pool engineering inc.
Pool Engineering, Inc.
1201 N Tustin Ave
Anaheim, CA 92807
Tel: (714) 630-6100
Fax: (714) 630-6114

Title : 850 6'-0" Page: _____
Job # : 850 6'-0" Dsgnr: TLL Date: SEP 5,2007
Description....
6'-0" Retaining Wall w/ Garden Wall Surcharge Level

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

Cantilevered Retaining Wall Design

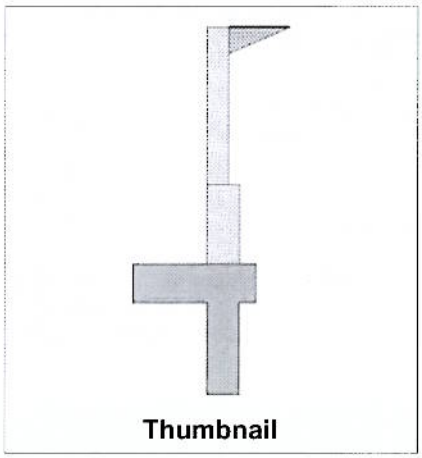
Code: IBC 2009

Criteria

Retained Height	=	6.00 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	=	2.01 OK
Sliding	=	1.54 OK
Total Bearing Load	=	2,091 lbs
...resultant ecc.	=	6.42 in
Soil Pressure @ Toe	=	1,035 psf OK
Soil Pressure @ Heel	=	80 psf OK
Allowable	=	1,500 psf
Soil Pressure Less Than Allowable		
ACI Factored @ Toe	=	1,453 psf
ACI Factored @ Heel	=	113 psf
Footing Shear @ Toe	=	18.5 psi OK
Footing Shear @ Heel	=	5.2 psi OK
Allowable	=	75.0 psi

Sliding Calcs (Vertical Component Used)

Lateral Sliding Force	=	1,125.4 lbs
less 100% Passive Force	= -	1,111.1 lbs
less 100% Friction Force	= -	627.4 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	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	=	**0.604**	**0.630**
Total Force @ Section	lbs =	400.5	854.8
Moment....Actual	ft-# =	547.2	1,773.8
Moment.....Allowable	ft-# =	905.4	2,814.4
Shear.....Actual	psi =	6.4	7.9
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 =		

pool engineering inc.
Pool Engineering, Inc.
1201 N Tustin Ave
Anaheim, CA 92807
Tel: (714) 630-6100
Fax: (714) 630-6114

Title : 850 6'-0" Page: _____
Job # : 850 6'-0" Dsgnr: TLL Date: SEP 5,2007
Description....
6'-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	=	2.25 ft
Heel Width	=	1.50
Total Footing Width	=	3.75
Footing Thickness	=	12.00 in
Key Width	=	12.00 in
Key Depth	=	28.00 in
Key Distance from Toe	=	2.25 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	113 psf
Mu' : Upward	=	3,609	57 ft-#
Mu' : Downward	=	656	354 ft-#
Mu: Design	=	2,953	298 ft-#
Actual 1-Way Shear	=	18.54	5.19 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: #4@ 13.25 in, #5@ 20.50 in, #6@ 29.00 in, #7@ 39.25 in, #8@ 48.25 in, #9@ 4
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	=	1,102.5	2.33	2,572.5	Soil Over Heel	= 375.0	3.50	1,312.5
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	= 35.0	3.50	122.6
Adjacent Footing Load	=	45.4	4.38	198.7	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)	= 602.0	2.66	1,599.5
					Earth @ Stem Transitions	= 166.7	3.08	513.9
					Footing Weight	= 562.5	1.88	1,054.7
					Key Weight	= 350.0	2.75	962.5
					Vert. Component	=		
Total	=	1,125.4	O.T.M. =	2,763.7	Total =	2,091.2 lbs	R.M.=	5,565.7

Resisting/Overturning Ratio = 2.01
Vertical Loads used for Soil Pressure = 2,091.2 lbs

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

DESIGNER NOTES: