East
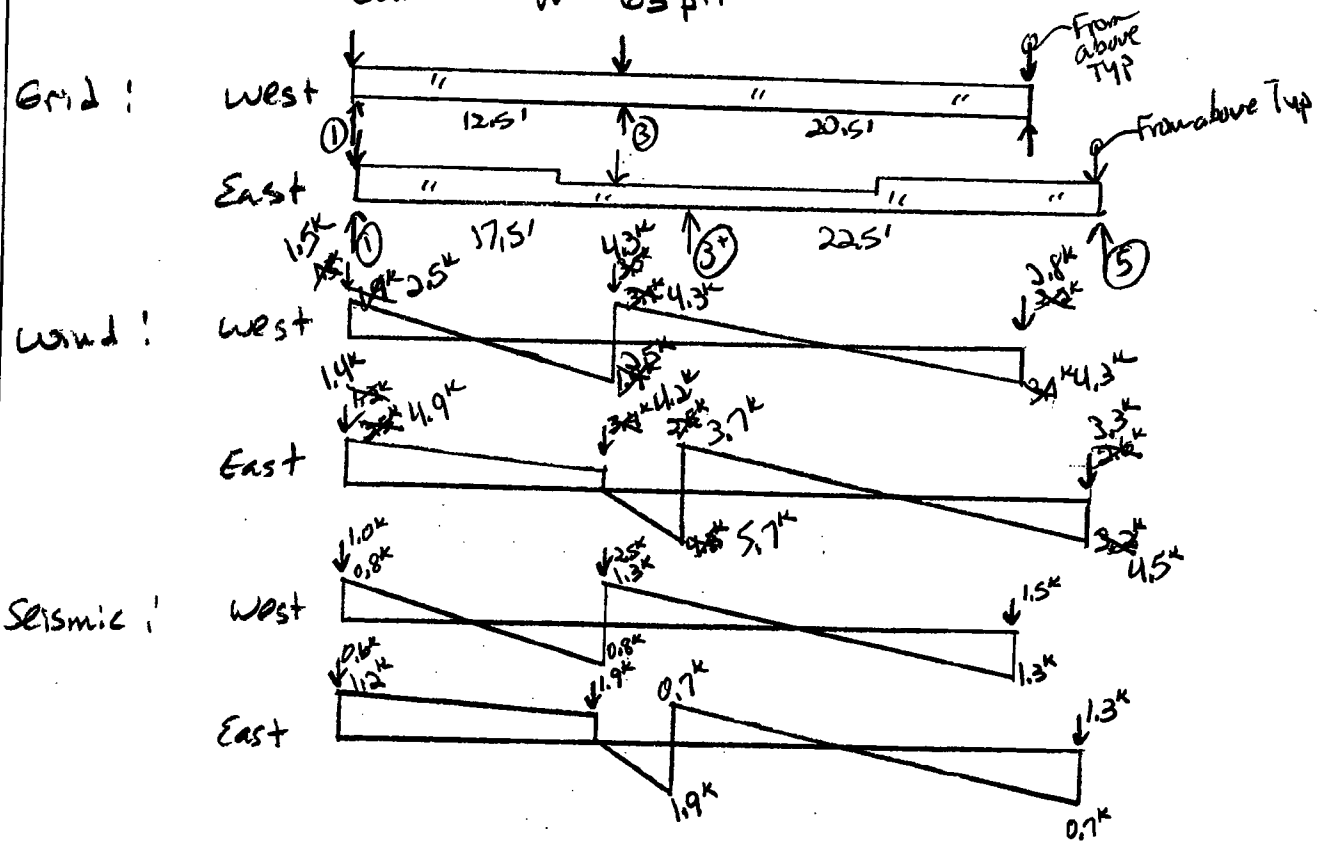
Seismic: West

East

		West		East		
Grid	1	3	4	2	3+	5
Vwind (kips)	4	11.1	7.1	6.3	9.4	7.8
Vseismic (kips)	1.8	3.8	2.8	1.8	2.6	2.0
Length of wall (ft)	22.5	7	SSW	5	9.5	7
v_wind (p/f)	178	1586	SSW	1260	989	1114
v_siesmic (p/l)**	80	543	SSW	360	274	286
h (ft)	10	10	10	10	10	10
OTF_Wind (lbs)*	1778	15857	SSW	12600	9895	11143
OTF_Seismic (lbs)*	800	5429	SSW	3600	2737	2857
Length of shortest wall pier (ft)	11	7	SSW	5	9.5	7
Apect Ratio Reduction for Seismic Loads	0.91	1.43	SSW	2.00	1.05	1.43
Siesmic Penalty	1.0	1.0	SSW	1.0	1.0	1.0
Shearwall	W6	2W2	SSW	2W3	2W3	2W3
Holdown	HDU2	HD19	SSWAB	HDU14	(2)CMST12	HD19

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

40'

2.0~~k~~ 4.5~~k~~
4.9

6.0~~k~~

280 plf 17.5'
V=~~7.0 plf~~

149 plf
~~142 plf~~

257 plf
V=~~3.0 plf~~

Block 2'
of Diaphragm

343 plf
~~plf~~ F (wind)

use 3½ x14 LSL
for Top chord

Blocking
not
req'd

Block 2' of
Diaphragm

Block 8' of diaphragm
4'

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L21
Sheet

Shearwell Key Plan

Zheng Residence 1

L22

Wind: W = 38psf(10.68') = 363plf

Seismic: W = 48plf

grid:

Wind

Seismic

Grid	B	D	E	F
Vwind (kips)	17.75	23.35	16.4	9.7
Vseismic (kips)	4.6	6.0	4.3	2.6
Length of wall (ft)	Concrete Wall	16	Concrete Wall	25.5
v_wind (p/f)	Concrete Wall	1459	Concrete Wall	380
v_siesmic (p/l)**	Concrete Wall	375	Concrete Wall	102
h (ft)	10	10	10	10
OTF_Wind (lbs)*	Concrete Wall	14594	Concrete Wall	3804
OTF_Seismic (lbs)*	Concrete Wall	3750	Concrete Wall	1020
Length of shortest wall pier (ft)	Concrete Wall	7	Concrete Wall	23
Apect Ratio Reduction for Seismic Loads	Concrete Wall	1.43	Concrete Wall	0.43
Siesmic Penalty	Concrete Wall	1.0	Concrete Wall	1.0
Shearwall	Concrete Wall	2W2	Concrete Wall	W4
Holdown	Concrete Wall	HD19	Concrete Wall	HDU8

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

Project: Zheng Residence 1

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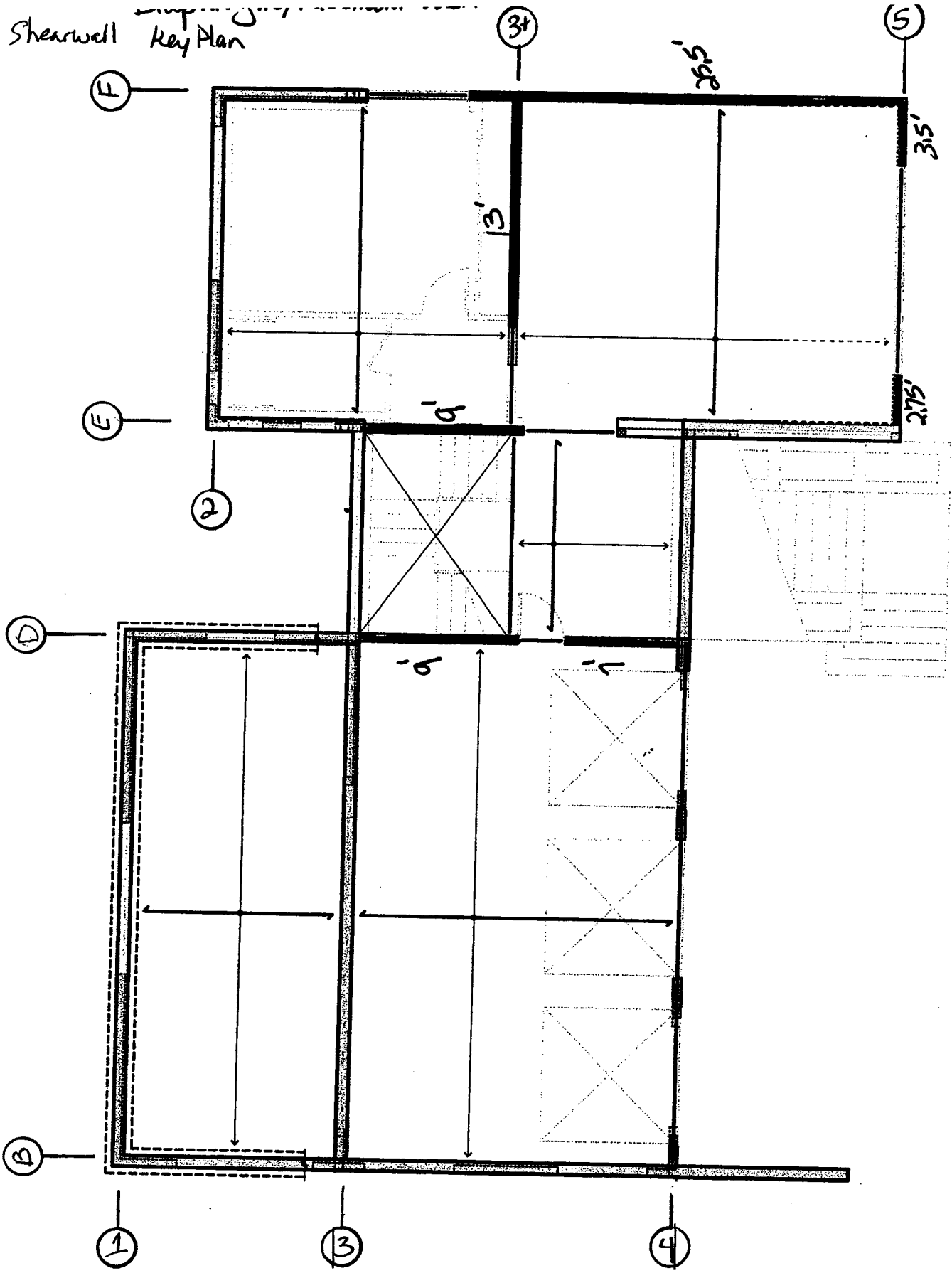ENGINEERING llc

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Sheet L23

Lateral Analysis (cont)   1st Floor diaphragm / Basement walls E/W Direction

Wind: East — $W_1 = \cancel{363}$ 363 plf

$\qquad\qquad W_2 = \cancel{165}$ plf

$\qquad\qquad\qquad 224$ plf

Seismic: East — $W = 33$ plf
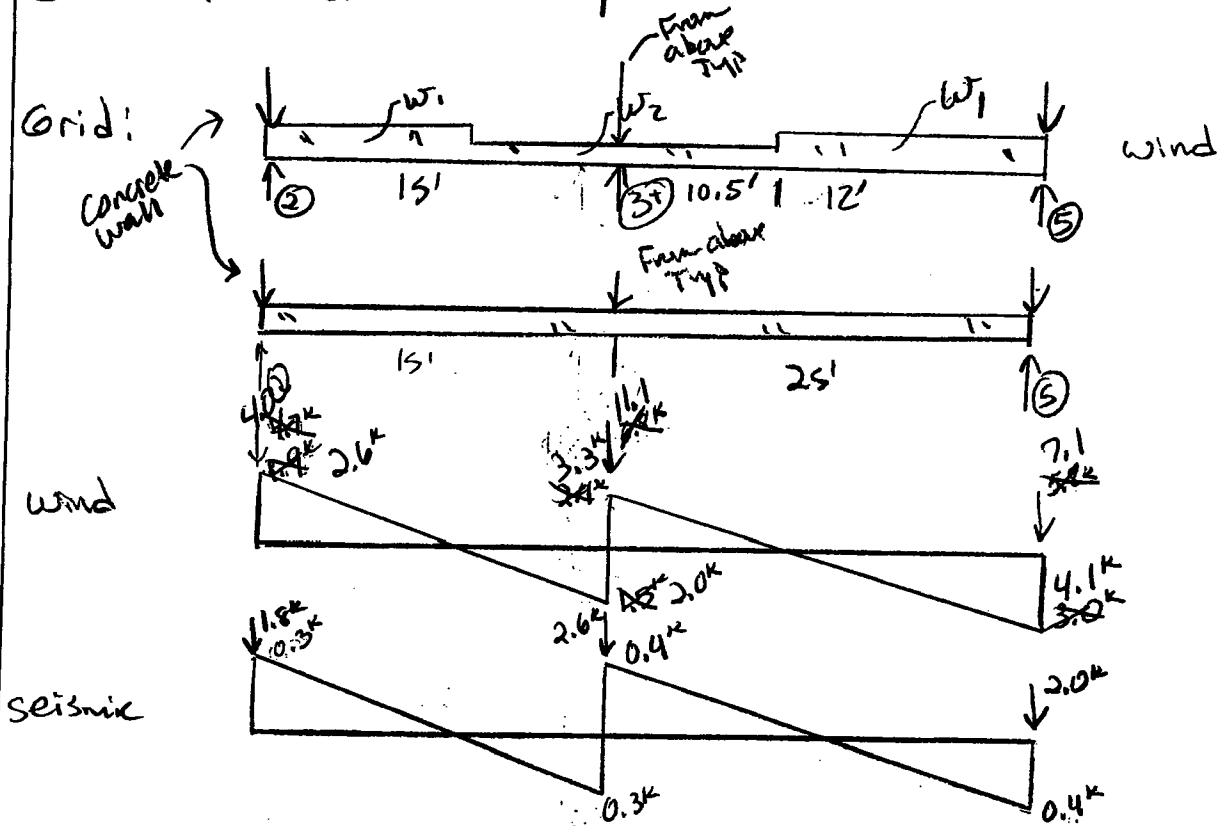
Grid:

East			
Grid	2	3+	5
Vwind (kips)	6.6	16.4	11.2
Vseismic (kips)	2.1	12.5	2.4
Length of wall (ft)	Concrete Wall	13	6.75
v_wind (p/f)	Concrete Wall	1262	1659
v_siesmic (p/l)**	Concrete Wall	962	646
h (ft)	10	10	10
OTF_Wind (lbs)*	Concrete Wall	12615	16593
OTF_Seismic (lbs)*	Concrete Wall	9615	3556
Length of shortest wall pier (ft)	Concrete Wall	13	2.75
Apect Ratio Reduction for Seismic Loads	Concrete Wall	0.77	3.00
Siesmic Penalty	Concrete Wall	1.0	0.55
Shearwall	Concrete Wall	2W3	2W2
Holdown	Concrete Wall	HDU14	(2) HDU14

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

**v_siesmic includes penalty

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Lateral analysis (Cont)

B15   Spandrel Beam   Comp. Cladding Load

$$q_z = 0.00256 \; K_z \, K_{zt} \, K_d \; V^2$$

$$q_z = 0.00256(0.72)(1.84)(0.85)(110)^2 = 35 \text{psf}$$

$V = 110 \text{ mph}$

$K_{zt} = 1.84$ (see pg L9)

$K_d = 0.85$ (Table 26.6-1)

$K_z = 2.01 \left(z/z_g\right)^{2/\alpha} = 0.72$

$z = 33.45'$

$z_g = 1200'$ ⎫

$\alpha = 7.0$ ⎬ Table 26.9-1

Load on Beam   try ⟦ 5¼ x 14 PSL ⟧

$$W = 35 \text{psf}(12.27') = 430 \text{ plf}$$

$\ell = 12.5'$

$M = 8.4^{k\cdot 1}$, $R_1 = R_2 = 2.7^k$

$f_b = 1568 \text{psi} \leq F_b' = 2,900 \text{psi}$

$f_v = 55 \text{psi} \leq F_v' = 290 \text{psi}$
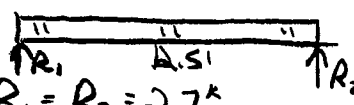
$\Delta_{LL} = 0.636'' = \ell/235$ okay   use ⟦ 5¼ x 14 psl for Spandrel Beam ⟧

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Zheng Residence 1
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Member Uniform Loads

Load Case	Member	Direction	Offset	End Offset	Force	Moment
			ft	ft	K/ft	ft-K/ft
D	BmX002	Force Y	0.000	21.500	-0.015	-NA-
L	BmX002	Force Y	0.000	21.500	-0.040	-NA-

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length	Rz 1	Rz 2	One Way	Framing
					ft				
BmX002	PSL-B 5.25x14	Parallam PSL 2.0E (Beam) NDS Structural Composite Lumber	N001	N002	21.500	Rigid	Rigid	Normal (2-way)	Beam

Load Cases

Load Case	Design Checks	Seismic Type	Results
(1)D	-NA-	-NA-	Yes (2 sets)
(3)E+X	-NA-	-NA-	Yes
(6)E-X	-NA-	-NA-	Yes
(12)L	-NA-	-NA-	Yes (2 sets)
(22)W+X	-NA-	-NA-	Yes
(25)W-X	-NA-	-NA-	Yes
(34)0.75(D+L+W) »+X	Defl. 'Other'	-NA-	Yes (2 sets)
(35)0.75(D+L+W) »-X	Defl. 'Other'	-NA-	Yes (2 sets)
(36)16-10Lr	Allowable (ASD)	-NA-	Yes (2 sets)
(37)16-11Lr	Allowable (ASD)	-NA-	Yes (2 sets)
(38)16-12E »+X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(39)16-12E »+X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(40)16-12E »-X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(41)16-12E »-X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(42)16-12W »+X	Allowable (ASD)	-NA-	Yes (2 sets)
(43)16-12W »-X	Allowable (ASD)	-NA-	Yes (2 sets)
(44)16-13Lr »+X	Allowable (ASD)	-NA-	Yes (2 sets)
(45)16-13Lr »-X	Allowable (ASD)	-NA-	Yes (2 sets)
(46)16-14 »+X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(47)16-14 »+X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(48)16-14 »-X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(49)16-14 »-X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(50)16-15 »+X	Allowable (ASD)	-NA-	Yes (2 sets)
(51)16-15 »-X	Allowable (ASD)	-NA-	Yes (2 sets)
(52)16-15Di	Allowable (ASD)	-NA-	Yes (2 sets)
(53)16-16 »+X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(54)16-16 »+X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(55)16-16 »-X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(56)16-16 »-X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(57)16-9	Allowable (ASD)	-NA-	Yes (2 sets)
(58)D+L	Defl. 'D + L'	-NA-	Yes (2 sets)
(59)D+Lr+R	Defl. 'Other'	-NA-	Yes (2 sets)
(60)Live	Defl. 'L only'	-NA-	Yes (2 sets)
(61)Seismic »+X	Defl. 'Other'	-NA-	Yes (2 sets)
(62)Seismic »-X	Defl. 'Other'	-NA-	Yes (2 sets)
(63)Wind »+X	Defl. 'W or S'	-NA-	Yes (2 sets)
(64)Wind »-X	Defl. 'W or S'	-NA-	Yes (2 sets)

Equation Load Combinations

Load Case	Cases	Equation
0.75(D+L+W) »+X	3	0.75D + 0.75L + 0.75W+X
0.75(D+L+W) »-X	3	0.75D + 0.75L + 0.75W-X

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16-9	2	D + L
16-10Lr	1	D
16-11Lr	2	D + 0.75L
16-12E »+X+30%+Z	2	1.14D + 0.70E+X
16-12E »+X+30%+Z:OS	2	1.14D + 2.10E+X
16-12E »-X+30%+Z	2	1.14D + 0.70E-X
16-12E »-X+30%+Z:OS	2	1.14D + 2.10E-X
16-12W »+X	2	D + 0.60W+X
16-12W »-X	2	D + 0.60W-X
16-13Lr »+X	3	D + 0.75L + 0.45W+X
16-13Lr »-X	3	D + 0.75L + 0.45W-X
16-14 »+X+30%+Z	3	1.10D + 0.75L + 0.53E+X
16-14 »+X+30%+Z:OS	3	1.10D + 0.75L + 1.58E+X
16-14 »-X+30%+Z	3	1.10D + 0.75L + 0.53E-X
16-14 »-X+30%+Z:OS	3	1.10D + 0.75L + 1.58E-X
16-15 »+X	2	0.60D + 0.60W+X
16-15 »-X	2	0.60D + 0.60W-X
16-15Di	1	0.60D
16-16 »+X+30%+Z	2	0.46D + 0.70E+X
16-16 »+X+30%+Z:OS	2	0.46D + 2.10E+X
16-16 »-X+30%+Z	2	0.46D + 0.70E-X
16-16 »-X+30%+Z:OS	2	0.46D + 2.10E-X
D+L	2	D + L
D+Lr+R	1	D
Live	1	L
Seismic »+X	1	E+X
Seismic »-X	1	E-X
Wind »+X	1	W+X
Wind »-X	1	W-X

Member Extreme Results

Member	Fx (lc)	Vy (lc)	Mz (lc)	fbz(-y) (lc)	fbz(+y) (lc)
	K	K	K-ft	Ksi	Ksi
BmX002	0.00 (1)	-6.12 (47)	-19.07 (22)	-1.335 (22)	-1.532 (41)
BmX002	0.00 (1)	3.63 (41)	21.90 (41)	1.532 (41)	1.335 (22)

(lc) = Load Case index, shown in 'Load Cases' table.

Nodal Extreme Reactions

Node	FX	FY	FZ	MX	MY	MZ
	K	K	K	K-ft	K-ft	K-ft
N001	0.000 (1)	-3.064 (22)	0.000 (1)	0.000 (1)	-NA-	-NA-
N001	0.000 (1)	3.625 (41)	0.000 (1)	0.000 (1)	-NA-	-NA-
N003	-NA-	-3.064 (25)	0.000 (1)	0.000 (1)	-NA-	-NA-
N003	-NA-	6.703 (47)	0.000 (1)	0.000 (1)	-NA-	-NA-

Nodal Supports

Node	Fix DX	Fix DY	Fix DZ	Fix RX	Fix RY	Fix RZ
N001	Yes	Yes	Yes	Yes	No	No
N003	No	Yes	Yes	Yes	No	No

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Member Uniform Loads

Load Case	Member	Direction	Offset	End Offset	Force	Moment
			ft	ft	K/ft	ft-K/ft
D	BmX003	Force Y	0.000	10.250	-0.353	-NA-
D	BmX003	Force Y	10.250	20.250	-0.353	-NA-
D	BmX003	Force Y	20.250	29.500	-0.353	-NA-
L	BmX003	Force Y	0.000	10.250	-0.780	-NA-
L	BmX003	Force Y	10.250	20.250	-0.780	-NA-
L	BmX003	Force Y	20.250	29.500	-0.780	-NA-
S	BmX003	Force Y	0.000	10.250	-0.100	-NA-
S	BmX003	Force Y	10.250	20.250	-0.100	-NA-
S	BmX003	Force Y	20.250	29.500	-0.100	-NA-

Member Elements

Member	Section	Material	(1)Node	(2)Node	Length	Rz1	Rz2	One Way	Framing
					ft				
BmX003	W12x45	ASTM A992 Grade 50	N001	N002	29.500	Rigid	Rigid	Normal (2-way)	Beam

Load Cases

Load Case	Design Checks	Seismic Type	Results
(1)D	-NA-	-NA-	Yes (2 sets)
(3)E+X	-NA-	-NA-	Yes (2 sets)
(6)E-X	-NA-	-NA-	Yes (2 sets)
(12)L	-NA-	-NA-	Yes (2 sets)
(20)S	-NA-	-NA-	Yes (2 sets)
(22)W+X	-NA-	-NA-	Yes (2 sets)
(25)W-X	-NA-	-NA-	Yes (2 sets)
(34)0.75(D+L+W) »+X	Defl. 'Other'	-NA-	Yes (2 sets)
(35)0.75(D+L+W) »-X	Defl. 'Other'	-NA-	Yes (2 sets)
(36)16-10Lr	Allowable (ASD)	-NA-	Yes (2 sets)
(37)16-10S	Allowable (ASD)	-NA-	Yes (2 sets)
(38)16-11Lr	Allowable (ASD)	-NA-	Yes (2 sets)
(39)16-11S	Allowable (ASD)	-NA-	Yes (2 sets)
(40)16-12E »+X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(41)16-12E »+X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(42)16-12E »-X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(43)16-12E »-X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(44)16-12W »+X	Allowable (ASD)	-NA-	Yes (2 sets)
(45)16-12W »-X	Allowable (ASD)	-NA-	Yes (2 sets)
(46)16-13Lr »+X	Allowable (ASD)	-NA-	Yes (2 sets)
(47)16-13Lr »-X	Allowable (ASD)	-NA-	Yes (2 sets)
(48)16-13S »+X	Allowable (ASD)	-NA-	Yes (2 sets)
(49)16-13S »-X	Allowable (ASD)	-NA-	Yes (2 sets)
(50)16-14 »+X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(51)16-14 »+X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(52)16-14 »-X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(53)16-14 »-X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(54)16-15 »+X	Allowable (ASD)	-NA-	Yes (2 sets)
(55)16-15 »-X	Allowable (ASD)	-NA-	Yes (2 sets)
(56)16-15Di	Allowable (ASD)	-NA-	Yes (2 sets)
(57)16-16 »+X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(58)16-16 »+X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(59)16-16 »-X+30%+Z	Allowable (ASD)	Redundancy	Yes (2 sets)
(60)16-16 »-X+30%+Z:OS	Allowable (ASD)	Overstrength	Yes (2 sets)
(61)16-9	Allowable (ASD)	-NA-	Yes (2 sets)
(62)D+L	Defl. 'D + L'	-NA-	Yes (2 sets)
(63)D+Lr+R	Defl. 'Other'	-NA-	Yes (2 sets)

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(64)D+S	Defl. 'Other'	-NA-	Yes (2 sets)
(65)Live	Defl. 'L only'	-NA-	Yes (2 sets)
(66)Seismic »+X	Defl. 'Other'	-NA-	Yes (2 sets)
(67)Seismic »-X	Defl. 'Other'	-NA-	Yes (2 sets)
(68)Snow	Defl. 'W or S'	-NA-	Yes (2 sets)
(69)Wind »+X	Defl. 'W or S'	-NA-	Yes (2 sets)
(70)Wind »-X	Defl. 'W or S'	-NA-	Yes (2 sets)

Equation Load Combinations

Load Case	Cases	Equation
0.75(D+L+W) »+X	3	0.75D + 0.75L + 0.75W+X
0.75(D+L+W) »-X	3	0.75D + 0.75L + 0.75W-X
16-9	2	D + L
16-10Lr	1	D
16-10S	2	D + S
16-11Lr	2	D + 0.75L
16-11S	3	D + 0.75L + 0.75S
16-12E »+X+30%+Z	2	1.14D + 0.70E+X
16-12E »+X+30%+Z:OS	2	1.14D + 2.10E+X
16-12E »-X+30%+Z	2	1.14D + 0.70E-X
16-12E »-X+30%+Z:OS	2	1.14D + 2.10E-X
16-12W »+X	2	D + 0.60W+X
16-12W »-X	2	D + 0.60W-X
16-13Lr »+X	3	D + 0.75L + 0.45W+X
16-13Lr »-X	3	D + 0.75L + 0.45W-X
16-13S »+X	4	D + 0.75L + 0.75S + 0.45W+X
16-13S »-X	4	D + 0.75L + 0.75S + 0.45W-X
16-14 »+X+30%+Z	4	1.10D + 0.75L + 0.75S + 0.53E+X
16-14 »+X+30%+Z:OS	4	1.10D + 0.75L + 0.75S + 1.58E+X
16-14 »-X+30%+Z	4	1.10D + 0.75L + 0.75S + 0.53E-X
16-14 »-X+30%+Z:OS	4	1.10D + 0.75L + 0.75S + 1.58E-X
16-15 »+X	2	0.60D + 0.60W+X
16-15 »-X	2	0.60D + 0.60W-X
16-15Di	1	0.60D
16-16 »+X+30%+Z	2	0.46D + 0.70E+X
16-16 »+X+30%+Z:OS	2	0.46D + 2.10E+X
16-16 »-X+30%+Z	2	0.46D + 0.70E-X
16-16 »-X+30%+Z:OS	2	0.46D + 2.10E-X
D+L	2	D + L
D+Lr+R	1	D
D+S	2	D + S
Live	1	L
Seismic »+X	1	E+X
Seismic »-X	1	E-X
Snow	1	S
Wind »+X	1	W+X
Wind »-X	1	W-X

Member Extreme Results

Member	Fx (lc)	Vy (lc)	Mz (lc)	fbz(-y) (lc)	fbz(+y) (lc)
	K	K	K-ft	Ksi	Ksi
BmX003	0.00 (1)	-18.06 (43)	-18.05 (60)	-3.754 (60)	-4.569 (41)
BmX003	0.00 (1)	19.91 (41)	21.97 (41)	4.569 (41)	3.754 (60)

(lc) = Load Case index, shown in 'Load Cases' table.

Nodal Extreme Reactions

Node	FX	FY	FZ	MX	MY	MZ
	K	K	K	K-ft	K-ft	K-ft

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Shearwall Capacity Table: Based on Table 4.3A, AWC SDPWS-2008

| Shearwall Type | DF (PlF) | | TOP Plate (PLF) | | Base Plate | |
	Wind	Seis	TJI (PlF)	2x or LSL	AT wood (PLF)	AT CONC. (PLF)
W6	365	260	16d @ 6" oc / 242	A35 @ 24" oc / 298	16d @ 6" oc / 242	5/8" ØAB @ 48" oc / 372
W4	532	380	(2) Rows 16d @ 6" oc / 484	A35 @ 16" oc / 446	(2) Rows 16d @ 6" oc / 484	5/8" ØAB @ 32" oc / 558
W3	685	490	(2) Rows 16d @ 6" oc / 484	A35 @ 12" oc / 595	(2) Rows 16d @ 6" oc / 484	5/8" ØAB @ 16" oc / 1116
W2	895	640	(2) Rows 16d @ 4½" oc / 645	A35 @ 9" oc / 793	(2) Rows 16d @ 4½" oc / 645	5/8" ØAB @ 12" oc / 1488
2W3	1370	980	N/A	A35 @ 6" oc / 1190	(2) Rows 16d @ 3" oc / 968	5/8" ØAB @ 16" oc / 1416
2W2	1790	1280	N/A	HGA10TK @ 8" oc / 1747	(2) Rows 16d @ 2" oc / 1452	5/8" ØAB @ 12" oc / 1888

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ROOF FRAMING KEYPLAN

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B6

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B1

B3

B4

B4

B3

B1

B1

B1

B1

B1

B1

B2

SCALE: 1/8" = 1'-0"

ZHENG RESIDENCE 1

F1
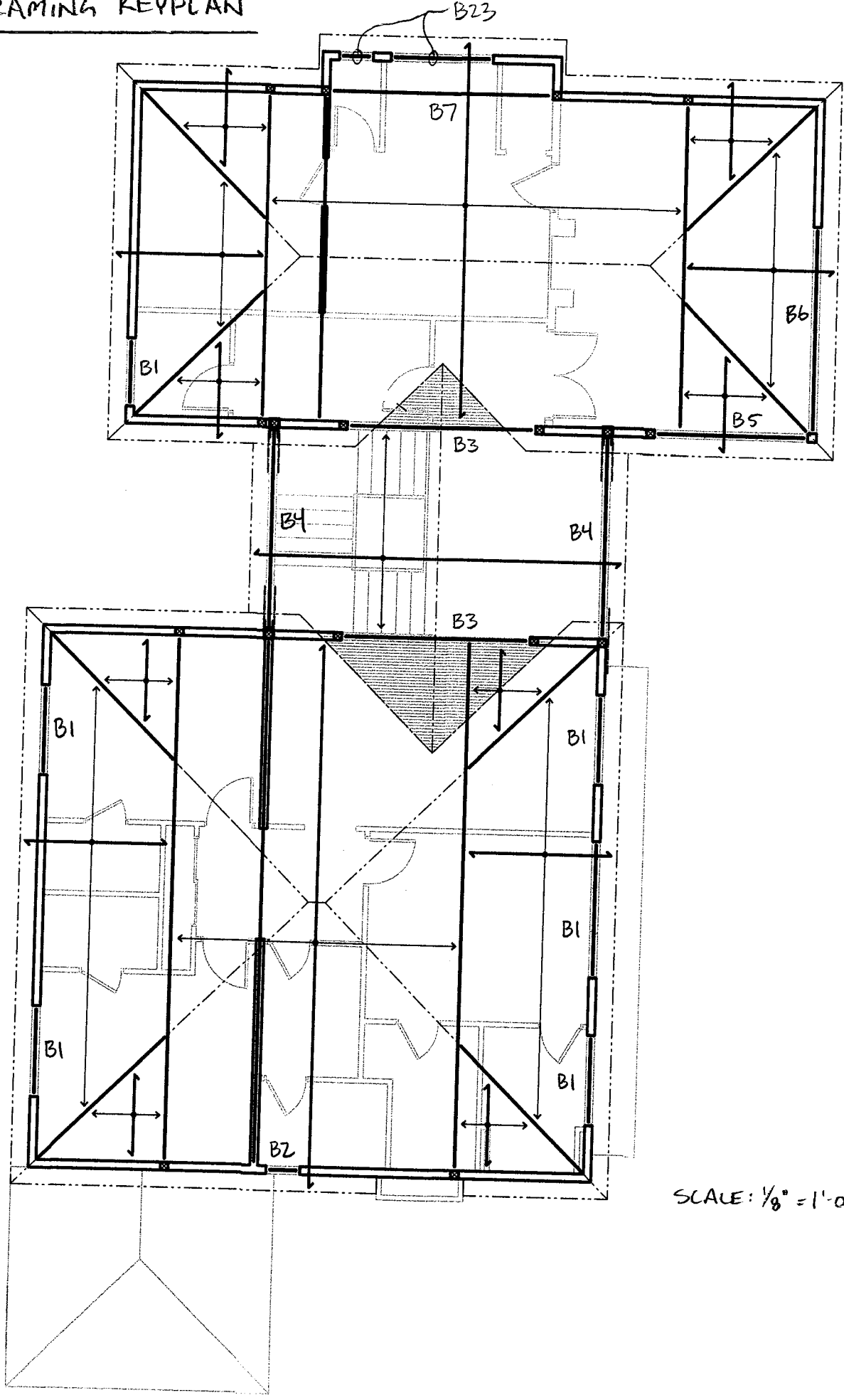
	b (in)	d (in)	Sx (in³)	Ix (in⁴)
2x4	1.5	3.5	3.06	5.36
2x6	1.5	5.5	7.56	20.80
2x8	1.5	7.25	13.14	47.63
2x10	1.5	9.25	21.39	98.93
2x12	1.5	11.25	31.64	177.98
2x14	1.5	13.25	43.89	290.78
3x4	2.5	3.5	5.10	8.93
3x6	2.5	5.5	12.60	34.66
3x8	2.5	7.25	21.90	79.39
3x10	2.5	9.25	35.65	164.89
3x12	2.5	11.25	52.73	296.63
3x14	2.5	13.25	73.15	484.63
4x4	3.5	3.5	7.15	12.51
4x6	3.5	5.5	17.65	48.53
4x8	3.5	7.25	30.66	111.15
4x10	3.5	9.25	49.91	230.84
4x12	3.5	11.25	73.83	415.28
4x14	3.5	13.25	102.41	678.48
6x6	5.5	5.5	27.73	76.26
6x8	5.5	7.5	51.56	193.36
6x10	5.5	9.5	82.73	392.96
6x12	5.5	11.5	121.23	697.07
6x14	5.5	13.5	167.06	1127.67
6x16	5.5	15.5	220.23	1706.78

	Hem-Fir No. 2		
M(#-ft)	Cd=1.0	Cd=1.15	Cd=1.6
(2)2x4	651	748	1,041
(2)2x6	1,393	1,602	2,228
(2)2x8	2,234	2,569	3,574
(2)2x10	3,333	3,833	5,333
(2)2x12	4,482	5,155	7,172
(2)2x14	5,596	6,485	8,954
DF-L No. 2			
3x4	574	660	919
3x6	1,229	1,413	1,966
3x8	1,971	2,267	3,154
3x10	2,941	3,382	4,706
3x12	3,955	4,548	6,328
3x14	4,938	5,678	7,900
DF-L No. 2			
4x4	804	924	1,286
4x6	1,720	1,979	2,753
4x8	2,989	3,438	4,783
4x10	4,492	5,166	7,187
4x12	6,091	7,004	9,745
4x14	7,681	8,833	12,289
DF-L No. 1			
6x6	3,120	3,587	4,991
6x8	5,801	6,671	9,281
6x10	9,307	10,703	14,891
6x12	13,638	15,684	21,821
6x14	18,550	21,333	29,680
6x16	24,081	27,693	38,530

ZHENG RESIDENCE 1

F2

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

Series	Width	Design Property	4½"	5½"	7¼"	9¼"	9½"	11⅞"	14"	16"	18"
					Depth						

(1) For product in beam orientation, unless otherwise noted.

ZHENG RESIDENCE 1

Design Stresses[1] (100% Load Duration)

Grade	Orientation	Shear Modulus of Elasticity (psi)	E Modulus of Elasticity (psi)	E min Adjusted Modulus of Elasticity (psi)	F_b Flexural Stress (psi)	F_t Design Tension (psi)	F_c⊥ Compression Perpendicular to Grain (psi)	F_c Compression Parallel to Grain (psi)	F_v Horizontal Shear (psi)	F_rL Compression Perpendicular Parallel (psi)	G Specific Gravity
					TimberStrand® LSL						
1.3E	Beam/Column	81,250	1.3 x 10⁶	660,750	1,710	1,075	750	710	425	0.50
	Plank	81,250	1.3 x 10⁶								
1.55E	Beam	96,875	1.55 x 10⁶	787,815	2,325	1,070	900	2,170	310	0.50
	Plank	96,875	1.55 x 10⁶								
					Microllam® LVL						
2.0E	Beam	125,000	2.0 x 10⁶	1,016,535	2,600	1,555	750	2,510	285	0.50
	Plank	125,000	2.0 x 10⁶	914,880							
					Parallam® PSL						
2.2E	Beam	137,500	2.2 x 10⁶	1,117,795	2,900	2,025	625	2,900	190	0.50
	Column	137,500	2.2 x 10⁶								

(1) Unless otherwise noted, adjustment to the design stresses for duration of load are permitted in accordance with the applicable code.

(2) Reference modulus of elasticity for beam and column stability calculations, per NDS®.

(3) For 12" depth. For other depths, multiply F_b by the appropriate factor as follows:
- For TimberStrand® LSL, multiply by $\left[\frac{12}{d}\right]^{0.092}$
- For Microllam® LVL, multiply by $\left[\frac{12}{d}\right]^{0.136}$
- For Parallam® PSL, multiply by $\left[\frac{12}{d}\right]^{0.111}$

(4) F_t has been adjusted to reflect the volume effects for most standard applications.

(5) $F_{c\perp}$ may not be increased for duration of load.

(6) For lateral connection design only.

(7) Specific gravity of 0.58 may be used for bolts installed perpendicular to face and loaded perpendicular to grain.

(8) Values are for thickness up to 3½".

(9) For members less than 1¾" thick and in plank orientation, use $F_{c\perp}$ of 670 psi. NDS® bearing area factor $C_b = 1.0$.

(10) Value accounts for large hole capabilities. See **Allowable Holes** on page 26.

(11) Value shown is for plank orientation.

(12) For column applications, use $F_{c\perp}$ of 500 psi. Alternatively, refer to ESR-1387, Table 1, footnote 15.

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 7¼" and less in depth are restricted to a maximum deflection of ⁹⁄₁₆".
- Beams that are 1¾" x 16" and deeper require multiple plies.
- No camber.
- Beams and columns must remain straight to within 5⅛/608 (in.) of true alignment. L is the unstrained length of the member in feet.

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

See pages 28 and 29 for multiple-member beam connections.
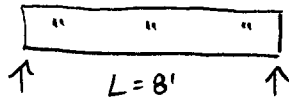

Beam Orientation
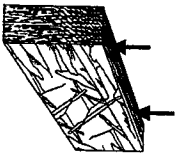
Column Orientation

Plank Orientation

ZHENG RESIDENCE 1

ROOF FRAMING

$D_L = 15 psf$, $S_L = 25 psf$

B1

$L = 8'$

$W = 4.5(40) = 180 plf$

$R = 720^\#$ $M = 1.44 k^{-1}$

$f_b = 658 psi$ $f_v = 50 psi$

$\Delta_{TL} = 0.14'' = \ell/686$

$\boxed{(2) 2\times 8}$

B2
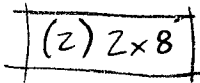
$L = 2'$
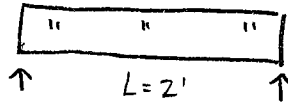
$W = 17(40) = 680 plf$

$R = 680^\#$ $M = 340^{\#-1}$

$f_b = 155 psi$ $f_v = 47 psi$

$\Delta_{TL} = 0.01'' = \ell/2400$

$\boxed{(2) 2\times 8}$

B3

$3410^\#$

$L = 11'$ R_1 R_2
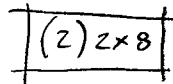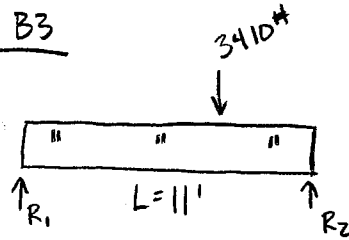
$W = 15(40) + 40 = 640 plf$

$R_1 = 4600^\#$ $R_2 = 5840^\#$

$M = 16.6 k^{-1}$

$f_b = 2420 psi$ $f_v = 211 psi$

$\Delta_{TL} = 0.32'' = \ell/413$

USE: $\boxed{3\frac{1}{2}'' \times 11\frac{7}{8}'' \ PSL}$

B4

$L = 12'$
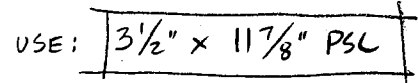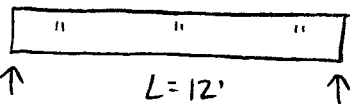
$W = \left(\frac{22}{2}\right)(40) = 440 plf$

$R = 2640^\#$ $M = 7.92 k^{-1}$

$f_b = 1149 psi$ $f_v = 78 psi$

$\Delta_{TL} = 0.32'' = \ell/450$

$\boxed{6\times 10}$

B5

$2200^\#$

$L = 9'$ R_1 R_2
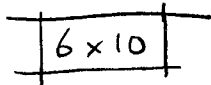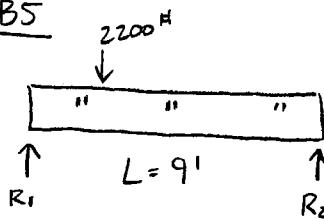
$W = \left(\frac{9}{2}\right)(40) = 180 plf$

$R_1 = 2640^\#$ $R_2 = 1180^\#$

$M = 3.85 k^{-1}$

$f_b = 925 psi$ $f_v = 122 psi$

$\Delta_{TL} = 0.15'' = \ell/720$

$\boxed{4\times 10}$

B6

$L = 12'$
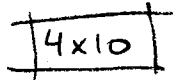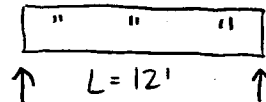
$W = \left(\frac{9}{2}\right)(40) = 180 plf$

$R = 1080^\#$

$M = 3.24 k^{-1}$

$f_b = 779 psi$

$f_v = 50 psi$

$\Delta_{TL} = 0.22''$
$= \ell/655$

$\boxed{4\times 10}$

B7

$L = 13'$
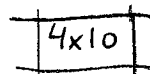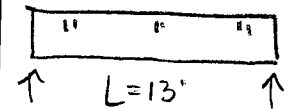
$W = 19\frac{1}{2}(40) = 380$

$R = 2470^\#$

$M = 8.03 k^{-1}$

$f_b = 795 psi$

$f_v = 59 psi$

$\Delta_{TL} = 0.22''$
$= \ell/709$

$\boxed{6\times 12}$

B23

$L = 6'$
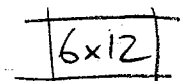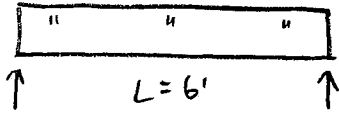
$W = 3(40) = 120 plf$

$R = 360\#$ $M = 0.54 k^{-1}$

$f_b = 247 psi$ $f_v = 25 psi$

$\Delta_{TL} = 0.03'' = \ell/2400$

$\boxed{(2) 2 \times 8}$

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ENGINEERING LLC

Project   ZHENG RESIDENCE 1

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Date

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F1   F2

B25

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B27   B28   B16   B27

F1

B12

B15   B11   B14

B13

F1   F1

B10

SCALE ⅛" = 1'-0"

B9

B9

B8

ZHENG RESIDENCE i

F7

1 piece(s) 14" TJI® 210 @ 16" OC

Overall Length: 20'

(F1)

19' 1"

|1| |2|

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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	723 @ 4 1/2"	1460 (3.50")	Passed (49%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	700 @ 5 1/2"	1945	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3397 @ 10'	4490	Passed (76%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.331 @ 10'	0.481	Passed (L/698)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.455 @ 10'	0.962	Passed (L/508)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	47	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' 9 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: 5/8" Gypsum ceiling.

Supports	Bearing Length			Loads to Supports (lbs)			
	Total	Available	Required	Dead	Floor Live	Total	Accessories
1 - Stud wall - DF	5.50"	3.75"	1.75"	200	533	733	1 3/4" Rim Board
2 - Stud wall - DF	5.50"	3.75"	1.75"	200	533	733	1 3/4" Rim Board

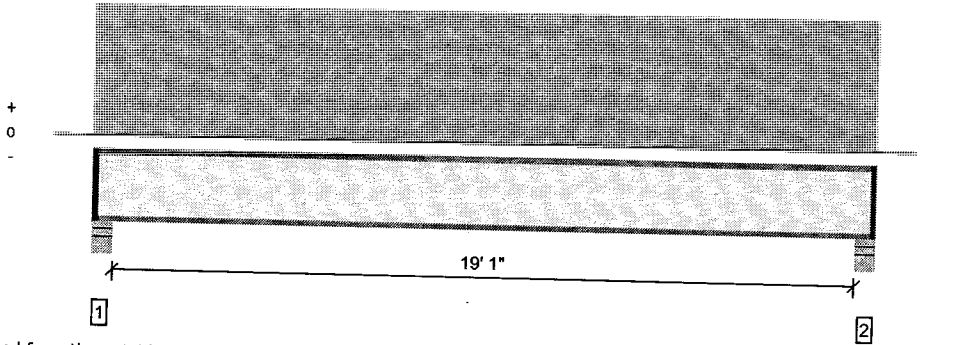* Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 20'	16"	15.0	40.0	Residential - Living Areas

SUSTAINABLE FORESTRY INITIATIVE

F8

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

1 piece(s) 1 3/4" x 9 1/2" 2.0E Microllam® LVL @ 16" OC

Overall Length: 4' 11 1/2"

(F2)
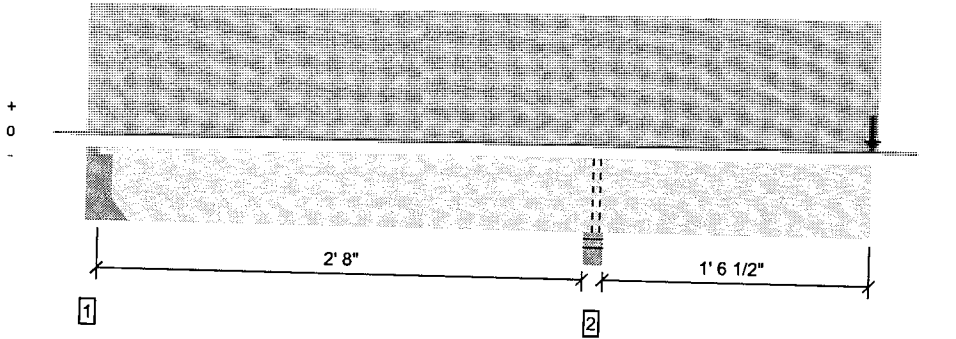
2' 8"   1' 6 1/2"

1   2

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

Design Results

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	539 @ 3' 2 1/4"	4091 (5.50")	Passed (13%)	--	1.0 D + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	176 @ 4' 2 1/2"	3633	Passed (5%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Moment (Ft-lbs)	-336 @ 3' 2 1/4"	7041	Passed (5%)	1.15	1.0 D + 0.75 L + 0.75 S (All Spans)
Live Load Defl. (in)	0.004 @ 4' 11 1/2"	0.200	Passed (2L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt Spans)
Total Load Defl. (in)	0.007 @ 4' 11 1/2"	0.200	Passed (2L/999+)	--	1.0 D + 0.75 L + 0.75 S (Alt 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).
- Overhang deflection criteria: LL (0.2") and TL (0.2").
- Bracing (Lu): All compression edges (top and bottom) must be braced at 4' 8" o/c unless detailed otherwise. Proper attachment and positioning of lateral bracing is required to achieve member 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: 5/8" Gypsum ceiling.

Supports

Supports	Bearing Length Total	Available	Required	Loads to Supports (lbs) Dead	Floor Live	Snow	Total	Accessories
1 - Hanger on 9 1/2" SPF beam	3.50"	Hanger¹	1.50"	44	93/-13	-46	137/-59	See note ¹
2 - Stud wall - SPF	5.50"	5.50"	1.50"	298	201	121	620	Blocking

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

Connector: Simpson Strong-Tie Connectors

Support	Model	Seat Length	Top Nails	Face Nails	Member Nails	Accessories
1 - Face Mount Hanger	IUS1.81/9.5	2.00"	N/A	8-10d x 1-1/2	2-10d x 1-1/2	

Loads

Loads	Location	Spacing	Dead (0.90)	Floor Live (1.00)	Snow (1.15)	Comments
1 - Uniform (PSF)	0 to 4' 11 1/2"	16"	45.0	40.0	-	Residential - Living Areas
2 - Point (lb)	4' 11 1/2"	N/A	45	-	75	

Weyerhaeuser Notes

SUSTAINABLE FORESTRY INITIATIVE

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

SECOND FLOOR FRAMING $D_L = 15\,psf$, $L_L = 40\,psf$, $S_L = 25\,psf$

B8

$L = 20'$
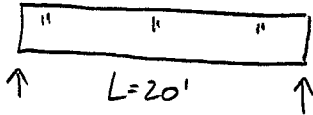
$W = 4.5(40) = 180\,plf$

$R = 1800^{\#}$ $M = 9.0\,k^{-1}$

$f_b = 890\,psi$ $f_v = 43\,psi$

$\Delta_{TL} = 0.58'' = \ell/413$

$\boxed{6 \times 12}$

B9

$2200^{\#}$ W_2 W_1

$L = 11.5'$ R_1 R_2
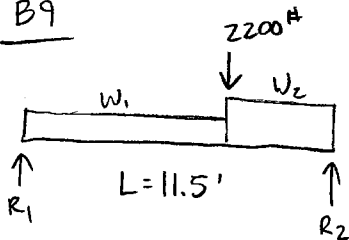
$W_1 = 4.5(40) = 180\,plf$

$W_2 = 11(40) = 440\,plf$

$R_1 = 1980^{\#}$

$R_2 = 3330^{\#}$

$M = 9.80\,k^{-1}$

$f_b = 970\,psi$

$f_v = 79\,psi$

$\Delta_{TL} = 0.18''$

$= \ell/766$

$\boxed{6 \times 12}$

RIM JOIST CALCULATIONS

WORST CASE

$720^{\#}$ $720^{\#}$

$L_{MAX} = 9'$

$W = \left(\frac{19}{2}\right)(55) + 90 = 613\,plf$

$R = 3480^{\#}$ $M = 6.57\,k^{-1}$

$f_b = 1380\,psi$ $f_v = 213\,psi$

$\Delta_{TL} = 0.16'' = \ell/675$

USE: $\boxed{3\frac{1}{2}'' \times 14'' \text{ LSL}}$

B10

$L = 23.5'$
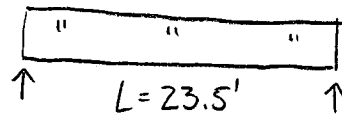
$W = \left(\frac{19}{2}\right)(55) + \left(\frac{12.5}{2}\right)(55)$

$= 523 + 344$

$= 867\,plf$

$R = 10.2\,k^{\#}$ $M = 59.85\,k^{-1}$

TRY: $\underline{W10 \times 45}$

$\dfrac{M_p}{\Omega_b} = 166\,k^{-1}$ $\dfrac{M_R}{\ell_p} = 105\,k^{-1}$

$\dfrac{V_n}{\Omega_V} = 74.7\,k^{-1}$

USE $\boxed{W10 \times 54}$

B11

$L = 12'$
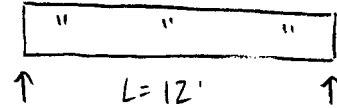
$W = 3(55) = 165\,plf$

$R = 990^{\#}$ $M = 2.97\,k^{-1}$

$f_b = 312\,psi$ $f_v = 30\,psi$

$\Delta_{TL} = 0.06'' = \ell/2400$

$\boxed{3\frac{1}{2}'' \times 14'' \text{ LSL}}$

B12

$330^{\#}$ $1013^{\#}$

W_1 W_2

$L = 11'$ R_1 R_2
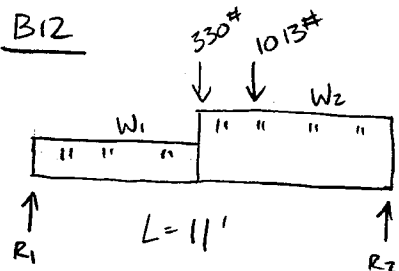
$W_1 = \left(\frac{19}{2}\right)(55) + 90 = 613\,plf$

$W_2 = \left(\frac{12}{2}\right)(55) + W_1 = 943\,plf$

$R_1 = 4510^{\#}$ $R_2 = 5560^{\#}$

$M = 15.5\,k^{-1}$

$f_b = 1630^{\#}$ $f_v = 170\,psi$

$\Delta_{TL} = 0.26'' = \ell/508$

$\boxed{3\frac{1}{2}'' \times 14'' \text{ LSL}}$

SECOND FLOOR FRAMING (CON'T)

B13
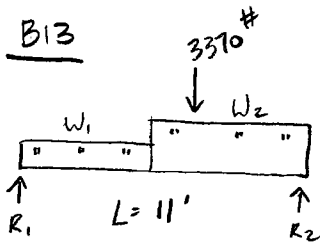
$W_1 = 1(55) + 90 = 145 plf$

$W_2 = W_1 + \left(\frac{12}{2}\right)(55) = 475 plf$

$R_1 = 2720^\#\qquad R_2 = 4230^\#$

$M = 14.2 k^{-1}$

$f_b = 1490 psi\qquad f_v = 130 psi$

$\Delta_{TL} = 0.21'' = \ell/629$

$$\boxed{3\tfrac{1}{2}'' \times 14''\ LSL}$$

B14

$W = 1(55) + 25 = 80 plf$

$R = 480^\#\qquad M = 1.44 k^{-1}$

$f_b = 303 psi$

$f_v = 30 psi$

$\Delta_{TL} = 0.06''$

$\qquad = \ell/2400$

$$\boxed{1\tfrac{3}{4}'' \times 14''\ LSL}$$

B15
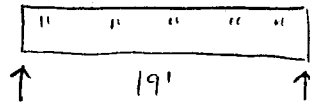
$W = 2(55) = 110 plf$

$R_1 = R_2 = 1045^\#\qquad M = 4.96 k^{-1}$

$f_b = 521 psi\qquad f_v = 32 psi$

$\Delta_{TL} = 0.26'' = \ell/877$

$$\boxed{3\tfrac{1}{2}'' \times 14''\ LSL}$$

B16
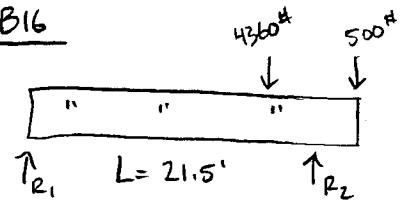
$W = 2(55) = 110 plf$

$R_1 = 1650^\#\quad R_2 = 5580^\#\quad M = 12.4 k^{-1}$

$f_b = 865 psi\qquad f_v = 130 psi$

$\Delta_{TL} = 0.31'' = \ell/735$

$$\boxed{5\tfrac{1}{4}'' \times 14''\ PSL}$$

B17
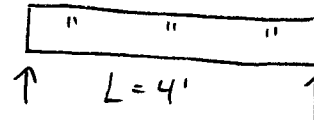
$W = 1230\left(\frac{24}{16}\right) = 1845 plf$

$R = 3690^\#\qquad M = 3.69 k^{-1}$

$f_b = 887 psi\qquad f_v = 171 psi$

$\Delta_{TL} = 0.03'' = \ell/1600$

$$\boxed{4 \times 10}$$

ZHENG RESIDENCE 1

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Sheet

$D_L = 15psf, \quad L_L = 40psf, \quad S_L = 25psf$

B24

$120^{\#}$
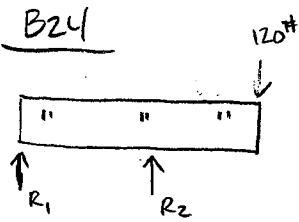
$L = 5.25'$

$W = 2(85) = 170 \, plf$

＊ EXTRA $30 \, plf$ ADDED FOR CONCRETE + TILE BASE

$R_1 = 138^{\#} \quad R_2 = 874^{\#}$

$M = 513^{\#}{-}' \quad f_b = 54 psi$

$\Delta_{TL} = 0.01'' = \ell/6300$

$\boxed{3\frac{1}{2}'' \times 14 \; LSL}$

B25

$500^{\#} \quad 138^{\#}$

$W_1 \qquad W_2$

$R_1 \qquad L = 13' \qquad R_2$
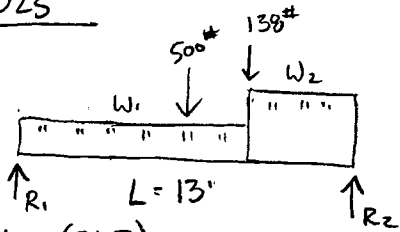
$W_1 = \left(\frac{21.5}{2}\right)(55) = 592 \, plf$

$W_2 = \left(\frac{15.5}{2}\right)(55) + \left(\frac{5.25}{2}\right)(85)$

$\qquad = 426 + 223 = 649 \, plf$

$R_1 = 4150^{\#} \quad R_2 = 4360^{\#}$

$M = 14.5 k^{-'} \quad f_b = 1520 psi$

$f_v = 134 psi$

$\Delta_{TL} = 0.35'' = \ell/446$

$\boxed{3\frac{1}{2}'' \times 14'' \; LSL}$

Project ___ ZHENG RESIDENCE ___

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Project # ___

Designer ___

Date ___

$\boxed{F12}$

Sheet

FIRST FLOOR FRAMING KEYPLAN

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F1

*SEE SHEET
L26

SCALE: 1/8" = 1'-0"

ZHENG RESIDENCE 1

F13
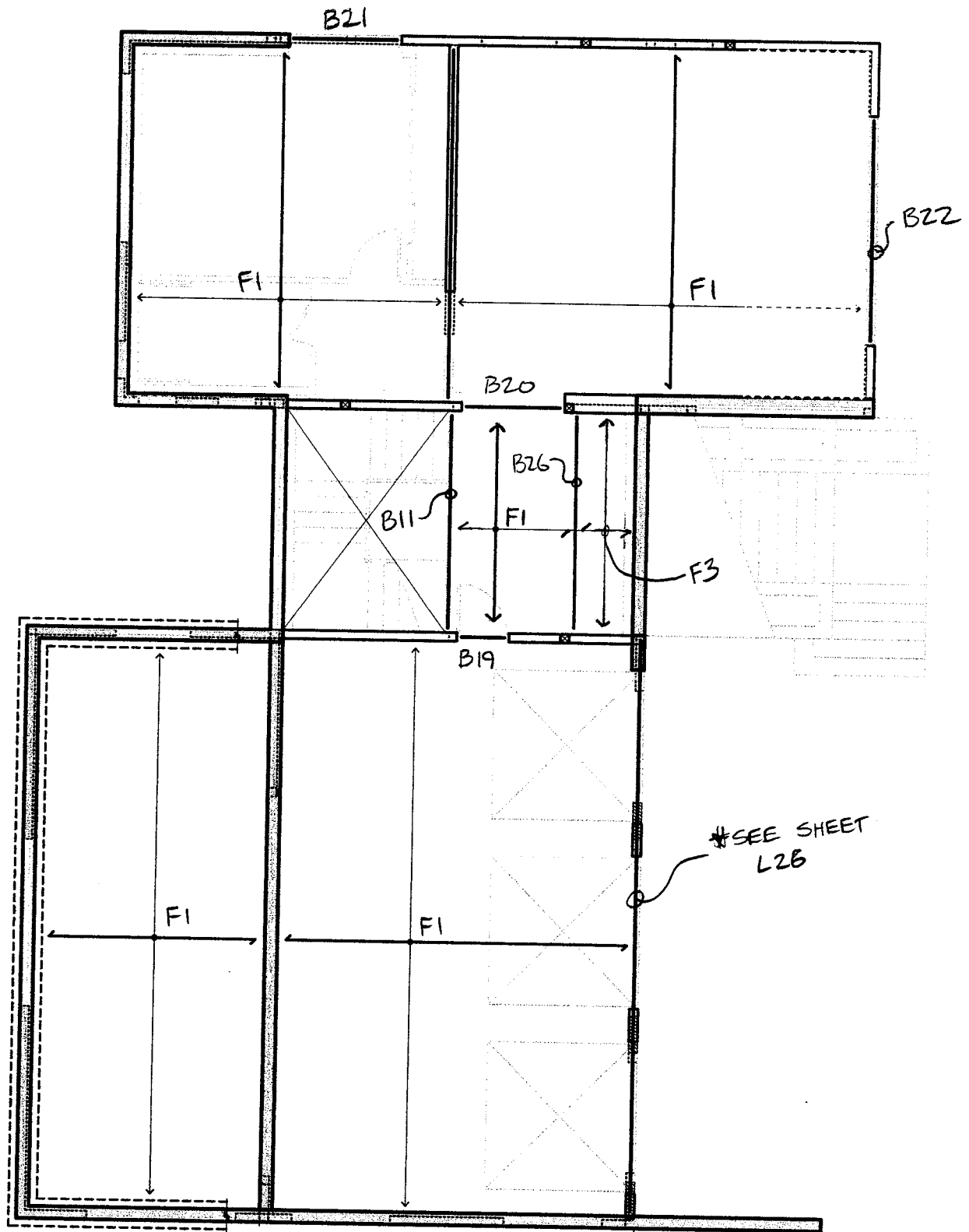
FIRST FLOOR FRAMING

$D_L = 15\,psf,\quad L_L = 40\,psf,\quad L_L @ DECK = 60\,psf$

B18

$3480^{\#}$ $3480^{\#}$

$L = 8.25'$ R_1 R_2
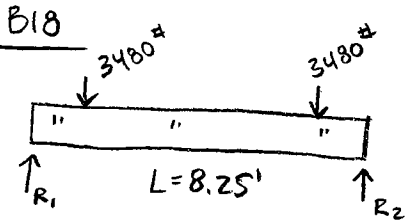
$W = 180 + 613 + \left(\frac{19}{2}\right)(55) = 1316\,plf$

$R_1 = R_2 = 8910^{\#}$

$M = 15.5\,k^{-1}$

$f_b = 1630\,psi \quad f_v = 273\,psi$

$\Delta_{TL} = 0.16'' = \ell/619$

$$\boxed{3\tfrac{1}{2}'' \times 14'' \text{ LSL}}$$

B19

$L = 3'$

$W = 1(55) + \left(\frac{12}{2}\right)(55) = 385\,plf$

$R = 578^{\#} \quad M = 433^{\#-1}$

$f_b = 198\,psi \quad f_v = 40\,psi$

$\Delta_{TL} = 0.01'' = \ell/3600$

$$\boxed{(2)\ 2\times 8}$$

B20

W_1 $330^{\#}$ W_2

$L = 6'$ R_1 R_2
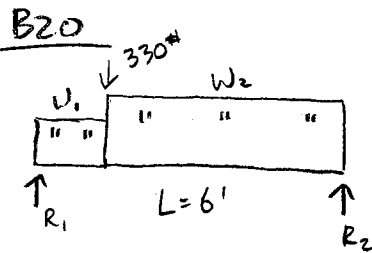
$W_1 = \left(\frac{19}{2}\right)(55) = 523\,plf$

$W_2 = \left(\frac{19}{2}\right)(55) + \left(\frac{12}{2}\right)(55) = 853\,plf$

$R_1 = 2370^{\#} \quad R_2 = 2580^{\#}$

$M = 3.9\,k^{-1}$

$f_b = 938\,psi \quad f_v = 120\,psi$

$\Delta_{TL} = 0.07'' = \ell/1028$

$$\boxed{4\times 10}$$

B21

$3690^{\#}$

$L = 6'$ R_1 R_2

$W = \left(\frac{19}{2}\right)(55) + 100 = 623\,plf$

$R_1 = 5890^{\#} \quad R_2 = 4340^{\#}$

$M = 10.2\,k^{-1} \quad f_b = 1070\,psi$

$f_v = 180\,psi$

$\Delta_{TL} = 0.05'' = \ell/1440$

$$\boxed{3\tfrac{1}{2}'' \times 14'' \text{ LSL}}$$

B22

$L = 12'$
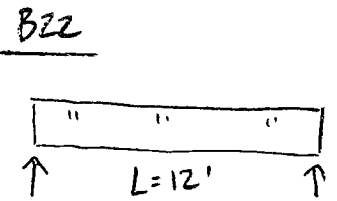
$W = 1(55) + 100 = 155\,plf$

$R = 930^{\#} \quad M = 2.79\,k^{-1}$

$f_b = 671\,psi \quad f_v = 43\,psi$

$\Delta_{TL} = 0.2'' = \ell/720$

$$\boxed{4\times 10}$$

B26

$L = 12'$
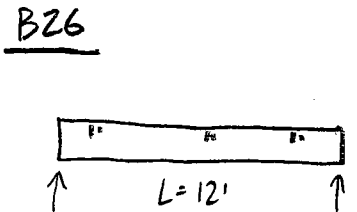
$W = 3(55) + 1.5(75) + 100 = 378\,plf$

$R = 2268^{\#} \quad M = 6.8\,k^{-1}$

$f_b = 714\,psi \quad f_v = 69\,psi$

$\Delta_{TL} = 0.14'' = \ell/1028$

USE: $\boxed{3\tfrac{1}{2}'' \times 14'' \text{ LSL}}$

Project: ZHENG RESIDENCE I

Project # CRD

Designer

Date

Sheet: F14

Porch Joists

L =	3 ft 6 in		Lumber Type =	Hem-Fir #2	
w_{DL} =	52 psf		F_b =	850 psi	
w_{LL} =	60 psf		F_v =	150 psi	
Spacing =	16 in o.c.		E =	1,300,000 psi	
Joist Size	2x8		C_D =	1	
S =	13.14 in^3		C_r =	1.15	
I =	47.63 in^4		C_F =	1.2	
A =	10.88 in^2		incised	no	
M =	229 #-ft				
R1 = R2 =	261 #		E' =	1300000 psi	
f_b =	209 psi		F_b' =	1173 psi	**OK**
f_v =	36.0 psi		F_v' =	150 psi	**OK**
Δ_{DL} =	0.004 in	=	L/	11110	
Δ_{LL} =	0.004 in	=	L/	9629	
Δ_{TL} =	0.008 in	=	L/	5158	

F15

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title	3' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	3.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem =		0.0 psf

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios
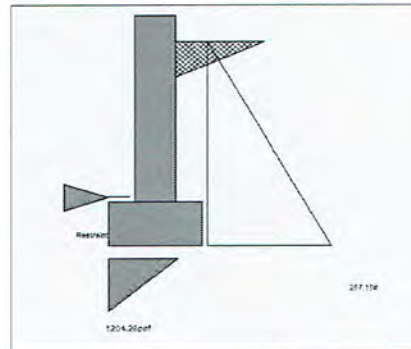
Overturning	=	1.77 OK
Slab Resists All Sliding !		
Total Bearing Load	=	675 lbs
...resultant ecc.	=	4.52 in
Soil Pressure @ Toe	=	1,204 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,445 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	0.0 psi OK
Footing Shear @ Heel	=	2.5 psi OK
Allowable	=	75.0 psi

Sliding Calcs Slab Resists All Sliding !

Lateral Sliding Force	=	257.2 lbs

Stem Construction

		Top Stem
		Stem OK
Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Thickness	=	8.00
Rebar Size	=	# 4
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.047
Total Force @ Section	lbs =	252.0
Moment....Actual	ft-# =	252.0
Moment.....Allowable	=	5,412.6
Shear.....Actual	psi =	3.4
Shear.....Allowable	psi =	75.0
Wall Weight	=	100.0
Rebar Depth 'd'	in =	6.25
LAP SPLICE IF ABOVE	in =	18.72
LAP SPLICE IF BELOW	in =	
HOOK EMBED INTO FTG	in =	6.00

Hook embedment reduced by stress ratio

Masonry Data

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

Concrete Data

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

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

East Mercer Parcel 1

Ret 1

Use menu item Settings > Printing & Title Block
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for your program.

Title   3' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	0.42 ft
Heel Width	=	1.08
Total Footing Width	=	1.50
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c =   2,500 psi   Fy =   60,000 psi
Footing Concrete Density =   150.00 pcf
Min. As % =   0.0018
Cover @ Top   2.00   @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	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 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

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... 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 Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
Total		257.2	O.T.M.	328.6	Stem Weight(s)	=	350.0	0.75	262.6
	=		=		Earth @ Stem Transitions	=			
Resisting/Overturning Ratio	=	1.77			Footing Weight	=	187.5	0.75	140.6
Vertical Loads used for Soil Pressure =		674.9 lbs			Key Weight	=			
					Vert. Component	=			
					Total =		674.9 lbs	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 Parcel 1

Ret

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   3' 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

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 footing

Lap Splice length for #4 bar specified in this stem design segment =   18.72 in

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

Hooked embedment length into footing for #4 bar specified in this stem design segment =   6.00 in

East Mercer Parcel 1

Ret 3

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   3' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

8" w/ #4 @ 12"

Restraint

5"   1'-1"

1'-6"

6"

3'-0"   3'-6"

10"

East Mercer Parcel 1

Ret 4

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title: **4' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	4.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem =		0.0 psf

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Design Summary
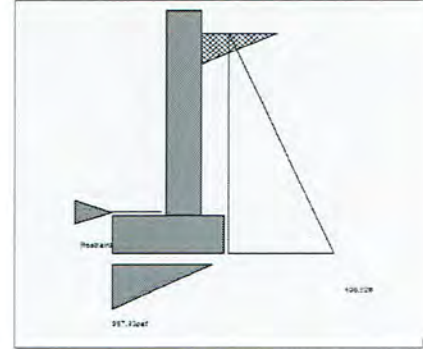
Wall Stability Ratios

Overturning	=	1.84 OK
Slab Resists All Sliding !		
Total Bearing Load	=	894 lbs
...resultant ecc.	=	5.03 in
Soil Pressure @ Toe	=	957 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,149 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	5.0 psi OK
Footing Shear @ Heel	=	3.0 psi OK
Allowable	=	75.0 psi

Sliding Calcs Slab Resists All Sliding !

Lateral Sliding Force	=	408.8 lbs

Stem Construction   Top Stem

Stem OK

Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Thickness	=	8.00
Rebar Size	=	# 4
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.110
Total Force @ Section lbs =		448.0
Moment....Actual ft-# =		597.3
Moment.....Allowable	=	5,412.6
Shear.....Actual psi =		6.0
Shear.....Allowable psi =		75.0
Wall Weight	=	100.0
Rebar Depth 'd' in =		6.25
LAP SPLICE IF ABOVE in =		18.72
LAP SPLICE IF BELOW in =		
HOOK EMBED INTO FTG in =		6.00

Hook embedment reduced by stress ratio

Masonry Data

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

Concrete Data

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

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

East Mercer Parcel 1

Ret 5

Use menu item Settings > Printing & Title Block
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for your program.

Title   4' Cantilever Wall w/Slab on Grade   Page: _____
Job #   :   Dsgnr: CRB   Date: 2 OCT 2014
Description....
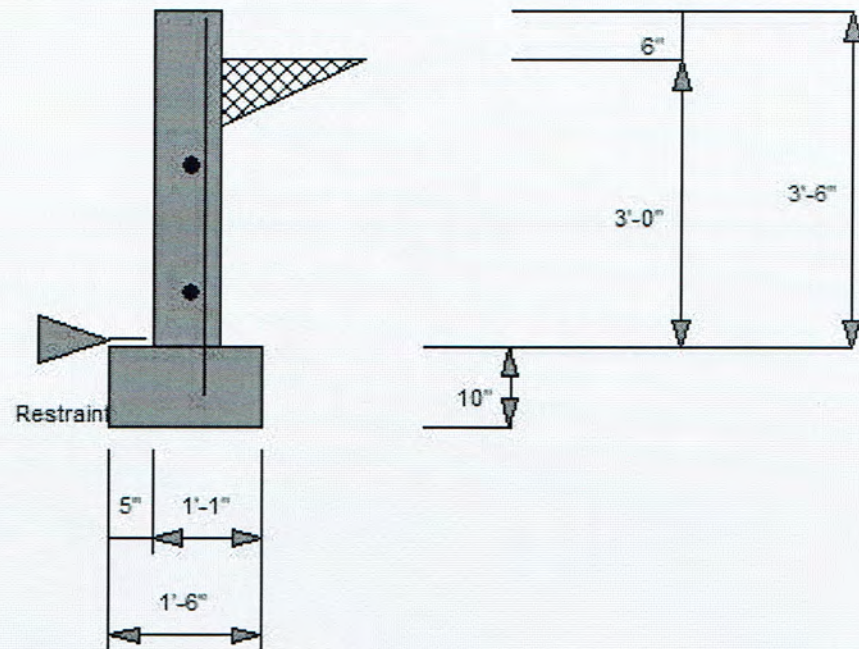Cantilever Retaining Wall w/Slab on Grade

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

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 Dimensions & Strengths

Toe Width	=	1.00 ft
Heel Width	=	1.08
Total Footing Width	=	2.08
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 2,500 psi   Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top   2.00   @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,149	0 psf
Mu' : Upward	=	472	1 ft-#
Mu' : Downward	=	13	59 ft-#
Mu: Design	=	459	58 ft-#
Actual 1-Way Shear	=	5.04	3.00 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 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

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... 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 Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
					Stem Weight(s)	=	450.0	1.33	600.0
Total		408.8	O.T.M.	658.7	Earth @ Stem Transitions	=			
	=		=		Footing Weight	=	260.4	1.04	271.2
Resisting/Overturning Ratio		=	1.84		Key Weight	=			
Vertical Loads used for Soil Pressure =		893.6	lbs		Vert. Component	=			
					Total =		893.6 lbs	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 1

Ret 6

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   4' 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

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 footing

Lap Splice length for #4 bar specified in this stem design segment =   18.72 in

Development length for #4 bar specified in this stem design segment =   14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =   6.00 in

East Mercer Parcel 1

Ret7

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   4' 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

Cantilevered Retaining Wall Design   Code: IBC 2012, ACI 318-11, ACI 530-11

8" w/ #4 @ 12"

Restraint

1'-0"   1'-1"

2'-1"

6"

4'-0"   4'-6"

10"

East Mercer Parcel 1

Ret 8

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title	5' 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

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

Criteria

Retained Height	=	5.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem =		0.0 psf

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	1.70 OK
Slab Resists All Sliding !		
Total Bearing Load	=	1,102 lbs
...resultant ecc.	=	6.66 in
Soil Pressure @ Toe	=	998 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,197 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	9.7 psi OK
Footing Shear @ Heel	=	3.7 psi OK
Allowable	=	75.0 psi

Sliding Calcs   Slab Resists All Sliding !

Lateral Sliding Force	=	595.5 lbs

Stem Construction

Top Stem

Stem OK

Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Thickness	=	8.00
Rebar Size	=	# 4
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.216
Total Force @ Section	lbs =	700.0
Moment....Actual	ft-# =	1,166.7
Moment.....Allowable	=	5,412.6
Shear.....Actual	psi =	9.3
Shear.....Allowable	psi =	75.0
Wall Weight	=	100.0
Rebar Depth 'd'	in =	6.25
LAP SPLICE IF ABOVE	in =	18.72
LAP SPLICE IF BELOW	in =	
HOOK EMBED INTO FTG	in =	6.00

Hook embedment reduced by stress ratio

Masonry Data

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

Concrete Data

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

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

East Mercer Parcel 1

Ret9

Use menu item Settings > Printing & Title Block
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for your program.

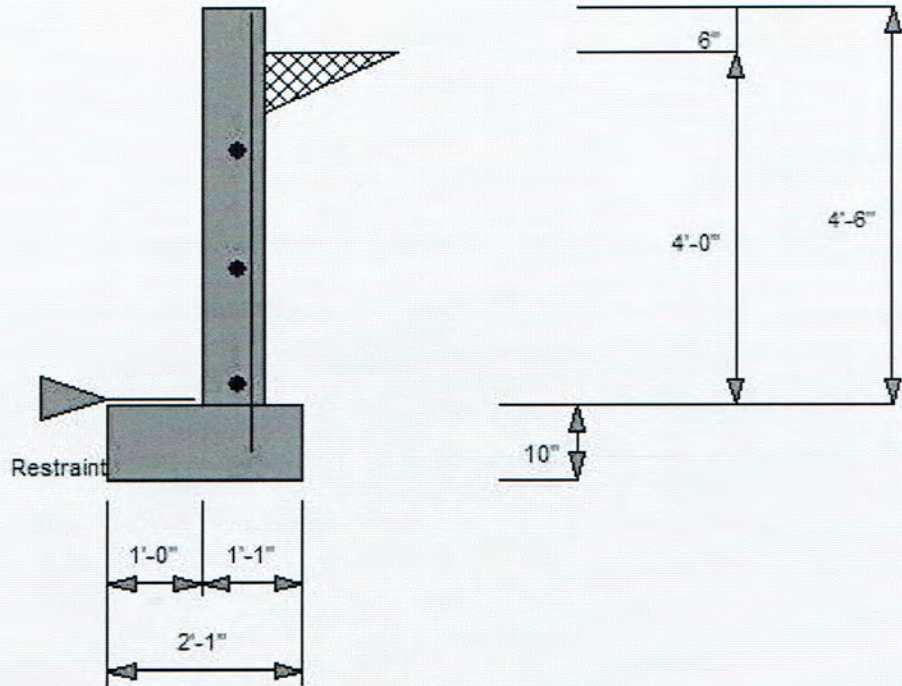|			Page:
Title	5' Cantilever Wall w/Slab on Grade		
Job #	:	Dsgnr: CRB	Date: 2 OCT 2014
Description....			
Cantilever Retaining Wall w/Slab on Grade			

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

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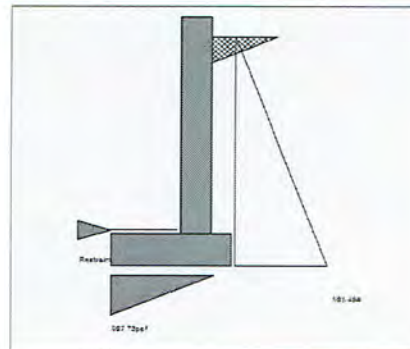License To : Buker Engineering, LLC

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	1.50 ft
Heel Width	=	1.08
Total Footing Width	=	2.58
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 2,500 psi   Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top   2.00   @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,197	0 psf
Mu' : Upward	=	1,042	0 ft-#
Mu' : Downward	=	75	70 ft-#
Mu: Design	=	967	70 ft-#
Actual 1-Way Shear	=	9.68	3.74 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 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

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... 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 Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
Total		595.5	O.T.M.	1,157.9	Stem Weight(s)	=	550.0	1.83	1,008.3
	=		=		Earth @ Stem Transitions	=			
					Footing Weight	=	322.9	1.29	417.0
Resisting/Overturning Ratio		=	1.70		Key Weight	=			
Vertical Loads used for Soil Pressure =		1,101.9 lbs			Vert. Component	=			
					Total =		1,101.9 lbs	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 1

Ret10

Use menu item Settings > Printing & Title Block
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for your program.

Title   5' 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

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 footing

Lap Splice length for #4 bar specified in this stem design segment =   18.72 in

Development length for #4 bar specified in this stem design segment =   14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =   6.00 in

East Mercer Parcel 1

Ret 11

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   5' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

8" w/ #4 @ 12"

Restraint

1'-6"   1'-1"

2'-7"

6"

5'-0"

5'-6"

10"

East Mercer Parcel 1

Ret12

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   6' 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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Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	6.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem =		0.0 psf

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	1.56 OK
Slab Resists All Sliding !		
Total Bearing Load	=	1,310 lbs
...resultant ecc.	=	8.98 in
Soil Pressure @ Toe	=	1,101 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,321 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	14.3 psi OK
Footing Shear @ Heel	=	4.4 psi OK
Allowable	=	75.0 psi

Sliding Calcs   Slab Resists All Sliding !

Lateral Sliding Force	=	817.2 lbs

Stem Construction

Top Stem
Stem OK

Design Height Above Ftg ft =	0.00
Wall Material Above "Ht" =	Concrete
Thickness =	8.00
Rebar Size =	# 4
Rebar Spacing =	12.00
Rebar Placed at =	Edge

Design Data

fb/FB + fa/Fa	=	0.372
Total Force @ Section	lbs =	1,008.0
Moment....Actual	ft-# =	2,016.0
Moment.....Allowable	=	5,412.6
Shear.....Actual	psi =	13.4
Shear.....Allowable	psi =	75.0
Wall Weight	=	100.0
Rebar Depth 'd'	in =	6.25
LAP SPLICE IF ABOVE	in =	18.72
LAP SPLICE IF BELOW	in =	
HOOK EMBED INTO FTG	in =	6.00

Hook embedment reduced by stress ratio

Masonry Data

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

Concrete Data

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

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

East Mercer Parcel 1

Ret 13

Use menu item Settings > Printing & Title Block
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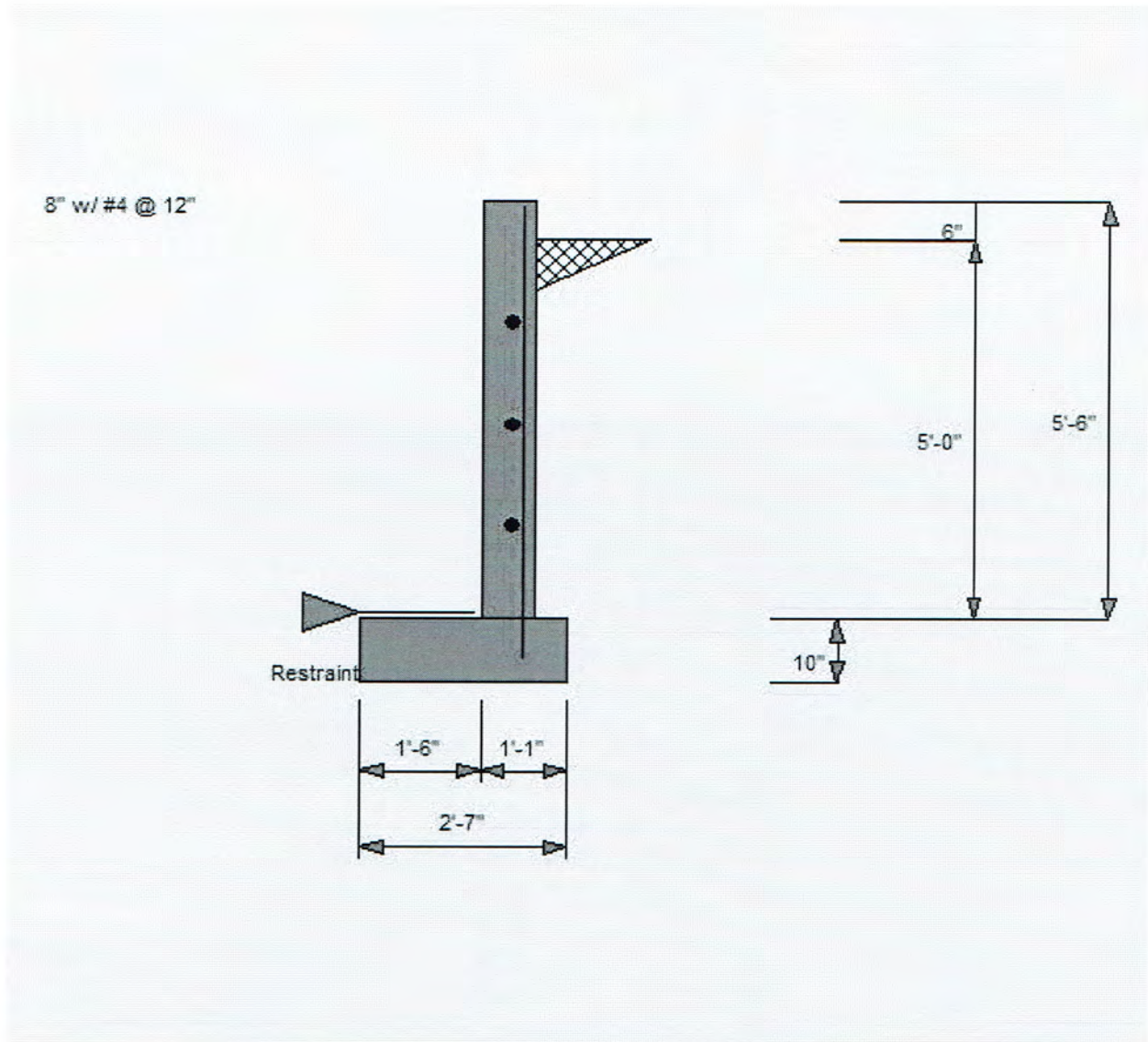for your program.

Title   6' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	2.00 ft
Heel Width	=	1.08
Total Footing Width	=	3.08
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c =   2,500 psi   Fy =   60,000 psi
Footing Concrete Density =   150.00 pcf
Min. As %   =   0.0018
Cover @ Top   2.00   @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,321	0 psf
Mu' : Upward	=	1,902	0 ft-#
Mu' : Downward	=	175	82 ft-#
Mu: Design	=	1,727	82 ft-#
Actual 1-Way Shear	=	14.33	4.36 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	#4 @ 11.11 in	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	

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

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	817.2	2.28	1,861.3	Soil Over Heel	=	274.8	2.87	789.9
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 Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				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 Transitions	=			
	=		=		Footing Weight	=	385.4	1.54	594.1
Resisting/Overturning Ratio		=	1.56		Key Weight	=			
Vertical Loads used for Soil Pressure =		1,310.2 lbs			Vert. Component	=			
					Total =		1,310.2 lbs	R.M.=	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 1

Ret 14

Use menu item Settings > Printing & Title Block
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for your program.

Title   6' 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

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 footing

Lap Splice length for #4 bar specified in this stem design segment =	18.72 in
Development length for #4 bar specified in this stem design segment =	14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	6.00 in

East Mercer Parcel 1

Ret 15

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   6' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

8" w/ #4 @ 12"

#4@11.11in
@ Toe

Restraint

6"

6'-0"   6'-6"

10"

2'-0"   1'-1"

3'-1"

3"

East Mercer Parcel 1

Ret 1b

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   7' Cantailever Wall w/Slab on Grade   Page: _____
Job #   :   Dsgnr: **CRB**   Date: 2 OCT 2014
Description....
Cantilever Retaining Wall w/Slab on Grade

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Cantilevered Retaining Wall Design   Code: IBC 2012, ACI 318-11, ACI 530-11

Criteria

Retained Height	=	7.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem =		0.0 psf

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	1.67 OK
Slab Resists All Sliding !		
Total Bearing Load	=	1,786 lbs
...resultant ecc.	=	9.40 in
Soil Pressure @ Toe	=	1,134 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,360 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	18.4 psi OK
Footing Shear @ Heel	=	8.8 psi OK
Allowable	=	75.0 psi

Sliding Calcs   Slab Resists All Sliding !

Lateral Sliding Force	=	1,073.8 lbs

Stem Construction

	Top Stem
	Stem OK
Design Height Above Ftg ft =	0.00
Wall Material Above "Ht" =	Concrete
Thickness =	8.00
Rebar Size =	# 4
Rebar Spacing =	12.00
Rebar Placed at =	Edge

Design Data

fb/FB + fa/Fa	=	0.591
Total Force @ Section	lbs =	1,372.0
Moment....Actual	ft-# =	3,201.3
Moment.....Allowable	=	5,412.6
Shear.....Actual	psi =	18.3
Shear.....Allowable	psi =	75.0
Wall Weight	=	100.0
Rebar Depth 'd'	in =	6.25
LAP SPLICE IF ABOVE	in =	18.72
LAP SPLICE IF BELOW	in =	
HOOK EMBED INTO FTG	in =	6.00

Hook embedment reduced by stress ratio

Masonry Data

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

Concrete Data

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

Load Factors

Building Code	IBC 2012, ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

East Mercer Parcel 1

Ret 17

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   7' Cantailever Wall w/Slab on Grade   Page: _____
Job #   :   Dsgnr: CRB   Date: 2 OCT 2014
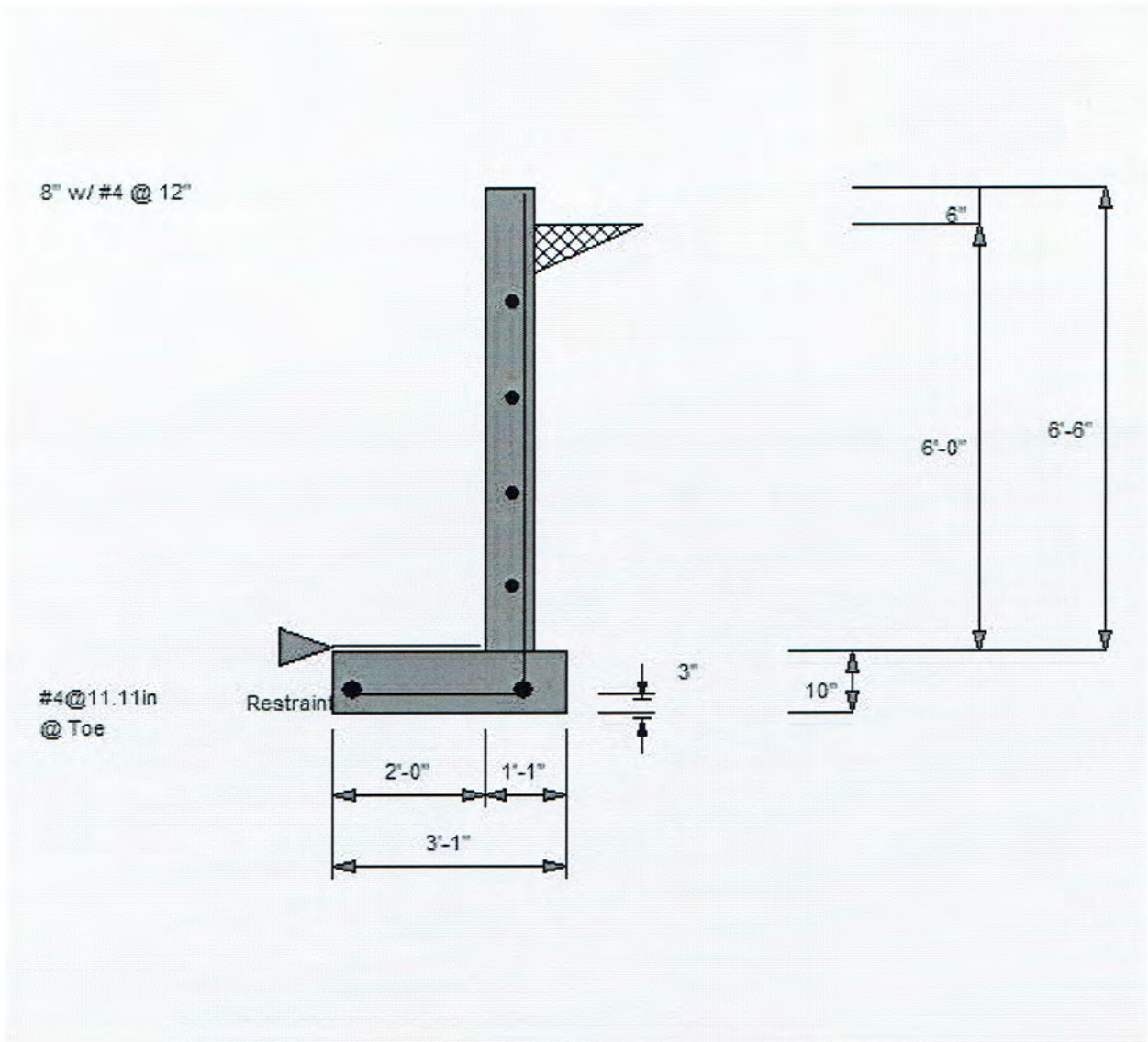Description....
Cantilever Retaining Wall w/Slab on Grade

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

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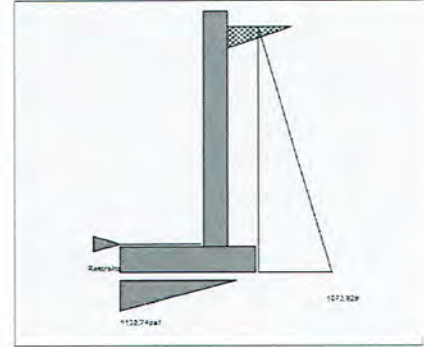
Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	2.25 ft
Heel Width	=	1.42
Total Footing Width	=	3.67
Footing Thickness	=	10.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 2,500 psi   Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top   2.00   @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,360	0 psf
Mu' : Upward	=	2,624	1 ft-#
Mu' : Downward	=	126	302 ft-#
Mu: Design	=	2,498	301 ft-#
Actual 1-Way Shear	=	18.43	8.82 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	#4 @ 11.11 in	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	

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

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,073.8	2.61	2,803.9	Soil Over Heel	=	577.8	3.29	1,901.9
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 Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				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 Transitions	=			
	=		=		Footing Weight	=	458.4	1.83	840.4
Resisting/Overturning Ratio		=	1.67		Key Weight	=			
Vertical Loads used for Soil Pressure =		1,786.1	lbs		Vert. Component	=			
						Total =	1,786.1 lbs	R.M.=	4,679.8

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

East Mercer Parcel 1

Ret 18

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   7' Cantailever 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

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 footing

Lap Splice length for #4 bar specified in this stem design segment =   18.72 in

Development length for #4 bar specified in this stem design segment =   14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =   6.00 in

East Mercer Parcel 1

Ret 19

Use menu item **Settings > Printing & Title Block**
to set these five lines of information
for your program.

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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

8" w/ #4 @ 12"

#4@11.11in
@ Toe

Restraint

2'-3"   1'-5"

3'-8"

3"

6"

7'-0"   7'-6"

10"

East Mercer Parcel 1

Ret 20

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title	8' 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

Cantilevered Retaining Wall Design   Code: IBC 2012, ACI 318-11, ACI 530-11

Criteria

Retained Height	=	8.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem =		0.0 psf

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Design Summary

Wall Stability Ratios

Overturning	=	1.77 OK
Slab Resists All Sliding !		

Total Bearing Load	=	2,393 lbs
...resultant ecc.	=	10.06 in
Soil Pressure @ Toe	=	1,164 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,397 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	17.4 psi OK
Footing Shear @ Heel	=	10.1 psi OK
Allowable	=	75.0 psi

Sliding Calcs   Slab Resists All Sliding !

Lateral Sliding Force	=	1,417.5 lbs

Stem Construction

Top Stem

Stem OK

Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Thickness	=	8.00
Rebar Size	=	# 5
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.588
Total Force @ Section lbs =		1,792.0
Moment....Actual ft-# =		4,778.7
Moment.....Allowable	=	8,121.3
Shear.....Actual psi =		24.1
Shear.....Allowable psi =		75.0
Wall Weight	=	100.0
Rebar Depth 'd' in =		6.19
LAP SPLICE IF ABOVE in =		23.40
LAP SPLICE IF BELOW in =		
HOOK EMBED INTO FTG in =		6.02

Hook embedment reduced by stress ratio

Masonry Data

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

Concrete Data

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

Load Factors

Building Code	IBC 2012, ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

East Mercer Parcel 2

Ret 21

Use menu item Settings > Printing & Title Block
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Title   8' 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
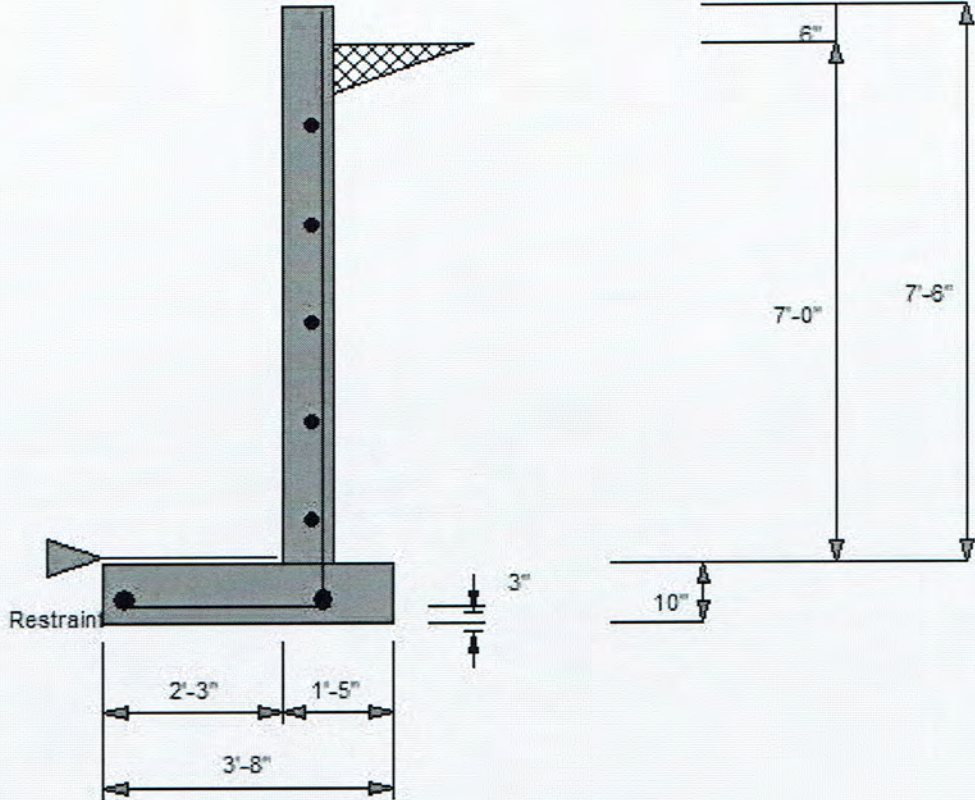
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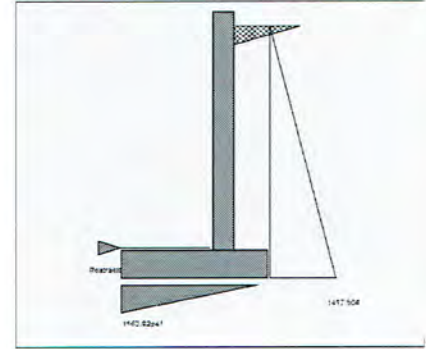## Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	2.75 ft
Heel Width	=	1.67
Total Footing Width	=	4.42
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 2,500 psi   Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top   2.00   @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	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	

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

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,417.5	3.00	4,252.5	Soil Over Heel	=	880.3	3.92	3,448.0
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 Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
Total		1,417.5	O.T.M.	4,252.5	Stem Weight(s)	=	850.0	3.08	2,620.8
	=		=		Earth @ Stem Transitions	=			
					Footing Weight	=	662.6	2.21	1,463.2
Resisting/Overturning Ratio		=	1.77		Key Weight	=			
Vertical Loads used for Soil Pressure =		2,392.8	lbs		Vert. Component	=			
					Total =		2,392.8 lbs	R.M.=	7,532.0

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

East Mercer Parcel 1

Ret 22

Use menu item Settings > Printing & Title Block
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Title	8' 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

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 footing

Lap Splice length for #5 bar specified in this stem design segment =   23.40 in

Development length for #5 bar specified in this stem design segment =   18.00 in

Hooked embedment length into footing for #5 bar specified in this stem design segment =   6.00 in

East Mercer Parcel 2

Ret 23

Use menu item Settings > Printing & Title Block
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for your program.

Title	8' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

8" w/ #5 @ 12"

#7@16.in
@ Toe

Restraint

#6@16"

@ Heel

6"

8'-0"

8'-6"

1'-0"

3"

2'-9"   1'-8"

4'-5"

East Mercer Parcel 1

Ret 24

Use menu item Settings > Printing & Title Block
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for your program.

Title   9' Cantilever Wall w/Slab on Grade   Page: _____
Job #   :   Dsgnr: **CRB**   Date: 2 OCT 2014
Description....
Cantilever Retaining Wall w/Slab on Grade

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Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	9.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem =		0.0 psf

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	1.87 OK
Slab Resists All Sliding !		
Total Bearing Load	=	3,027 lbs
...resultant ecc.	=	10.33 in
Soil Pressure @ Toe	=	1,172 psf OK
Soil Pressure @ Heel	=	0 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,406 psf
ACI Factored @ Heel	=	0 psf
Footing Shear @ Toe	=	18.9 psi OK
Footing Shear @ Heel	=	12.0 psi OK
Allowable	=	75.0 psi

Sliding Calcs   Slab Resists All Sliding !

Lateral Sliding Force	=	1,779.3 lbs

Stem Construction

Top Stem

Stem OK

Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Thickness	=	8.00
Rebar Size	=	# 5
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.838
Total Force @ Section lbs =		2,268.0
Moment....Actual ft-# =		6,804.0
Moment.....Allowable	=	8,121.3
Shear.....Actual psi =		30.5
Shear.....Allowable psi =		75.0
Wall Weight	=	100.0
Rebar Depth 'd' in =		6.19
LAP SPLICE IF ABOVE in =		23.40
LAP SPLICE IF BELOW in =		
HOOK EMBED INTO FTG in =		8.70

Hook embedment reduced by stress ratio

Masonry Data

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

Concrete Data

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

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

East Mercer Parcel 1

Ret 25

Use menu item Settings > Printing & Title Block
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Title   9' Cantilever Wall w/Slab on Grade   Page: _____
Job #   :   Dsgnr: CRB   Date: 2 OCT 2014
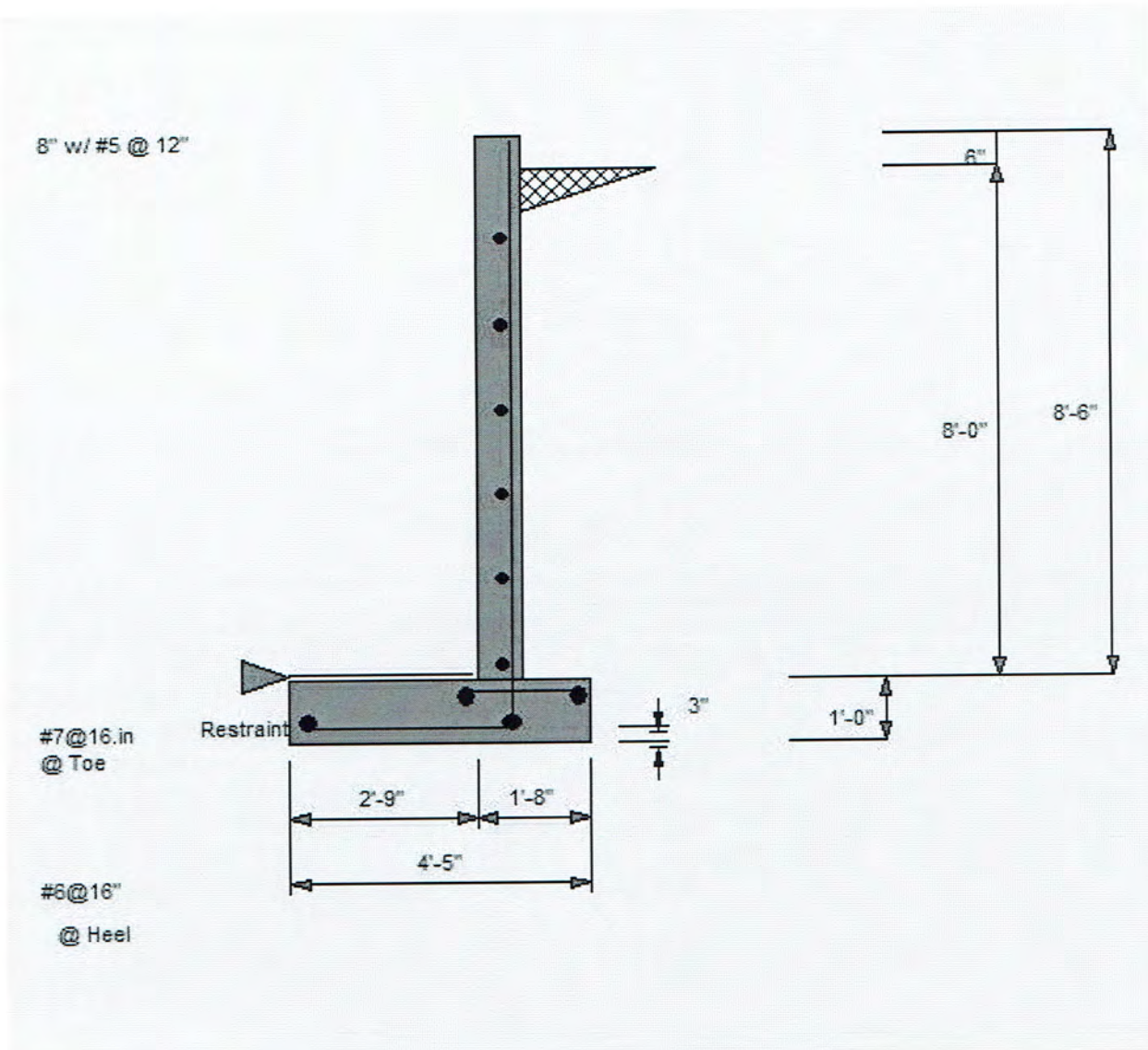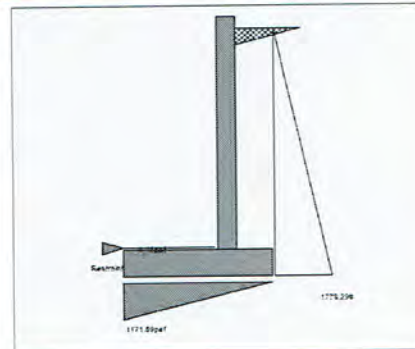Description....
Cantilever Retaining Wall w/Slab on Grade

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

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Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	3.25 ft
Heel Width	=	1.92
Total Footing Width	=	5.17
Footing Thickness	=	13.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c =   2,500 psi   Fy =   60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top   2.00   @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,406	0 psf
Mu' : Upward	=	5,869	89 ft-#
Mu' : Downward	=	237	1,081 ft-#
Mu: Design	=	5,631	992 ft-#
Actual 1-Way Shear	=	18.90	12.03 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 5 @ 12.00 in	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	

Other Acceptable Sizes & Spacings

Toe: #4@ 8.55 in, #5@ 13.25 in, #6@ 18.80 in, #7@ 25.64 in, #8@ 33.76 in, #9@ 42
Heel: Not req'd, Mu < S * Fr
Key: No key defined

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	1,779.3	3.36	5,980.4	Soil Over Heel	=	1,237.8	4.54	5,622.0
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 Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
Total		1,779.3	O.T.M.	5,980.4	Stem Weight(s)	=	950.0	3.58	3,404.2
	=		=		Earth @ Stem Transitions	=			
					Footing Weight	=	839.6	2.58	2,169.2
Resisting/Overturning Ratio		=	1.87		Key Weight	=			
Vertical Loads used for Soil Pressure =		3,027.5	lbs		Vert. Component	=			
					Total =		3,027.5 lbs	R.M.=	11,195.4

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

East mercer Parcel 1

Retab

Use menu item Settings > Printing & Title Block
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Title   9' 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

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 footing

Lap Splice length for #5 bar specified in this stem design segment =   23.40 in

Development length for #5 bar specified in this stem design segment =   18.00 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =   6.00 in

East Mercer Parcel 1

Ret27

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title	9' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

8" w/ #5 @ 12"

6"

9'-0"   9'-6"

Restraint

#5@12.in
@ Toe

3"

1'-1"

3'-3"   1'-11"

5'-2"

East Mercer Parcel 1

Ret28

Use menu item Settings > Printing & Title Block
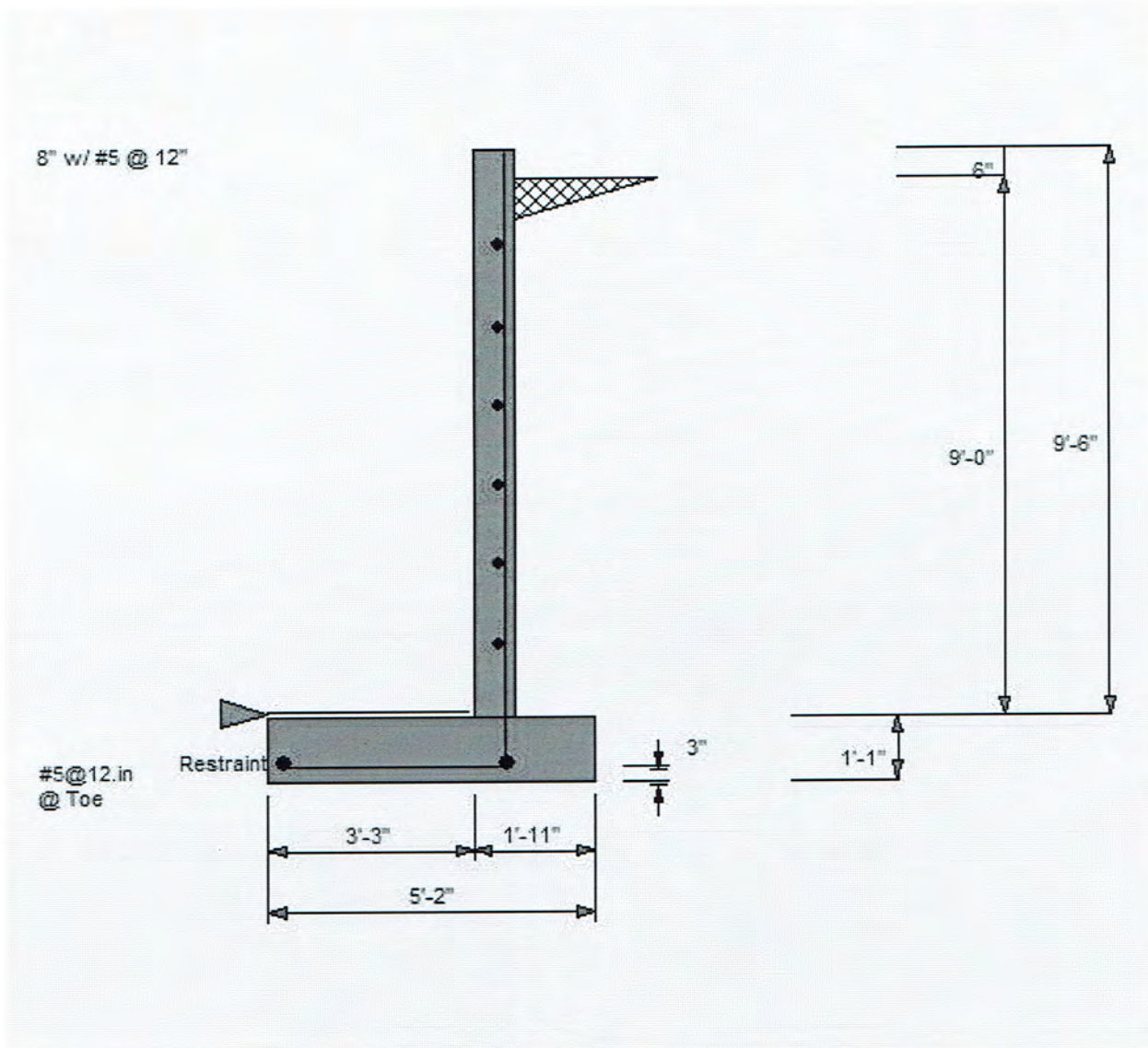to set these five lines of information
for your program.

Title **10' Cantilever Wall w/Slab on Grade**   Page: _____
Job #   :   Dsgnr: **CRB**   Date: 2 OCT 2014
Description....
Cantilever Retaining Wall w/Slab on Grade

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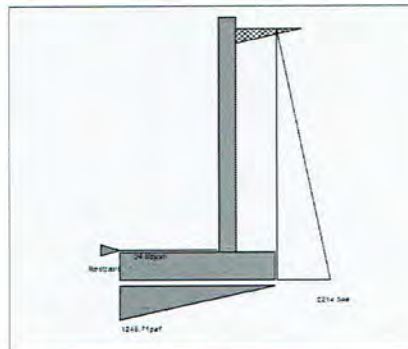License To : Buker Engineering, LLC

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	10.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem =		0.0 psf

Adjacent Footing Load

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

Design Summary

Wall Stability Ratios

Overturning	=	1.92 OK
Slab Resists All Sliding !		
Total Bearing Load	=	3,784 lbs
...resultant ecc.	=	11.16 in
Soil Pressure @ Toe	=	1,249 psf OK
Soil Pressure @ Heel	=	35 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,498 psf
ACI Factored @ Heel	=	42 psf
Footing Shear @ Toe	=	18.8 psi OK
Footing Shear @ Heel	=	13.0 psi OK
Allowable	=	75.0 psi

Sliding Calcs Slab Resists All Sliding !

Lateral Sliding Force	=	2,214.8 lbs

Stem Construction

	Top Stem	
		Stem OK
Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Thickness	=	8.00
Rebar Size	=	# 6
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.923
Total Force @ Section	lbs =	2,800.0
Moment....Actual	ft-# =	9,333.3
Moment.....Allowable	=	10,109.5
Shear.....Actual	psi =	41.5
Shear.....Allowable	psi =	75.0
Wall Weight	=	100.0
Rebar Depth 'd'	in =	5.63
LAP SPLICE IF ABOVE	in =	28.08
LAP SPLICE IF BELOW	in =	
HOOK EMBED INTO FTG	in =	11.53

Hook embedment reduced by stress ratio

Masonry Data

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

Concrete Data

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

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

East Mercer Parcel 1

Ret 29

Use menu item Settings > Printing & Title Block
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Title   **10' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	3.75 ft
Heel Width	=	2.15
Total Footing Width	=	5.90
Footing Thickness	=	15.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c =   2,500 psi   Fy =   60,000 psi
Footing Concrete Density =   150.00 pcf
Min. As %   =   0.0018
Cover @ Top   2.00   @ Btm.=   3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,498	42 psf
Mu' : Upward	=	8,365	179 ft-#
Mu' : Downward	=	333	1,693 ft-#
Mu: Design	=	8,032	1,514 ft-#
Actual 1-Way Shear	=	18.79	13.03 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	

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

Item		...OVERTURNING... Force lbs	Distance ft	Moment ft-#			...RESISTING... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	2,214.8	3.75	8,305.7	Soil Over Heel	=	1,628.4	5.16	8,397.2
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 Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
Total		2,214.8	**O.T.M.**	8,305.7	Stem Weight(s)	=	1,050.0	4.08	4,287.5
	=		=		Earth @ Stem Transitions	=			
Resisting/Overturning Ratio		=	**1.92**		Footing Weight	=	1,105.7	2.95	3,260.1
Vertical Loads used for Soil Pressure =		3,784.1	lbs		Key Weight	=			
					Vert. Component	=			
					Total =		**3,784.1** lbs	**R.M.=**	**15,944.8**

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

East Mercer Parcel 1

Ret 30

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   10' 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

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 footing

Lap Splice length for #6 bar specified in this stem design segment =   28.08 in

Development length for #6 bar specified in this stem design segment =   21.60 in
Hooked embedment length into footing for #6 bar specified in this stem design segment =   6.00 in

East Mercer Parcel 1

Ret 31

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   10' 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

Cantilevered Retaining Wall Design   Code: IBC 2012, ACI 318-11, ACI 530-11

8" w/ #6 @ 12"

Restraint

#7@16.in
@ Toe

#6@16"
@ Heel

3'-9"   2'-2"

5'-11"

3"

6"

10'-0"   10'-6"

1'-3"

East Mercer Parcel 1

Ret 32

Use menu item Settings > Printing & Title Block
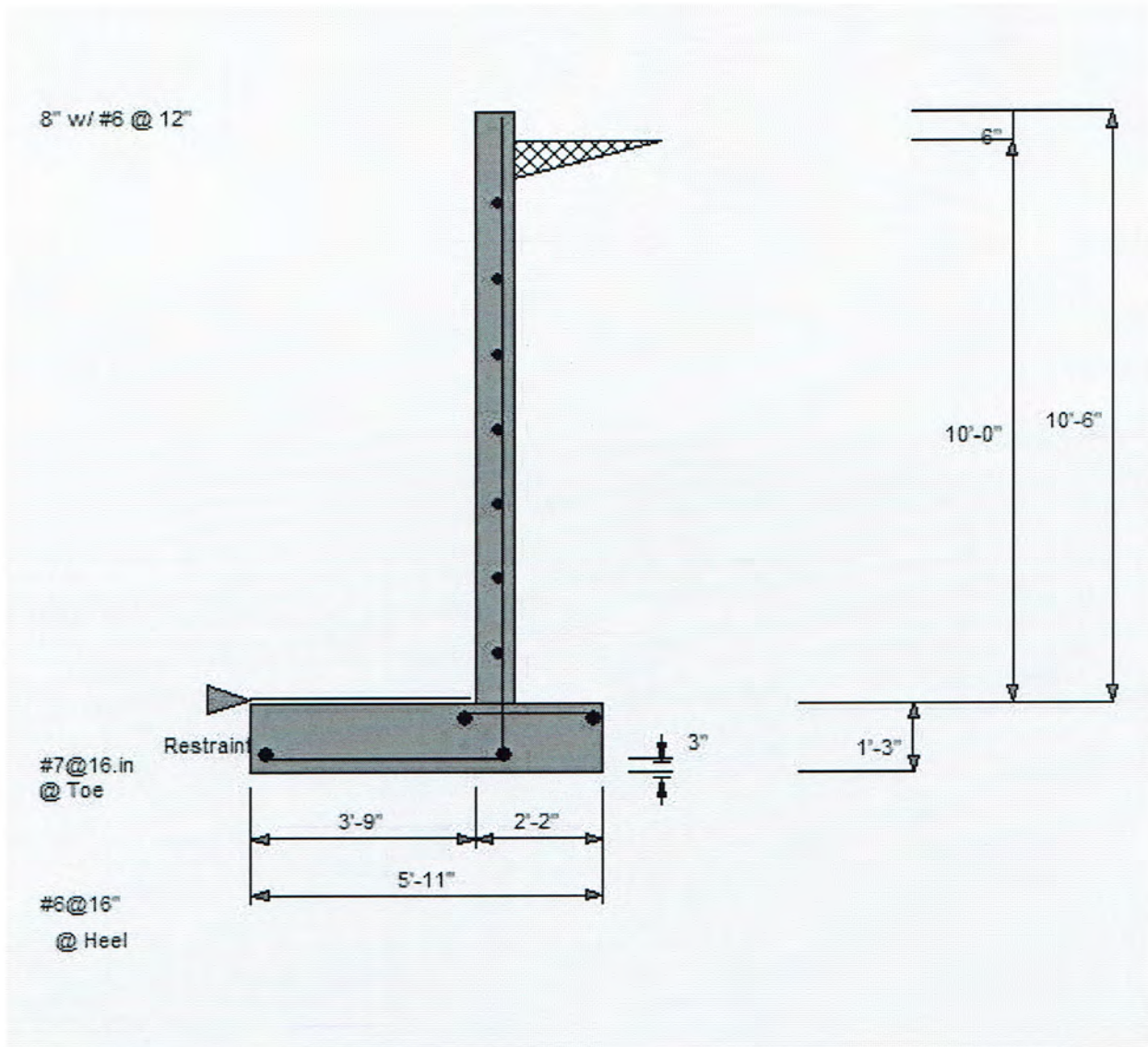to set these five lines of information
for your program.

Title   **11' 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

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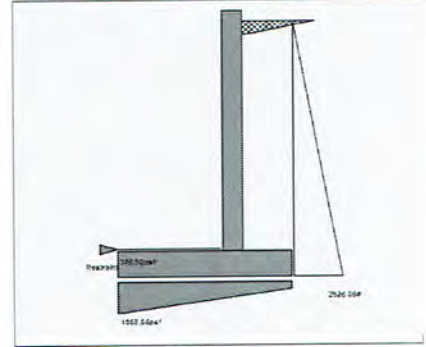
Cantilevered Retaining Wall Design   Code: IBC 2012, ACI 318-11, ACI 530-11

Criteria

Retained Height	=	11.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem =		0.0 psf

Adjacent Footing Load

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

Axial Load Applied to Stem

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

Design Summary

Wall Stability Ratios

Overturning	=	2.44 OK
Slab Resists All Sliding !		
Total Bearing Load	=	5,185 lbs
...resultant ecc.	=	6.84 in
Soil Pressure @ Toe	=	1,086 psf OK
Soil Pressure @ Heel	=	379 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,303 psf
ACI Factored @ Heel	=	454 psf
Footing Shear @ Toe	=	21.0 psi OK
Footing Shear @ Heel	=	14.7 psi OK
Allowable	=	75.0 psi

Sliding Calcs   Slab Resists All Sliding !

Lateral Sliding Force	=	2,626.1 lbs

Stem Construction

	Top Stem
	Stem OK

Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Thickness	=	10.00
Rebar Size	=	# 6
Rebar Spacing	=	12.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.883
Total Force @ Section lbs =		3,388.0
Moment....Actual ft-# =		12,422.7
Moment.....Allowable	=	14,069.5
Shear.....Actual psi =		37.0
Shear.....Allowable psi =		75.0
Wall Weight	=	125.0
Rebar Depth 'd' in =		7.63
LAP SPLICE IF ABOVE in =		28.08
LAP SPLICE IF BELOW in =		
HOOK EMBED INTO FTG in =		11.02

Hook embedment reduced by stress ratio

Masonry Data

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

Concrete Data

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

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

East Mercer Parcel 1

Ret33

Use menu item Settings > Printing & Title Block
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for your program.

Title **11' 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

RetainPro 10 (c) 1987-2014, Build 10.14.9.29
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License To : Buker Engineering, LLC

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	4.25 ft
Heel Width	=	2.83
Total Footing Width	=	7.08
Footing Thickness	=	15.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 2,500 psi   Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,303	454 psf
Mu' : Upward	=	10,232	1,068 ft-#
Mu' : Downward	=	120	3,353 ft-#
Mu: Design	=	10,113	2,285 ft-#
Actual 1-Way Shear	=	21.00	14.70 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	# 5 @ 8.00 in	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	

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

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	2,626.1	4.08	10,723.2	Soil Over Heel	=	2,419.6	6.08	14,718.8
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 Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
Total		2,626.1	**O.T.M.**	10,723.2	Stem Weight(s)	=	1,437.5	4.67	6,708.3
	=		=		Earth @ Stem Transitions	=			
					Footing Weight	=	1,328.1	3.54	4,703.3
Resisting/Overturning Ratio		=	**2.44**		Key Weight	=			
Vertical Loads used for Soil Pressure =		5,185.2 lbs			Vert. Component	=			
					Total =		5,185.2 lbs	**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 1

Ret 34

Use menu item Settings > Printing & Title Block
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for your program.

Title   11' 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

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 footing

Lap Splice length for #6 bar specified in this stem design segment =   28.08 in

Development length for #6 bar specified in this stem design segment =   21.60 in
Hooked embedment length into footing for #6 bar specified in this stem design segment =   6.00 in

East Mercer Parcel 1

Ret 35

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

Title   **11' 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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

10" w/ #6 @ 12"

Restraint

#5@8.in
@ Toe

4'-3"   2'-10"

7'-1"

3"

6"

11'-0"   11'-6"

1'-3"

East Mercer Parcel 1

Ret 36

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Criteria

Retained Height	=	12.00 ft
Wall height above soil	=	0.50 ft
Slope Behind Wall	=	0.00 : 1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data

Allow Soil Bearing	=	2,000.0 psf
Equivalent Fluid Pressure Method		
Heel Active Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	0.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in

Surcharge Loads

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

Axial Load Applied to Stem

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

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
The above lateral load has been increased by a factor of		1.00
Wind on Exposed Stem =		0.0 psf

Adjacent Footing Load

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

Design Summary
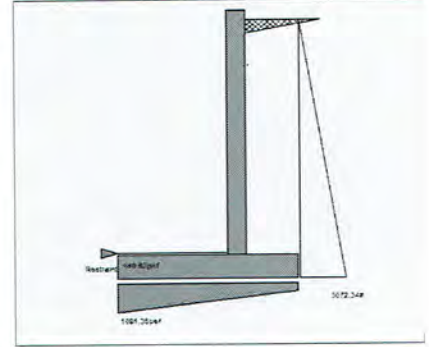
Wall Stability Ratios

Overturning	=	2.49 OK
Slab Resists All Sliding !		
Total Bearing Load	=	6,001 lbs
...resultant ecc.	=	6.65 in
Soil Pressure @ Toe	=	1,091 psf OK
Soil Pressure @ Heel	=	441 psf OK
Allowable	=	2,000 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,310 psf
ACI Factored @ Heel	=	529 psf
Footing Shear @ Toe	=	24.6 psi OK
Footing Shear @ Heel	=	17.5 psi OK
Allowable	=	75.0 psi

Sliding Calcs Slab Resists All Sliding !

Lateral Sliding Force	=	3,072.3 lbs

Stem Construction

Top Stem

Stem OK

Design Height Above Ftg ft =		0.00
Wall Material Above "Ht"	=	Concrete
Thickness	=	10.00
Rebar Size	=	# 6
Rebar Spacing	=	9.00
Rebar Placed at	=	Edge

Design Data

fb/FB + fa/Fa	=	0.881
Total Force @ Section lbs =		4,032.0
Moment....Actual ft-# =		16,128.0
Moment.....Allowable =		18,302.4
Shear.....Actual psi =		44.1
Shear.....Allowable psi =		75.0
Wall Weight =		125.0
Rebar Depth 'd' in =		7.63
LAP SPLICE IF ABOVE in =		28.08
LAP SPLICE IF BELOW in =		
HOOK EMBED INTO FTG in =		10.96

Hook embedment reduced by stress ratio

Masonry Data

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

Concrete Data

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

Load Factors

Building Code	IBC 2012,ACI
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.000
Seismic, E	1.000

East Mercer Parcel 1

Ret37

Use menu item Settings > Printing & Title Block
to set these five lines of information
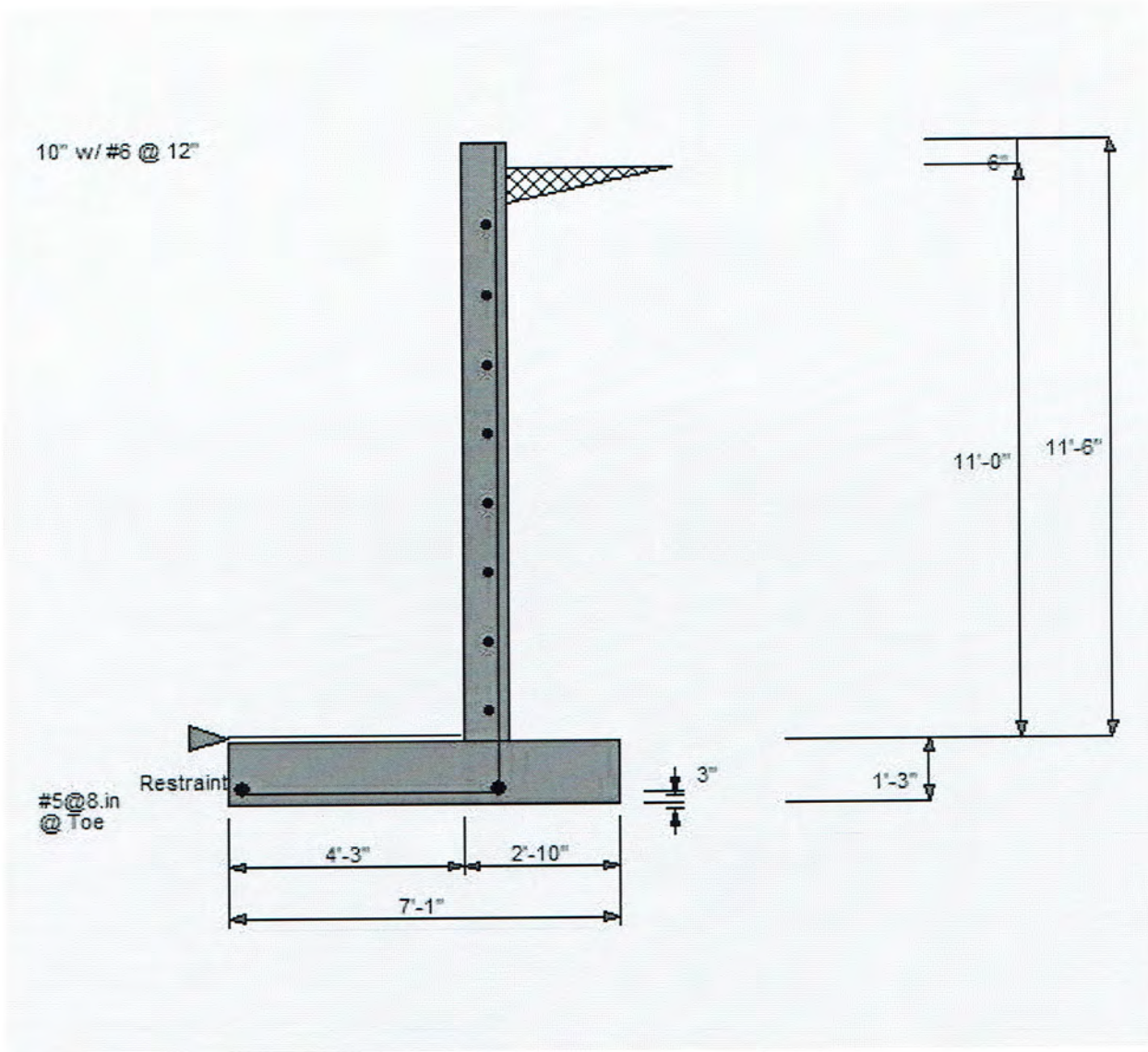for your program.

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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

Footing Dimensions & Strengths

Toe Width	=	4.75 ft
Heel Width	=	3.08
Total Footing Width	=	7.83
Footing Thickness	=	15.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c =   2,500 psi   Fy =   60,000 psi
Footing Concrete Density =   150.00 pcf
Min. As %   =   0.0018
Cover @ Top   2.00   @ Btm.=   3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	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	=	None Spec'd	
Key Reinforcing	=	None Spec'd	

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

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	3,072.3	4.42	13,569.5	Soil Over Heel	=	2,969.6	6.71	19,920.3
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 Stem	=			
Load @ Stem Above Soil	=				* Axial Live Load on Stem	=			
	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
Total		3,072.3	O.T.M.	13,569.5	Stem Weight(s)	=	1,562.5	5.17	8,072.9
	=		=		Earth @ Stem Transitions	=			
					Footing Weight	=	1,468.7	3.92	5,752.1
Resisting/Overturning Ratio		=	2.49		Key Weight	=			
Vertical Loads used for Soil Pressure =		6,000.7 lbs			Vert. Component	=			
					Total =		6,000.7 lbs	R.M.=	33,745.3

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

East Mercer Parcel 1

Ret 38

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.

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

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 footing

Lap Splice length for #6 bar specified in this stem design segment =   28.08 in

Development length for #6 bar specified in this stem design segment =   21.60 in
Hooked embedment length into footing for #6 bar specified in this stem design segment =   6.00 in

Title   12' Cantilever Wall w/Slab on Grade   Page: _____
Job #   :   Dsgnr: CRB   Date: 2 OCT 2014
Description....
Cantilever Retaining Wall w/Slab on Grade

East Mercer Parcel 2

Ret39

Use menu item Settings > Printing & Title Block
to set these five lines of information
for your program.
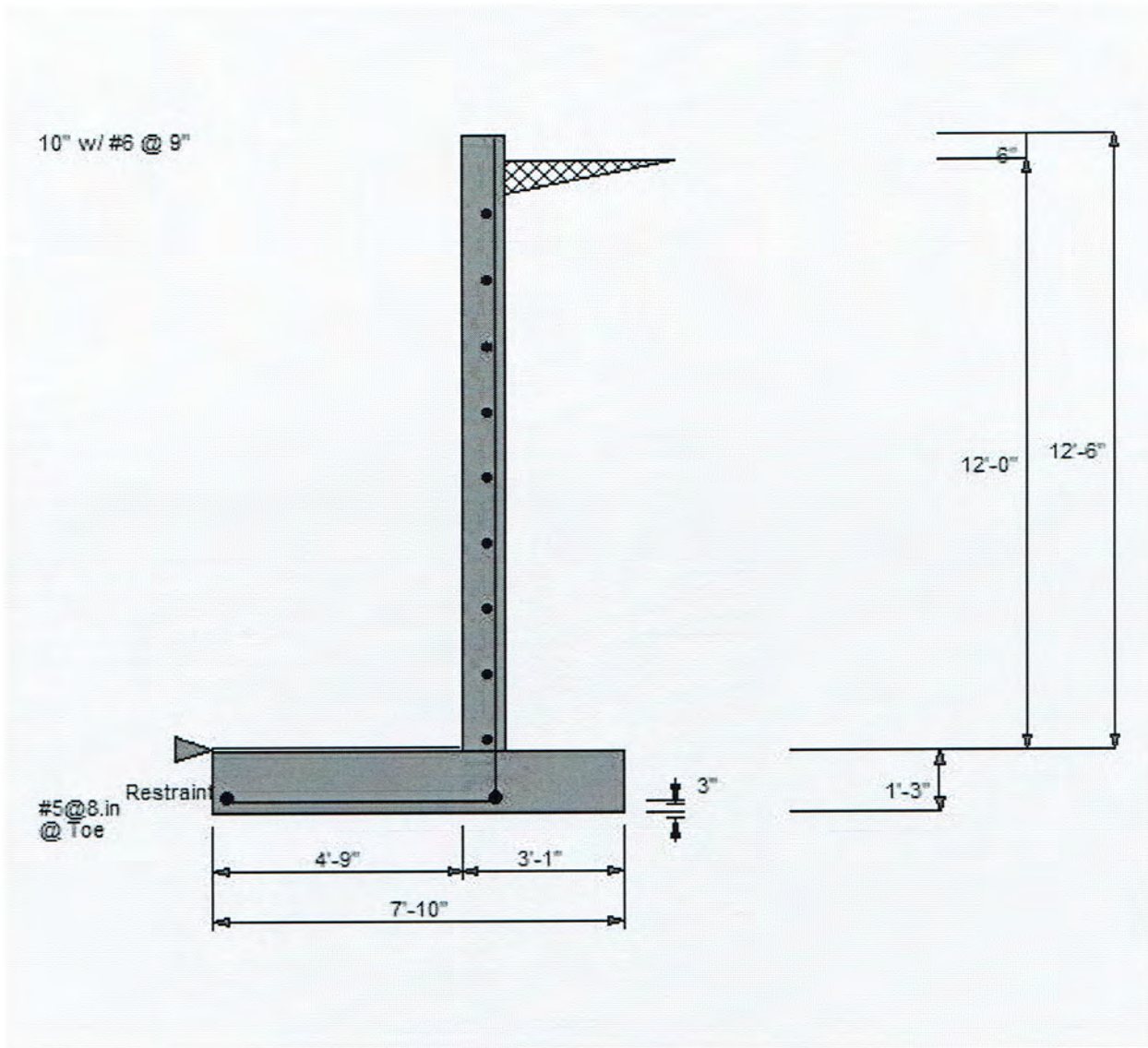
Title   12' Cantilever Wall w/Slab on Grade   Page: _____
Job #   :   Dsgnr: CRB   Date: 2 OCT 2014
Description....
Cantilever Retaining Wall w/Slab on Grade

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

Cantilevered Retaining Wall Design   Code: IBC 2012,ACI 318-11,ACI 530-11

10" w/ #6 @ 9"

6"

12'-0"   12'-6"

Restraint

#5@8.in
@ Toe

3"

1'-3"

4'-9"   3'-1"

7'-10"

East Mercer Parcel 1

Ret 40