pcaStructurePoint
CONCRETE SOFTWARE SOLUTIONS

www.pcaStructurePoint.com
info@pcaStructurePoint.com
847.966.4357 (HELP) phone
847.581.0644 fax

Nonslender Bearing Wall

Empirical Design Method (ACI 318-05, 14.5)

A concrete bearing wall supports a floor system. The height of the wall is 10 ft, and the wall is considered laterally restrained at the top.

Design Data

Floor beam reactions:

$P_D := 55klf$

$P_L := 30klf$

Neglect weight of wall

Concrete

$f'_c := 4000psi$

$\phi := 0.65$

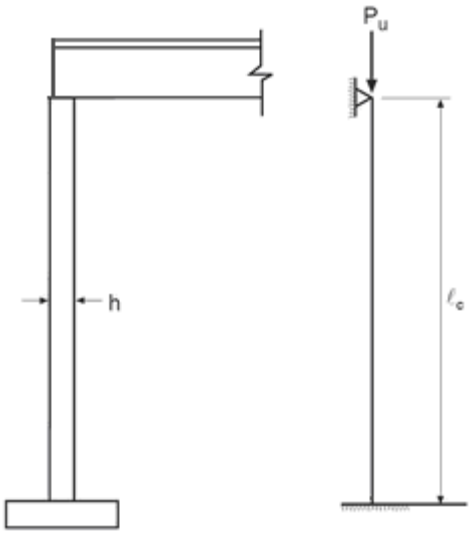
Minimum reinforcement ratios

$\rho_{minh} := 0.0020$

$\rho_{minv} := 0.0012$

Geometry

Wall height	$l_c := 10ft$
Assumed load eccentricity	$e := 1.33in$
Effective length factor	$k := 0.8$



Calculations

1. Select trial wall thickness h

Minimum thickness	$h_{min} := \max\left(4in, \frac{l_c}{25}\right)$ $\quad h_{min} = 4.8\,in$
Trial thickness	$h := 8in$
Check eccentricity	$\frac{h}{6} = 1.333\,in \quad if\left(e > \frac{h}{6}, "NG", "OK"\right) = "OK"$
Slenderness	$\frac{k \cdot l_c}{0.3 \cdot h} = 40$

www.pcaStructurePoint.com
info@pcaStructurePoint.com
847.966.4357 (HELP) phone
847.581.0644 fax

2. Calculate factored loading

$b := 1ft$

$P_u := b \cdot (1.2P_D + 1.6P_L)$ $\quad P_u = 114\,kips$

3. Calculate design strength of wall

$A_g := b \cdot h$ $\quad A_g = 96\,in^2$

$$\phi P_n := 0.55 \cdot \phi \cdot f'_c \cdot A_g \cdot \left[1 - \left(\frac{k \cdot l_c}{32 \cdot h}\right)^2\right]$$

$\phi P_n = 117.975\,kips$ $\quad \dfrac{P_u}{\phi P_n} = 0.966$

$if(\phi P_n < P_u, "NG", "OK") = "OK"$

4. Determine single layer of reinforcment

$A_{sminv} := \rho_{minv} \cdot h$ $\quad A_{sminh} := \rho_{minh} \cdot h$

$A_{sminv} = 0.115\,\dfrac{in^2}{ft}$ $\quad A_{sminh} = 0.192\,\dfrac{in^2}{ft}$