pool engineering inc.
1201 N. Tustin Avenue
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Fax: (714) 630-6114
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DETAIL # 850

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

STRUCTURAL CALCULATIONS

FOR

DETAIL 850 T SHAPE
1'-4" TO 6'-0" HIGH
LEVEL BACKFILL
WITH SURCHARGE FROM FREESTANDING WALL

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_y = **40000psi** (Grade 40) (or as noted)

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Title : 850 1'-4" Page: _____
Job # : 850 1'-4" Dsgnr: TLL Date: SEP 5,2007
Description....
1'-4" Retaining Wall w/ Garden Wall Surcharge Level

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

Cantilevered Retaining Wall Design

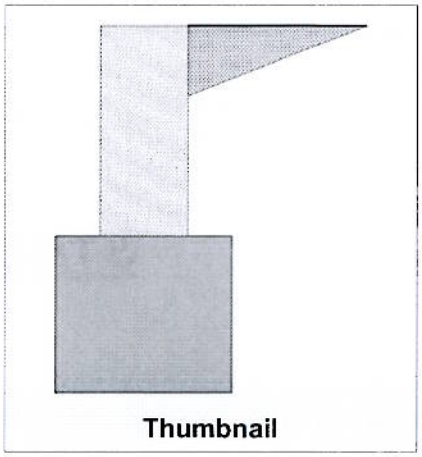
Code: IBC 2009

Criteria

Retained Height	=	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

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
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



Thumbnail

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	=	2.77	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 Allowable			
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 Component Used)

Lateral Sliding Force	=	122.6 lbs
less 100% Passive Force	= -	100.0 lbs
less 100% Friction Force	= -	110.3 lbs
Added Force Req'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
Wind, W	1.300
Seismic, E	1.000

Stem Construction

Top Stem

			Stem OK
Design Height Above Ftg	ft =		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	=		**0.023**
Total Force @ Section	lbs =		40.5
Moment....Actual	ft-# =		17.8
Moment.....Allowable	=		776.1
Shear.....Actual	psi =		0.6
Shear.....Allowable	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 FTG	in =		6.00

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

f'c	psi =	
Fy	psi =	

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Title : 850 1'-4" Page:
Job # : 850 1'-4" Dsgnr: TLL Date: SEP 5,2007
Description....
1'-4" Retaining Wall w/ Garden Wall Surcharge Level

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

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 Dimensions & Strengths

Toe Width	=	0.33 ft
Heel Width	=	1.00
Total Footing Width	=	1.33
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.33 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	721	51 psf
Mu' : Upward	=	80	17 ft-#
Mu' : Downward	=	26	55 ft-#
Mu: Design	=	53	39 ft-#
Actual 1-Way Shear	=	1.40	1.01 psi
Allow 1-Way Shear	=	75.00	75.00 psi

Toe Reinforcing = # 4 @ 24.00 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 & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
Heel Active Pressure	=	122.5	0.78	95.2	Soil Over Heel	=	55.5	1.17	64.8
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	=			
Adjacent Footing Load	=	22.6	0.48	10.9	Axial Dead Load on Stem	=			
Added Lateral Load	=				* Axial Live Load on Stem	=			
Load @ Stem Above Soil	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
					Stem Weight(s)	=	112.0	0.67	74.6
					Earth @ Stem Transitions	=			
Total	=	122.6	**O.T.M.** =	98.6	Footing Weight	=	200.0	0.67	133.3
Resisting/Overturning Ratio		= **2.77**			Key Weight	=		0.83	
Vertical Loads used for Soil Pressure =		367.5 lbs			Vert. Component	=			
						Total =	367.5 lbs	**R.M.=**	272.8

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

DESIGNER NOTES:

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Title : 850 2'-0" Page: _____
Job # : 850 2'-0" Dsgnr: TLL Date: SEP 5,2007
Description....
2'-0" Retaining Wall w/ Garden Wall Surcharge

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

Cantilevered Retaining Wall Design

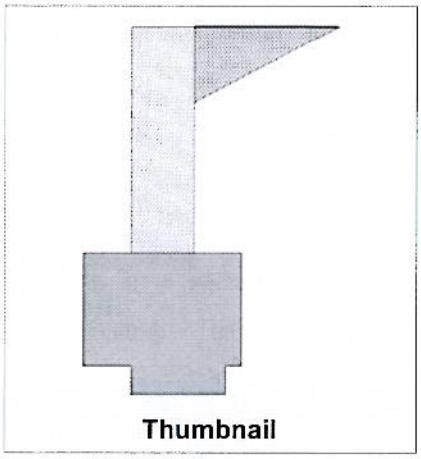
Code: IBC 2009

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	=	1,500.0 psf
Equivalent Fluid Pressure Method		
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



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	=	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	=	1,500 psf	
Soil Pressure Less Than 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 Component 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

Load 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

Stem Construction

Top Stem

		Stem OK
Design Height Above Ftg	ft =	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
Moment....Actual	ft-# =	64.6
Moment.....Allowable	=	776.1
Shear.....Actual	psi =	1.7
Shear.....Allowable	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 FTG	in =	6.00

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

f'c	psi =	
Fy	psi =	

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Title : 850 2'-0" Dsgnr: TLL Page: _____
Job # : 850 2'-0" Date: SEP 5,2007
Description....
2'-0" Retaining Wall w/ Garden Wall Surcharge

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

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & 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	=	3.00 in
Key Distance from Toe	=	0.50 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	863	281 psf
Mu' : Upward	=	175	80 ft-#
Mu' : Downward	=	47	124 ft-#
Mu: Design	=	128	45 ft-#
Actual 1-Way Shear	=	2.77	0.94 psi
Allow 1-Way Shear	=	75.00	75.00 psi

Toe Reinforcing = None Spec'd
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 & Resisting Forces & Moments

		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... 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	=	87.6	1.42	124.1
Adjacent Footing Load	=	33.1	0.90	29.8	Axial Dead Load on Stem	=			
Added Lateral Load	=				* Axial Live Load on Stem	=			
Load @ Stem Above Soil	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
					Stem Weight(s)	=	168.0	0.83	140.0
					Earth @ Stem Transitions	=			
Total	=	213.1	**O.T.M.** =	224.8	Footing Weight	=	250.0	0.83	208.3
					Key Weight	=	37.5	1.00	37.5
					Vert. Component	=			
					Total =		668.1 lbs	**R.M.=**	687.0

Resisting/Overturning Ratio = 3.06
Vertical Loads used for Soil Pressure = 668.1 lbs

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

DESIGNER NOTES:

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Title : 850 2'-8" Page: _____
Job # : 850 2'-8" Dsgnr: TLL Date: SEP 5,2007
Description....
2'-8" Retaining Wall w/ Garden Wall Surcharge

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

Cantilevered Retaining Wall Design

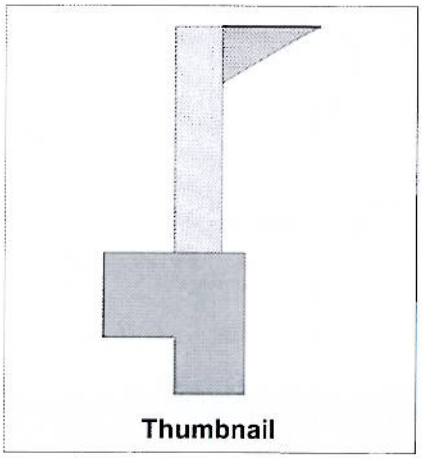
Code: IBC 2009

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

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
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



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	=	2.48 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 Component Used)

Lateral Sliding Force	=	318.8 lbs
less 100% Passive Force	= -	277.8 lbs
less 100% Friction Force	= -	233.7 lbs
Added Force Req'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
Wind, W	1.300
Seismic, E	1.000

Stem Construction

Top Stem

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	=	0.208
Total Force @ Section	lbs =	188.7
Moment....Actual	ft-# =	161.7
Moment.....Allowable	=	776.1
Shear.....Actual	psi =	3.0
Shear.....Allowable	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 FTG	in =	6.00

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

f'c	psi =
Fy	psi =

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

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Registration #: RP-1159015 RP9.19
Licensed to: Pool Engineering, Inc.

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths

Toe Width	=	1.00 ft
Heel Width	=	1.00
Total Footing Width	=	2.00
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	8.00 in
Key Distance from Toe	=	1.00 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	894	206 psf
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 = # 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 & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... 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	53.9	Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
					Surcharge Over Toe	=		
					Stem Weight(s)	= 224.0	1.33	298.7
					Earth @ Stem Transitions	=		
Total	=	318.8	**O.T.M.** =	416.3	Footing Weight	= 300.0	1.00	300.0
					Key Weight	= 100.0	1.50	150.0
					Vert. Component	=		
					Total =	779.0 lbs	**R.M.**=	1,032.7

Resisting/Overturning Ratio = **2.48**
Vertical Loads used for Soil Pressure = 779.0 lbs

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

DESIGNER NOTES:

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Title : 850 3'-4" Page: _____
Job # : 850 3'-4" Dsgnr: TLL Date: SEP 5,2007
Description....
3'-4" Retaining Wall w/ Garden Wall Surcharge Level
This Wall in File: W:\Retain Pro\2010 CBC\STANDARD 2010.

Cantilevered Retaining Wall Design

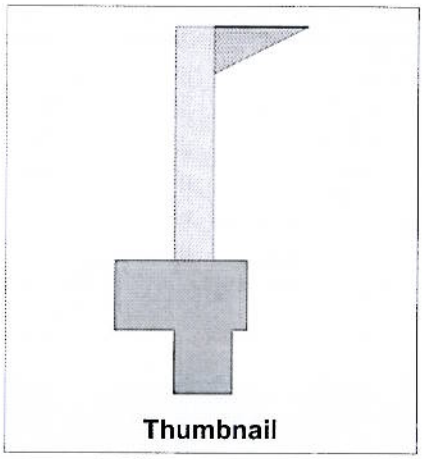
Code: IBC 2009

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 Method		
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



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	=	1,500 psf

Soil Pressure Less Than Allowable

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 Component Used)

Lateral Sliding Force	=	441.7 lbs
less 100% Passive Force	= -	367.4 lbs
less 100% Friction Force	= -	320.3 lbs
Added Force Req'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
Wind, W	1.300
Seismic, E	1.000

Stem Construction

Top Stem

			Stem OK
Design Height Above Ftg	ft =		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	=		**0.411**
Total Force @ Section	lbs =		286.3
Moment....Actual	ft-# =		319.1
Moment.....Allowable	=		776.1
Shear.....Actual	psi =		4.5
Shear.....Allowable	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 FTG	in =		6.00

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

f'c	psi =	
Fy	psi =	

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Title : 850 3'-4" Page: _____
Job # : 850 3'-4" Dsgnr: TLL Date: SEP 5,2007
Description....
3'-4" Retaining Wall w/ Garden Wall Surcharge Level

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

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths

Toe Width	=	1.00 ft
Heel Width	=	1.25
Total Footing Width	=	2.25
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	11.00 in
Key Distance from Toe	=	1.00 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,195	146 psf
Mu' : Upward	=	690	74 ft-#
Mu' : Downward	=	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 = # 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 & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... 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	=				Adjacent Footing Load	= 69.7	1.96	136.5
Adjacent Footing Load	=	41.8	1.94	80.9	Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
					Surcharge Over Toe	=		
					Stem Weight(s)	= 280.0	1.33	373.3
					Earth @ Stem Transitions	=		
Total	=	441.7	**O.T.M.** =	683.5	Footing Weight	= 337.5	1.13	379.7
Resisting/Overturning Ratio		= **2.30**			Key Weight	= 137.5	1.50	206.3
Vertical Loads used for Soil Pressure =		1,067.7 lbs			Vert. Component	=		
					Total =	1,067.7 lbs	**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.

DESIGNER NOTES:

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Title : 850 4'-0" Page: _____
Job # : 850 4'-0" Dsgnr: TLL Date: SEP 5,2007
Description....
4'-0" Retaining Wall w/ Garden Wall Surcharge Level
This Wall in File: W:\Retain Pro\2010 CBC\STANDARD 2010

Cantilevered Retaining Wall Design

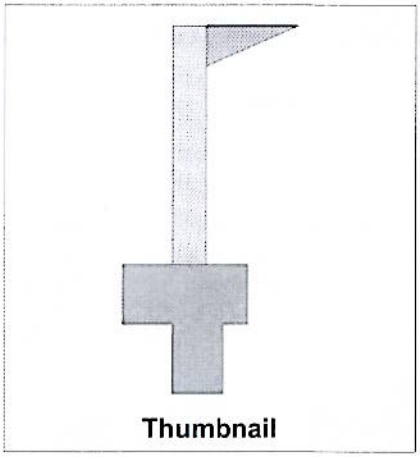
Code: IBC 2009

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 Method		
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



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	=	2.15	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 Than Allowable			
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 Component Used)

Lateral Sliding Force	=	583.5 lbs	
less 100% Passive Force	= -	469.4 lbs	
less 100% Friction Force	= -	418.2 lbs	
Added Force Req'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
Wind, W	1.300
Seismic, E	1.000

Stem Construction

Top Stem

Design Height Above Ftg	ft =	Stem OK 0.00	
Wall Material Above "Ht"	=	Masonry	
Thickness	=	8.00	
Rebar Size	=	# 4	
Rebar Spacing	=	16.00	
Rebar Placed at	=	Edge	

Design Data

fb/FB + fa/Fa	=	**0.604**
Total Force @ Section	lbs =	400.5
Moment....Actual	ft-# =	547.2
Moment.....Allowable	=	905.4
Shear.....Actual	psi =	6.4
Shear.....Allowable	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 FTG	in =	6.00

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

f'c	psi =	
Fy	psi =	

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Title : 850 4'-0" Page: _____
Job # : 850 4'-0" Dsgnr: TLL Date: SEP 5,2007
Description....
4'-0" Retaining Wall w/ Garden Wall Surcharge Level

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

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths

Toe Width	=	1.00 ft
Heel Width	=	1.50
Total Footing Width	=	2.50
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	14.00 in
Key Distance from Toe	=	1.00 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm.= 3.00 in

Footing Design Results

		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 = # 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

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... 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 Heel	=		
Toe Active Pressure	=	-22.5	0.33	-7.5	Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	= 91.3	2.08	190.1
Adjacent Footing Load	=	43.5	2.52	109.4	Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
					Surcharge Over Toe	=		
					Stem Weight(s)	= 336.0	1.33	448.0
					Earth @ Stem Transitions	=		
Total	=	583.5	**O.T.M.** =	1,039.4	Footing Weight	= 375.0	1.25	468.8
Resisting/Overturning Ratio			=	**2.15**	Key Weight	= 175.0	1.50	262.5
Vertical Loads used for Soil Pressure =		1,393.9 lbs			Vert. Component	=		
					Total =	1,393.9 lbs	**R.M.=**	2,237.4

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

DESIGNER NOTES:

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Title : 850 4'-8" Page: _____
Job # : 850 4'-8" Dsgnr: TLL Date: SEP 5,2007
Description....
4'-8" Retaining Wall w/ Garden Wall Surcharge Level
This Wall in File: W:\Retain Pro\2010 CBC\STANDARD 2010.

Cantilevered Retaining Wall Design

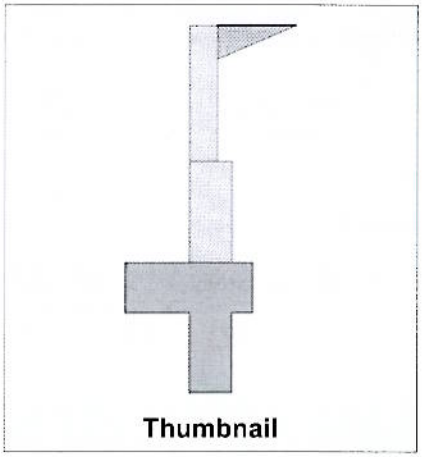
Code: IBC 2009

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 Method		
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



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	=	2.19 OK
Sliding	=	1.55 OK
Total Bearing Load	=	1,626 lbs
...resultant ecc.	=	4.84 in
Soil Pressure @ Toe	=	979 psf OK
Soil Pressure @ Heel	=	104 psf OK
Allowable	=	1,500 psf

Soil Pressure Less Than Allowable

ACI Factored @ Toe	=	1,376 psf
ACI Factored @ Heel	=	147 psf
Footing Shear @ Toe	=	12.6 psi OK
Footing Shear @ Heel	=	3.8 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component Used)

Lateral Sliding Force	=	744.6 lbs
less 100% Passive Force	= -	667.4 lbs
less 100% Friction Force	= -	487.7 lbs
Added Force Req'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
Wind, W	1.300
Seismic, E	1.000

Stem Construction

		Top Stem	2nd
		Stem OK	Stem OK
Design Height Above Ftg	ft =	2.00	0.00
Wall Material Above "Ht"	=	Masonry	Masonry
Thickness	=	8.00	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
Moment....Actual	ft-# =	161.7	857.4
Moment.....Allowable	ft-# =	776.1	2,074.4
Shear.....Actual	psi =	3.0	4.9
Shear.....Allowable	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 FTG	in =		6.00
Masonry Data			
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 Weight	
Masonry Design Method	=	ASD Half-Stress option used.	
Concrete Data			
f'c	psi =		
Fy	psi =		

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Title : 850 4'-8" Page:
Job # : 850 4'-8" Dsgnr: TLL Date: SEP 5,2007
Description....
4'-8" Retaining Wall w/ Garden Wall Surcharge Level

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

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 Dimensions & Strengths

Toe Width	=	1.50 ft
Heel Width	=	1.50
Total Footing Width	=	3.00
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	19.00 in
Key Distance from Toe	=	1.50 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	1,376	147 psf
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 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

		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#			.....RESISTING..... 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 Stem	=			
Added Lateral Load	=				* Axial Live Load on Stem	=			
Load @ Stem Above Soil	=				Soil Over Toe	=			
					Surcharge Over Toe	=			
					Stem Weight(s)	=	490.0	1.92	942.7
					Earth @ Stem Transitions	=	111.1	2.33	259.3
					Footing Weight	=	450.0	1.50	675.0
					Key Weight	=	237.5	2.00	475.0
					Vert. Component	=			
Total	=	744.6	**O.T.M.** =	1,496.4		**Total** =	1,625.6 lbs	**R.M.=**	3,278.7

Resisting/Overturning Ratio = **2.19**
Vertical Loads used for Soil Pressure = 1,625.6 lbs

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

DESIGNER NOTES:

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Title : 850 5'-4" Page: _____
Job # : 850 5'-4" Dsgnr: TLL Date: SEP 5,2007
Description....
5'-4" Retaining Wall w/ Garden Wall Surcharge Level

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

Cantilevered Retaining Wall Design

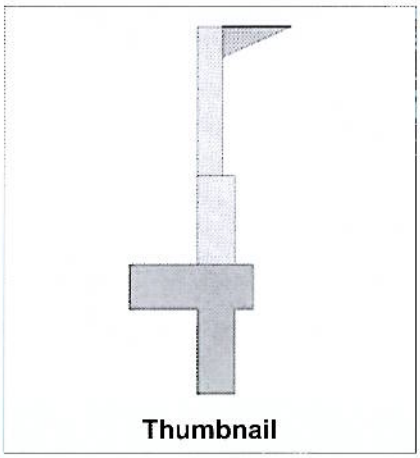
Code: IBC 2009

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 Method		
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



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	=	2.06 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 Than Allowable		
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 Component Used)

Lateral Sliding Force	=	925.0 lbs
less 100% Passive Force	= -	850.7 lbs
less 100% Friction Force	= -	553.6 lbs
Added Force Req'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
Wind, W	1.300
Seismic, E	1.000

Stem Construction

		Top Stem	2nd
		Stem OK	Stem OK
Design Height Above Ftg	ft =	2.00	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
Moment....Actual	ft-# =	319.1	1,261.6
Moment.....Allowable	ft-# =	905.4	2,814.4
Shear.....Actual	psi =	4.5	6.3
Shear.....Allowable	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 FTG	in =		6.00
Masonry Data			
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 Weight	
Masonry Design Method	=	ASD Half-Stress option used.	
Concrete Data			
f'c	psi =		
Fy	psi =		

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Fax: (714) 630-6114

Title : 850 5'-4" Page: _____
Job # : 850 5'-4" Dsgnr: TLL Date: SEP 5,2007
Description....
5'-4" Retaining Wall w/ Garden Wall Surcharge Level
This Wall in File: W:\Retain Pro\2010 CBC\STANDARD 2010.

Cantilevered Retaining Wall Design

Code: IBC 2009

Footing Dimensions & Strengths

Toe Width	=	1.83 ft
Heel Width	=	1.50
Total Footing Width	=	3.33
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	23.00 in
Key Distance from Toe	=	1.83 ft

f'c = 2,500 psi Fy = 40,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 3.00 @ Btm.= 3.00 in

Footing Design Results

		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	=	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 & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... 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 Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
					Surcharge Over Toe	=		
					Stem Weight(s)	= 546.0	2.25	1,227.1
					Earth @ Stem Transitions	= 138.9	2.67	370.3
					Footing Weight	= 500.0	1.67	833.2
					Key Weight	= 287.5	2.33	670.7
					Vert. Component	=		
Total	=	925.0	**O.T.M.** =	2,066.2	**Total** =	1,845.4 lbs	**R.M.=**	4,251.7

Resisting/Overturning Ratio = **2.06**
Vertical Loads used for Soil Pressure = 1,845.4 lbs

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

DESIGNER NOTES: