

STRUCTURAL CALCULATIONS

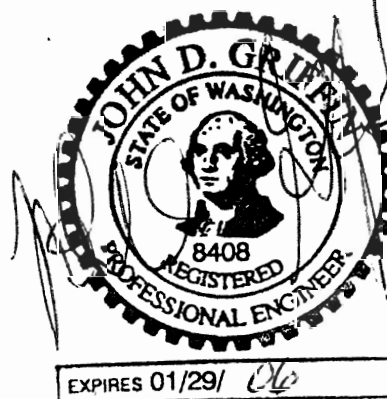
INDEX

ITEM

SHEET NUMBER

PIER DESIGN

1-4



LOADS TO PIER

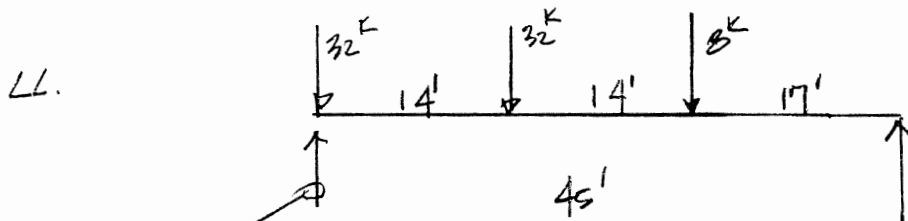
FOR $L = 45' \times 16'$ WIDE

DL TRIDECK - (2'-3" DEEP) $\frac{837 \text{ #/ft}}{1000} \times 3 \times 22.5' = 56.5^k$

CURB $\frac{10.5}{12} \times .15 \times 1.625' \times 2 \times 22.5' = 9.4^k$

PIER DL - $.15 \times 544 \times 1.5' \times 4' \times 16' = 14.4^k$

Σ DL 80.5



$R = 32^k + \frac{31}{45} \times 32^k + \frac{17}{45} \times 8^k = 57.1^k \rightarrow 60.5^k$

TL 141. k

Allow Soil Bcg. = 3000 psf

Area req'd = $\frac{141^k}{3.0} = 47 \text{ SF}$

Assume $L = 18'$; WIDTH = $\frac{47 \text{ SF}}{18'} = 2.61' \rightarrow 3.0'$

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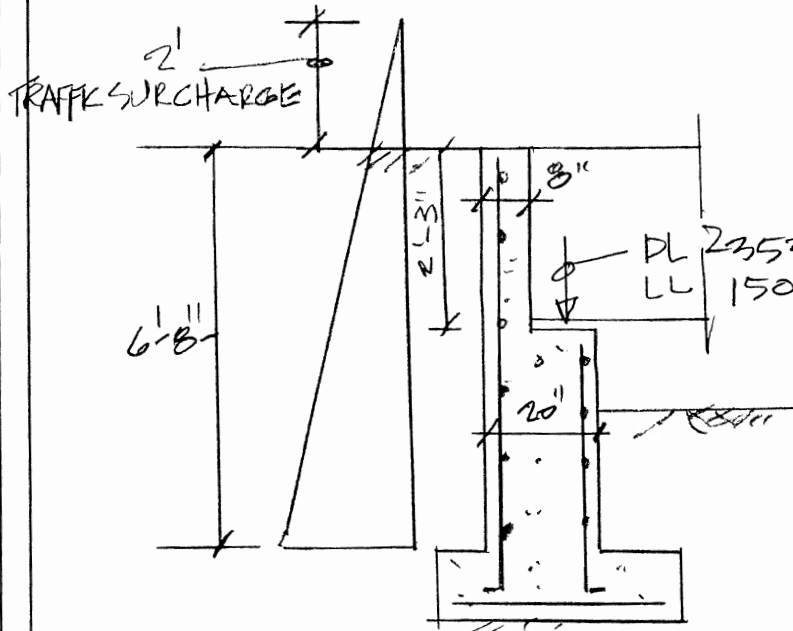
JOB BARNABY C.

SHEET NO. 2 OF

CALCULATED BY JOG DATE 5-19-05

CHECKED BY DATE

SCALE



$EFP = 35 \text{ PCF}$
 $X/\text{LOW. S.B.} = 3000 \text{ PSF}$

SEE COMPUTER OUTPUT
FOR PIER DESIGN

PIER SECT

This Wall in File: c:\rp61\barnaby.rp5

Retain Pro 6.1f, 01-October-2004, (c)1989-2004
Registration #: RP-1134815

Cantilevered Retaining Wall Design

Code: 1997 UBC

Criteria		Soil Data		Footing Dimensions & Strengths	
Retained Height	= 8.67 ft	Allow Soil Bearing	= 3,000.0 psf	Toe Width	= 1.42 ft
Wall height above soil	= 0.00 ft	Equivalent Fluid Pressure Method		Heel Width	= 2.00
Slope Behind Wall	= 0.00 : 1	Heel Active Pressure	= 35.0 psf/ft	Total Footing Width	= 3.42
Height of Soil over Toe	= 24.00 in	Toe Active Pressure	= 35.0 psf/ft	Footing Thickness	= 12.00 in
Water height over heel	= 0.0 ft	Passive Pressure	= 300.0 psf/ft	Key Width	= 0.00 in
Wind on Stem	= 0.0 psf	Soil Density	= 110.0 pcf	Key Depth	= 0.00 in
		Footing Soil Friction	= 0.300	Key Distance from Toe	= 0.00 ft
		Soil height to ignore for passive pressure	= 0.00 in	f _c = 3,000 psi	F _y = 60,000 psi
				Footing Concrete Density	= 150.00 pcf
				Min. As %	= 0.0018
				Cover @ Top = 2.00 in	@ Btm. = 3.00 in

Surcharge Loads		Lateral Load Applied to Stem		Adjacent Footing Load	
Surcharge Over Heel	= 0.0 psf	Lateral Load	= 0.0 #/ft	Adjacent Footing Load	= 0.0 lbs
Used To Resist Sliding & Overturning		...Height to Top	= 0.00 ft	Footing Width	= 0.00 ft
Surcharge Over Toe	= 0.0 psf	...Height to Bottom	= 0.00 ft	Eccentricity	= 0.00 in
Used for Sliding & Overturning				Wall to Ftg CL Dist	= 0.00 ft
				Footing Type	Line Load
				Base Above/Below Soil at Back of Wall	= 0.0 ft

Axial Load Applied to Stem	
Axial Dead Load	= 3,540.0 lbs
Axial Live Load	= 1,500.0 lbs
Axial Load Eccentricity	= 0.0 in

Design Summary	
Wall Stability Ratios	
Overturning	= 3.13 OK
Sliding	= 2.26 OK
Total Bearing Load	= 8,141 lbs
...resultant ecc.	= 1.78 in
Soil Pressure @ Toe	= 3,000 psf OK
Soil Pressure @ Heel	= 1,761 psf OK
Allowable	= 3,000 psf
Soil Pressure Less Than Allowable	
ACI Factored @ Toe	= 3,565 psf
ACI Factored @ Heel	= 2,093 psf
Footing Shear @ Toe	= 20.1 psi OK
Footing Shear @ Heel	= 3.9 psi OK
Allowable	= 93.1 psi
Sliding Calcs (Vertical Component NOT Used)	
Lateral Sliding Force	= 1,478.9 lbs
less 100% Passive Force	= - 1,350.0 lbs
less 100% Friction Force	= - 1,992.2
Added Force Req'd	= 0.0 lbs OK
....for 1.5 : 1 Stability	= 0.0 lbs OK

Stem Construction		Top Stem	2nd
Design height	ft =	Stem OK 3.42	Stem OK 0.00
Wall Material Above "Ht"	=	Concrete	Concrete
Thickness	=	8.00	20.00
Rebar Size	=	# 4	# 4
Rebar Spacing	=	12.00	12.00
Rebar Placed at	=	Edge	Edge
Design Data			
fb/FB + fa/Fa	=	0.248	0.370
Total Force @ Section	lbs =	771.8	1,992.7
Moment....Actual	ft-# =	1,350.6	6,008.0
Moment.....Allowable	ft-# =	5,448.0	16,248.0
Shear.....Actual	psi =	10.3	9.1
Shear.....Allowable	psi =	93.1	93.1
Lap Splice if Above	in =	28.48	28.48
Lap Splice if Below	in =	28.48	7.67
Wall Weight	psf =	100.0	250.0
Rebar Depth 'd'	in =	6.25	18.25
Masonry Data			
f'm	psi =		
F _s	psi =		
Solid Grouting	=		
Special Inspection	=		
Modular Ratio 'n'	=		
Short Term Factor	=		
Equiv. Solid Thick.	=		
Masonry Block Type	=	Medium Weight	
Concrete Data			
f _c	psi =	3,000.0	3,000.0
F _y	psi =	60,000.0	60,000.0

Footing Design Results		Toe	Heel
Factored Pressure	=	3,565	2,093 psf
Mu' : Upward	=	3,389	119 ft-#
Mu' : Downward	=	448	317 ft-#
Mu: Design	=	2,941	198 ft-#
Actual 1-Way Shear	=	20.09	3.94 psi
Allow 1-Way Shear	=	93.11	93.11 psi
Toe Reinforcing	=	None Spec'd	
Heel Reinforcing	=	None Spec'd	
Key Reinforcing	=	None Spec'd	

Other Acceptable Sizes & Spacings

Toe: Not req'd, Mu < S * Fr
Heel: Not req'd, Mu < S * Fr
Key: No key defined

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Summary of Overturning & Resisting Forces & Moments

Item	OVERTURNING.....			RESISTING.....			
	Force lbs	Distance ft	Moment ft-#	Force lbs	Distance ft	Moment ft-#	
Heel Active Pressure	= 1,636.4	3.22	5,274.7	Soil Over Heel	= 317.9	3.25	1,034.2
Toe Active Pressure	= -157.5	1.00	-157.5	Sloped Soil Over Heel	=		
Surcharge Over Toe	=			Surcharge Over Heel	=		
Adjacent Footing Load	=			Adjacent Footing Load	=		
Added Lateral Load	=			Axial Dead Load on Stem	= 3,540.0	2.25	7,976.8
Load @ Stem Above Soil	=			Soil Over Toe	= 312.4	0.71	221.8
				Surcharge Over Toe	=		
				Stem Weight(s)	= 1,380.0	2.06	2,847.1
				Earth @ Stem Transitions	= 577.5	2.59	1,493.8
				Footing Weight	= 513.0	1.71	877.2
				Key Weight	=		
				Vert. Component	= 456.1	3.42	1,559.8
Total	= 1,478.9	O.T.M. =	5,117.2	Total =	7,096.9	lbs R.M.=	16,010.7
Resisting/Overturning Ratio		=	3.13				
Vertical Loads used for Soil Pressure	=	8,140.8	lbs				
Vertical component of active pressure NOT used for soil pressure							