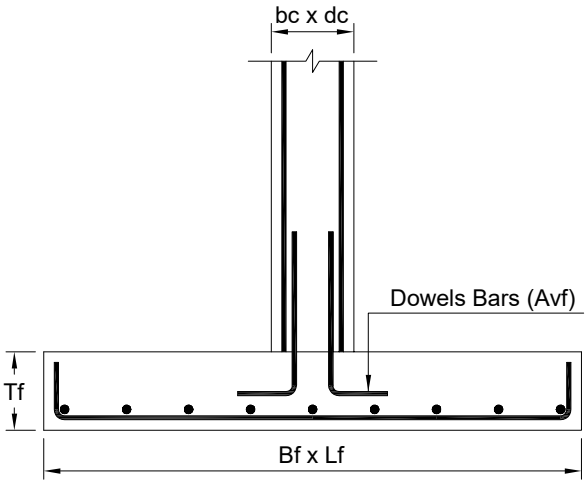
Design for Transfer of Horizontal Force at Base of Column where The Footing Surface is not Intentionally Roughened as per ACI 318-11 Chapter 12



System

Column Width, b_c=		12.0 in
Column Depth, d_c=		12.0 in
Footing Width, B_f=		9.0 ft
Footing Length, L_f=		9.0 ft
Footing Thickness, T_f=		22.0 in

Load

Ultimate Horizontal Force at the Base of Column, V_u=		84.0 kips

Material Properties

Concrete Strength, f'_c=		4000 psi
Yield Strength of Reinforcement, f_y=		60000 psi
Shear Strength Reduction Factor (According to Cl.9.3.2 of ACI318), Φ=		0.75
Modification Factor for Lightweight Concrete, λ=		1.00
Friction Factor (According to Cl.11.6.4.3 of ACI318), μ= 0.6* λ	=	0.60

Check on Maximum Shear Transfer Permitted

Nominal Shear Force (According to Cl.11.6.5 of ACI318),

ΦV_{n1}=	$\Phi*(0.2*f'_c/1000*b_c*d_c)$	=	86.4 kips
ΦV_{n2}=	$\Phi*(800*b_c*d_c)/1000$	=	86.4 kips
Minimum Nominal Shear, ΦV_n=	MIN(ΦV_{n1}; ΦV_{n2};)	=	86.4 kips
Check Validity=	IF(Vu<ΦV_n; "Valid"; "Increase Dimension")	=	Valid

Required Area of Reinforcement (According to Eq.11-25 of ACI318),

$$A_{vf} = \frac{Vu*1000}{\Phi*fy*\mu} = 3.11 \text{ in}^2$$

Provided Shear Reinforcement, Bar=	SEL("ACI/Bar"; Bar;)	=	No.8
Diameter of Bars, Dia=	TAB("ACI/Bar"; Dia; Bar=Bar)	=	1.0000 in
Number of Bars, n=			4
Provided Area of Reinforcement, A_s=	$n*\frac{\pi*Dia^2}{4}$	=	3.14 in^2
Check Validity=	IF(A_s>A_{vf}; "Valid"; "Increase RFT")	=	Valid

Check on Development Length of Tensile Reinforcement with Column

Clear Cover to Center of Bars, c=			3.25 in
Center to Center Bar Spacing, S=			4.50 in
Factor of, cb=	MIN(c+Dia/2; S/2)	=	2.25 in
(According to Cl.12.2.3 of ACI318) Factor of, Ktr=			0.00
(According to Cl.12.2.4 of ACI318) Factor of, Ψ_t=			1.00
(According to Cl.12.2.4 of ACI318) Factor of, Ψ_e=			1.00
(According to Cl.12.2.4 of ACI318) Factor of, Ψ_s=			1.00

Development Length within Column

Development Length (According to Eq.12-1 of ACI318),

L_{d1}= $\frac{3}{40}*\frac{fy}{\lambda*\sqrt{f'c}}*\frac{\Psi_t*\Psi_e*\Psi_s}{(cb+Ktr)/Dia}*Dia$ = 31.6 in

Development Length within Footing

Development Length (According to Cl.12.5.2 of ACI318),

L_{d2}= $\frac{0.02*\Psi_e*fy}{\lambda*\sqrt{f'c}}*Dia$ = 19.0 in

Design Summary

Provided Area of Reinforcement, A_s=	A_s	=	3.14 in^2
Development Length within Column, L_{d1}=	L_{d1}	=	31.6 in
Development Length within Footing, L_{d2}=	L_{d2}	=	19.0 in