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	420	0	463.2
Wall	108	0	0
Floor	55	220	0
Stemwall	150	0	0
Totals	733	220	463.2

ASD Load Cases from ASCE 7-10:

2.) D + L =	953 plf		
3.) D + (Lr or S) =	1196.2 plf		
4.) D + .75L + .75(Lr or S) =	1245.4 plf	(governs)	

Bearing Calculations:

Applied Bearing Pressure	Qasd =	1,245	psf	
Eff. Allowable SBP	Qe =	1,400	psf	
Footing Width Required	Wreq =	10.7	in	
Footing Width	Wfooting =	**12**	in	→ **OK**

Strength Design Load Cases from ASCE 7-10:

1.) 1.4D =	1026.2 plf	
2.) 1.2D + 1.6L + .5(Lr or S) =	1463.2 plf	
3.) 1.2D + 1.6(Lr or S) + L =	1840.72 plf	(governs)

Beam Shear Calculations (One Way Shear):

Ult. Applied Bearing Pressure	Qu =	1,841	psf	
Applied Beam Shear	Vu =	115	lbs	
Allowable Beam Shear	Vc =	2,218	lbs	(ACI 11-3)
Footing Depth Required	Dreq =	0.3	in	
Footing Depth	Dfooting =	**6.0**	in	→ **OK**

Bending Calculations:

Cantilever length	a =	0.26	in
	Lcant =	3.0	in
Factored Bending Moment	Mu =	690	in-lb
Moment Strength	Mn =	14,997	in-lb

Transverse Reinforcement Calculations:

$Mu/\phi bd^2$	Rn =	12.6	psi	
Steel Ratio	ρ =	0.0002		
Steel Req. based on Moment	As(1) =	0.006	in^2	
Steel Req. based on Shrink	As(2) =	0.130	in^2	(ACI 7.12)
Controlling Reinf. Steel	As(req) =	0.130	in^2	
Required Spacing with #4 bars =		18.18	in o/c	
Selected Transverse Spacing:	**#4 bars @**	**18**	**in o/c**	
Reinforcement Area Provided	As =	0.131	in^2	→ **OK**

Development Length Calculations:

spacing/cover dimension	c =	3.0	in	
Transverse Reinf. Factor	$c + K_{tr}/d_b$ =	6	(use 2.5)	
Length Req.	Ld =	13.0	in	(ACI 12-1)
Length Available	Ld-sup =	0	in	

Note: Plain concrete adequate for bending, therefore development length not required.

Longitudinal Reinforcement Calculations:

Steel Req. based on Shrink	As(2) =	0.130	in^2	(ACI 7.12)
Controlling Reinf. Steel	As(req) =	0.130	in^2	
Required number of #4 bars =		0.66		
Selected Longitudinal Bars:		**2**	**- Cont. #4 bars**	
Reinforcement Area Provided	As =	0.393	in^2	→ **OK**

Roof LL or S =	19.3	psf
Roof DL =	17.5	psf
Roof Trib. Width =	24.0	ft
Wall DL =	12	psf
Wall Hgt. =	9	ft
Floor LL =	40.0	psf
Floor DL =	10.0	psf
FloorTrib. Width =	5.5	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.	6	in
ρ_{soil} =	100	pcf
Stem Width =	6	in
Stem Hgt. =	24	in
Footing Width =	12	in
Footing Depth =	6	in

Eff. Depth to Top Layer of Steel

d =	2.25	in

Beam Shear Calculations (One Way Shear):
Unreinforced Concrete

Vu =	460	lbs	
Vc =	2,103	lbs	(ACI 22-9)
Dreq =	1.3	in	
Dfooting =	**6.0**	in	→ **OK**

Bending Calculations:
Unreinforced Concrete

S =	32.0	in^3	
Mu =	690	in-lb	
Mn =	5,258	in-lb	(ACI 22-2)
Dreq =	0.8	in	
Dfooting =	**6.0**	in	→ **OK**

(Transverse Reinforcment Unnecessary)

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)