

1201 N. Tustin Avenue  
Anaheim, CA 92807  
Fax: (714) 630-6114  
Phone: (714) 630-6100

## STRUCTURAL CALCULATIONS

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FOR

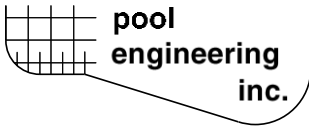
# STANDARD POOL STRUCTURAL PLAN

FOR USE ONLY @:  
2765 60<sup>th</sup> Ave SE  
Mercer Island, WA 98040

Engineer's Seal



**PREPARED IN ACCORDANCE WITH  
THE 2018 INTERNATIONAL BUILDING CODE  
CONCRETE  $f'_c = 2,500\text{psi}$   
REINFORCING  $f_y = 40,000\text{psi}$  (Grade 40)**



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## SWIMMING POOL CALCULATIONS NOTATION

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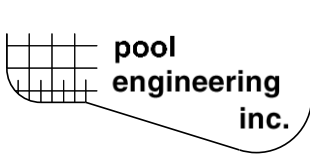
$f'_c$  : specific compressive strength of concrete (psi)  
 $\omega_c$  : weight of concrete (pcf)  
 $f_c = 0.45 f'_{airr} c'$  : allowable extreme fiber stress in compression for concrete (psi)  
 $u_c = 1.1 \sqrt{f'_c}$  : permissible shear stress carried by concrete (psi)  
 $E = 57000 \sqrt{f'_{cc}}$  : modulus of elasticity of concrete (psi)  $f_y =$   
 40000 : specified yield strength of reinforcement (psi)  
 $f_{sall} = 20000$  [GRADE 40, 50], 24000 [GRADE 60] : permissible tensile strength in reinf. (psi)  $E$   
 $= 290000000$  : modulus of elasticity of reinforcement (psi)  $\gamma_s$  : equivalent fluid pressure  
 of soil (pcf)  
 $E^s$   
 $n =$  : modular ratio of elasticity  
 $E_c b$  : width of compression face of member (in) cover : 3 in. minimum for  
 Concrete cast against and permanently exposed to earth.

### SEE CALCULATION METHODOLOGY: STANDARD PLAN

$H$  : total height of pool wall including bond beam (ft)  
 $RBB$  : distance from top of bond beam to surface of water (ft.)  $R$  :  
 Radius of pool wall curvature (ft)  $t$  : thickness of pool wall at  
 particular height (in)  
 $d = t - \text{cover} - (D_s/2)$  : distance from extreme compression fiber to centroid of tension reinforcement (in)  $H_1$   
 : top depth of particular section (ft)  
 $H_2$  : bottom depth of particular section (ft)  
 $OTM_{SOIL} = \frac{1}{6} \gamma_s H^3$  : over-turning moment (ft-lbs)  $V_{SOIL} = \frac{1}{2} \gamma_s H^2$  : shear (lbs)  
 $M_R$  : Moment Resisting (ft-lbs)  
 $M_T = OTM_{SOIL} + M_R$  : Net Moment (ft-lbs)  
 $V_T = V_{SOIL}$  : Net Shear (lbs)  
 $A_s$  : area of nonprestressed tension reinforcement (in<sup>2</sup>)  $D_s$  :  
 Diameter of reinforcement (in)  $\rho =$  : ratio of tension  
 reinforcement  
 $k = \frac{\sqrt{(pn)^2 + 2p\rho n} - n}{M_T}$   $j = 1 - \frac{k}{3}$   
 $A_s j d$  : average stress in the steel (psi)

$$f_s = \frac{2Mfc}{jkd^2}$$
 : maximum compressive stress at the top of the compressive zone (psi)

$$v = \frac{V}{bd}$$
 : design shear stress (psi)



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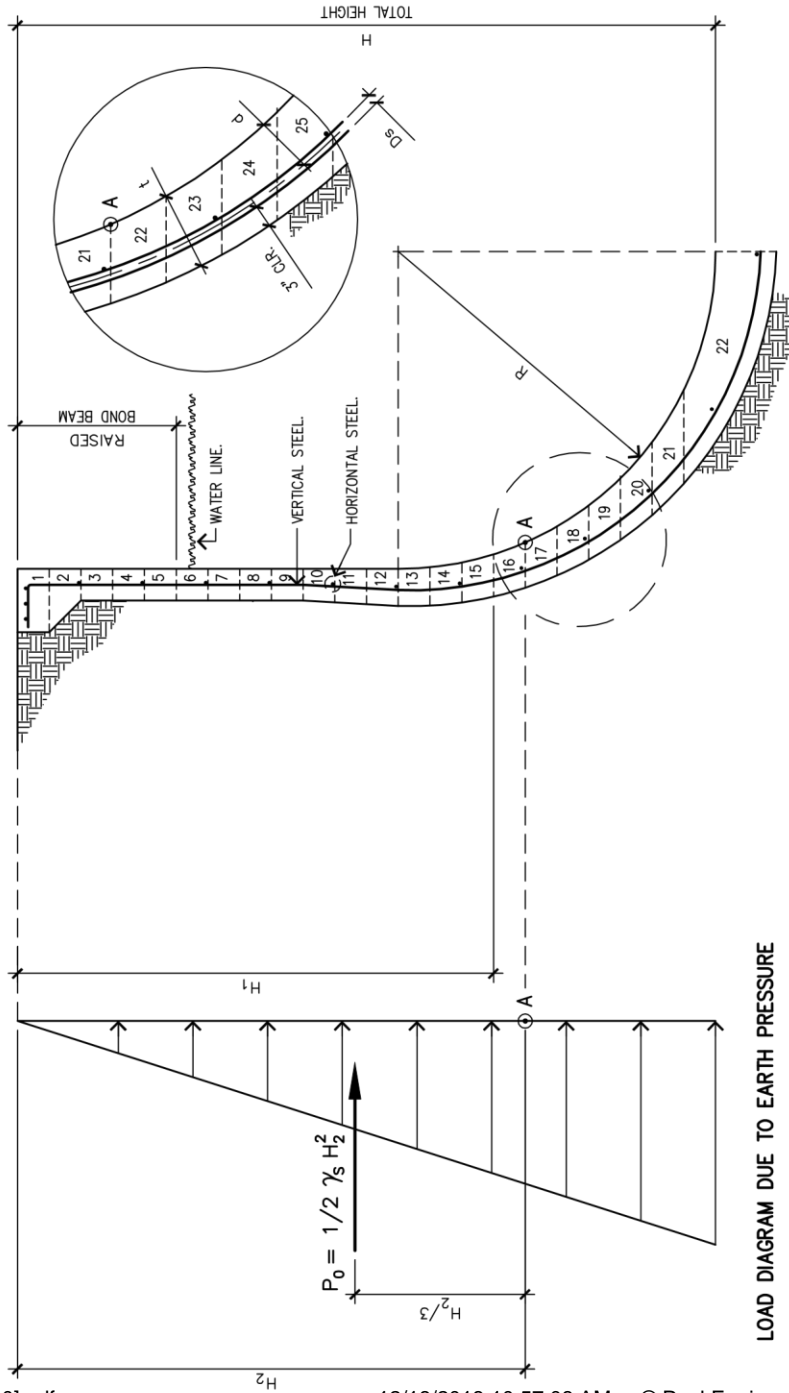
## STRUCTURAL CALCULATIONS

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# POOL WALL

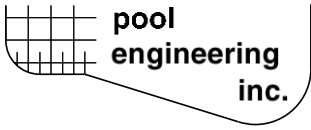
## GENERAL METHODOLOGY & CALCULATIONS

*The following pages demonstrate the basic calculations which are summarized  
 in the Pool Wall Summary Tables*



LOAD DIAGRAM DUE TO EARTH PRESSURE

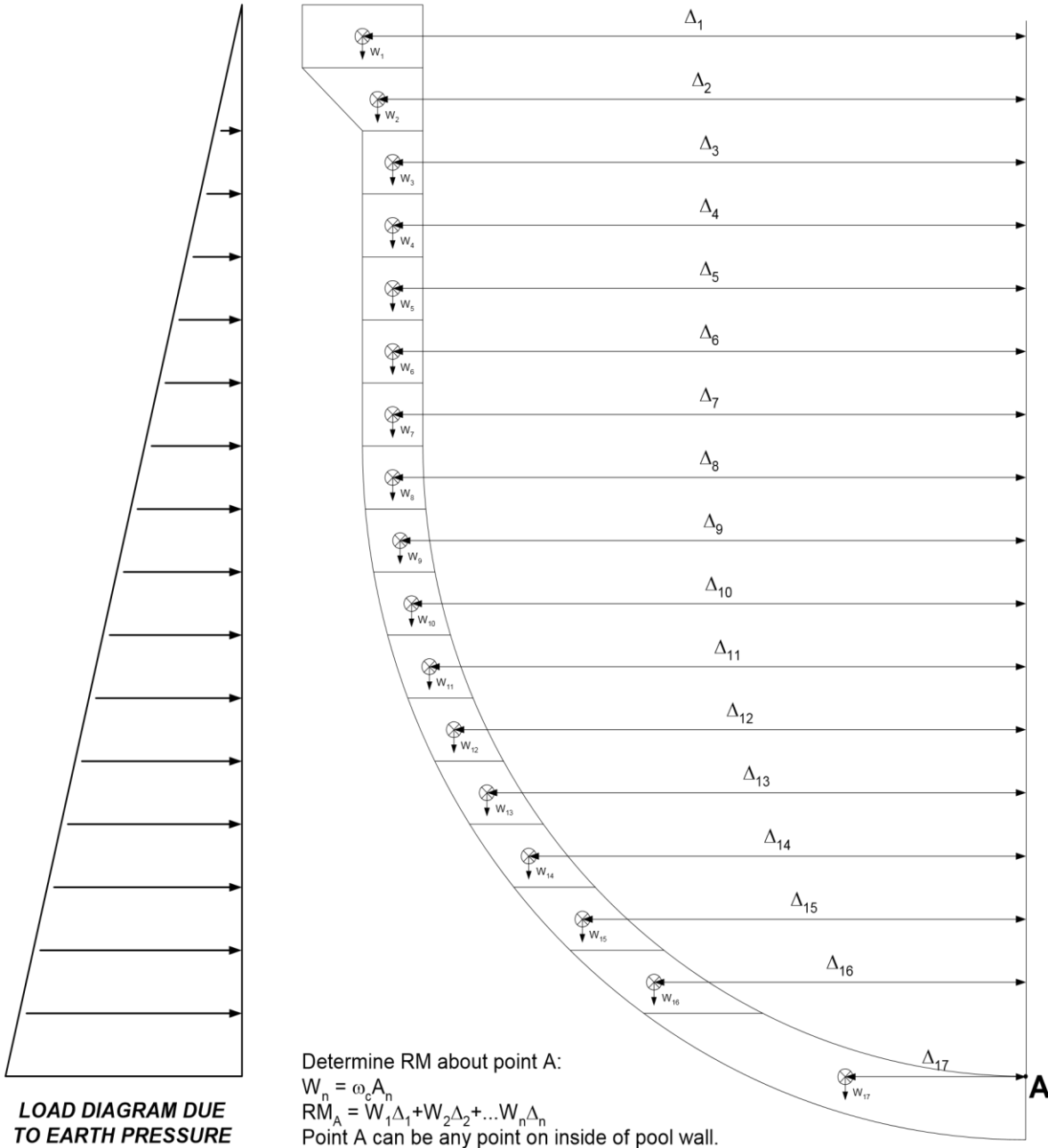
NET MOM = OTM soil - M<sub>R</sub>  
 DETERMINE OTM AND V DUE TO  $\gamma_s$   
 $OTM_A = (1/2 \gamma_s H^2)(H_2/3) = 1/6 \gamma_s H^3$   
 $V_A = 1/2 \gamma_s H^2$

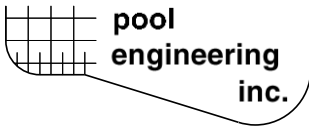


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# RESISTING MOMENT METHODOLOGY

## OFFSETS EARTH PRESSURE MOMENTS





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# SAMPLE CALCULATIONS

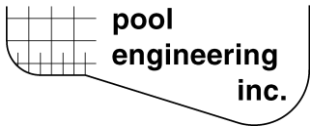
# SECTION 13, NO R.B.B.

TABLE A - NON-EXPANSIVE SOIL

Demonstrating methodology used to calculate results shown in summary tables.

$f'_c =$	2500 psi	Design concrete strength
$\omega_c =$	150 pcf	
$f_c = 0.45f'_{all-c} =$	1125 psi	Permissible service load flexural stress
$\nu_c = 1.1 f'_c =$	55.0 psi	Permissible service load shear stress
$E = 57000 f'_{cc} =$	2850000 psi	Modulus of elasticity for concrete
$f_y =$	40000 psi	Yield stress of reinforcement
$f_{sall} =$	20000 psi	Permissible tensile stress of reinforcement
$E_s =$	2.9E+07 psi	Modulus of elasticity of reinforcement
$\gamma_s =$	30 pcf	Design soil equivalent fluid pressure
$n = E_s/E_c =$	10.18	
$b =$	12 in	
$cover =$	3 in	
$H =$	8.5 ft	Concrete coverage (clearance to earth)
Try wall thickness $t =$	6.0 in	
at a depth of $H_2 =$	6.5 ft	
Try vertical steel =	#3 @ 6"	
$D_s =$	0.375 in	
$A_s =$	0.221 in <sup>2</sup>	
$d = t - cover - (D_s/2) =$	2.81 in	
$OTM_{SOIL} = \frac{1}{6}\gamma_s H^3 =$	1373 ft-lb	
$M_R =$	-647 ft-lb	Overturning moment due to <b>earth</b> pressure
$M_T = OTM_{SOIL} + M_R =$	726 ft-lb	Resisting moment due to weight of pool wall.
$V = V_T SOIL = \frac{1}{2}\gamma_s H^2 =$	634 lb	

SEE POOL WALL SUMMARY



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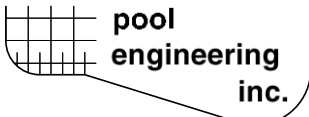
Shear due to earth pressure

**SAMPLE CALCULATIONS (CONT.)**

**SECTION 13, NO R.B.B.**  
**TABLE A - NON-EXPANSIVE**

**SOIL** Demonstrating methodology used to calculate results shown in summary tables.

$$\begin{aligned}
 & \rho = \frac{A_s}{bd} = 0.006 \\
 & k = \frac{2\rho n}{(\rho n)^2 + 2\rho n - n} = 0.284 \\
 & j = \frac{1 - \sqrt{1 - k}}{k} = 0.905 \\
 & M^r fs = 13154.2 \text{ psi} < 20000 \text{ psi} \quad \text{OK} \\
 & A_s j d = 513.9 \text{ psi} < 1125 \text{ psi} \quad \text{OK} \\
 & \frac{2M^r fc}{j k bd^2} = 15.9 \text{ psi} < 55.0 \text{ psi} \quad \text{OK} \\
 & u = \frac{V^r}{bd}
 \end{aligned}$$



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## STRUCTURAL CALCULATIONS

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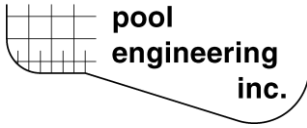
### **POOL WALL**

### SWIMMING POOL CALCULATIONS

### RESISTING MOMENT METHODOLOGY

*The following pages demonstrate the basic calculations which are summarized  
in the Resisting Moment Tables.*





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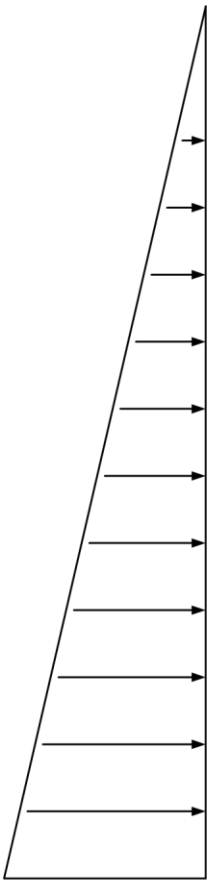
## SAMPLE CALCULATIONS

## SECTION 13, NO R.B.B.

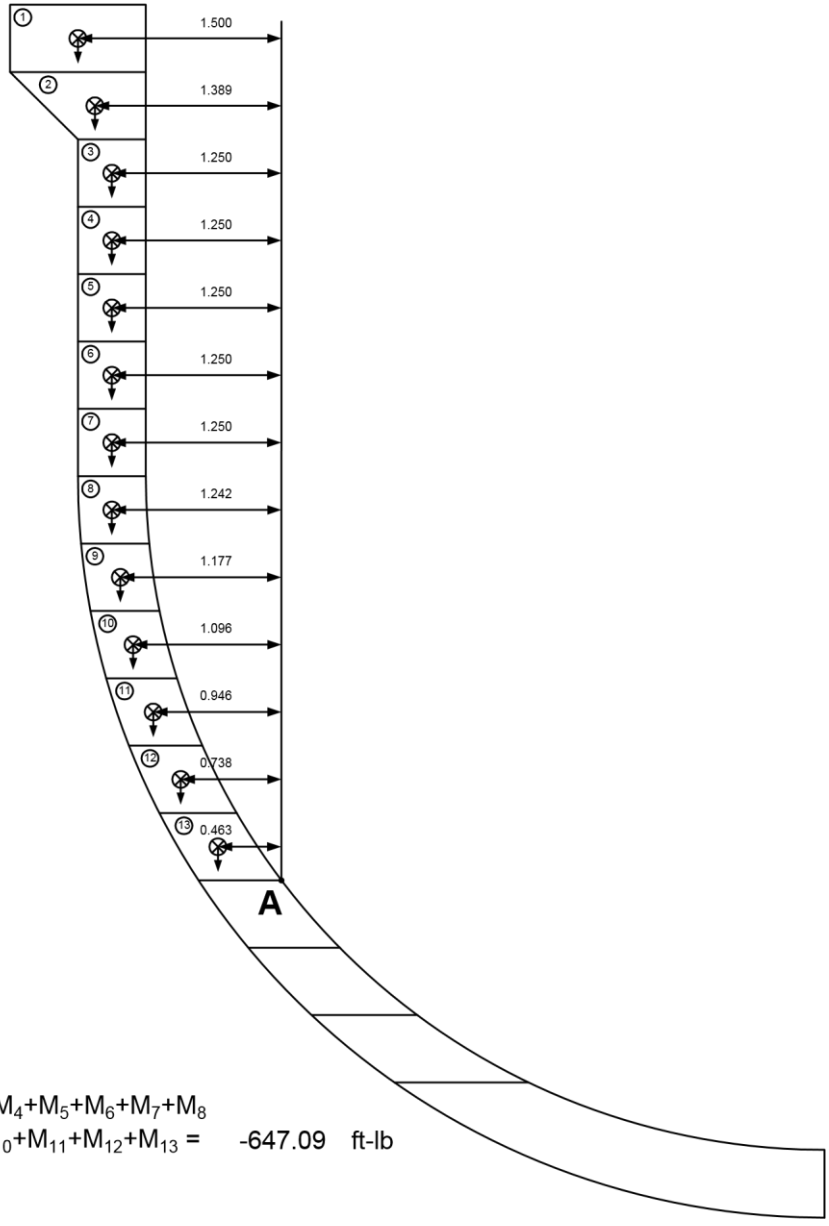
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### RESISTING MOMENT METHODOLOGY WALL LOADED BY EARTH PRESSURE

### TABLE A - NON-EXPANSIVE SOIL

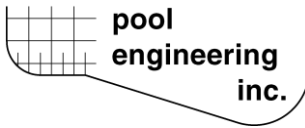


$A_1 = 0.500 \text{ ft}^2$	$W_1 = 75.00 \text{ lb}$	$M_1 = -112.50 \text{ ft-lb}$
$A_2 = 0.375 \text{ ft}^2$	$W_2 = 56.25 \text{ lb}$	$M_2 = -78.12 \text{ ft-lb}$
$A_3 = 0.250 \text{ ft}^2$	$W_3 = 37.50 \text{ lb}$	$M_3 = -46.87 \text{ ft-lb}$
$A_4 = 0.250 \text{ ft}^2$	$W_4 = 37.50 \text{ lb}$	$M_4 = -46.87 \text{ ft-lb}$
$A_5 = 0.250 \text{ ft}^2$	$W_5 = 37.50 \text{ lb}$	$M_5 = -46.87 \text{ ft-lb}$
$A_6 = 0.250 \text{ ft}^2$	$W_6 = 37.50 \text{ lb}$	$M_6 = -46.87 \text{ ft-lb}$
$A_7 = 0.250 \text{ ft}^2$	$W_7 = 37.50 \text{ lb}$	$M_7 = -46.87 \text{ ft-lb}$
$A_8 = 0.250 \text{ ft}^2$	$W_8 = 37.56 \text{ lb}$	$M_8 = -46.65 \text{ ft-lb}$
$A_9 = 0.253 \text{ ft}^2$	$W_9 = 37.90 \text{ lb}$	$M_9 = -44.60 \text{ ft-lb}$
$A_{10} = 0.258 \text{ ft}^2$	$W_{10} = 38.63 \text{ lb}$	$M_{10} = -42.35 \text{ ft-lb}$
$A_{11} = 0.265 \text{ ft}^2$	$W_{11} = 39.80 \text{ lb}$	$M_{11} = -37.66 \text{ ft-lb}$
$A_{12} = 0.276 \text{ ft}^2$	$W_{12} = 41.46 \text{ lb}$	$M_{12} = -30.58 \text{ ft-lb}$
$A_{13} = 0.292 \text{ ft}^2$	$W_{13} = 43.75 \text{ lb}$	$M_{13} = -20.26 \text{ ft-lb}$



$$RM_A = M_1 + M_2 + M_3 + M_4 + M_5 + M_6 + M_7 + M_8 + M_9 + M_{10} + M_{11} + M_{12} + M_{13} = -647.09 \text{ ft-lb}$$

## STRUCTURAL CALCULATIONS



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# POOL WALL

## POOL WALL ANALYSIS

### SUMMARY TABLES

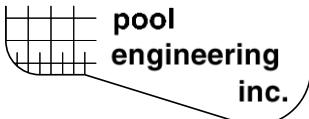
The following pages demonstrate the basic calculations which are summarized in the Pool Wall Summary Tables

### POOL WALL SUMMARY

NO R.B.B.

**TABLE A - NON-EXPANSIVE SOIL**

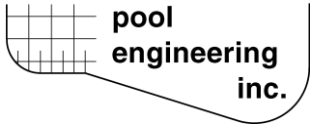
$\gamma_{SOIL}$ 30 pcf				$H$		$RBB$ 0.0 ft		$R$ 5.0 ft	
Sec				SOIL	Vertical	As in <sup>2</sup>	Ds in.	SOIL	



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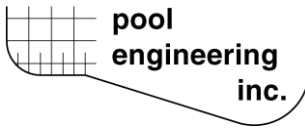
	H 1 ft	H 2 ft	t in	d in	OT M ft- lb	MR ft- lb	M T ft- lb	V l b	Steel				fs psi	fs <sub>all</sub> psi	f c p si	f <sub>cal</sub> psi	v p si	V <sub>all</sub> psi				
1	0.0	0.5	1.0	2.81	8.81	1	-38	-37	4	#3 @ 12"	0.110	0.375	0.001	0.136	0.955	-476.1	20000.0	-7.3	112.5	0.0	5.5	0
2	0.5	1.0	1.5	2.81	2.81	5	-59	-54	15	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-2272.4	20000.0	-65.5	112.5	0.4	5.5	0
3	1.0	1.5	2.0	2.81	2.81	17	-69	-52	34	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-2168.0	20000.0	-62.5	112.5	1.0	5.5	0
4	1.5	2.0	2.5	2.81	2.81	40	-78	-38	60	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-1593.3	20000.0	-46.0	112.5	1.8	5.5	0
5	2.0	2.5	3.0	2.81	2.81	78	-88	-9	94	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-391.8	20000.0	-11.3	112.5	2.8	5.5	0
6	2.5	3.0	3.5	2.81	2.81	135	-97	38	135	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	1593.3	20000.0	46.0	112.5	4.0	5.5	0
7	3.0	3.5	4.0	2.81	2.81	214	-106	1	184	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	4518.8	20000.0	130.3	112.5	5.4	5.5	0
8	3.5	4.0	4.5	2.81	2.81	320	-124	1	246	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	8180.0	20000.0	235.9	112.5	7.1	5.5	0
9	4.0	4.5	5.0	2.81	2.81	456	-162	2	304	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	12277.3	20000.0	354.1	112.5	9.0	5.5	0
10	4.5	5.0	5.5	2.81	2.81	625	-225	4	375	#3 @ 6"	0.221	0.375	0.007	0.304	0.899	8589.2	20000.0	369.4	112.5	11.1	5.5	0
11	5.0	5.5	6.0	2.81	2.81	832	-321	5	451	#3 @ 6"	0.221	0.375	0.007	0.304	0.899	10984.3	20000.0	472.4	112.5	13.4	5.5	0
12	5.5	6.0	6.5	2.81	2.81	1080	-457	6	540	#3 @ 6"	0.221	0.375	0.007	0.304	0.899	13390.0	20000.0	575.8	112.5	16.0	5.5	0
13	6.0	6.5	7.0	3.31	3.31	1373	-647	7	634	#3 @ 6"	0.221	0.375	0.006	0.284	0.905	13154.2	20000.0	513.9	112.5	15.9	5.5	0
14	6.5	7.0	7.5	3.31	3.31	1715	-914	8	731	#3 @ 6"	0.221	0.375	0.006	0.284	0.905	14506.2	20000.0	566.8	112.5	15.5	5.5	0
15	7.0	7.5	8.0	3.31	3.31	2109	-1219	8	840	#3 @ 6"	0.221	0.375	0.006	0.284	0.905	14673.9	20000.0	573.3	112.5	15.2	5.5	0
16	7.5	8.0	8.5	3.31	3.31	2560	-1904	6	960	#3 @ 6"	0.221	0.375	0.006	0.284	0.905	11881.3	20000.0	464.2	112.5	14.2	5.5	0



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17	8.0	8	6.5	3.	30	-	-	10	#3 @ 6"	0.221	0.375	0.006	0.284	0.905	-13543.2	20000.0	-	112	2	5
		.5		3	71	38	7	84									52	5.0	7.	
				1		18	4										9.1	3	5.	
							8												0	



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# RESISTING MOMENTS

**NO R.B.B.**

WALL LOADED BY EARTH PRESSURE

**TABLE A - NON-EXPANSIVE SOIL**

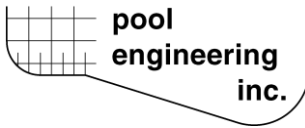
$\gamma_{SOIL}$ 30 Section → ↓ H2 ↓		$H$ 8.5 ft 1 2	$RBB$ 0.0 f 3 4 5	$R$ 5.0 ft 6 7 8 9 10 11 12	RM	
1	0.5 75.0	0.50 75.00	56.25 37.50	37.50 37.50	37.50	-37.50
2	1.0 56.3	0.50 37.50	0.39 21.88			-59.38
3	1.5 37.5	0.50 37.50	0.39 21.88	0.25 9.38		-68.75
4	2.0 37.5	0.50 37.50	0.39 21.88	0.25 9.38	0.25 9.38	-78.13
5	2.5 37.5	0.50 37.50	0.39 21.88	0.25 9.38	0.25 9.38	-87.50
6	3.0 37.5	0.50 37.50	0.39 21.88	0.25 9.38	0.25 9.38	-96.88
7	3.5 37.5	0.50 37.50	0.39 21.88	0.25 9.38	0.25 9.38	-106.25
8	4.0 37.6	0.53 39.38	0.41 23.28	0.28 10.31	0.28 10.31	-124.27
9	4.5 37.9	0.60 45.08	0.49 27.56	0.35 13.16	0.35 13.16	-161.85
10	5.0 38.6	0.73 54.77	0.62 34.83	0.48 18.01	0.48 18.01	-225.44
11	5.5 39.8	0.92 68.81	0.81 45.36	0.67 25.03	0.67 25.03	-320.90
12	6.0 41.5	1.17 60.0	1.06 41.5	0.92 1.17	0.92 1.17	-457.11
13	6.5 43.8	0.85 112.50	0.77 78.12	0.62 46.87	0.62 46.87	-647.09
14	7.0 50.0	0.85 144.70	0.77 102.27	0.62 62.97	0.62 62.97	-914.34
15	7.5 56.7	0.85 187.50	0.77 134.37	0.62 84.37	0.62 84.37	-1299.46
16	8.0 67.6	0.85 249.04	0.77 180.53	0.62 115.15	0.62 115.15	-1904.23
17	8.5 226.3	0.85 412.50	0.77 303.13	0.62 196.88	0.62 196.88	-3818.13

# RESISTING MOMENTS cont.

**NO R.B.B.**

WALL LOADED BY EARTH PRESSURE

**TABLE A - NON-EXPANSIVE SOIL**



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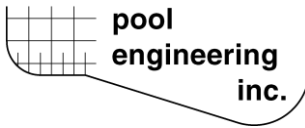
$\gamma_{SOIL}$  30 pcf       $H$  8.5 ft       $RBB$  0.0 ft       $R$  5.0 ft

Section	H2	Weight	13	14	15	16	17	RM			
1	0.5	75.0	-37.50								
2	1.0	56.3									
3	1.5	37.5						-59.38			
4	2.0	37.5						-68.75			
5	2.5	37.5						-78.13			
6	3.0	37.5						-87.50			
7	3.5	37.5						-96.88			
8	4.0	37.6						-106.25			
9	4.5	37.9						-124.27			
10	5.0	38.6						-161.85			
11	5.5	39.8						-225.44			
12	6.0	41.5						-320.90			
13	6.5	43.8	0.46					-457.11			
14	7.0	50.0	0.89	0.56				-647.09			
		...	39.04	27.77	-914.34	15	7.5	56.7	1.46	1.13	0.67
		...	64.01	56.31	38.20	-1299.46					
		...	16	8.0	67.6	2.28	1.95	1.49	0.88		
		...	99.91	97.33	84.69	59.49	-1904.23	17	8.5	226.3	4.46
		...	4.13	3.67	3.06	1.41					
		...	195.26	206.30	208.18	206.86	318.25	-3818.13			

**POOL WALL SUMMARY**

**NO R.B.B.**  
**TABLE B - EXPANSIVE SOIL**

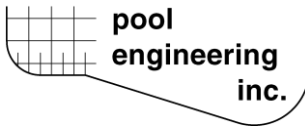
$\gamma_{SOIL}$ 45 pcf	$H$	$RBB$ 0.0 ft	$R$ 5.0 ft
Sec	SOIL	Vertical	SOIL



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	H 1 ft	H 2 ft	t i n	d i n	O T M ft- lb	M R ft- lb	M T ft- lb	V l b	Steel	A s in <sup>2</sup>	D s in	p	k	j	fs psi	fS <sub>all</sub> psi	f c p s i	f <sub>c</sub> all p s i	v p s i	Val p s i
1	0.0	0.5	1.0	8.1	138	-37	6	#3 @ 12"	0.1110	0.375	0.000	0.136	0.955		-472.1	20000.0	7.3	11.25	0.1	5.5
2	0.5	1.0	6.0	2.81	859	-52	23	#3 @ 12"	0.1110	0.375	0.000	0.227	0.924		-2168.0	20000.0	6.25	11.25	0.7	5.5
3	1.0	1.5	6.0	2.81	2569	-43	51	#3 @ 12"	0.1110	0.375	0.000	0.227	0.924		-1815.3	20000.0	5.24	11.25	1.5	5.5
4	1.5	2.0	6.0	2.81	6078	-18	90	#3 @ 12"	0.1110	0.375	0.000	0.227	0.924		-757.5	20000.0	2.218	11.25	2.7	5.5
5	2.0	2.5	6.0	2.81	11788	-30	141	#3 @ 12"	0.1110	0.375	0.000	0.227	0.924		1240.7	20000.0	35.8	11.25	4.2	5.5
6	2.5	3.0	6.0	2.81	20397	-10	203	#3 @ 12"	0.1110	0.375	0.000	0.227	0.924		4414.3	20000.0	12.73	11.25	6.0	5.5
7	3.0	3.5	6.0	2.81	32106	-21	276	#3 @ 12"	0.1110	0.375	0.000	0.227	0.924		8998.3	20000.0	25.96	11.25	8.2	5.5
8	3.5	4.0	6.5	3.1	48012	-35	360	#3 @ 12"	0.1110	0.375	0.000	0.211	0.930		12525.5	20000.0	32.96	11.25	9.1	5.5
9	4.0	4.5	7.5	3.1	68166	-51	456	#3 @ 12"	0.1110	0.375	0.000	0.188	0.937		13914.1	20000.0	36.2	11.25	8.8	5.5
10	4.5	5.0	7.5	3.1	93236	-70	563	#3 @ 6"	0.222	0.375	0.000	0.254	0.915		9651.7	20000.0	32.38	11.25	1.9	5.5
11	5.0	5.5	7.5	3.4	13428	-90	681	#3 @ 6"	0.222	0.375	0.000	0.254	0.915		12472.6	20000.0	41.84	11.25	3.2	5.5
12	5.5	6.0	8.5	3.1	14937	-1	810	#3 @ 6"	0.222	0.375	0.000	0.233	0.922		12495.2	20000.0	37.22	11.25	2.7	5.5
13	6.0	6.5	8.5	3.1	20060	-1	951	#3 @ 6"	0.222	0.375	0.000	0.233	0.922		14968.5	20000.0	45.99	11.25	4.9	5.5
14	6.5	7.0	9.5	3.1	21573	-1	1103	#3 @ 6"	0.222	0.375	0.000	0.216	0.928		14433.6	20000.0	39.02	11.25	4.6	5.5





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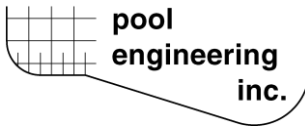
15	7.0	7.5	1.0	6.8	3.1	-1.4	1.6	1.2	#3 @ 6"	0.2	0.3	0.0	0.209	0.930	14551.2	20000.0	37.0	11.25	1.5	5.5
16	7.5	8.0	1.0	6.8	3.1	-1.4	1.6	1.2	#3 @ 6"	0.2	0.3	0.0	0.209	0.930	14124.7	20000.0	36.5	11.25	1.7	5.0
17	8.0	8.5	1.0	6.8	3.1	-1.4	1.6	1.2	#3 @ 6"	0.2	0.3	0.0	0.209	0.930	-470.5	20000.0	-1.2	11.25	1.9	5.0

**RESISTING MOMENTS** **NO R.B.B.**

WALL LOADED BY EARTH PRESSURE

**TABLE B - EXPANSIVE SOIL**

Section	$\gamma_{SOIL}$ 45	H 8.5 ft	RBB 0.0 f	R 5.0 ft	1	2	3	4	5	6	7	8	9	10	11	12	RM								
					0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0									
					Weight	75.00	56.25	37.50	37.50	37.50	37.50	37.50	38.96	43.26	48.08	49.69	52.53								
1	0.5	75.0			0.50																				
					37.50												-37.50								
2	1.0	56.3			0.50	0.39																			
					37.50	21.88											-59.38								
3	1.5	37.5			0.50	0.39	0.25																		
					37.50	21.88	9.38										-68.75								
4	2.0	37.5			0.50	0.39	0.25	0.25																	
					37.50	21.88	9.38	9.38	-78								14								
5	2.5	37.5	0.50	0.39	0.25	0.25	0										14								
6	3.0	37.5	0.50	0.39	0.25	0.25	0.25	0									14								
7	3.5	37.5	0.50	0.39	0.25	0.25	0.25	0.25	0								14								
					37.50	21.88	9.38	9.38	9.38	9.38	9.38	9.38	-106				14								
8	4.0	39.0	0.53	0.41	0.28	0.28	0.28	0.28	0.28	0.39	0.38	23.28	10.31	10.31	10.31	10.31	10.31	10.77	-125.01	<b>Error! Bookmark not defined.</b>					
					37.50	21.88	9.38	9.38	9.38									-87.50							
					37.50	21.88	9.38	9.38	9.38	9.38	9.38							-96.88							
9	4.5	43.3			0.60	0.49	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.31											
					45.08	27.56	13.16	13.16	13.16	13.16	13.16	13.73	13.56					-165.74							
10	5.0	48.1			0.73	0.62	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.44	0.39										
					54.77	34.83	18.01	18.01	18.01	18.01	18.01	18.77	19.15	18.73	-236.31	11	5.5	49.7	0.92	0.81	0.67	0.67	0.67	0.67	0.67
					0.63	0.58	0.43																		
					68.81	45.36	25.03	25.03	25.03	25.03	25.03	26.06	27.24	27.73	21.34	-341.68	12	6.0	52.5	1.17	1.06	0.92	0.92	0.92	0.92
					0.92	0.92	0.88	0.83	0.68	0.48															
					87.74	59.56	34.50	34.50	34.50	34.50	34.50	34.50	35.89	38.16	39.87	33.89	25.24	...	-492.83						
13	6.5	60.4			1.50	1.39	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.21	1.16	1.01	0.81								
					112.50	78.12	46.87	46.87	46.87	46.87	46.87	46.87	48.75	52.44	55.74	50.29	42.59	...	-709.40						
14	7.0	66.1			1.93	1.82	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.64	1.59	1.44	1.24								



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		144.70	102.27	62.97	62.97	62.97	62.97	62.97	65.48	71.01	76.39	71.62	65.14 ...	-1015.94
15	7.5 77.8	2.50	2.39	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.21	2.16	2.01	1.81
		187.50	134.37	84.37	84.37	84.37	84.37	84.37	87.71	95.70	103.83	99.98	95.12 ...	-1466.19
16	8.0 97.6	3.32	3.21	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.03	2.98	2.83	2.63
		249.04	180.53	115.15	115.15	115.15	115.15	115.15	119.68	131.20	143.28	140.74	138.22 ...	-2191.89
17	8.5 388.7	5.50	5.39	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.21	5.16	5.01	4.81
		412.50	303.13	196.88	196.88	196.88	196.88	196.88	204.60	225.47	248.08	249.03	252.71 ...	-4660.84

**RESISTING MOMENTS**

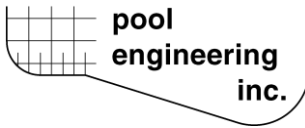
**NO R.B.B.**

**cont.**

**WALL LOADED BY EARTH PRESSURE**

**TABLE B - EXPANSIVE SOIL**

<div style="border: 1px solid black; padding: 2px;"> <math>\gamma_{SOIL}</math> 45 pcf         </div>		<div style="border: 1px solid black; padding: 2px;"> <math>F</math> </div>		<div style="border: 1px solid black; padding: 2px;"> <math>RBB</math> </div>		<div style="border: 1px solid black; padding: 2px;"> <math>C</math> </div>		<div style="border: 1px solid black; padding: 2px;"> <math>R</math> 5.0 ft         </div>	
Section	H2	13	14	15	16	17	RM		
		6.5	7.0	7.5	8.0	8.5			
		Weight	60.44	66.10	77.82	97.59	388.75		
1	0.5	75.0							
									-37.50
2	1.0	56.3							
									-59.38
3	1.5	37.5							
									-68.75
4	2.0	37.5							
									-78.13
5	2.5	37.5							
									-87.50
6	3.0	37.5							
									-96.88
7	3.5	37.5							
									-106.25
8	4.0	39.0							
									-125.01
9	4.5	43.3							
									-165.74
10	5.0	48.1							
									-236.31
11	5.5	49.7							
									-341.68
12	6.0	52.5							
									-492.83
13	6.5	60.4	0.57						
		...	34.59						-709.40
14	7.0	66.1	1.00	0.66					
		...	60.53	43.93					-1015.94
15	7.5	77.8	1.57	1.24	0.81				



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... 95.03 81.66 63.42 -1466.19 16 8.0 97.6 2.39 2.06 1.64

1.08

... 144.63 135.89 127.27 105.67 -2191.89

17 8.5 388.7 4.57 4.24 3.81 3.26 1.57

... 276.36 279.94 296.88 318.36 609.41 -4660.84

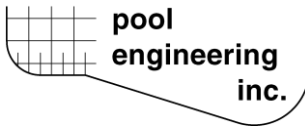
# POOL WALL SUMMARY

**NO R.B.B.**

**TABLE C - HIGHLY EXPANSIVE SOIL OR NO DECK**

$\gamma_{SOIL}$  62 pc   
  $H$  8.5 ft   
 RBB 0.0 ft   
  $R$  5.0 ft

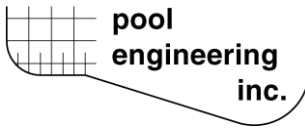
Sec	H1 ft	H2 ft	t in	d in.	SOIL			Vertical Steel	As in <sup>2</sup>	Ds in.	SOIL								
					CMR ft-lb	MT ft-lb	V lb				$\rho$	k	j	fs psi	fsall psi	fc psi	fcall psi	v psi	vall psi
1	0.0	0.5	2.0	8.81	-38	-36	8	#3 @ 12"	0.110	0.375	0.001	0.136	0.955	-467.4	20000.0	-7.2	1125.0	0.1	55.0
2	0.5	1.0	6.0	2.81	-59	-49	31	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-2046.8	20000.0	-59.0	1125.0	0.9	55.0
3	1.0	1.5	6.0	2.81	-69	-34	70	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-1406.3	20000.0	-40.6	1125.0	2.1	55.0
4	1.5	2.0	6.0	2.81	-78	5	125	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	212.1	20000.0	6.1	1125.0	3.7	55.0
5	2.0	2.5	6.0	2.81	-88	75	195	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	3134.4	20000.0	90.4	1125.0	5.8	55.0
6	2.5	3.0	6.5	3.31	-98	183	281	#3 @ 12"	0.110	0.375	0.003	0.211	0.930	6461.3	20000.0	170.0	1125.0	7.1	55.0
7	3.0	3.5	7.5	4.31	-44	330	386	#3 @ 12"	0.110	0.375	0.002	0.188	0.937	9015.6	20000.0	204.9	1125.0	7.4	55.0
8	3.5	4.0	8.5	5.31	-66	530	496	#3 @ 12"	0.110	0.375	0.002	0.171	0.943	11487.5	20000.0	238.8	1125.0	7.8	55.0
9	4.0	4.5	9.5	6.31	-44	761	638	#3 @ 12"	0.110	0.375	0.001	0.158	0.947	13831.7	20000.0	255.2	1125.0	8.3	55.0
10	4.5	5.0	9.5	6.31	-27	1029	781	#3 @ 6"	0.221	0.375	0.003	0.216	0.928	9540.7	20000.0	279.0	1125.0	1.3	55.0
11	5.0	5.5	9.5	6.31	-39	1335	946	#3 @ 6"	0.221	0.375	0.003	0.216	0.928	12374.6	20000.0	334.5	1125.0	1.5	55.0



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12	5.50	6.05	1.05	7.31	22	-	16	11	#3 @ 6"	0.221	0.375	0.003	0.202	0.933	13326.0	20000.0	331.9	1125.0	12.8	55.0
13	6.05	6.55	1.15	8.31	22	-	20	13	#3 @ 6"	0.221	0.375	0.002	0.191	0.936	14156.3	20000.0	328.3	1125.0	13.2	55.0
14	6.50	7.05	1.25	9.31	22	-	23	15	#3 @ 6"	0.221	0.375	0.002	0.181	0.940	14733.9	20000.0	321.0	1125.0	13.7	55.0
15	7.05	7.55	1.35	10.31	22	-	26	17	#3 @ 6"	0.221	0.375	0.002	0.173	0.942	14819.2	20000.0	305.3	1125.0	14.4	55.0
16	7.50	8.00	1.40	10.81	22	-	27	19	#3 @ 6"	0.221	0.375	0.002	0.170	0.943	14429.3	20000.0	289.7	1125.0	15.4	55.0
17	8.05	8.50	1.45	10.81	22	-	56	22	#3 @ 6"	0.221	0.375	0.002	0.170	0.943	2991.6	20000.0	601.0	1125.0	17.4	55.0





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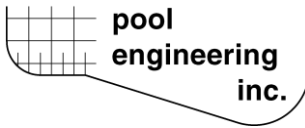
$\gamma_{SOIL}$ 62 pcf	$H$ 8.5 ft	$RBB$ 0.0 ft	$R$ 5.0 ft
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Section	H2	13	14	15	16	17	RM
		6.5	7.0	7.5	8.0	8.5	
		Weight	74.16	85.70	100.20	123.46	595.14
1	0.5 75.0						
							-37.50
2	1.0 56.3						
							-59.38
3	1.5 37.5						
							-68.75
4	2.0 37.5						
							-78.13
5	2.5 37.5						
							-87.50
6	3.0 39.1						
							-97.68
7	3.5 43.8						
							-110.46
8	4.0 49.7						
							-135.92
9	4.5 55.6						
							-186.42
10	5.0 60.8						
							-271.10
11	5.5 62.8						
							-395.79
12	6.0 65.8						
							-573.51
13	6.5 74.2	0.66					
		...	49.25				-827.85
14	7.0 85.7	1.09	0.79				
		...	81.08	67.87			-1194.25
15	7.5 100.2	1.66	1.36	0.97			
		...	123.41	116.77	96.82	-1736.86	16 8.0 123.5 2.48 2.18 1.79
1.26							
		...	184.26	187.09	179.04	155.23	-2615.26
17	8.5 595.1	4.66	4.36	3.97	3.44	1.71	
		...	345.89	373.86	397.43	424.30	1020.03 -5825.13

**POOL WALL SUMMARY** **2'-6" R.B.B.**

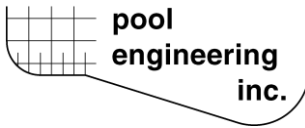
**TABLE E - NON-EXPANSIVE SOIL**

$\gamma_{SOIL}$ 30 pcf	$H$ 11.0 ft	$RBB$ 2.5 ft	$R$ 5.0 ft
------------------------	-------------	--------------	------------



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Sec	H1 ft.	H2 ft.	t in.	d in.	SOIL				Vertical Steel	As in <sup>2</sup>	Ds in.	SOIL								
					OT M ft-lb	MR ft-lb	MT ft-lb	V I b				p	k	j	fs psi	fs <sub>all</sub> psi	fc p si	fc <sub>a</sub> p si	v p si	v <sub>all</sub> p si
1	0.0	0.5	1.2	8.81	1	-38	-37	4	#3 @ 12"	0.110	0.375	0.001	0.136	0.955	-476.1	20000.0	-7.3	1125.0	0.0	55.0
2	0.5	1.0	6.0	2.81	5	-59	-54	15	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-2272.4	20000.0	-65.5	1125.0	0.4	55.0
3	1.0	1.5	6.0	2.81	17	-69	-52	34	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-2168.0	20000.0	-62.5	1125.0	0.0	55.0
4	1.5	2.0	6.0	2.81	40	-78	-38	60	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-1593.3	20000.0	-46.0	1125.0	1.8	55.0
5	2.0	2.5	6.0	2.81	78	-88	-9	94	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-391.8	20000.0	-11.3	1125.0	2.8	55.0
6	2.5	3.0	6.0	2.81	135	-97	38	135	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	1593.3	20000.0	46.0	1125.0	4.0	55.0
7	3.0	3.5	6.0	2.81	214	-106	108	184	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	4518.8	20000.0	130.3	1125.0	5.4	55.0
8	3.5	4.0	6.0	2.81	320	-116	204	240	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	8541.2	20000.0	246.4	1125.0	7.1	55.0
9	4.0	4.5	6.0	2.81	456	-125	331	304	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	13817.5	20000.0	398.6	1125.0	9.0	55.0
10	4.5	5.0	6.0	2.81	625	-134	491	375	#3 @ 6"	0.221	0.375	0.007	0.304	0.899	10546.8	20000.0	453.6	1125.0	1.1	55.0
11	5.0	5.5	6.5	3.31	832	-145	687	454	#3 @ 6"	0.221	0.375	0.006	0.284	0.905	12452.9	20000.0	486.5	1125.0	1.4	55.0
12	5.5	6.0	7.5	4.31	1080	-157	923	540	#3 @ 6"	0.221	0.375	0.004	0.254	0.915	12700.2	20000.0	426.0	1125.0	1.4	55.0
13	6.0	6.5	8.5	5.31	1373	-187	1186	634	#3 @ 6"	0.221	0.375	0.003	0.233	0.922	13143.2	20000.0	391.5	1125.0	9.9	55.0
14	6.5	7.0	9.5	6.31	1715	-252	1463	735	#3 @ 6"	0.221	0.375	0.003	0.216	0.928	13563.8	20000.0	367.0	1125.0	9.7	55.0
15	7.0	7.5	10.5	7.31	2109	-362	1747	844	#3 @ 6"	0.221	0.375	0.003	0.202	0.933	13917.4	20000.0	346.0	1125.0	9.6	55.0
16	7.5	8.0	11.5	8.31	2560	-529	2031	960	#3 @ 6"	0.221	0.375	0.002	0.191	0.936	14179.0	20000.0	328.9	1125.0	9.6	55.0
17	8.0	8.5	12.5	9.31	3071	-768	2302	1084	#3 @ 6"	0.221	0.375	0.002	0.181	0.940	14295.8	20000.0	315.0	1125.0	9.7	55.0
18	8.5	9.0	13.0	9.81	3645	-111	2538	1215	#3 @ 6"	0.221	0.375	0.002	0.177	0.941	14930.5	20000.0	316.0	1125.0	1.3	55.0



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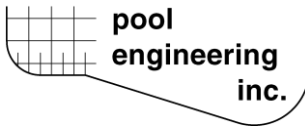
						07														
19	9.0	9.5	14.0	10.81	4287	-1587	2700	1354	#3 @ 6"	0.221	0.375	0.002	0.170	0.943	14377.7	20000.0	288.6	1125.0	10.4	55.0
20	9.5	10.0	14.0	10.81	5000	-2282	2718	1500	#3 @ 6"	0.221	0.375	0.002	0.170	0.943	14475.8	20000.0	290.6	1125.0	11.6	55.0
21	10.0	10.5	14.0	10.81	5788	-3385	2403	1654	#3 @ 6"	0.221	0.375	0.002	0.170	0.943	12795.1	20000.0	256.9	1125.0	12.7	55.0
22	10.5	11.0	14.0	10.81	6655	-7189	-534	1815	#3 @ 6"	0.221	0.375	0.002	0.170	0.943	-2841.8	20000.0	-57.0	1125.0	14.0	55.0

**RESISTING MOMENTS** **2'-6" R.B.B.**

**WALL LOADED BY EARTH PRESSURE** **TABLE E - NON-EXPANSIVE SOIL**

$\gamma_{SOIL}$ 30 f Section → ↓ H2 → ↓		<b>H</b> 11.0	<b>RBB</b> 2.5 f	<b>R</b> 5.0 ft																	
		1	2	3	4	5	6	7	8	9	10	11	12								RM
		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0								
	Weight	75.00	56.25	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50	37.50	39.06	43.75							
1	0.575.0	0.50																			-37.50
2	1.056.3	0.50	0.39																		-59.38
3	1.537.5	0.50	0.39	0.25																	-68.75
4	2.037.5	0.50	0.39	0.25	0.25																-78.13
5	2.537.5	0.50	0.39	0.25	0.25	0.25															-87.50
6	3.037.5	0.50	0.39	0.25	0.25	0.25	0.25														-96.88
7	3.537.5	0.50	0.39	0.25	0.25	0.25	0.25	0.25													-106.25
8	4.037.5	0.50	0.39	0.25	0.25	0.25	0.25	0.25	0.25												-115.63
9	4.537.5	0.50	0.39	0.25	0.25	0.25	0.25	0.25	0.25	0.25											-125.00
10	5.037.5	0.50	0.39	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25										-134.38
	39.1	0.50	0.39	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.26							115.5





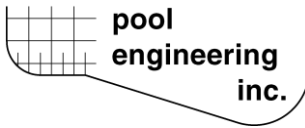
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		37.50	21.88	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	10.18	-	
144.55	12 6.0	43.8	0.50	0.39	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.26	
	0.29													
		37.50	21.88	9.38	9.38	9.38	9.38	9.38	9.38	9.38	9.38	10.18	12.78 ...	-157.34
13	6.5 49.7	0.53	0.41	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.29	0.32
		39.38	23.28	10.31	10.31	10.31	10.31	10.31	10.31	10.31	10.31	11.16	13.88 ...	-187.50
14	7.0 55.6	0.60	0.49	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.36	0.39
		45.08	27.56	13.16	13.16	13.16	13.16	13.16	13.16	13.16	13.16	14.12	17.20 ...	-252.24
15	7.5 62.1	0.73	0.62	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.49	0.52
		54.77	34.83	18.01	18.01	18.01	18.01	18.01	18.01	18.01	18.01	19.17	22.86 ...	-362.25
16	8.0 69.3	0.92	0.81	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.68	0.71
		68.81	45.36	25.03	25.03	25.03	25.03	25.03	25.03	25.03	25.03	26.48	31.04 ...	-528.50
17	8.5 77.5	1.17	1.06	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.96
		87.74	59.56	34.50	34.50	34.50	34.50	34.50	34.50	34.50	34.50	36.34	42.09 ...	-768.23
18	9.0 87.4	1.50	1.39	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.26	1.29
		112.50	78.12	46.87	46.87	46.87	46.87	46.87	46.87	46.87	46.87	49.24	56.53 ...	-1107.48
19	9.5 98.5	1.93	1.82	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.68	1.69	1.72
		144.70	102.27	62.97	62.97	62.97	62.97	62.97	62.97	62.97	62.97	66.01	75.31 ...	-1587.01
20	10.0	111.4	2.50	2.39	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.25	2.26
	2.29													
		187.50	134.37	84.37	84.37	84.37	84.37	84.37	84.37	84.37	84.37	88.30	100.28 ...	-2281.72
21	10.5	135.0	3.32	3.21	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.07	3.08
	3.11													
		249.04	180.53	115.15	115.15	115.15	115.15	115.15	115.15	115.15	115.15	120.36	136.18 ...	-3385.45
22	11.0	604.9	5.50	5.39	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.26
	5.29													
		412.50	303.13	196.88	196.88	196.88	196.88	196.88	196.88	196.88	196.88	205.49	231.53 ...	-7188.64

**RESISTING MOMENTS cont.** **2'-6" R.B.B.**  
**WALL LOADED BY EARTH PRESSURE** **TABLE E - NON-EXPANSIVE SOIL**

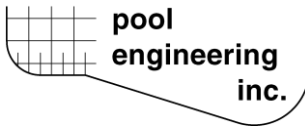
$\gamma_{SOIL}$ 30 pcf Section → ↓ H2 → ↓													
	13	14	15	16	17	18	19	20	21	22	RM		
	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0			
	Weight	49.66	55.61	62.06	69.25	77.53	87.42	98.47	111.36	134.96	604.88		
1	0.5	75.0											
													-37.50
2	1.0	56.3											
													-59.38
3	1.5	37.5											
													-68.75
4	2.0	37.5											
													-78.13
5	2.5	37.5											
													-87.50
6	3.0	37.5											
													-96.88
7	3.5	37.5											





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																	2.4			
4	1.5	2.0	6.0	2.81	60	-78	-18	90	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	-757.5	20000.0	-21.8	1125.0	2.7	55.0
5	2.0	2.5	6.0	2.81	117	-88	30	141	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	1240.7	20000.0	35.8	1125.0	4.2	55.0
6	2.5	3.0	6.0	2.81	203	-97	106	203	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	4414.3	20000.0	127.3	1125.0	6.0	55.0
7	3.0	3.5	6.0	2.81	322	-106	215	276	#3 @ 12"	0.110	0.375	0.003	0.227	0.924	8998.3	20000.0	259.6	1125.0	8.2	55.0
8	3.5	4.0	6.5	3.31	480	-116	364	360	#3 @ 12"	0.110	0.375	0.003	0.211	0.930	12828.2	20000.0	337.5	1125.0	9.1	55.0
9	4.0	4.5	7.5	4.31	683	-129	554	456	#3 @ 12"	0.110	0.375	0.002	0.188	0.937	14895.9	20000.0	338.5	1125.0	8.8	55.0
10	4.5	5.0	7.5	4.31	938	-144	794	563	#3 @ 6"	0.221	0.375	0.004	0.254	0.915	10924.2	20000.0	366.5	1125.0	1.9	55.0
11	5.0	5.5	8.5	5.31	1248	-161	1087	681	#3 @ 6"	0.221	0.375	0.003	0.233	0.922	12052.8	20000.0	359.1	1125.0	1.7	55.0
12	5.5	6.0	9.5	6.31	1620	-182	1438	810	#3 @ 6"	0.221	0.375	0.003	0.216	0.928	13337.3	20000.0	360.6	1125.0	1.7	55.0
13	6.0	6.5	10.5	7.31	2060	-222	1837	951	#3 @ 6"	0.221	0.375	0.003	0.202	0.933	14636.2	20000.0	364.5	1125.0	1.8	55.0
14	6.5	7.0	10.5	7.31	2573	-300	2273	1103	#3 @ 4"	0.331	0.375	0.004	0.241	0.920	12240.9	20000.0	382.9	1125.0	2.6	55.0
15	7.0	7.5	11.5	8.31	3164	-424	2740	1266	#3 @ 4"	0.331	0.375	0.003	0.228	0.924	12920.8	20000.0	375.8	1125.0	2.7	55.0
16	7.5	8.0	12.5	9.31	3840	-610	3230	1440	#3 @ 4"	0.331	0.375	0.003	0.217	0.928	13541.3	20000.0	369.5	1125.0	2.9	55.0
17	8.0	8.5	13.5	10.31	4606	-877	3729	1626	#3 @ 4"	0.331	0.375	0.003	0.208	0.931	14069.7	20000.0	362.6	1125.0	3.1	55.0
18	8.5	9.0	14.5	11.31	5468	-1253	4215	1823	#3 @ 4"	0.331	0.375	0.002	0.199	0.934	14453.8	20000.0	358.8	1125.0	3.4	55.0
19	9.0	9.5	15.5	12.31	6430	-1784	4646	2031	#3 @ 4"	0.331	0.375	0.002	0.192	0.936	14602.0	20000.0	341.1	1125.0	3.7	55.0
20	9.5	10.0	16.0	12.81	7500	-2556	4944	2250	#3 @ 4"	0.331	0.375	0.002	0.189	0.937	14911.9	20000.0	340.7	1125.0	4.6	55.0
21	10.0	10.5	16.0	12.81	8682	-3778	4904	2481	#3 @ 4"	0.331	0.375	0.002	0.189	0.937	14791.7	20000.0	338.0	1125.0	6.1	55.0



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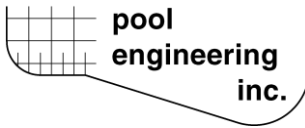
22	10.5	1	1	12.81	99	-	18	27	#3 @ 4"	0.331	0.375	0.002	0.189	0.937	5651.2	20000.0	12	11	1	5
		1.0	6.0		83	8	74	23									9.	25.	7.	5.
						1											1	0	7	0
						0														
						9														

**RESISTING MOMENTS** **2'-6" R.B.B.**

WALL LOADED BY EARTH PRESSURE

**TABLE F - EXPANSIVE SOIL**

$\gamma_{SOIL}$ 45 f Section → ↓ H2 → ↓		<b>H</b> 11.0 1    2		<b>RBB</b> 2.5 f 3    4		<b>R</b> 5.0 ft 5    6		7    8		9    10		11    12		RM
		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	
		Weight	75.00	56.25	37.50	37.50	37.50	37.50	37.50	39.06	43.75	46.88	50.00	56.25
1	0.5 75.0	0.50												
		37.50												-37.50
2	1.0 56.3	0.50	0.39											
		37.50	21.88											-59.38
3	1.5 37.5	0.50	0.39	0.25										
		37.50	21.88	9.38										-68.75
4	2.0 37.5	0.50	0.39	0.25	0.25									
		37.50	21.88	9.38	9.38									-78.13
5	2.5 37.5	0.50	0.39	0.25	0.25	0.25								
		37.50	21.88	9.38	9.38	9.38								-87.50
6	3.0 37.5	0.50	0.39	0.25	0.25	0.25	0.25							
		37.50	21.88	9.38	9.38	9.38	9.38							-96.88
7	3.5 37.5	0.50	0.39	0.25	0.25	0.25	0.25	0.25						
		37.50	21.88	9.38	9.38	9.38	9.38	9.38						-106.25
8	4.0 39.1	0.50	0.39	0.25	0.25	0.25	0.25	0.25	0.25					
		37.50	21.88	9.38	9.38	9.38	9.38	9.38	9.38	10.18				-116.43
9	4.5 43.8	0.50	0.39	0.25	0.25	0.25	0.25	0.25	0.25	0.26	0.29			
		37.50	21.88	9.38	9.38	9.38	9.38	9.38	9.38	10.18	12.78	-129.21	105.0	46.9
	0.50 0.39	0.25	0.25	0.25	0.25	0.25	0.26	0.29	0.31					
		37.50	21.88	9.38	9.38	9.38	9.38	9.38	10.18	12.78	14.65			-143.86
11	5.5 50.0	0.50	0.39	0.25	0.25	0.25	0.25	0.25	0.26	0.29	0.31	0.33		
		37.50	21.88	9.38	9.38	9.38	9.38	9.38	10.18	12.78	14.65	16.69		-
	160.55 12 6.0	56.3	0.50	0.39	0.25	0.25	0.25	0.25	0.25	0.25	0.26	0.29	0.31	0.33
	0.38													
		37.50	21.88	9.38	9.38	9.38	9.38	9.38	10.18	12.78	14.65	16.69	21.12 ...	-181.66
13	6.5 62.1	0.53	0.41	0.28	0.28	0.28	0.28	0.28	0.28	0.29	0.32	0.34	0.36	0.40
		39.38	23.28	10.31	10.31	10.31	10.31	10.31	11.16	13.88	15.82	17.94	22.53 ...	-222.32
14	7.0 66.2	0.60	0.49	0.35	0.35	0.35	0.35	0.35	0.35	0.36	0.39	0.41	0.43	0.48
		45.08	27.56	13.16	13.16	13.16	13.16	13.16	14.12	17.20	19.38	21.74	26.80 ...	-299.84
15	7.5 68.6	0.73	0.62	0.48	0.48	0.48	0.48	0.48	0.48	0.49	0.52	0.54	0.56	0.61
		54.77	34.83	18.01	18.01	18.01	18.01	18.01	19.17	22.86	25.44	28.20	34.07 ...	-424.23
16	8.0 75.5	0.92	0.81	0.67	0.67	0.67	0.67	0.67	0.67	0.68	0.71	0.73	0.75	0.79
		68.81	45.36	25.03	25.03	25.03	25.03	25.03	26.48	31.04	34.22	37.56	44.60 ...	-610.31
17	8.5 83.9	1.17	1.06	0.92	0.92	0.92	0.92	0.92	0.92	0.93	0.96	0.98	1.00	1.05



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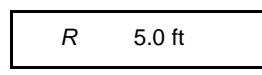
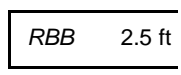
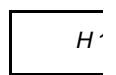
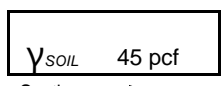
		87.74	59.56	34.50	34.50	34.50	34.50	34.50	36.34	42.09	46.05	50.18	58.80 ...	-877.11
18	9.094.0	1.50	1.39	1.25	1.25	1.25	1.25	1.25	1.25	1.26	1.29	1.31	1.33	1.38
		112.50	78.12	46.87	46.87	46.87	46.87	46.87	49.24	56.53	61.52	66.69	77.37 ...	-1252.87
19	9.5106.7	1.93	1.82	1.68	1.68	1.68	1.68	1.68	1.68	1.69	1.72	1.74	1.76	1.80
		144.70	102.27	62.97	62.97	62.97	62.97	62.97	66.01	75.31	81.65	88.15	101.51 ...	-1783.84
20	10.0 2.38	123.4	2.50	2.39	2.25	2.25	2.25	2.25	2.25	2.25	2.26	2.29	2.31	2.33
		187.50	134.37	84.37	84.37	84.37	84.37	84.37	88.30	100.28	108.40	116.69	133.62 ...	-2556.26
21	10.5 3.20	147.1	3.32	3.21	3.07	3.07	3.07	3.07	3.07	3.07	3.08	3.11	3.13	3.15
		249.04	180.53	115.15	115.15	115.15	115.15	115.15	120.36	136.18	146.86	157.72	179.77 ...	-3778.29
22	11.0 5.38	722.0	5.50	5.39	5.25	5.25	5.25	5.25	5.25	5.25	5.26	5.29	5.31	5.33
		412.50	303.13	196.88	196.88	196.88	196.88	196.88	205.49	231.53	249.02	266.69	302.37 ...	-8108.97

**RESISTING MOMENTS cont.**

**2'-6" R.B.B.**

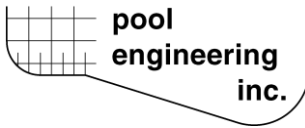
WALL LOADED BY EARTH PRESSURE

TABLE F - EXPANSIVE SOIL



Section	H2	Weight	13	14	15	16	17	18	19	20	21	22	RM
1	0.5	75.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	-37.50
2	1.0	56.3	62.10	66.20	68.59	75.54	83.94	94.02	106.67	123.36	147.14	721.99	-59.38
3	1.5	37.5											-68.75
4	2.0	37.5											-78.13
5	2.5	37.5											-87.50
6	3.0	37.5											-96.88
7	3.5	37.5											-106.25
8	4.0	39.1											-116.43
9	4.5	43.8											-129.21
10	5.0	46.9											-143.86
11	5.5	50.0											-160.55
12	6.0	56.3											-181.66
13	6.5	62.1	0.43										-222.32
			...	26.75									-299.84
14	7.0	66.2	0.51	0.46									
			...	31.47	30.68								





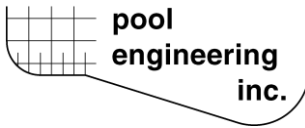
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10	4.5	5.0	1.0	7.31	1300	-17.4	112.6	780	#3 @ 6"	0.221	0.375	0.003	0.202	0.933	8967.0	20000.0	223.3	1125.0	8.9	5.5	5.0
11	5.0	5.5	1.1	8.31	1730	-20.6	152.4	944	#3 @ 6"	0.221	0.375	0.002	0.191	0.936	10639.9	20000.0	246.8	1125.0	9.5	5.5	5.0
12	5.5	6.0	1.2	9.31	2246	-24.3	200.3	1113	#3 @ 6"	0.221	0.375	0.002	0.181	0.940	12437.0	20000.0	271.0	1125.0	1.0	5.5	5.0
13	6.0	6.5	1.3	10.31	2856	-30.4	251.8	1315	#3 @ 6"	0.221	0.375	0.002	0.173	0.942	14267.0	20000.0	293.9	1125.0	1.7	5.5	5.0
14	6.5	7.0	1.3	10.31	3567	-40.9	312.8	1519	#3 @ 3"	0.442	0.375	0.004	0.236	0.921	9027.8	20000.0	273.5	1125.0	2.4	5.5	5.0
15	7.0	7.5	1.3	10.31	4388	-56.9	381.8	1715	#3 @ 3"	0.442	0.375	0.004	0.236	0.921	10914.9	20000.0	330.7	1125.0	4.2	5.5	5.0
16	7.5	8.0	1.3	10.31	5325	-79.7	457.7	1917	#3 @ 3"	0.442	0.375	0.004	0.236	0.921	12941.2	20000.0	392.1	1125.0	6.1	5.5	5.0
17	8.0	8.5	1.4	11.31	6387	-111.4	522.4	2113	#3 @ 3"	0.442	0.375	0.003	0.226	0.925	13693.5	20000.0	393.7	1125.0	6.6	5.5	5.0
18	8.5	9.0	1.5	12.31	7582	-155.3	602.7	2312	#3 @ 3"	0.442	0.375	0.003	0.218	0.927	14342.1	20000.0	393.2	1125.0	7.1	5.5	5.0
19	9.0	9.5	1.6	13.31	8917	-216.8	691.6	2516	#3 @ 3"	0.442	0.375	0.003	0.211	0.930	14810.1	20000.0	388.7	1125.0	7.6	5.5	5.0
20	9.5	10.0	1.7	14.31	10400	-305.5	795.0	2710	#3 @ 3"	0.442	0.375	0.003	0.204	0.932	14956.4	20000.0	377.0	1125.0	8.2	5.5	5.0
21	10.0	10.5	1.8	14.81	12039	-414.7	894.3	2910	#3 @ 3"	0.442	0.375	0.002	0.201	0.933	14923.1	20000.0	369.0	1125.0	9.4	5.5	5.0
22	10.5	11.0	1.8	14.81	13842	-444.2	940.5	3115	#3 @ 3"	0.442	0.375	0.002	0.201	0.933	8648.3	20000.0	213.8	1125.0	2.1	5.5	5.0

**RESISTING MOMENTS** **2'-6" R.B.B.**

**WALL LOADED BY EARTH PRESSURE** **TABLE G - HIGHLY EXPANSIVE SOIL OR NO DECK**

$\gamma_{SOIL}$ 62 f	$H$ 11.0	$RBB$ 2.5 f	$R$ 5.0 ft
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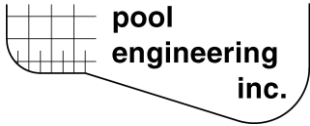


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Section	→	1	2	3	4	5	6	7	8	9	10	11	12	RM
	H2 →	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	
	↓	Weight	75.00	56.25	37.50	37.50	37.50	39.06	43.75	50.00	56.25	62.50	68.75	75.00
1	0.5 75.0	0.50												
		37.50												-37.50
2	1.0 56.3	0.50	0.39											
		37.50	21.88											-59.38
3	1.5 37.5	0.50	0.39	0.25										
		37.50	21.88	9.38										-68.75
4	2.0 37.5	0.50	0.39	0.25	0.25									
		37.50	21.88	9.38	9.38									-78.13
5	2.5 37.5	0.50	0.39	0.25	0.25	0.25								
		37.50	21.88	9.38	9.38	9.38								-87.50
6	3.0 39.1	0.50	0.39	0.25	0.25	0.25	0.26							
		37.50	21.88	9.38	9.38	9.38	10.18							-97.68
7	3.5 43.8	0.50	0.39	0.25	0.25	0.25	0.26	0.29						
		37.50	21.88	9.38	9.38	9.38	10.18	12.78						-110.46
8	4.0 50.0	0.50	0.39	0.25	0.25	0.25	0.26	0.29	0.33					
		37.50	21.88	9.38	9.38	9.38	10.18	12.78	16.69	-127.15	9	4.5	56.3	0.50
	0.39 0.25	0.25	0.25	0.26	0.29	0.33	0.38							
		37.50	21.88	9.38	9.38	9.38	10.18	12.78	16.69	21.12				-148.26
10	5.0 62.5	0.50	0.39	0.25	0.25	0.25	0.26	0.29	0.33	0.38	0.42			
		37.50	21.88	9.38	9.38	9.38	10.18	12.78	16.69	21.12	26.06			-174.33
11	5.5 68.8	0.50	0.39	0.25	0.25	0.25	0.26	0.29	0.33	0.38	0.42	0.46		
		37.50	21.88	9.38	9.38	10.18	12.78	16.69	21.12	26.06	31.53	-205.86	12	6.0
		0.33	0.38	0.42	0.46	0.50								
		37.50	21.88	9.38	9.38	9.38	10.18	12.78	16.69	21.12	26.06	31.53	37.52 ...	-243.38
13	6.5 80.8	0.53	0.41	0.28	0.28	0.28	0.29	0.32	0.36	0.40	0.44	0.48	0.53	
		39.38	23.28	10.31	10.31	10.31	11.16	13.88	17.94	22.53	27.63	33.26	39.40 ...	-304.23
14	7.0 85.1	0.60	0.49	0.35	0.35	0.35	0.36	0.39	0.43	0.48	0.52	0.56	0.60	
		45.08	27.56	13.16	13.16	13.16	14.12	17.20	21.74	26.80	32.38	38.48	45.10 ...	-408.93
15	7.5 86.7	0.73	0.62	0.48	0.48	0.48	0.49	0.52	0.56	0.61	0.65	0.69	0.73	
		54.77	34.83	18.01	18.01	18.01	19.17	22.86	28.20	34.07	40.46	47.37	54.79 ...	-569.06
16	8.0 89.0	0.92	0.81	0.67	0.67	0.67	0.68	0.71	0.75	0.79	0.83	0.88	0.92	
		68.81	45.36	25.03	25.03	25.03	26.48	31.04	37.56	44.60	52.15	60.23	68.83 ...	-797.47
17	8.5 92.5	1.17	1.06	0.92	0.92	0.92	0.93	0.96	1.00	1.05	1.09	1.13	1.17	
		87.74	59.56	34.50	34.50	34.50	36.34	42.09	50.18	58.80	67.93	77.59	87.76 ...	-1114.21
18	9.0 100.6	1.50	1.39	1.25	1.25	1.25	1.26	1.29	1.33	1.38	1.42	1.46	1.50	
		112.50	78.12	46.87	46.87	46.87	49.24	56.53	66.69	77.37	88.56	100.28	112.52 ...	-1553.14
19	9.5 113.5	1.93	1.82	1.68	1.68	1.68	1.69	1.72	1.76	1.80	1.85	1.89	1.93	
		144.70	102.27	62.97	62.97	62.97	66.01	75.31	88.15	101.51	115.39	129.80	144.72 ...	-2168.09
20	10.0 2.50	130.7	2.50	2.39	2.25	2.25	2.25	2.25	2.26	2.29	2.33	2.38	2.42	2.46
		187.50	134.37	84.37	84.37	84.37	88.30	100.28	116.69	133.62	151.06	169.03	187.52 ...	-3055.31
21	10.5 3.32	155.0	3.32	3.21	3.07	3.07	3.07	3.07	3.08	3.11	3.15	3.20	3.24	3.28
		249.04	180.53	115.15	115.15	115.15	120.36	136.18	157.72	179.77	202.35	225.44	249.06 ...	-4446.59

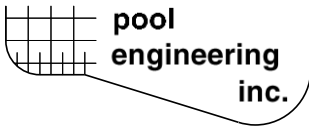






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21	10.5	155.0	3.35	3.31	3.24	3.10	2.90	2.66	2.37	1.99	1.47			
			...	270.60	281.34	280.51	275.44	268.06	267.89	269.10	259.92	227.83	-4446.59	
22	11.0	835.4	5.53	5.49	5.42	5.27	5.08	4.84	4.55	4.17	3.65			
		1.88												
			...	446.61	466.72	469.36	469.39	469.57	487.18	516.55	544.87	565.58	1567.70	-9442.23



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## STRUCTURAL CALCULATIONS

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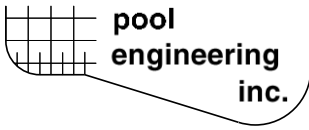
# SWIMMING POOL CALCULATIONS BUILDING SURCHARGE METHODOLOGY

*The following pages demonstrate the basic calculations which are summarized  
in the Pool Wall Summary Tables*

# SWIMMING POOL CALCULATIONS NOTATION

---

- $f'_c$  : specific compressive strength of concrete (psi)
  - $\omega_c$  : weight of concrete (pcf)
  - $f_c = 0.45 f'_{all}$  : allowable extreme fiber stress in compression for concrete (psi)
  - $v_c = 1.1 \sqrt{f'_c}$  : permissible shear stress carried by concrete (psi)
  - $E = 57000 f'_c$  : modulus of elasticity of concrete (psi)
  - $f_y = 40000$  : specified yield strength of reinforcement (psi)
  - $f_{sall} = 20000$  [GRADE 40, 50],  $24000$  [GRADE 60] : permissible tensile strength in reinf. (psi)  $E_s$
  - $= 29000000$  : modulus of elasticity of reinforcement (psi)  $\gamma_s$  : equivalent fluid pressure of soil (pcf)
  - $E_s$
  - $n =$  : modular ratio of elasticity
  - $E_c b$  : width of compression face of member (in) cover : 3 in. minimum for Concrete cast against and permanently exposed to earth.
- SEE CALCULATION METHODOLOGY:**
- $H$  : total height of pool wall including bond beam (ft)
  - RBB : distance from top of bond beam to surface of water (ft.)  $R$  : Radius of pool wall curvature (ft)  $t$  : thickness of pool wall at particular height (in)
  - $d = t - \text{cover} - (D_s/2)$  : distance from extreme compression fiber to centroid of tension reinforcement (in)
  - $H_1$  : top depth of particular section (ft)
  - $H_2$  : bottom depth of particular section (ft)
  - $OTM_{SOIL} = \frac{1}{6} \gamma_s H_2^3$  : over-turning moment (ft-lbs)  $V_{SOIL} = \frac{1}{2} \gamma_s H_2^2$  : shear (lbs)
  - $M_R$  : Moment Resisting (ft-lbs)
  - $OTM_{load}$  : over-turning moment due to additional vertical load (ft-lbs) - SEE BOUSSINESQ ANALYSIS
  - $V_{load}$  : shear due to additional vertical load (lbs) - SEE BOUSSINESQ ANALYSIS
  - $M_T = OTM_{SOIL} + OTM_{load} + M_R$  : Net Moment (ft-lbs)
  - $V_T = V_{SOIL} + V_{load}$  : Net Shear (lbs)



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$A_s$  : area of nonprestressed tension reinforcement (in<sup>2</sup>)  $D_s$  :

Diameter of reinforcement (in)  $\rho = \frac{A_s}{bd}$  : ratio of tension

reinforcement

$k = \sqrt{\rho n + 2\rho n - \rho n}$   $j = 1 - \frac{k}{2}$

$A_s j d$  : average stress in the steel (psi)

$$\frac{A}{bd} \sqrt{\frac{M_T}{3}}$$

$= \frac{2Mfc}{2j k bd}$  : maximum compressive stress at the top of the compressive zone (psi)

$v = \frac{V}{I}$  : design shear stress (psi)  
 $f_s =$

$bd$

## TYPICAL 2 STORY FOOTING SURCHARGE

---



Max. Depth	ft
R.B.B. Height	ft
Design Strif	ft
Pool Floor	ft

$f_c$	2500 psi
$F_c$	1125 psi
$n_c$	55
$E_c$	2850 ksi
$E_s$	29000 ksi
$n$	10.75
$d_c$	150 pcf

Resultant Force	ft
Face of P.W. to Load	ft
Depth to Load	ft
Total Height of P.W	ft

Dead	1.0
Live	1.0
Soil	1.0
Water	1.0
Resisting	0.9
Seismic	1.0
Wind	1.0

Reinf. Clearance:  
CLR = in



TABLE D - EXPANSIVE SOIL w/ BUILDING SURCHARGE

POOL WALL DESIGN  
 E.F.P. pcf  
 SOIL = 45

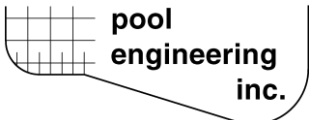
POOL PROPERTIES

CONCRETE

Adjacent Footing Load Inputs

Load Factors

POOL WALL DESIGN (SOIL LOADING)																												
Loading					Properties					Moment Check					Check Minimum Steel Percentage		Transition											
V <sub>soil</sub> (lb)(ft-lb)(ft-lb)(ft-lb)(ft-lb)(ft)	V <sub>sur</sub> (lb)(ft-lb)(ft-lb)(ft-lb)(ft-lb)(ft)	V	M <sub>soil</sub> (ft-lb)(ft)	M <sub>0</sub> (ft-lb)(ft)	M <sub>resist</sub> (ft-lb)(ft)	M <sub>radius</sub> (ft-lb)(ft)	Reinforcing Spacing	Add Bars	A <sub>s</sub> (in <sup>2</sup> )	d <sub>s</sub> (in)	f <sub>y</sub> (psi)	F <sub>s</sub> (lb)	F <sub>s</sub> (lb)	dV	Shear *	r	kj	M <sub>s</sub> ft-lb	M <sub>c</sub> ft-lb	M <sub>s</sub> ft-lb	Flex. Ratio	A <sub>min</sub> (in <sup>2</sup> )	Min./Max. Steel Ratio	Check Check	Std. Floor			
1.55101512502301.06.0#3@120#4	1.55101512502301.06.0#3@120#4	1.55101512502301.06.0#3@120#4	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	60	4	0.1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	11.0	40000	43750	43750	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	
1.55101512502301.06.0#3@120#4	1.55101512502301.06.0#3@120#4	1.55101512502301.06.0#3@120#4	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	60	4	0.1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	11.0	40000	43750	43750	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2
1.55101512502301.06.0#3@120#4	1.55101512502301.06.0#3@120#4	1.55101512502301.06.0#3@120#4	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	60	4	0.1100.37540000200002.81318560.0120.00.80.2270.8244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	11.0	40000	43750	43750	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2	0.0030.2270.9244799334790.0000.169N/A per ACI 318 Sect. 10.5.1OK2



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Wall Design

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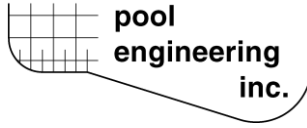


TABLE D - EXPANSIVE SOIL w/ BUILDING SURCHARGE

**RESISTING MOMENTS**

H2	Weight	Resisting Moment
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Max. Depth	6	ft
R.B.B. Height	2.5	ft
Design Strif	12	in
Pool Floor	6	ft

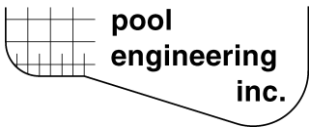
$f_c$	2500	psi
$F_c$	1125	psi
$n_c$	55	psi
$E_c$	2850	ksi
$E_s$	29000	ksi
$n$	10.175	
$d_c$	150	pcf

Resultant Force	11	ft
Face of P.W. to Load	2.5	ft
Depth to Load	2.5	ft
Total Height of P.W	11	ft

Dead	1.0
Live	1.0
Soil	1.0
Water	1.0
Resisting	0.9
Seismic	1.0
Wind	1.0

Reinf. Clearance:  
CLR = 5 in



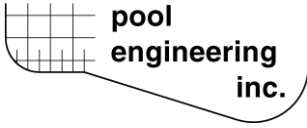


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Freestanding Pool  
Wall Design

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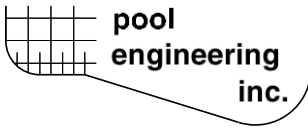


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TABLE H - EXPANSIVE SOIL w/ ROCK SURCHARGE

RESISTING MOMENTS

Weight	h <sub>2</sub>	Resisting Moment
0.5111	822.533	47.00521
0.5111	822.533	70.50781
0.5111	822.533	94.01042
0.5111	822.533	117.513
0.5111	822.533	141.0156
0.5111	822.533	165.5188
0.5111	822.533	190.0220
0.5111	822.533	214.5252
0.5111	822.533	239.0284
0.5111	822.533	263.5316
0.5111	822.533	288.0348
0.5111	822.533	312.5380
0.5111	822.533	337.0412
0.5111	822.533	361.5444
0.5111	822.533	386.0476
0.5111	822.533	410.5508
0.5111	822.533	435.0540
0.5111	822.533	459.5572
0.5111	822.533	484.0604
0.5111	822.533	508.5636
0.5111	822.533	533.0668
0.5111	822.533	557.5700
0.5111	822.533	582.0732
0.5111	822.533	606.5764
0.5111	822.533	631.0796
0.5111	822.533	655.5828
0.5111	822.533	680.0860
0.5111	822.533	704.5892
0.5111	822.533	729.0924
0.5111	822.533	753.5956
0.5111	822.533	778.0988
0.5111	822.533	802.6020
0.5111	822.533	827.1052
0.5111	822.533	851.6084
0.5111	822.533	876.1116
0.5111	822.533	900.6148
0.5111	822.533	925.1180
0.5111	822.533	949.6212
0.5111	822.533	974.1244
0.5111	822.533	998.6276
0.5111	822.533	1023.1308
0.5111	822.533	1047.6340
0.5111	822.533	1072.1372
0.5111	822.533	1096.6404
0.5111	822.533	1121.1436
0.5111	822.533	1145.6468
0.5111	822.533	1170.1500
0.5111	822.533	1194.6532
0.5111	822.533	1219.1564
0.5111	822.533	1243.6596
0.5111	822.533	1268.1628
0.5111	822.533	1292.6660
0.5111	822.533	1317.1692
0.5111	822.533	1341.6724
0.5111	822.533	1366.1756
0.5111	822.533	1390.6788
0.5111	822.533	1415.1820
0.5111	822.533	1439.6852
0.5111	822.533	1464.1884
0.5111	822.533	1488.6916
0.5111	822.533	1513.1948
0.5111	822.533	1537.6980
0.5111	822.533	1562.2012
0.5111	822.533	1586.7044
0.5111	822.533	1611.2076
0.5111	822.533	1635.7108
0.5111	822.533	1660.2140
0.5111	822.533	1684.7172
0.5111	822.533	1709.2204
0.5111	822.533	1733.7236
0.5111	822.533	1758.2268
0.5111	822.533	1782.7300
0.5111	822.533	1807.2332
0.5111	822.533	1831.7364
0.5111	822.533	1856.2396
0.5111	822.533	1880.7428
0.5111	822.533	1905.2460
0.5111	822.533	1929.7492
0.5111	822.533	1954.2524
0.5111	822.533	1978.7556
0.5111	822.533	2003.2588
0.5111	822.533	2027.7620
0.5111	822.533	2052.2652
0.5111	822.533	2076.7684
0.5111	822.533	2101.2716
0.5111	822.533	2125.7748
0.5111	822.533	2150.2780
0.5111	822.533	2174.7812
0.5111	822.533	2200.0000
0.5111	822.533	2225.0000
0.5111	822.533	2250.0000
0.5111	822.533	2275.0000
0.5111	822.533	2300.0000
0.5111	822.533	2325.0000
0.5111	822.533	2350.0000
0.5111	822.533	2375.0000
0.5111	822.533	2400.0000
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0.5111	822.533	2500.0000
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0.5111	822.533	2550.0000
0.5111	822.533	2575.0000
0.5111	822.533	2600.0000
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0.5111	822.533	2725.0000
0.5111	822.533	2750.0000
0.5111	822.533	2775.0000
0.5111	822.533	2800.0000
0.5111	822.533	2825.0000
0.5111	822.533	2850.0000
0.5111	822.533	2875.0000
0.5111	822.533	2900.0000
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0.5111	822.533	3000.0000
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0.5111	822.533	3050.0000
0.5111	822.533	3075.0000
0.5111	822.533	3100.0000
0.5111	822.533	3125.0000
0.5111	822.533	3150.0000
0.5111	822.533	3175.0000
0.5111	822.533	3200.0000
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0.5111	822.533	4025.0000
0.5111	822.533	4050.0000
0.5111	822.533	4075.0000
0.5111	822.533	4100.0000
0.5111	822.533	4125.0000
0.5111	822.533	4150.0000
0.5111	822.533	4175.0000
0.5111	822.533	4200.0000
0.5111	822.533	4225.0000
0.5111	822.533	4250.0000
0.5111	822.533	4275.0000
0.5111	822.533	4300.0000
0.5111	822.533	4325.0000
0.5111	822.533	4350.0000
0.5111	822.533	4375.0000
0.5111	822.533	4400.0000
0.5111	822.533	4425.0000
0.5111	822.533	4450.0000
0.5111	822.533	4475.0000
0.5111	822.533	4500.0000
0.5111	822.533	4525.0000
0.5111	822.533	4550.0000
0.5111	822.533	4575.0000
0.5111	822.533	4600.0000
0.5111	822.533	4625.0000
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0.5111	822.533	4675.0000
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0.5111	822.533	4725.0000
0.5111	822.533	4750.0000
0.5111	822.533	4775.0000
0.5111	822.533	4800.0000
0.5111	822.533	4825.0000
0.5111	822.533	4850.0000
0.5111	822.533	4875.0000
0.5111	822.533	4900.0000
0.5111	822.533	4925.0000
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0.5111	822.533	5000.0000
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0.5111	822.533	5075.0000
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0.5111	822.533	5125.0000
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0.5111	822.533	5200.0000
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0.5111	822.533	5550.0000
0.5111	822.533	5575.0000
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0.5111	822.533	5675.0000
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0.5111	822.533	5775.0000
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0.5111	822.533	5825.0000
0.5111	822.533	5850.0000
0.5111	822.533	5875.0000
0.5111	822.533	5900.0000
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0.5111	822.533	6525.0000
0.5111	822.533	6550.0000
0.5111	822.533	6575.0000
0.5111	822.533	6600.0000
0.5111	822.533	6625.0000
0.5111	822.533	6650.0000
0.5111	822.533	6675.0000
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0.5111	822.533	6775.0000
0.5111	822.533	6800.0000
0.5111	822.533	6825.0000
0.5111	822.533	6850.0000
0.5111	822.533	6875.0000
0.5111	822.533	6900.0000
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0.5111	822.533	7075.0000
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0.5111	822.533	7125.0000
0.5111	822.533	7150.0000
0.5111	822.533	7175.0000
0.5111		



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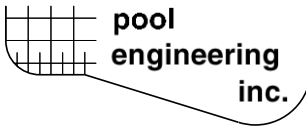
## STRUCTURAL CALCULATIONS

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# SWIMMING POOL CALCULATIONS

## SHALLOW/DEEP END RAMP METHODOLOGY

*The following pages demonstrate the basic calculations which are summarized  
in the Pool Wall Summary Tables*

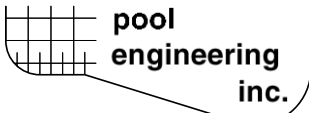


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## SWIMMING POOL CALCULATIONS NOTATION

---

$f'_c$  : specific compressive strength of concrete (psi)  
 $\omega_c$  : weight of concrete (pcf)  
 $f_c = 0.45\sqrt{f'_c}$  : allowable extreme fiber stress in compression for concrete (psi)  
 $u_c = 1.1\sqrt{f'_c}$  : permissible shear stress carried by concrete (psi)  
 $E = 57000\sqrt{f'_c}$  : modulus of elasticity of concrete (psi)  
 $f_y = 40000$  : specified yield strength of reinforcement (psi)  
 $f_{s_{all}} = 20000$  [GRADE 40, 50], 24000 [GRADE 60] : permissible tensile strength in reinf. (psi)  $E_s$   
 $= 29000000$  : modulus of elasticity of reinforcement (psi)  $\gamma_s$  : equivalent fluid pressure  
 of soil (pcf)  
 $E_s$   
 $n = \frac{E_s}{E_c}$  : modular ratio of elasticity  
 $E_c b$  : width of compression face of member (in) cover : 3 in. minimum for  
 Concrete cast against and permanently exposed to earth.  
*SEE CALCULATION METHODOLOGY:*  
 $H$  : total height of pool wall including bond beam (ft)  
 $RBB$  : distance from top of bond beam to surface of water (ft.)  $R$  : Radius of pool wall curvature  
 $(ft) t$  : thickness of pool wall at particular height (in)  $d_1 = t - d_2$  : distance from extreme  
 compression fiber to centroid of tension reinforcement (in)  
 $d$  : d necessary to resist **earth** pressure and additional load due to vertical surcharge  
 $d_2 = cover + (D_s/2)$  : distance from extreme compression fiber to centroid of tension reinforcement (in) : d  
 necessary to resist **water** pressure  
 $H_1$  : top depth of particular section (ft)  $H_2$  : bottom depth of particular section (ft)  
 $H_w$  : water depth (ft)  
 $OTM = \frac{1}{6}\gamma H_2^3 W$  : over-turning moment (ft-lbs)  $V = \frac{1}{2}\gamma H_2^2 W$  : shear (lbs)  
 $M_R$  : Moment Resisting (ft-lbs)  
 $M_T = OTM + M_R$  : Net Moment (ft-lbs)  
 $V_T = V$  : Net Shear (lbs)



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$A_s$  : area of nonprestressed tension reinforcement (in<sup>2</sup>)  $D_s$  :

Diameter of reinforcement (in)  $\rho = \frac{A_s}{bd}$  : ratio of tension

reinforcement

$k$

$$k = (\rho n) + 2\rho n - \rho n \quad j = 1 - \frac{A_s}{bd}$$

$A_s j d$  : average stress in the steel (psi)

$$\frac{A_s}{bd} \sqrt{\frac{M_T}{3}}$$

$$= \tau_2 j k b d \frac{2Mfc}{V} : \text{maximum compressive stress at the top of the compressive zone (psi)}$$

$V$

$v = \frac{V}{A_s j d}$  : design shear stress (psi)

$f_s =$

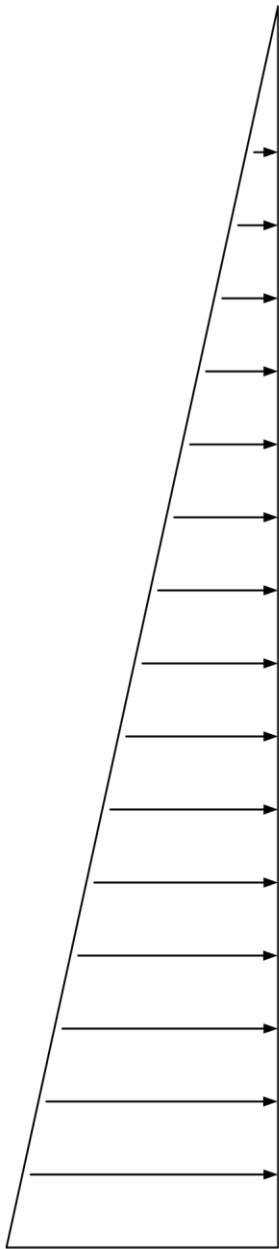
$bd$

## RESISTING MOMENT METHODOLOGY

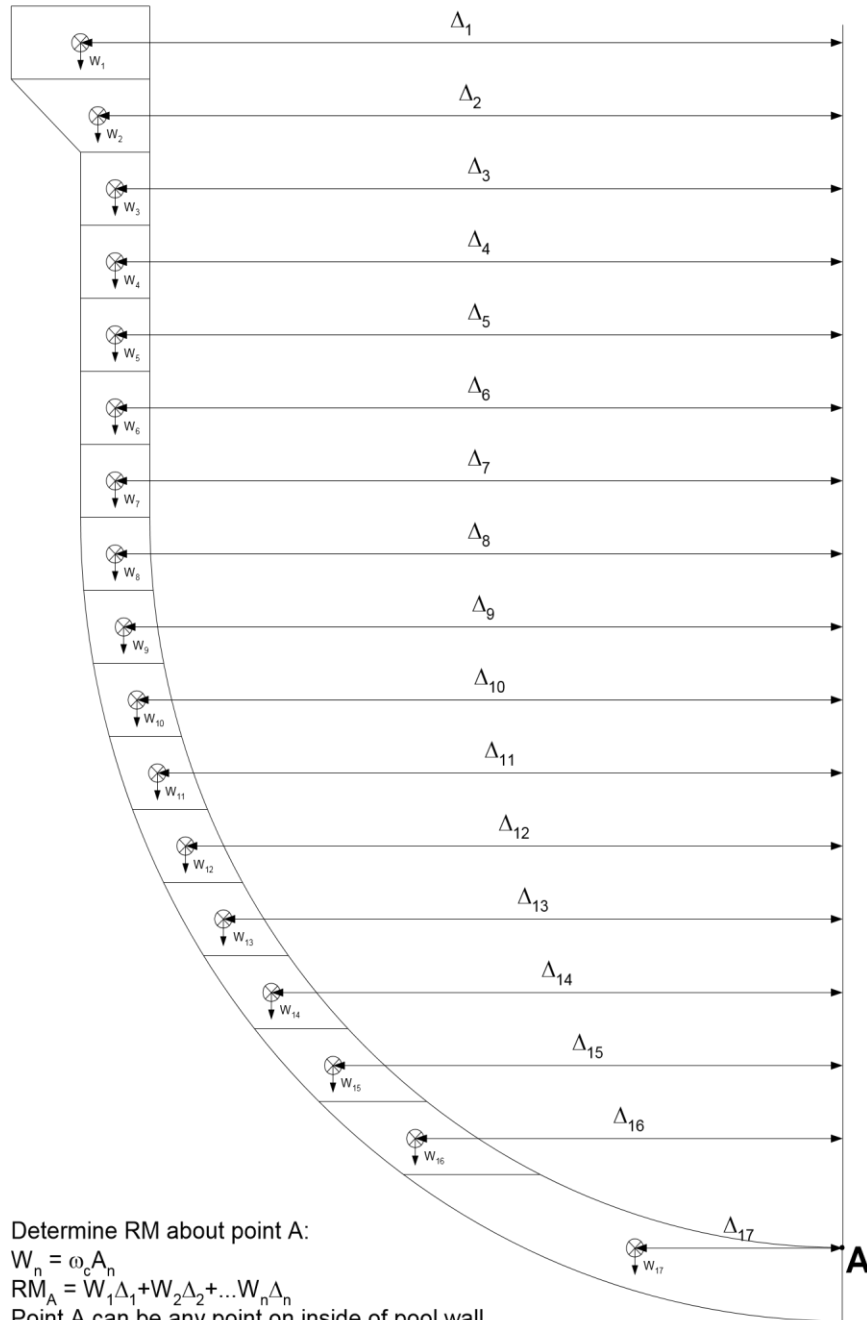
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OFFSETS EARTH PRESSURE

SHALLOW/DEEP END RAMP - DETAIL #11



LOAD DIAGRAM DUE TO EARTH PRESSURE



Determine RM about point A:

$$W_n = \omega_c A_n$$

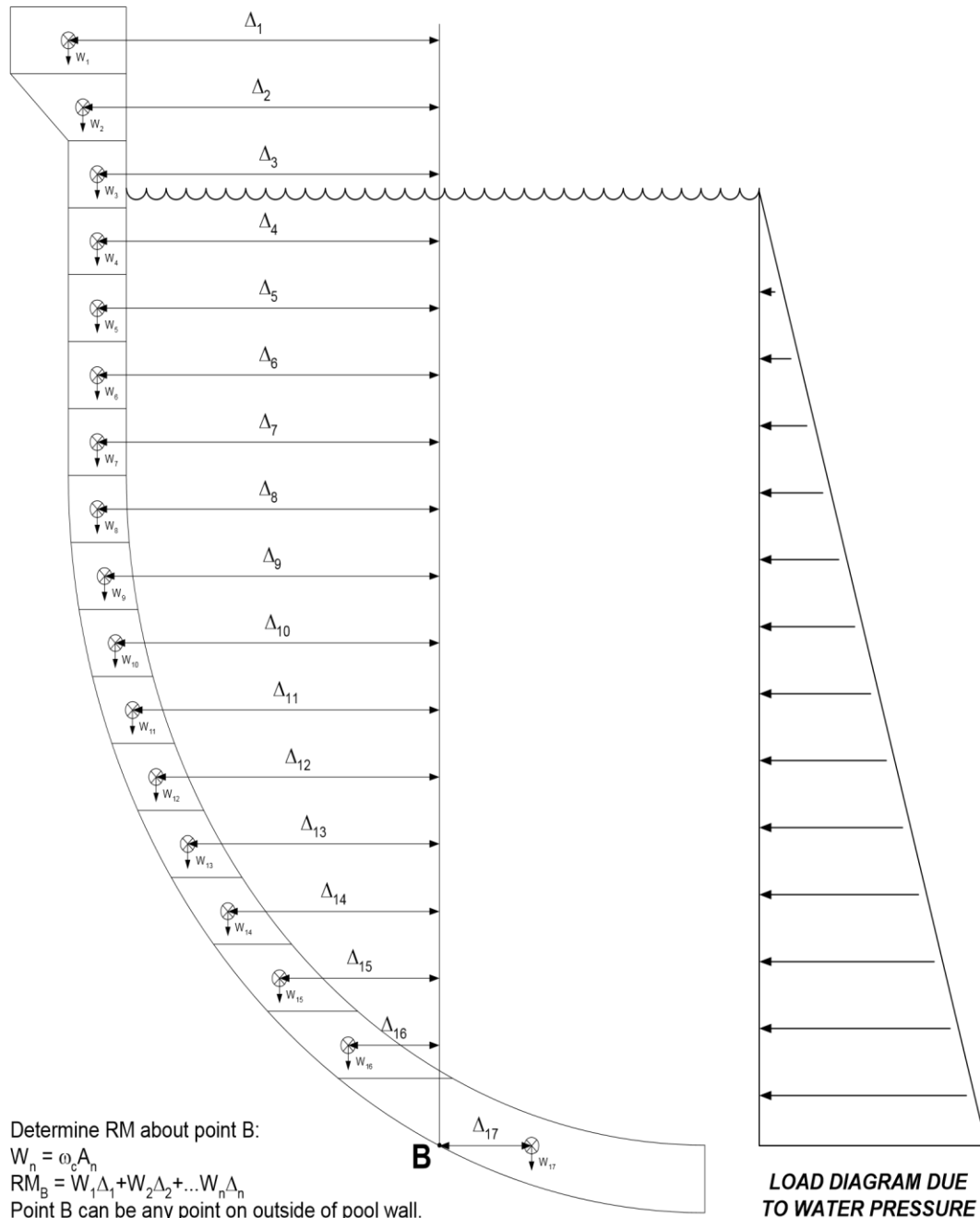
$$RM_A = W_1 \Delta_1 + W_2 \Delta_2 + \dots + W_n \Delta_n$$

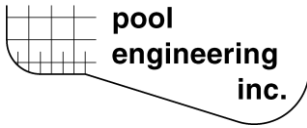
Point A can be any point on inside of pool wall.

# RESISTING MOMENT METHODOLOGY

## WALL LOADED BY WATER PRESSURE

SHALLOW/DEEP END RAMP - DETAIL #11





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## SAMPLE CALCULATIONS

## SECTION 12, NO R.B.B.

### SHALLOW/DEEP END RAMP - DETAIL #11

Demonstrating methodology used to calculate results shown in summary tables.

$$f'_c = 2500 \text{ psi}$$

$$\omega_c = 150 \text{ pcf}$$

$$f_c = 0.45f'_c = 1125 \text{ psi}$$

$$u_c = 1.1f'_c = 55.0 \text{ psi}$$

$$E = 57000 \sqrt{f'_c} = 2850000 \text{ psi}$$

$$f_y = 40000 \text{ psi}$$

$$f_{sall} = 20000 \text{ psi}$$

$$E_s = 2.9E+07 \text{ psi}$$

$$\gamma_s = 45 \text{ pcf } \gamma_w$$

$$= 0 \text{ pcf}$$

$$n = E_s/E_c = 10.18$$

$$b = 12 \text{ in}$$

$$\text{cover} = 3 \text{ in } H =$$

$$6.0 \text{ ft}$$

Try wall thickness  $t = 12.0 \text{ in}$  at a

depth of  $H_2 = 6.0 \text{ ft}$

Try vertical steel = #3 @ 6"

$$D_s = 0.375 \text{ in}$$

$$A_s = 0.221 \text{ in}^2$$

$$d_1 = t - d_2 = 3.00 \text{ in}$$

$$d_2 = \text{cover} + (D_s/2) = 9.00 \text{ in}$$

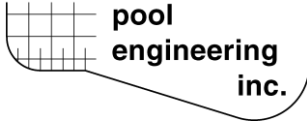
— 1

<sup>3</sup>earth pressure

$$OTM_{SOIL} = \gamma_s H_2 = \frac{1}{6} = 1620 \text{ ft-lb} \quad \text{Overturning moment due to}$$

— 1 2 **earth pressure**

$$V = V_{T \text{ SOIL}} = \gamma_s H_2 = \frac{1}{2} = 810 \text{ lb} \quad \text{Shear due to}$$



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## SAMPLE CALCULATIONS (CONT.)

## SECTION 12, NO R.B.B.

### SHALLOW/DEEP END RAMP - DETAIL

#11 Demonstrating methodology used to calculate results shown in summary tables.

$$M_R = -1915 \text{ ft-lb} \quad \text{Resisting moment due to weight of pool wall.}$$

*(wall loaded by **earth** pressure)*

$$M_T = OTM_{soil} + M_R = -295 \text{ ft-lb} \quad \text{SEE POOL WALL SUMMARY}$$

$$\rho = \frac{A^s}{bdk} = 0.006$$

$$bdk = (\rho n)^2 + 2\rho \rho n -$$

$$\sqrt{\quad} \quad nk = \begin{matrix} 0.296 \\ 0.901 \end{matrix}$$

$$j = 1 - \frac{\quad}{3}$$

$$fs = \frac{M^T}{A_s j d_1} = -5919.6 \text{ psi} < 20000 \text{ psi} \quad \text{OK}$$

$$fc = \frac{2M^T}{j k b d_{12}} = -245.1 \text{ psi} < 1125 \text{ psi} \quad \text{OK}$$

$$fc = \frac{2M^T}{j k b d_{12}} = 22.5 \text{ psi} < 55.0 \text{ psi} \quad \text{OK}$$

$$u = \frac{V^T}{bd_1} = -2246 \text{ ft-lb} \quad \text{Overturning moment due to **water** pressure}$$

$$OTM_{water} = \frac{1}{6} \gamma_w H_w^2$$

$$V = V_{T \text{ water}} = \frac{1}{2} \gamma_w H_w^2 = -1123 \text{ lb} \quad \text{Shear due to **water** pressure}$$

$$M_R = 156 \text{ ft-lb} \quad \text{Resisting moment due to weight of pool wall.}$$

*(wall loaded by **water** pressure)*

$$M_T = OTM_{water} + M_R = -2090 \text{ ft-lb} \quad \text{SEE POOL WALL SUMMARY}$$

$A^s$



$$\rho = \frac{M}{bd^2} = 0.002$$

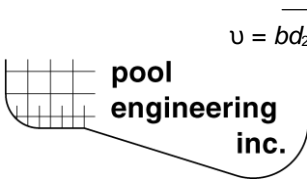
$$k = \sqrt{\frac{M}{bd^2}} = 0.184$$

$$j = 1 - \frac{\rho k}{3} = 0.939$$

$$f_s = \frac{M}{A_s j d} = 13441.5 \text{ psi} < 20000 \text{ psi} \quad \text{OK}$$

$$f_c = \frac{2M}{j k b d^2} = 10.4 \text{ psi} < 55.0 \text{ psi} \quad \text{OK}$$

$V$



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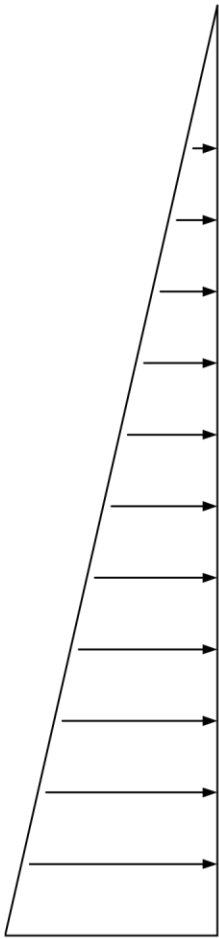
**SAMPLE CALCULATIONS**

**SECTION 12, NO R.B.B.**

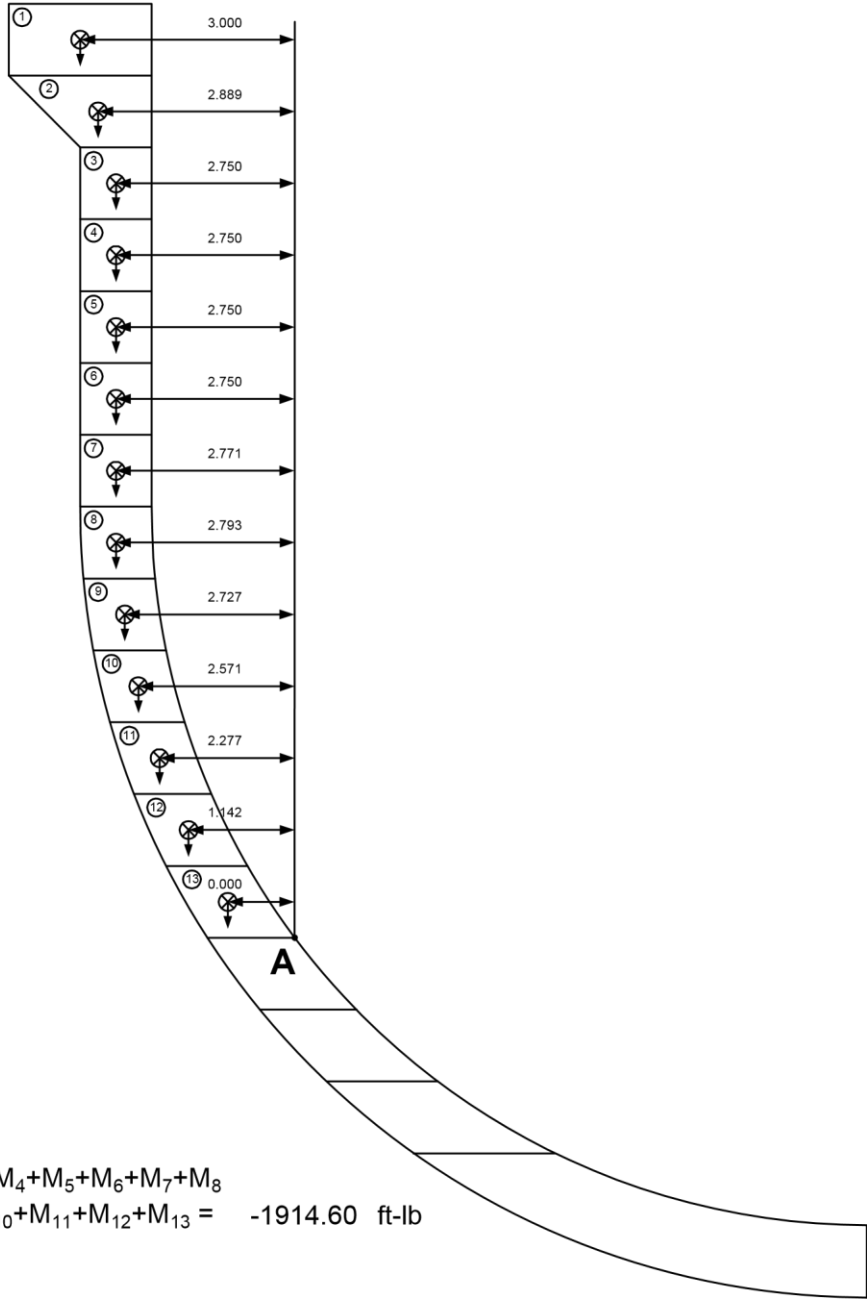
SHALLOW/DEEP END RAMP - DETAIL #11

**RESISTING MOMENT METHODOLOGY**

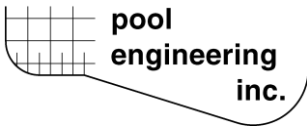
WALL LOADED BY EARTH PRESSURE



A <sub>1</sub> =	0.500 ft <sup>2</sup>
W <sub>1</sub> =	75.00 lb
M <sub>1</sub> =	-225.00 ft-lb
A <sub>2</sub> =	0.375 ft <sup>2</sup>
W <sub>2</sub> =	56.25 lb
M <sub>2</sub> =	-162.50 ft-lb
A <sub>3</sub> =	0.250 ft <sup>2</sup>
W <sub>3</sub> =	37.50 lb
M <sub>3</sub> =	-103.13 ft-lb
A <sub>4</sub> =	0.250 ft <sup>2</sup>
W <sub>4</sub> =	37.50 lb
M <sub>4</sub> =	-103.13 ft-lb
A <sub>5</sub> =	0.250 ft <sup>2</sup>
W <sub>5</sub> =	37.50 lb
M <sub>5</sub> =	-103.13 ft-lb
A <sub>6</sub> =	0.250 ft <sup>2</sup>
W <sub>6</sub> =	37.50 lb
M <sub>6</sub> =	-103.13 ft-lb
A <sub>7</sub> =	0.271 ft <sup>2</sup>
W <sub>7</sub> =	40.63 lb
M <sub>7</sub> =	-112.59 ft-lb
A <sub>8</sub> =	0.310 ft <sup>2</sup>
W <sub>8</sub> =	46.48 lb
M <sub>8</sub> =	-129.81 ft-lb
A <sub>9</sub> =	0.354 ft <sup>2</sup>
W <sub>9</sub> =	53.13 lb
M <sub>9</sub> =	-144.87 ft-lb
A <sub>10</sub> =	0.415 ft <sup>2</sup>
W <sub>10</sub> =	62.32 lb
M <sub>10</sub> =	-160.21 ft-lb
A <sub>11</sub> =	0.512 ft <sup>2</sup>
W <sub>11</sub> =	76.81 lb
M <sub>11</sub> =	-174.90 ft-lb
A <sub>12</sub> =	2.290 ft <sup>2</sup>
W <sub>12</sub> =	343.57 lb
M <sub>12</sub> =	-392.22 ft-lb
A <sub>13</sub> =	0.000 ft <sup>2</sup>
W <sub>13</sub> =	0.00 lb
M <sub>13</sub> =	0.00 ft-lb



$$RM_A = M_1 + M_2 + M_3 + M_4 + M_5 + M_6 + M_7 + M_8 + M_9 + M_{10} + M_{11} + M_{12} + M_{13} = -1914.60 \text{ ft-lb}$$



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## POOL WALL SUMMARY

NO R.B.B.  
 SHALLOW/DEEP END RAMP - DETAIL #11

V <sub>so</sub> 45 pcf		H 6.0 ft		RBB 0.0 ft		R 2.5 ft										
Sec	H 1 ft.	H 2 ft.	t in.	d1 in.	d 2 in.	SOIL				WATER				Vertical Steel	As in <sup>2</sup>	D s in.
						OT M ft-lb	MR ft-lb	MT ft-lb	V lb	OTM ft-lb	MR ft-lb	MT ft-lb	V lb			

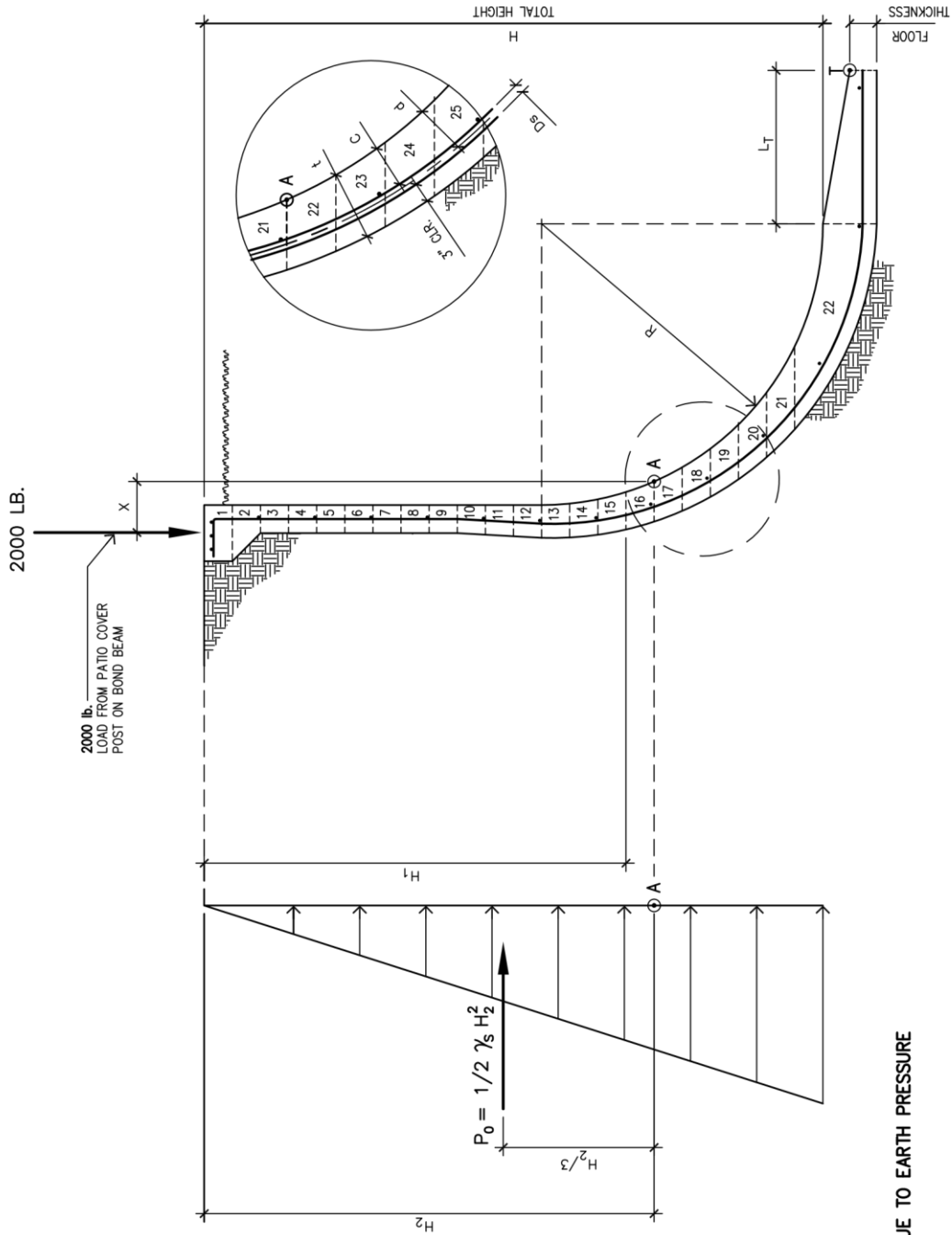
1	0	0	1	9.00	3.0	1	-38	-37	6	-1	38	36	#3 @ 12"	0.110	0.375
2	0	1	6.0	3.00	3.0	8	-59	-52	23	-10	6	-4	#3 @ 12"	0.110	0.375
3	1	1	6.0	3.00	3.0	25	-69	-43	51	-35	16	-19	#3 @ 12"	0.110	0.375
4	1	2	6.0	3.00	3.0	60	-78	-18	90	-83	25	-58	#3 @ 12"	0.110	0.375
5	2	2	6.0	3.00	3.0	117	-88	30	141	-163	34	-128	#3 @ 12"	0.110	0.375
6	2	3	6.0	3.00	3.0	203	-97	106	203	-281	44	-237	#3 @ 12"	0.110	0.375
7	3	3	7.0	3.00	4.0	322	-108	214	276	-446	80	-366	#3 @ 12"	0.110	0.375
8	3	4	8.0	3.00	5.0	480	-140	340	360	-666	103	-563	#3 @ 12"	0.110	0.375
9	4	4	9.0	3.00	6.0	683	-222	462	456	-948	100	-848	#3 @ 12"	0.110	0.375
10	4	5	10.0	3.00	7.0	938	-380	558	563	-1300	61	-1239	#3 @ 6"	0.221	0.375
11	5	5	11.0	3.00	8.0	1248	-681	566	681	-1730	-27	-1758	#3 @ 6"	0.221	0.375
12	5	6	12.0	3.00	9.0	1620	-1915	-295	810	-2246	156	-2090	#3 @ 6"	0.221	0.375

Sec	H1 ft.	H2 ft.	t in.	SOIL							WATER						
				ρ	k	j	f s p s i	fs <sub>all</sub> psi	fc psi	v psi	ρ	k	j	fs psi	fs <sub>all</sub> psi	fc p si	v p si
1	0	0	1	0.001	0.134	0.955	-462.1	20000.0	-7.0	0.1	0.003	0.221	0.926	1415.1	20000.0	39.4	0.2
2	0	1	6.0	0.003	0.221	0.926	-2027.8	20000.0	-56.4	0.6	0.003	0.221	0.926	162.2	20000.0	4.5	0.9
3	1	1	6.0	0.003	0.221	0.926	-1698.0	20000.0	-47.2	1.4	0.003	0.221	0.926	761.3	20000.0	21.2	1.9
4	1	2	6.0	0.003	0.221	0.926	-708.5	20000.0	-19.7	2.5	0.003	0.221	0.926	2275.1	20000.0	63.3	3.5
5	2	2	6.0	0.003	0.221	0.926	1160.5	20000.0	32.3	3.9	0.003	0.221	0.926	5008.5	20000.0	139.3	5.4
6	2	3	6.0	0.003	0.221	0.926	4129.0	20000.0	114.8	5.6	0.003	0.221	0.926	9266.5	20000.0	257.8	7.8
7	3	3	7.0	0.003	0.221	0.926	8352.3	20000.0	232.3	7.7	0.002	0.194	0.935	10630.8	20000.0	251.9	8.0





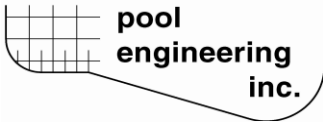
**DETAIL #12: STANDARD POOL WALL**  
 EQUIVALENT FLUID PRESSURE = 62.4 P.C.F.  
 CALCULATION METHODOLOGY  
 W/ 2000 LB. PATIO COVER POST LOAD



LOAD DIAGRAM DUE TO EARTH PRESSURE

NET MOM = OTM<sub>soil</sub> + OTM<sub>LOAD</sub> - M<sub>RESISTING</sub> + OTM<sub>POST LOAD</sub>  
 DETERMINE OTM AND V DUE TO  $\gamma_s$   
 $OTM_A = (1/2 \gamma_s H_2^2)(H_2/3) = 1/6 \gamma_s H_2^3$   
 $V_A = 1/2 \gamma_s H_2$

DETERMINE OTM<sub>POST LOAD</sub>  
 OTM = (2000 lb)(-x) = NEGATIVE MOMENT (RESISTING MOMENT)  
 NO INCREASED MOMENT ON POOL WALL FROM POST LOAD



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## BEARING CALCULATION

## DETAIL 12 POST LOAD

### Standard Pool Structural Plan: Detail #12 Attached Patio Cover Post Loading

Determine pool floor area necessary for bearing

P := 2000lb Applied load (live and dead) from attached patio cover qa :=

1500psf Allowable soil bearing pressure (2015 IBC Table 1806.2)

$A := \frac{P}{qa} = 1.333 \text{ ft}^2$  Pool floor area required to distribute load to soil

- It is a safe assumption that all pools which utilize this plan
- will have a floor area much greater than 1.333 sq. ft., therefore post load bearing calculation is okay by inspection.