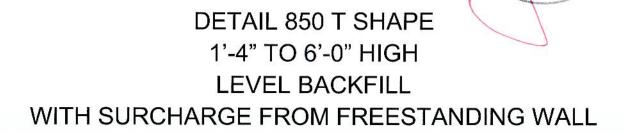
# 1'-4" to 6'-0" HIGH T SHAPE RETAINING WALL W/ SURCHARGE

# STRUCTURAL CALCULATIONS

# **FOR**



DESIGN BASED ON CBC 2010 EDITION AND IBC 2009 EDITION

FOUNDATION PRESSURE: 1500psf

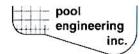
PASSIVE PRESSURE: 200pcf

ACTIVE PRESSURE - EXPANSIVE SOIL LEVEL: 45pcf

FRICTION: 0.30

CONCRETE:  $f_c$ ' = **2500psi** MASONRY:  $f_m$ ' = **1500psi** 

REINFORCING:  $f_v = 40000psi$  (Grade 40) (or as noted)



Title : 850 1'-4" Job # : 850 1'-4"

Description..

Dsgnr: TLL

Date:

Page: SEP 5,2007

1'-4" Retaining Wall w/ Garden Wall Surcharge

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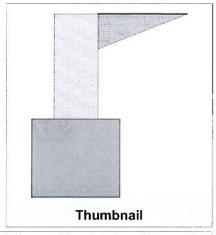
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#### Cantilevered Retaining Wall Design

Code: IBC 2009

Criteria		
Retained Height	> <b>=</b>	1.33 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00:1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data		-30-30	
Allow Soil Bearing	=	1,500.0	psf
Equivalent Fluid Pressur	e Meth	od	1200000
Heel Active Pressure	=		psf/ft
Toe Active Pressure	=	45.0	psf/ft
Passive Pressure	=	200.0	psf/ff
Soil Density, Heel	=	125.00	pcf
Soil Density, Toe	=	125.00	pcf
Footing  Soil Friction	=	0.300	
Soil height to ignore for passive pressure	=	0.00	in



## Surcharge Loads

Surcharge Over Heel 0.0 psf NOT Used To Resist Sliding & Overturning Surcharge Over Toe 0.0 psf NOT 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	=	0.0 #/ft
Height to Top	=	0.00 ft
Height to Bottom	=	0.00 ft
The above lateral I has been increased by a factor of		1.00
Wind on Exposed	Stem =	0.0 psf

Stem Construction

Lateral Load Applied to Stem

Adjacent Footing Load				
Adjacent Footing Load	=	438.0 lbs		
Footing Width	=	1.00 ft		
Eccentricity	=	0.00 in		
Wall to Ftg CL Dist	=	1.00 ft		
Footing Type		Line Load		
Base Above/Below Soil at Back of Wall	=8	-1.0 ft		
Poisson's Ratio	$= 10^{-10}$	0.300		

Design Summary		
Wall Stability Ratios		
Overturning	=	2.77 OK
Sliding	=	1.72 OK
Total Bearing Load	=	368 lbs
resultant ecc.	=	2.31 in
Soil Pressure @ Toe	=	515 psf OK
Soil Pressure @ Heel	=	37 psf OK
Allowable	=	1,500 psf
Soil Pressure Less	Than	
ACI Factored @ Toe	=	721 psf
ACI Factored @ Heel	=	51 psf
Footing Shear @ Toe	=	1.4 psi OK
Footing Shear @ Heel	=	1.0 psi OK
Allowable	=	75.0 psi
Sliding Calcs (Vertical C	Compo	nent Used)

Lateral Sliding Force 122.6 lbs = less 100% Passive Force = -100.0 lbs less 100% Friction Force = -110.3 lbs

Added Force Reg'd 0.0 lbs ....for 1.5: 1 Stability 0.0 lbs

***		-
	Design Height Above Ftg	
	Wall Material Above "Ht"	
	Thickness	
	Rebar Size	
	Rebar Spacing	
	Rebar Placed at	
OK	Design Data ————	
OK OK	fb/FB + fa/Fa	
UK	Total Force @ Section	
	MomentActual	1
	MomentAllowable	
	ShearActual	
OK	ShearAllowable	
	Wall Weight	
OK	Rebar Depth 'd'	
	LAP SPLICE IF ABOVE	
	LAP SPLICE IF BELOW	
	HOOK EMBED INTO FTO	G
014	Massaury Data	
OK	Masonry Data ———— f'm	_
OK	Fs	
	Solid Grouting	
	Modular Ratio 'n'	

Wall Material Above "Ht"	=	Masonry	
Thickness	=	8.00	
Rebar Size	=	# 4	
Rebar Spacing	=	24.00	
Rebar Placed at	=	Edge	
Design Data ————— fb/FB + fa/Fa	=	0.023	
Total Force @ Section	lbs =	40.5	
MomentActual	ft-#=	17.8	
MomentAllowable	= 0	776.1	
ShearActual	psi =	0.6	
ShearAllowable	psi =	19.4	
Wall Weight	=	84.0	
Rebar Depth 'd'	in =	5.25	
LAP SPLICE IF ABOVE	in =	24.00	
LAP SPLICE IF BELOW	in=		
HOOK EMBED INTO FT	G in=	6.00	
Masonry Data —			
f'm	psi =	1,500	
Fs	psi =	20,000	
Callel Carrellan	0.00	V	

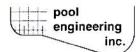
Top Stem

ft =

Stem OK

Building Code	IBC 2009
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.300
Seismic, E	1.000

f'm	psi =	1,50	00	
Fs	psi =	20,00	00	
Solid Grouting	=	Ye	es	
Modular Ratio 'n'	=	25.7	78	
Short Term Factor	=	1.00	00	
Equiv. Solid Thick.	in =	7.6	50	
Masonry Block Type	=	Normal	Weight	
Masonry Design Method	=	ASD H	alf-Stress option used.	
Concrete Data			——————————————————————————————————————	
fc	psi =			
Fy	psi =			



: 850 1'-4" Title Job # : 850 1'-4"

Description....

Dsgnr: TLL

Date:

Page: SEP 5,2007

Level

1'-4" Retaining Wall w/ Garden Wall Surcharge

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#### Cantilevered Retaining Wall Design

Code: IBC 2009

<b>Footing Dim</b>	ension	ns & S	Stren	gths
Toe Width		=	0	.33 ft
Heel Width		=	1	.00
Total Footing W	idth	= -	1	.33
Footing Thickne	ss	=	12	.00 in
Key Width		=	12	.00 in
Key Depth		=	0	.00 in
Key Distance fro	om Toe	=	0	.33 ft
fc = 2,500	0 psi	Fy =	40,0	000 psi
Footing Concret	e Density	/ <sup>'</sup> =	150	.00 pcf
Min. As %		=	0.00	)18
Cover @ Top	3.00	@ E	3tm.=	3.00 ir

		_Toe_	Heel
Factored Pressure	=	721	51 ps
Mu' : Upward	=	80	17 ft-
Mu': Downward	=	26	55 ft-
Mu: Design		53	39 ft-
Actual 1-Way Shear	=	1.40	1.01 ps
Allow 1-Way Shear	=	75.00	75.00 ps
Toe Reinforcing	=	#4@24.00 in	
Heel Reinforcing	=	# 4 @ 12.00 in	
Key Reinforcing	=	# 4 @ 12.00 in	

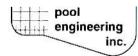
Other Acceptable Sizes & Spacings

Toe: Not reg'd, Mu < S \* Fr Heel: Not req'd, Mu < S \* Fr Key: Not Req'd = Mu<S\*Fr

<b>Summary of Overturning</b>	& Resisting Forces	& Moments
-------------------------------	--------------------	-----------

		OV	ERTURN	ING				RE	SISTING	
Item		Force lbs	Distanc ft		oment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	122.5	0.78	8	95.2	Soil Over Heel	=	55.5	1.17	64.8
Surcharge over Heel	=					Sloped Soil Over Heel	=			
Toe Active Pressure	i = 1	-22.5	0.33		-7.5	Surcharge Over Heel	=			
Surcharge Over Toe	=					Adjacent Footing Load	=			
Adjacent Footing Load	=	22.6	0.48		10.9	Axial Dead Load on Sten	n =			
Added Lateral Load	=					* Axial Live Load on Stem	=			
Load @ Stem Above So	il =					Soil Over Toe	= 1			
<u> </u>						Surcharge Over Toe	=			
						Stem Weight(s)	=	112.0	0.67	74.6
			_			Earth @ Stem Transition	s =			
Total	=	122.6	O.T.M.	=	98.6	Footing Weight	= 1	200.0	0.67	133.3
Resisting/Overturning	g Rat	io	=	2.77	7	Key Weight	=		0.83	
Vertical Loads used f	or So	il Pressure	= 3	67.5 lb	s	Vert. Component	=			
						Tota	al =	367.5 II	os R.M.=	272.8

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



850 2'-0" Title Job# 850 2'-0"

Description...

Dsgnr: TLL

2'-0" Retaining Wall w/ Garden Wall Surcharge

Date:

Page: SEP 5,2007

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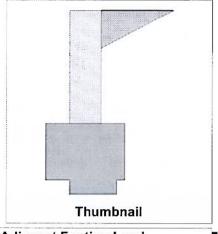
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#### Cantilevered Retaining Wall Design

Code: IBC 2009

Criteria		
Retained Height	=	2.00 ft
Wall height above soil	=	0.00 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	= 1	1,500.0	psf
Equivalent Fluid Pressure	e Meth	od	
Heel Active Pressure	=	45.0	psf/ft
Toe Active Pressure	=	45.0	psf/ft
Passive Pressure	=	200.0	psf/ft
Soil Density, Heel	=	125.00	pcf
Soil Density, Toe	=	125.00	pcf
Footing  Soil Friction	= 0	0.300	
Soil height to ignore for passive pressure	=	0.00	in



# Surcharge Loads

Surcharge Over Heel 0.0 psf NOT Used To Resist Sliding & Overturning Surcharge Over Toe 0.0 psf NOT 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 Ap	plied	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 Ste	em =	0.0 psf

Stem Construction

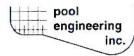
Adjacent Footing Load									
Adjacent Footing Load	=	438.0 lbs							
Footing Width	=	1.00 ft							
Eccentricity	=	0.00 in							
Wall to Ftg CL Dist	=	1.00 ft							
Footing Type		Line Load							
Base Above/Below Soil at Back of Wall	=	-1.0 ft							
Poisson's Ratio	i=1	0.300							

Design Summary			
Wall Stability Ratios Overturning	=	8	3.06 OK
Sliding	=		1.67 OK
Total Bearing Load	=		668 lbs
resultant ecc.	=		1.70 in
Soil Pressure @ Toe	=		605 psf OK
Soil Pressure @ Heel	=		197 psf OK
Allowable Soil Pressure Less	= Th	an A	1,500 psf Allowable
ACI Factored @ Toe	=		863 psf
ACI Factored @ Heel	=		281 psf
Footing Shear @ Toe	=		2.8 psi OK
Footing Shear @ Heel	=		0.9 psi OK
Allowable	=		75.0 psi
Sliding Calcs (Vertical Co	om	pon	ent Used)
Lateral Sliding Force	=		213.1 lbs
less 100% Passive Force	=		156.3 lbs
less 100% Friction Force	=	-	200.4 lbs
Added Force Req'd	=		0.0 lbs OK
for 1.5: 1 Stability	=		0.0 lbs OK

oad Factors	
<b>Building Code</b>	IBC 2009
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.300
Seismic, E	1.000

ciii oononaaanon	-		
Design Height Above Ftg	ft =	Stem OK 0.00	
Wall Material Above "Ht"	=	Masonry	
Thickness	=	8.00	
Rebar Size	=	# 4	
Rebar Spacing	=	24.00	
Rebar Placed at	=	Edge	
Design Data ————			
fb/FB + fa/Fa	=	0.083	
Total Force @ Section	lbs =	104.9	
MomentActual	ft-# =	64.6	
MomentAllowable	=	776.1	
ShearActual	psi =	1.7	
ShearAllowable	psi =	19.4	
Wall Weight	· =	84.0	
Rebar Depth 'd'	in=	5.25	
LAP SPLICE IF ABOVE	in =	24.00	
LAP SPLICE IF BELOW	in=		
HOOK EMBED INTO FT	G in=	6.00	
Massaumi Data			
Masonry Data ————	1	4.500	20 20 20 20 20 20 20 20 20 20 20 20 20 2
Fs	psi =	1,500	
8.37	psi = =	20,000 Yes	
Solid Grouting		res	
Modular Ratio 'n'	=	25.78	
Short Term Factor	=	1.000	
Equiv. Solid Thick.	in =	7.60	
Masonry Block Type	=	Normal Weigl	ht
Masonry Design Method	=	ASD Half-St	ress option used.
Concrete Data			
fc	psi =		
Fy	psi =		

Top Stem



y, mc. /e 807

m, CA 92807 Description....
4) 630,6100 2'-0" Ro

Dsgnr: TLL

This Wall in File: W:\Retain Pro\2010 CBC\STANDARD 2010

Date: SEP 5,2007

2'-0" Retaining Wall w/ Garden Wall Surcharge

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Cantilevered Retaining Wall Design

Code: IBC 2009

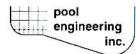
<b>Footing Dimensi</b>	ons & S	Strengths
Toe Width	=	0.50 ft
Heel Width	=	1.17
Total Footing Width	= "	1.67
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	70=	3.00 in
Key Distance from To	e =	0.50 ft
fc = 2,500 psi	Fy =	40,000 psi
Footing Concrete Den	sity =	150.00 pcf
Min. As %	=	0.0018
Cover @ Top 3.0	0 @	3.00 in

		Toe	Heel	
Factored Pressure	=	863	281	osf
Mu': Upward	=	175	80 f	t-#
Mu' : Downward	=	47	124 f	t-#
Mu: Design	=	128	45 f	t-#
Actual 1-Way Shear	=	2.77	0.94	osi
Allow 1-Way Shear	=	75.00	75.00	osi
Toe Reinforcing	=	None Spec'd		
Heel Reinforcing	=	#4@12.00 in		
Key Reinforcing	i=1			

Title : 850 2'-0" Job # : 850 2'-0"

Toe: Not req'd, Mu < S \* Fr Heel: Not req'd, Mu < S \* Fr Key: Not Req'd = Mu<S\*Fr

W		OV	ERTURNING	G				RE	SISTING	
ltem		Force lbs	Distance ft	Mo	ment -#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	202.5	1.00		202.5	Soil Over Heel	=	125.0	1.42	177.1
Surcharge over Heel	=					Sloped Soil Over Heel	=			
Toe Active Pressure	=	-22.5	0.33		-7.5	Surcharge Over Heel	=			
Surcharge Over Toe	=					Adjacent Footing Load	= 0	87.6	1.42	124.1
Adjacent Footing Load	=	33.1	0.90		29.8	Axial Dead Load on Ster	m =			
Added Lateral Load	=					* Axial Live Load on Stem	=			
Load @ Stem Above So	il =					Soil Over Toe	=			
						Surcharge Over Toe	=			
						Stem Weight(s)	=	168.0	0.83	140.0
			_		-	Earth @ Stem Transition	ıs=			
Total	=	213.1	O.T.M. =		224.8	Footing Weight	=	250.0	0.83	208.3
Resisting/Overturnin	a Rat	io	=	3.06		Key Weight	=	37.5	1.00	37.5
Vertical Loads used f	•		= 668	.1 lbs		Vert. Component	= ;			
						Tot	al =	668.1	bs R.M.=	687.0



Title : 850 2'-8" Job # : 850 2'-8"

Description....

Dsgnr: TLL

2'-8" Retaining Wall w/ Garden Wall Surcharge

Date:

Page: SEP 5,2007

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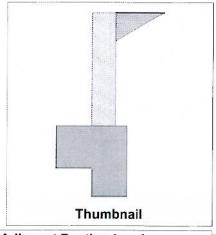
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#### Cantilevered Retaining Wall Design

Code: IBC 2009

Criteria		
Retained Height	=	2.67 ft
Wall height above soil	=	0.00 ft
Slope Behind Wall	=	0.00:1
Height of Soil over Toe	=	0.00 in
Water height over heel	=	0.0 ft

Soil Data			10
Allow Soil Bearing	=	1,500.0	psf
Equivalent Fluid Pressur	e Meth	od	
Heel Active Pressure	=	45.0	psf/ft
Toe Active Pressure	=		psf/ft
Passive Pressure	=	200.0	psf/ft
Soil Density, Heel	=	125.00	pcf
Soil Density, Toe	=	125.00	pcf
Footing  Soil Friction	=	0.300	
Soil height to ignore for passive pressure	Ħ	0.00	in



#### Surcharge Loads Surcharge Over Heel = 0.0 psf NOT Used To Resist Sliding & Overturning Surcharge Over Toe 0.0 psf NOT Used for Sliding & Overturning Axial Load Applied to Stem

Axiai Loau Applie	นเบ	Stem
Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Wall Stability Ratios		
Overturning	=	2.48 OK
Sliding	=	1.60 OK
Total Bearing Load	=	779 lbs
resultant ecc.	=	2.50 in
Soil Pressure @ Toe	=	633 psf Ok
Soil Pressure @ Heel	=	146 psf OK
Allowable	=	1,500 psf
Soil Pressure Less	Than	Allowable
ACI Factored @ Toe	=	894 psf
ACI Factored @ Heel	=	206 psf
Footing Shear @ Toe	=	5.0 psi OK
Footing Shear @ Heel	=	1.4 psi OK
Allowable	=	75.0 psi
Sliding Calcs (Vertical C	Compo	nent Used)
Lateral Sliding Force	=	318.8 lbs

277.8 lbs

233.7 lbs

0.0 lbs OK

0.0 lbs OK

oad Factors	
Building Code	IBC 2009
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.300
Seismic, E	1.000

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	d i	1.00			
Wind on Exposed Ste	em =	0.0 psf			

Adjacent Footing Load				
Adjacent Footing Load	=	438.0 lbs		
Footing Width	=	1.00 ft		
Eccentricity	=	0.00 in		
Wall to Ftg CL Dist	=	1.00 ft		
Footing Type		Line Load		
Base Above/Below Soil at Back of Wall	=	-1.0 ft		
Poisson's Ratio	=	0.300		

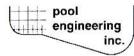
tem Construction		Top Stem
D		Stem OK
Design Height Above Ftg		
Wall Material Above "Ht"	=	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Thickness	=	0.00
Rebar Size	=	
Rebar Spacing	=	24.00
Rebar Placed at	=	= Edge
Design Data ————— fb/FB + fa/Fa	_	- 0.208
Total Force @ Section	lbs =	
MomentActual	ft-# =	
MomentAllowable	=	
ShearActual	psi =	
ShearAllowable	psi =	
	psi =	
Wall Weight Rebar Depth 'd'		04.0
LAP SPLICE IF ABOVE	in =	·
LAP SPLICE IF ABOVE	in =	
HOOK EMBED INTO FT	W. 1.75-7.	
TIOOK EMBED INTO LI	G III -	0.00
Masonry Data		
f'm	psi =	1,500
Fs	psi =	20,000
Solid Grouting	=	Yes
Modular Ratio 'n'	=	25.78
Short Term Factor	=	1.000
Equiv. Solid Thick.	in=	7,60
Masonry Block Type	=	Normal Weight
Masonry Design Method	=	ASD Half-Stress option used.
Concrete Data	1.2	
fc	psi =	
Fy	psi =	

less 100% Passive Force = -

less 100% Friction Force = -

Added Force Reg'd

....for 1.5: 1 Stability



Title : 850 2'-8" Job # : 850 2'-8"

Dsgnr: TLL

Date:

Page: SEP 5,2007

Description....

2'-8" Retaining Wall w/ Garden Wall Surcharge

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### Cantilevered Retaining Wall Design

Code: IBC 2009

Footin	g Dimens	ions & S	Strengths
Toe Widt	h	=	1.00 ft
Heel Wid	th	=	1.00
Total Foo	ting Width	= "	2.00
Footing T	hickness	=	12.00 in
Key Widt	h	=	12.00 in
Key Dept	:h	=::	8.00 in
Key Dista	ance from To	e =	1.00 ft
fc =	2,500 psi	Fy =	40,000 psi
Footing C	oncrete Der	nsity =	150.00 pcf
Min. As %	6	=	0.0018
Cover @	Top 3.0	00 @ E	3.00 in

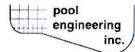
W-100-		Toe_	Heel
Factored Pressure	=	894	206 pst
Mu': Upward	=	517	33 ft-#
Mu' : Downward	=	143	85 ft-#
Mu: Design	=	374	52 ft-#
Actual 1-Way Shear	=	5.02	1.35 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	#4@12.00 in	
Key Reinforcing	$\hat{x}_{i} = \hat{x}_{i}$	#4@12.00 in	

Toe: Not req'd, Mu < S \* Fr Heel: Not req'd, Mu < S \* Fr Key: Not Req'd = Mu<S\*Fr

Summary of Overturning & Resisting Forces & Moments

		0V	ERTURN	ING				RI	SISTING	
ltem		Force lbs	Distanc ft	e M	oment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	302.6	1.22		369.8	Soil Over Heel	=	111.1	1.83	203.7
Surcharge over Heel	=					Sloped Soil Over Heel	=			
Toe Active Pressure		-22.5	0.33		-7.5	Surcharge Over Heel	=			
Surcharge Over Toe	=					Adjacent Footing Load	=	43.8	1.83	80.3
Adjacent Footing Load	=	38.7	1.39	ř	53.9	Axial Dead Load on Ster	m =			
Added Lateral Load	=					* Axial Live Load on Stem	1 =			
Load @ Stem Above So	il =					Soil Over Toe	=			
						Surcharge Over Toe	=			
						Stem Weight(s)	=	224.0	1.33	298.7
	8		_	0		Earth @ Stem Transition	ns=			
Total	=	318.8	O.T.M.	=	416.3	Footing Weight	=	300.0	1.00	300.0
Resisting/Overturnin	a Rat	io	=	2.4	В	Key Weight	=	100.0	1.50	150.0
Vertical Loads used f			= ;	779.0 lb	s	Vert. Component	=			
						Tot	al =	779.0	bs R.M.=	1,032.7

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



Title : 850 3'-4" Job # : 850 3'-4"

Description....

Dsgnr: TLL

3'-4" Retaining Wall w/ Garden Wall Surcharge

Page: Date: **SEP** 

SEP 5,2007

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#### Cantilevered Retaining Wall Design

Code: IBC 2009

Criteria		
Retained Height	=	3.33 ft
Wall height above soil	=	0.00 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	=	1,500.0	psf
Equivalent Fluid Pressure	e Meth	od	
Heel Active Pressure	= 1	45.0	psf/ft
Toe Active Pressure	=	45.0	psf/ft
Passive Pressure	=	200.0	psf/ft
Soil Density, Heel	=	125.00	pcf
Soil Density, Toe	=	125.00	pcf
Footing[ Soil Friction	=	0.300	
Soil height to ignore for passive pressure	=	0.00	in



# Surcharge Loads

Surcharge Over Heel = 0,0 psf NOT Used To Resist Sliding & Overturning Surcharge Over Toe = 0.0 psf NOT 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				

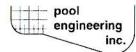
Wind on Exposed Stem = 0.0 psf

Adjacent Footing Load					
Adjacent Footing Load	=	438.0 lbs			
Footing Width	=	1.00 ft			
Eccentricity	=	0.00 in			
Wall to Ftg CL Dist	=	1.00 ft			
Footing Type		Line Load			
Base Above/Below Soil at Back of Wall	=	-1.0 ft			
Poisson's Ratio	=	0.300			

	-		
Design Summary			
Wall Stability Ratios			
Overturning	=		2.30 OK
Sliding	=		1.56 OK
Total Bearing Load	=		1,068 lbs
resultant ecc.	=		3.52 in
Soil Pressure @ Toe	=		846 psf OK
Soil Pressure @ Heel	=		104 psf OK
Allowable Soil Pressure Less	= Th	an A	1,500 <sub>psf</sub>
ACI Factored @ Toe	=		1,195 psf
ACI Factored @ Heel	=		146 psf
Footing Shear @ Toe	=		7.4 psi OK
Footing Shear @ Heel	=		2.9 psi OK
Allowable	=		75.0 psi
Sliding Calcs (Vertical Co	om	pon	ent Used)
Lateral Sliding Force	=		441.7 lbs
less 100% Passive Force	=	$\sim$	367.4 lbs
less 100% Friction Force	Ξ	-	320.3 lbs
Added Force Req'd	=		0.0 lbs OK
for 1.5:1 Stability	=		0.0 lbs OK

Building Code	IBC 2009
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.300
Seismic, E	1.000

tem Construction		Top Stem
Dealer Halak Alere Et		Stem OK
Design Height Above Ftg		
Wall Material Above "Ht"	=	Masony
Thickness	=	0.00
Rebar Size	=	
Rebar Spacing	=	
Rebar Placed at	=	Edge
Design Data ————— fb/FB + fa/Fa	=	0.411
Total Force @ Section	lbs =	
MomentActual	ft-#=	
MomentAllowable	=	
		1,0.1
ShearActual	psi =	
ShearAllowable	psi =	
Wall Weight	=	04.0
Rebar Depth 'd'	in =	
LAP SPLICE IF ABOVE	in =	24.00
LAP SPLICE IF BELOW	in=	
HOOK EMBED INTO FT	G in =	6.00
Masonry Data —	_90_500	
fm	psi =	1,500
Fs	psi =	20,000
Solid Grouting	=	Yes
Modular Ratio 'n'	=	25.78
Short Term Factor	=	1.000
Equiv. Solid Thick.	in =	7.60
Masonry Block Type	=	Normal Weight
Masonry Design Method	=	ASD Half-Stress option used.
Concrete Data		
fc	psi =	
Fy	psi =	



Title : 850 3'-4" Job # : 850 3'-4"

Description....

Dsgnr: TLL

3'-4" Retaining Wall w/ Garden Wall Surcharge

Date:

Page: SEP 5,2007

Level

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Retain Pro 9 © 1989 - 2011 Ver: 9.19 8152 Registration #: RP-1159015 RP9.19

Licensed to: Pool Engineering, Inc.

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dim	nensior	ns & S	Strengths	
Toe Width		=	1.00 ft	
Heel Width		=	1.25	
Total Footing W	fidth	= -	2.25	
Footing Thickne	ss	=	12.00 in	
Key Width		=	12.00 in	
Key Depth		=	11.00 in	
Key Distance fro	om Toe	=	1.00 ft	
f'c = 2,50	0 psi	Fy =	40,000 ps	i
<b>Footing Concret</b>	e Density	=	150.00 pc	f
Min. As %		=	0.0018	
Cover @ Top	3.00	@ E	3.00 stm.=	in

Footing Desig	ın	Results	
		Toe	Heel
Factored Pressure	=	1,195	146 psf
Mu': Upward	=	690	74 ft-#
Mu': Downward	$\epsilon_{ij} = \epsilon_{ij}$	143	223 ft-#
Mu: Design	=	547	149 ft-#
Actual 1-Way Shear	=	7.37	2.92 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	#4@12.00 in	
Key Reinforcing	=		

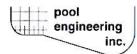
Other Acceptable Sizes & Spacings Toe: Not req'd, Mu < S \* Fr

Heel: Not req'd, Mu < S \* Fr Key: Not Req'd = Mu<S\*Fr

Cummon	~£	Overturning	9	Docieting	Earne	9	Mamanta
Summary	OI	Overturning	œ	Resisting	<b>FUICES</b>	$\alpha$	Montents

		OV	ERTURNING	3			RE	SISTING	
Item		Force lbs	Distance ft	Moment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	422.4	1.44	610.1	Soil Over Heel	=	243.0	1.96	475.9
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Toe Active Pressure	=	-22.5	0.33	-7.5	Surcharge Over Heel	=			
Surcharge Over Toe	i=0				Adjacent Footing Load	=0	69.7	1.96	136.5
Adjacent Footing Load	=	41.8	1.94	80.9	Axial Dead Load on Ster	m =			
Added Lateral Load	=				* Axial Live Load on Stem	=			
Load @ Stem Above So	il =				Soil Over Toe	=			
					Surcharge Over Toe	=			
					Stem Weight(s)	=	280.0	1.33	373.3
			-	(	Earth @ Stem Transition	ns =			
Total	=	441.7	O.T.M. =	683.5	Footing Weight	=	337.5	1.13	379.7
Resisting/Overturning	g Rat	io	=	2.30	Key Weight	=	137.5	1.50	206.3
Vertical Loads used f	or So	il Pressure	= 1,067	7 lbs	Vert. Component	=			
					Tot	al =	1,067.7 lb	s R.M.=	1,571.6

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



Title : 850 4'-0" Job # : 850 4'-0"

Description....

Dsgnr: TLL

Page: Date:

SEP 5,2007

4'-0" Retaining Wall w/ Garden Wall Surcharge

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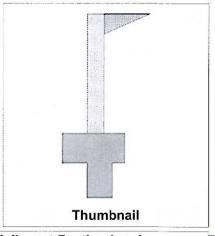
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# Cantilevered Retaining Wall Design

Code: IBC 2009

Criteria		
Retained Height	=	4.00 ft
Wall height above soil	=	0.00 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	=	1,500.0	psf
Equivalent Fluid Pressure	e Meth	nod	0.000000
Heel Active Pressure	=	45.0	psf/f
Toe Active Pressure	=	45.0	psf/f
Passive Pressure	=	200.0	psf/ff
Soil Density, Heel	=	125.00	pcf
Soil Density, Toe	=	125.00	pcf
Footing  Soil Friction	=	0.300	
Soil height to ignore for passive pressure	=	0.00	in



#### Surcharge Loads Surcharge Over Heel 0.0 psf NOT Used To Resist Sliding & Overturning Surcharge Over Toe 0.0 psf NOT 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					

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

Axial Load Eccentricity	=		0.0 in
<b>Design Summary</b>			
Wall Stability Ratios			
Overturning	=		2.15 OK
Sliding	=		1.52 OK
Total Bearing Load	=		1,394 lbs
resultant ecc.	=		4.69 in
Soil Pressure @ Toe	=		1,080 psf OK
Soil Pressure @ Heel	=		35 psf OK
Allowable	=		1,500 psf
Soil Pressure Less	Th	an	
ACI Factored @ Toe	=		1,526 psf
ACI Factored @ Heel	=		49 psf
Footing Shear @ Toe	=		10.0 psi OK
Footing Shear @ Heel	=		5.0 psi OK
Allowable	=		75.0 psi
Sliding Calcs (Vertical C	om	pc	nent Used)
Lateral Sliding Force	=	90.	583.5 lbs
less 100% Passive Force	=	$\approx$	469.4 lbs
less 100% Friction Force	=	_	418.2 lbs
Added Force Reg'd	=		0.0 lbs OK
for 1.5 : 1 Stability	=		0.0 lbs OK
Load Factors			
Building Code			IBC 2009
Dead Load			1.200
Live Load			1.600
Earth, H			1.600
carm, m			1.000

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 loa has been increase by a factor of		1.00			
Wind on Exposed St	em =	0.0 psf			

Adjacent Footing Load				
=	438.0 lbs			
=	1.00 ft			
= 0	0.00 in			
=	1.00 ft			
	Line Load			
=	-1.0 ft			
=0	0.300			
	11 11 11 11			

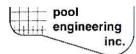
000	Top Stem
_	Stem OK
	and the second s
	Massiny
	0.00
	, , , , , , , , , , , , , , , , , , ,
	10.00
=	Edge
	0.604
	000.4
4.30000	
psi =	19.4
=	84.0
in=	5.25
in =	24.00
in=	
3 in =	6.00
	S 1990 - 12
psi =	1,500
psi =	20,000
=	Yes
=	25.78
=:	1.000
in =	7.60
=	Normal Weight
=	ASD Half-Stress option used.
Section 1	
200	
psi =	
	ft = = = = = = = = = = = = = = = = = = =

1.300

1.000

Wind, W

Seismic, E



Title : 850 4'-0" Job # : 850 4'-0"

Description....

Dsgnr: TLL 4'-0" Retaining Wall w/ Garden Wall Surcharge

Page: SEP 5,2007

Date:

Level

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#### Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dim	ensio	ns & S	Stren	gths
Toe Width		=	1	.00 ft
Heel Width		=	1	.50
Total Footing Wi	idth	=	2	.50
Footing Thicknes	SS	=	12	.00 in
Key Width		=	12	.00 in
Key Depth		=	14	.00 in
Key Distance fro	m Toe	=	1	.00 ft
fc = 2,500	) psi	Fy =	40,0	000 psi
Footing Concrete	e Densit	y =	150	.00 pcf
Min. As %		=	0.00	18
Cover @ Top	3.00	@ E	3tm.=	3.00 ir

		Toe	Heel
Factored Pressure	=	1,526	49 psf
Mu' : Upward	=	882	123 ft-#
Mu' : Downward	=	143	455 ft-#
Mu: Design	=	740	332 ft-#
Actual 1-Way Shear	=	10.01	5.02 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	$\dot{z} = 0$	#4@16.00 in	
Heel Reinforcing	=	#4@12.00 in	
Key Reinforcing	=	#4@12.00 in	

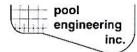
Other Acceptable Sizes & Spacings

Toe: Not req'd, Mu < S \* Fr Heel: Not req'd, Mu < S \* Fr Key: Not Req'd = Mu<S\*Fr

f Overturning	& Resisting	Forces &	Moments
	f Overturning	f Overturning & Resisting	f Overturning & Resisting Forces &

		OV	ERTURNING	ì			RE	SISTING	
Item		Force lbs	Distance ft	Moment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	562.5	1.67	937.5	Soil Over Heel	=	416.7	2.08	868.1
Surcharge over Heel	=				Sloped Soil Over Hee	el =			
Toe Active Pressure	=	-22.5	0.33	-7.5	Surcharge Over Heel	=			
Surcharge Over Toe					Adjacent Footing Loa	d =	91.3	2.08	190.1
Adjacent Footing Load	=	43.5	2.52	109.4	Axial Dead Load on S	Stem =			
Added Lateral Load	=				* Axial Live Load on St	em =			
Load @ Stem Above So	il =				Soil Over Toe	=			
2 - III - III					Surcharge Over Toe	=			
					Stem Weight(s)	=	336.0	1.33	448.0
	8				Earth @ Stem Transit	tions =			
Total	=	583.5	O.T.M. =	1,039.4	Footing Weight	=	375.0	1.25	468.8
Resisting/Overturnin	g Rat	io	=	2.15	Key Weight	=	175.0	1.50	262.5
Vertical Loads used f	for So	il Pressure	= 1,393.	9 lbs	Vert. Component	=			
						Γotal =	1,393.9 lk	s R.M.=	2,237.4
					* Axial live load NOT in	cluded in	total displaye	d, or used for	overturning

resistance, but is included for soil pressure calculation.



Title 850 4'-8" Job # 850 4'-8"

Description....

Dsgnr: TLL

4'-8" Retaining Wall w/ Garden Wall Surcharge

Page: Date: SEP 5,2007

Level

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#### Cantilevered Retaining Wall Design

Code: IBC 2009

Criteria		
Retained Height	=	4.67 ft
Wall height above soil	=	0.00 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	=	1,500.0	psf
Equivalent Fluid Pressure	e Meth	od	er Bestarten
Heel Active Pressure	=	45.0	psf/ft
Toe Active Pressure	=	45.0	psf/ft
Passive Pressure	=	200.0	psf/ft
Soil Density, Heel	=	125.00	pcf
Soil Density, Toe	=	125.00	pcf
Footing  Soil Friction	=:	0.300	
Soil height to ignore for passive pressure	=	0.00	in



=	0.0 psf
liding	& Overturning
= 3	0.0 psf
Over	turning
d to	Stem
	= Over

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

Axial Load Eccentricity	=		0.0 in
<b>Design Summary</b>			
Wall Stability Ratios Overturning	=	5	2.19 OK
Sliding	=		1.55 OK
Total Bearing Loadresultant ecc.	=		1,626 lbs 4.84 in
Soil Pressure @ Toe Soil Pressure @ Heel	=		979 psf OK 104 psf OK
Allowable Soil Pressure Less	= Th	an A	1,500 <sub>psf</sub> Allowable
ACI Factored @ Toe ACI Factored @ Heel	=		1,376 psf 147 psf
Footing Shear @ Toe Footing Shear @ Heel Allowable	= =		12.6 psi OK 3.8 psi OK 75.0 psi
Sliding Calcs (Vertical Co Lateral Sliding Force less 100% Passive Force less 100% Friction Force	om = = =	por - -	nent Used) 744.6 lbs 667.4 lbs 487.7 lbs
Added Force Req'dfor 1.5 : 1 Stability	=		0.0 lbs OK 0.0 lbs OK
Load Factors ————————————————————————————————————			IBC 2009
Dead Load Live Load			1.200 1.600
Earth, H			1.600

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 Ste	m =	0.0 psf			

Adjacent Footing Load					
Adjacent Footing Load	=	438.0 lbs			
Footing Width	=	1.00 ft			
Eccentricity	=	0.00 in			
Wall to Ftg CL Dist	=	1.00 ft			
Footing Type		Line Load			
Base Above/Below Soil at Back of Wall	=	-1.0 ft			
Poisson's Ratio	=	0.300			

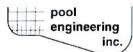
tem Construction		Top Stem	2nd	
B. 1. 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Stem OK	Stem OK	
Design Height Above Ftg		10010	0.00	
Wall Material Above "Ht"		Masonry	Masonry	
Thickness	=	0.00	12.00	
Rebar Size	=	# 4	# 4	
Rebar Spacing	=	24.00	16.00	
Rebar Placed at	=	Edge	Edge	
Design Data ————— fb/FB + fa/Fa	=	0.208	0.413	
Total Force @ Section	lbs =	188.7	532.8	
MomentActual	ft-# =	161.7	857.4	
MomentAllowable	ft-#=	776.1	2,074.4	
ShearActual	psi =	3.0	4.9	
ShearAllowable	psi =	19.4	19.4	
Wall Weight	psf =	84.0	133.0	
Rebar Depth 'd'	in=	5.25	9.00	
LAP SPLICE IF ABOVE	in=	24.00	24.00	
LAP SPLICE IF BELOW	in =	24.00		
HOOK EMBED INTO FT	G in=		6.00	
Masonry Data				and the second s
f'm	psi =	1,500	1,500	
Fs	psi =	20,000	20,000	
Solid Grouting	=	Yes	Yes	
Modular Ratio 'n'	=	25.78	25.78	
Short Term Factor	=	1.000	1.000	
Equiv. Solid Thick.	in =	7.60	11.60	
Masonry Block Type	=	Normal We	ight	
Masonry Design Method	=	ASD Half-	Stress option	n used.
Concrete Data				reconstruites to
fc	psi =			
Fy	psi =			

1.300

1.000

Wind, W

Seismic, E



Pool Engineering, Inc. 1201 N Tustin Ave Anaheim, CA 92807 Tel: (714) 630-6100

Fax: (714) 630-6114

Title : 850 4'-8" Job # : 850 4'-8"

Description....

Dsgnr: TLL

4'-8" Retaining Wall w/ Garden Wall Surcharge

Page: SEP 5,2007

Date:

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## Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Din	nensior	ns & S	Stren	gths
Toe Width		=	1	.50 ft
Heel Width		=	1	.50
Total Footing W	idth/	=	3	.00
Footing Thickne	ss	=	12.	.00 in
Key Width		=	12.	00 in
Key Depth		= 1	19.	.00 in
Key Distance from	om Toe	=	1.	50 ft
fc = 2,50		Fy =		00 psi
Footing Concret	e Density	=	150	.00 pcf
Min. As %		=	0.00	18
Cover @ Top	3.00	@ E	3tm.=	3.00 ir

		Toe	Heel
Factored Pressure	=	1,376	147 pst
Mu' : Upward	=	1,742	70 ft-#
Mu': Downward	=	322	289 ft-#
Mu: Design	=	1,420	219 ft-#
Actual 1-Way Shear	=	12.63	3.81 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	#4@16.00 in	
Heel Reinforcing	=	# 4 @ 12.00 in	
Key Reinforcing	=	# 4 @ 12.00 in	

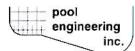
Other Acceptable Sizes & Spacings Toe: Not reg'd, Mu < S \* Fr

Heel: Not req'd, Mu < S \* Fr Key: Not Req'd = Mu<S\*Fr

Summary of	f Overturning	& Resisting	Forces &	Moments

		OV	ERTURN	ING				RE	SISTING	
ltem		Force lbs	Distanc ft	е	Moment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	722.6	1.89		1,365.0	Soil Over Heel	=	291.7	2.75	802.1
Surcharge over Heel	=					Sloped Soil Over Heel	=			
Toe Active Pressure	=	-22.5	0.33		-7.5	Surcharge Over Heel	=			
Surcharge Over Toe	=					Adjacent Footing Load	=	45.3	2.75	124.6
Adjacent Footing Load	=	44.5	3.12		138.9	Axial Dead Load on Ster	m =			
Added Lateral Load	=					* Axial Live Load on Stem	1 =			
Load @ Stem Above So	il =					Soil Over Toe	=			
						Surcharge Over Toe	= 0			
						Stem Weight(s)	=	490.0	1.92	942.7
						Earth @ Stem Transition	ns =	111.1	2.33	259.3
Total	=	744.6	O.T.M.	=	1,496.4	Footing Weight	=	450.0	1.50	675.0
Resisting/Overturnin	g Rat	io	=	2	19	Key Weight	=	237.5	2.00	475.0
Vertical Loads used f	or So	I Pressure	= 1,6	25.6	lbs	Vert. Component	=			
						Tot	al =	1,625.6	bs R.M.=	3,278.7

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



: 850 5'-4" : 850 5'-4" Title Job#

Description....

Dsgnr: TLL

5'-4" Retaining Wall w/ Garden Wall Surcharge

Level

Page: Date: SEP 5,2007

This Wall in File: W:\Retain Pro\2010 CBC\STANDARD 2010.

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## Cantilevered Retaining Wall Design

Code: IBC 2009

Criteria		
Retained Height	=	5.33 ft
Wall height above soil	=	0.00 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	=	1,500.0	psf
Equivalent Fluid Pressure	e Meth	od	
Heel Active Pressure	=	45.0	psf/ft
Toe Active Pressure	=	45.0	psf/ft
Passive Pressure	=	200.0	psf/ff
Soil Density, Heel	=	125.00	pcf
Soil Density, Toe	=	125.00	pcf
Footing  Soil Friction	=	0.300	
Soil height to ignore for passive pressure	=	0.00	in



#### Surcharge Loads

Surcharge Over Heel 0.0 psf NOT Used To Resist Sliding & Overturning Surcharge Over Toe 0.0 psf NOT 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	=	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 Ste	em =	0.0 psf

Lateral Load Applied to Stem

Adjacent Footing I	Loa	d
Adjacent Footing Load	=	438.0 lbs
Footing Width	=	1.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	1.00 ft
Footing Type		Line Load
Base Above/Below Soil at Back of Wall	=	-1.0 ft
Poisson's Ratio	=	0.300

Axial Load Eccentricity	=		0.0 in			
Design Summary						
Wall Stability Ratios	=					
Overturning	=		2.06 OK 1.52 OK			
Sliding	_		1.52 OK			
Total Bearing Load	=		1,845 lbs			
resultant ecc.	=		5.79 in			
Soil Pressure @ Toe	=		1,034 psf OK			
Soil Pressure @ Heel	=		73 psf OK			
Allowable	=		1,500 psf			
Soil Pressure Less	Th	an A				
ACI Factored @ Toe	=		1,453 psf			
ACI Factored @ Heel	=		103 psf			
Footing Shear @ Toe	=		15.7 psi OK			
Footing Shear @ Heel	=		4.6 psi OK			
Allowable	=		75.0 psi			
Sliding Calcs (Vertical C	om	por	nent Used)			
Lateral Sliding Force	=		925.0 lbs			
less 100% Passive Force	=	*	850.7 lbs			
less 100% Friction Force	=	-	553.6 lbs			
Added Force Reg'd	=		0.0 lbs OK			
for 1.5 : 1 Stability	=		0.0 lbs OK			
Load Factors						

IBC 2009

1.200 1.600

1.600

1.300

1.000

Fy

Stem Construction		Top Stem	2nd	
Design Height Above Ftg	ft =	Stem OK 2.00	Stem OK 0.00	
Wall Material Above "Ht"	=	Masonry	Masonry	
Thickness	=	8.00	12.00	
Rebar Size	=	# 4	# 4	
Rebar Spacing	=	16.00	8.00	
Rebar Placed at	=	Edge	Edge	
Design Data ————				
fb/FB + fa/Fa	=	0.352	0.448	
Total Force @ Section	lbs =	286.3	684.0	
MomentActual	ft-# =	319.1	1,261.6	
MomentAllowable	ft-# =	905.4	2,814.4	
ShearActual	psi =	4.5	6.3	
ShearAllowable	psi =	19.4	19.4	
Wall Weight	psf=	84.0	133.0	
Rebar Depth 'd'	in=	5.25	9.00	
LAP SPLICE IF ABOVE	in=	24.00	24.00	
LAP SPLICE IF BELOW	in=	24.00		
HOOK EMBED INTO FT	3 in =		6.00	
Masonry Data				
fm	psi =	1,500	1.500	
Fs	psi =	20,000	20,000	
Solid Grouting	=	Yes	Yes	
Modular Ratio 'n'	=	25.78	25.78	
Short Term Factor	=	1.000	1.000	
Equiv. Solid Thick.	in =	7.60	11.60	
Masonry Block Type	=	Normal We		
Masonry Design Method	=	ASD Half-	Stress option us	sed.
Concrete Data				
fc	psi =			

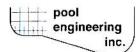
**Building Code** Dead Load

Live Load Earth, H

Wind, W

Seismic, E

psi =



: 850 5'-4" Title Job # : 850 5'-4"

Description....

Dsgnr: TLL

Page: Date:

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5'-4" Retaining Wall w/ Garden Wall Surcharge This Wall in File: W:\Retain Pro\2010 CBC\STANDARD 2010.

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**Cantilevered Retaining Wall Design** 

Code: IBC 2009

Footing Dim	ensio	ns & S	Strengths	
Toe Width		=	1.83 ft	
Heel Width		= 1.50		
Total Footing W	idth	= "	3.33	
Footing Thickne	ss	=	12.00 in	
Key Width		= ;	12.00 in	
Key Depth		=	23.00 in	
Key Distance fro	m Toe	=	1.83 ft	
f'c = 2,500	0 psi	Fy =	40,000 psi	
Footing Concrete	e Density	/ =	150.00 pcf	
Min. As %		=	0.0018	
Cover @ Top	3.00	@ E	3.00 ir	

2000		Toe	Heel
Factored Pressure	=	1,453	103 psf
Mu': Upward	=	2,541	57 ft-#
Mu': Downward	=	456	322 ft-#
Mu: Design	=	2,086	264 ft-#
Actual 1-Way Shear	0.00	15.66	4.61 psi
Allow 1-Way Shear	=	75.00	75.00 psi
Toe Reinforcing	=	#4@8.00 in	
Heel Reinforcing	=	# 4 @ 12.00 in	
Key Reinforcing	=	# 4 @ 12.00 in	

Other Acceptable Sizes & Spacings Toe: Not req'd, Mu < S \* Fr Heel: Not req'd, Mu < S \* Fr

Key: Not Req'd = Mu<S\*Fr

Summary of Overturning & Resi	isting Forces & Moments
-------------------------------	-------------------------

OVERTURNING						RESISTING			
Item		Force lbs	Distance ft	Moment ft-#			Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	902.4	2.11	1,905.0	Soil Over Heel	=	333.3	3.08	1,027.6
Surcharge over Heel	=				Sloped Soil Over Heel	=			
Toe Active Pressure	=	-22.5	0.33	-7.5	Surcharge Over Heel	=			
Surcharge Over Toe	=				Adjacent Footing Load	=	39.8	3.08	122.8
Adjacent Footing Load	=	45.1	3.74	168.7	Axial Dead Load on Ste	m =			
Added Lateral Load	=				* Axial Live Load on Stem	1 =			
Load @ Stem Above So	il =				Soil Over Toe	=			
					Surcharge Over Toe	=			
					Stem Weight(s)	=	546.0	2.25	1,227.1
					Earth @ Stem Transition	ns =	138.9	2.67	370.3
Total	=	925.0	O.T.M. =	2,066.2	Footing Weight	=	500.0	1.67	833.2
Resisting/Overturnin	g Rat	io	= 2	2.06	Key Weight	=	287.5	2.33	670.7
Vertical Loads used t	or So	il Pressure	= 1,845.	4 lbs	Vert. Component	=			
							4 045 4 1		4 OF 4 7

1,845.4 lbs R.M.= 4,251.7 \* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.