Job#: **2014-021**

Stemwall Cont. Footing Calculator

Check continuous footings at highest (vertically) loaded section of wall excluding point loads.
From previous sections and by inspection the most critically loaded wall is at the front entrance wall between the garage and front bedroom.

(plf)	Dead Load	Floor Live	Roof Live
Roof	2000	0	2000
Wall	108	0	0
Floor	0	0	0
Stemwall	150	0	0
Totals	2258	0	2000

Roof LL or S =	20.0	psf	
Roof DL =	20.0	psf	
Roof Trib. Width =	100.0	ft	
Wall DL =	12	psf	
Wall Hgt. =	9	ft	
Floor LL =	0.0	psf	
Floor DL =	0.0	psf	
FloorTrib. Width =	0.0	ft	
ρ_{conc} =	150	pcf	
Steel Yield Strength =	60,000	psi	
Conc. Comp. Strength =	3,000	psi	
Soil Bearing Pressure =	1,500	psf	
Reinf. Cover =	3	in	
Reinf. Bar Size =	4		
Soil Depth Above Ftg.	12	in	
ρ_{soil} =	100	pcf	
Stem Width =	6	in	
Stem Hgt. =	24	in	
Footing Width =	42	in	
Footing Depth =	12	in	

ASD Load Cases from ASCE 7-10:

2.) D + L =	2258	plf	
3.) D + (Lr or S) =	4258	plf	(governs)
4.) D + .75L + .75(Lr or S) =	3758	plf	

Bearing Calculations:

Applied Bearing Pressure	Q_{asd} =	1216.6	psf	
Eff. Allowable SBP	Q_e =	1264.3	psf	
Footing Width Required	W_{req} =	40.4	in	
Footing Width	$W_{footing}$ =	**42**	in	→ **OK**

Strength Design Load Cases from ASCE 7-10:

1.) 1.4D =	3161.2	plf	
2.) 1.2D + 1.6L + .5(Lr or S) =	3709.6	plf	
3.) 1.2D + 1.6(Lr or S) + L =	5909.6	plf	(governs)

Eff. Depth to Top Layer of Steel

d =	8.25	in

Beam Shear Calculations (One Way Shear):

Applied Bearing Pressure	Q_u =	1688.5	psf	
Applied Beam Shear	V_u =	1371.9	lbs	
Allowable Beam Shear	V_{c1} =	8133.7	lbs	
Footing Depth Required	D_{req} =	2.0	in	
Footing Depth	$D_{footing}$ =	**12.0**	in	→ **OK**

Beam Shear Calculations (One Way Shear):
Unreinforced Concrete

V_u =	1125.6	lbs	
V_{c1} =	5258.1	lbs	
D_{req} =	2.6	in	
$D_{footing}$ =	**12.0**	in	→ **OK**

Bending Calculations:

Cantilever length	L_{cant} =	18.0	in
Factored Bending Moment	M_u =	22794.2	in-lb

Bending Calculations:
Unreinforced Concrete

S =	200.0	in^3
M_u =	22794.2	in-lb
M_n =	32863.4	in-lb
D_{req} =	8.3	in
$D_{footing}$ =	**12.0**	in → **OK**

Transverse Reinforcement Calculations:

	R_n =	31.0		
Steel Ratio	ρ =	0.0005		
Steel Req. based on Moment	$A_{s(1)}$ =	0.051	in^2	
Steel Req. based on Shrink	$A_{s(2)}$ =	0.259	in^2	
Controlling Reinf. Steel	$A_{s(req)}$ =	0.259	in^2	
Required Spacing with #4 bars =		9.09	in o/c	
Selected Transverse Spacing:	**#4 bars @**	**9**	**in o/c**	
Reinforcement Area Provided	A_s =	0.262	in^2	→ **OK**

(Transverse Reinforcement Unnecessary)

Development Length Calculations:

spacing/cover dimension	c =	4.5	in	
Transverse Reinf. Factor	$c + K_{tr}/d_b$ =	9	(use 2.5)	
Length Req.	L_d =	13.0	in	
Length Available	$L_{d\text{-}sup}$ =	15	in	

λ =	1.0	(lightweight aggregate factor)
ψ_t =	1.0	(reinforcement location factor)
ψ_e =	1.0	(coating factor)
ψ_s =	0.8	(reinforcement size factor)
K_{tr} =	0.0	(transverse reinf. Index)

Longitudinal Reinforcement Calculations:

Steel Req. based on Shrink	$A_{s(2)}$ =	0.907	in^2	
Controlling Reinf. Steel	$A_{s(req)}$ =	0.907	in^2	
Required number of #4 bars =		4.62		
Selected Longitudinal Bars:		**5**	**- Cont. #4 bars**	
Reinforcement Area Provided	A_s =	0.982	in^2	→ **OK**