

2.2. RAILING POST AT SECOND FLOOR

Project Name:		Coral Gables FL	
Address:			
Load Design =	200 Lbs	Distance Between Posts =	2 ft
Railing High =	42 in	Concrete Slab Thickness =	4 in

Load design or 50lb/ft x distance between posts.
Point of load applicatant to finish floor.
Concrete slab thickness. $\geq 4"$, ACI 318-02 APPENDIX D.8.5

$h_{ef}(\text{Max}) \leq 4.67 \text{ in, and } h_{ef}(\text{Max}) \leq 6.25 \text{ in}$
Deep of embedment. OK, h_{ef} .

Checking h_{ef} .
Distance from the center of post to the edge of concrete.
Grout $F'c = 10000 \text{ psi}$, $\leq 10 \text{ Ksi}$, ACI 318 APPENDIX D.3.5
Outside dimension perpendicular to the force.

Slab $F'c = 6000 \text{ psi}$
 $d_o = 1.50 \text{ in}$
Circular post = N (Y / Yes or N / No)
SQ or RECT Post = Y

$l = 4.50 \text{ in}$
 $l \leq 8 d_o$

HD = 3 in
 l = is load bearing length of the anchor for shear, not exceed 8d

Hole diameter, core drill or foam embedment.

$a = 2.288 \text{ in}$
 $a = (2 * h_{ef}^2 + 3 L h_{ef}) / (3 h_{ef} + 6 L)$

$P_2 = 3050.8 \text{ Lbs}$
 $P_2 = a^2 * P / (h_{ef} (2 a - h_{ef}))$

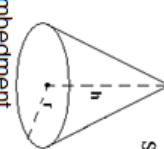
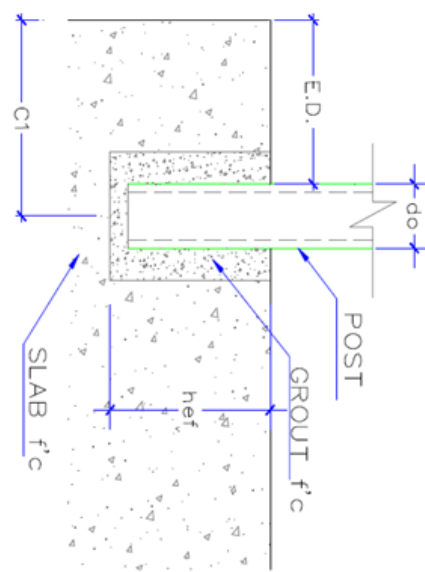
$P_1 = 2850.8 \text{ Lbs}$
 $P_1 = P_2 - P$

$V_u = 1.6 \times P_2$
 $V_u = 4881.4 \text{ Lbs}$
 $d = 3.00 \text{ in}$

Live load, ACI 318-02 Section 9.2
Factored Load
Critical Perimeter for Punching Shear

Ac = A2 - A1 = 26.241
A1 = 4.9983
A2 = 31.239

Surface area = $\pi r \sqrt{r^2 + h^2}$

ELEVATION

1. SHEAR CONE STRENGTH ACI 318 Sec 9.3.2.3

$$b_o = 4.500 \text{ in}$$

$$\phi V_c = \phi 4 \sqrt{f'_c} \times A_c$$

$$\phi V_c = 6097.8 \text{ lb}$$

$\geq V_u$, OK, SATISFACTORY

ACI 318 Sec 9.3.2.3
AC: Area of Failure
Ac = 26.24 in²

2. BEARING STRENGTH (GROUT) ACI 318 Sec 10.14

$$A_F = \sqrt{\frac{b_{eff}}{d_o}} = 1.19 \text{ in}^2 \quad A < 2, \text{ OK}$$

ber = 2.12 in ACI 318 Sec 10.14

$$P_{allowable} = \phi(0.85 f'_c A_F)$$

Pallowable = 6570.4 lb $\geq V_u$, OK, SATISFACTORY

3. BEARING STRENGTH (SLAB) ACI 318 Sec 10.14

$$A_F = \sqrt{\frac{b_{eff}}{d_o}} = 2.24 \text{ in}^2 \quad A \geq 2, A = 2$$

ber = 7.50 in ACI 318 Sec 10.14

$$P_{allowable} = \phi(0.85 f'_c A_F)$$

Pallowable = 6630.0 lb $\geq V_u$, OK, SATISFACTORY

$$\phi V_{cb} = \phi * A_v / A_{v0} * \psi_6 * \psi_7 * (7 * (\ell / d_o))^{0.2} * \sqrt{d_o} * \sqrt{f'_c} * C_1^{1.5}$$

$$\phi V_{cb} = 4505.6 \text{ Lbs} < V_u, \text{ NO GOOD}$$

$\psi_6 =$	1.0
$\psi_7 =$	1.0
$\phi =$	0.75

Av/Avo and ψ_6 terms are 1.0 for single shear sleeve not influenced by more than one free edge

$\psi_7 =$ 1.0 in cracked unreinforced concrete

$\psi_7 =$ 1.2 with edge reinf of #4 bar and greater

$\psi_7 =$ 1.4 with edge reinf of #4 bar and stirrups at 4" or less

$\ell =$ is load bearing length for shear, not exceed 8d

