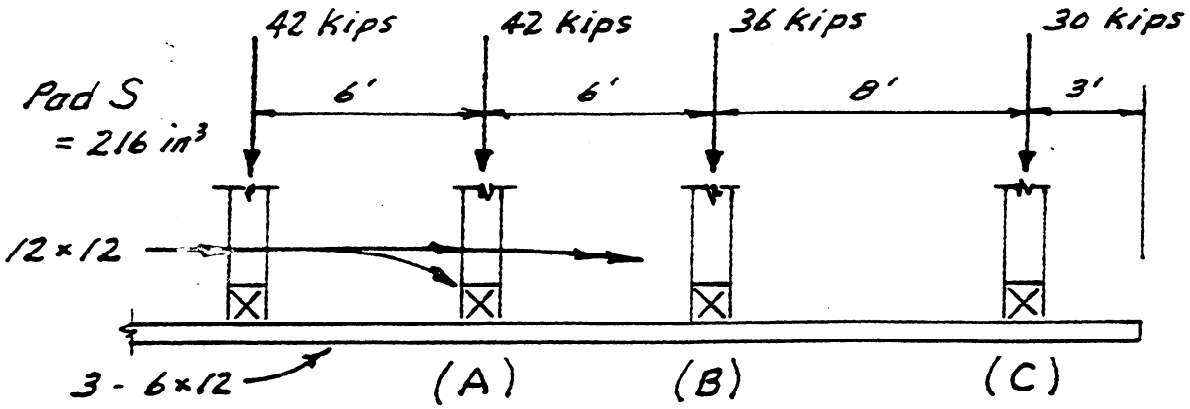
EXAMPLE 12 CONTINUOUS PAD - INDIVIDUAL CORBELS



Allowable soil bearing value = 3000 psf

Check Post A (Section 7-2.03A)

1. Calculate effective length of pad

$$L_e = \frac{t}{12} + \frac{S}{p} = \frac{12}{12} + \frac{216}{42} = 6.14'$$

2. Find bearing length

$L_e = 6.14'$

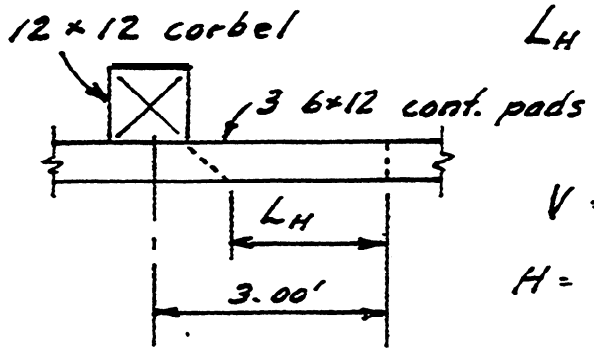
Post spacing = 6.00' (governs)

3. Calculate soil pressure

$$\text{Soil pressure} = \frac{P}{A} = \frac{42000}{3(6.00)} = 2333 \text{ psf}$$

2333 < 3000 allowable - OK

4. Calculate horiz. shear stress



$$L_H = 3.00 - \frac{1.0}{2} - 0.5 = 2.00'$$

$$V = 3(2333 \times 2.00) = 13998 \text{ lbs.}$$

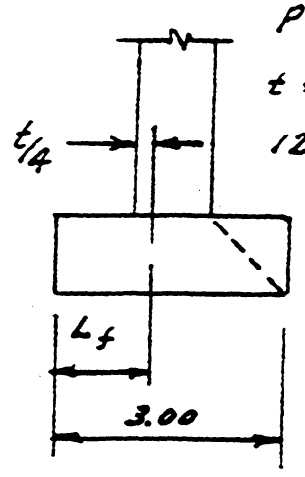
$$H = \frac{3V}{2A} = \frac{3(13998)}{2(6 \times 12 \times 3)} = 97 \text{ psi}$$

97 psi < 140 allow. OK

Revised 05/92

Post A Continued

Check Corbel



$P = 42000$ lbs

$t = 12''$

$12'' \times 12''$ corbel

$A = 12 \times 12 = 144 \ \square''$

$S = \frac{(12)(12)^2}{6} = 288 \ in^3$

$w = \frac{42000}{3} = 14000$ lbs

1. Calculate compression stress

$$f_c = \frac{P}{A} = \frac{42000}{144} = 292 \text{ psi}$$

292 psi < 450 allow. $C_\perp$ OK

2. Calculate horiz. shear stress

$H = 0$ psi (by inspection)

3. Calculate bending stress

$$L_f = 3.0/2 - 1.0/2 + 1.0/4 = 1.25'$$

$$M = \frac{wL^2}{2} = \frac{(14000)(1.25)^2}{2} = 10938 \text{ ft-lbs}$$

$$f_b = \frac{M}{S} = \frac{(10938)(12)}{288} = 456 \text{ psi}$$

456 psi < 1800 allow. OK

Check Post B (Section 7-2.03 A)

1. Calculate effective length of pad

$$L_e = \frac{t}{12} + \frac{S}{P} = \frac{12}{12} + \frac{216}{36} = 7.00'$$

2. Find limiting length on short side (left side)

$$\frac{L_e}{2} = \frac{7.00}{2} = 3.50'$$

$$\frac{\text{post spacing}}{2} = \frac{6.00}{2} = 3.00$$

Compared values are unequal; therefore, system is asymmetrical for analysis.

$$L_1 = 3.00'$$

3. Calculate ASYM length

$$L_{ASYM} = \frac{1}{2}\left(\frac{12}{24} + \frac{(216)(1500)}{(6000)(36)}\right) + \sqrt{\frac{(216)(1500)(3.00)}{(6000)(36)} - \frac{(12/12)^2}{16} + \left[\frac{1}{2}\left(\frac{12}{24} + \frac{(216)(1500)}{(6000)(36)}\right)\right]^2}$$

$$= 3.36'$$

4. Find limiting length on long side

$1/2$ post spacing on right $= 8.00/2 = 4.00'$

$$L_{ASYM} = 3.36 = L_2$$

5. Calculate soil pressure

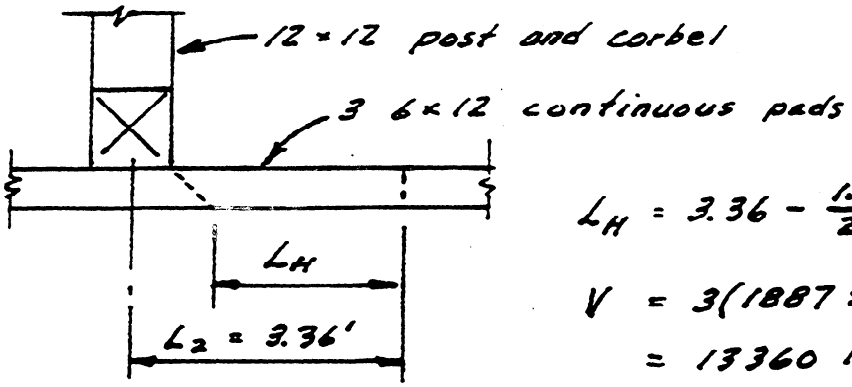
Bearing length $= L_1 + L_2 = 3.00 + 3.36 = 6.36'$

Soil pressure $= P/A = \frac{36000}{3(6.36)} = 1887$ psf

1887 psf < 3000 allow. OK

Post B Continued

6. Calculate horiz. shear on long side



$$L_H = 3.36 - \frac{1.0}{2} - 0.5 = 2.36'$$

$$V = 3(1887 \times 2.36)$$
$$= 13360 \text{ lbs}$$

$$H = \frac{3V}{2A} = \frac{3(13360)}{2(6 \times 12 \times 3)} = 93 \text{ psi}$$

93 psi < 140 allow. OK

Check Corbel

Corbel is OK by inspection

(Post load at B < post load at A)

Check Post C (Section 7-2.03B)

1. Calculate effective length of pad

$$L_e = \frac{t}{12} + \frac{S}{P} = \frac{12}{12} + \frac{216}{30} = 8.20'$$

2. Find limiting length on outside of post

$$\frac{0.8L_e}{2} = \frac{0.8(8.20)}{2} = 3.28'$$

Edge distance = 3.00'

Compared distances are unequal; therefore, system is asymmetrical for analysis.

$$L_1 = 3.00'$$

Post C Continued

3. Find preliminary limiting length on inside of post

$\frac{1}{2}(L_e) = \frac{1}{2}(8.20) = 4.10'$

$\frac{1}{2}$ (post spacing) $= \frac{1}{2}(8.00) = 4.00 = PL_2$

4. Calculate ASYM length

From ASYM formula, $L_{ASYM} = 3.74'$

5. Find limiting length on inside of post

PL_2 (step 3) $= 4.00'$

$L_{ASYM} = 3.74' = L_2$

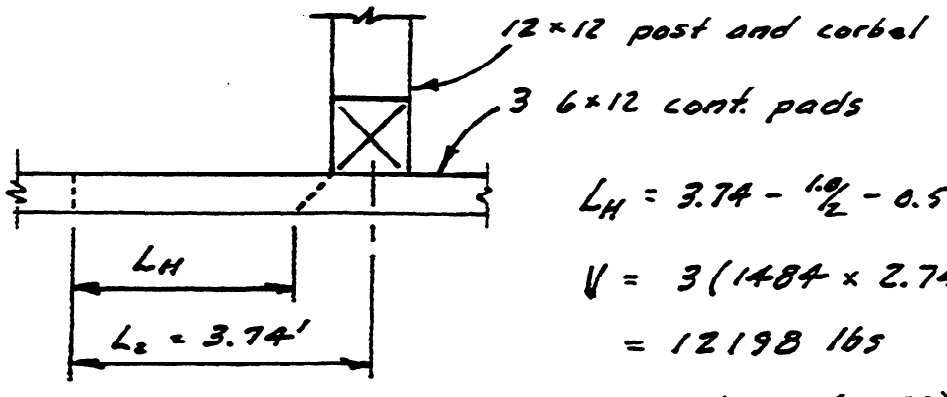
6. Calculate soil pressure

Bearing length $= L_1 + L_2 = 3.00 + 3.74 = 6.74'$

Soil pressure $= \frac{P}{A} = \frac{30000}{3(6.74)} = 1484$ psf

1484 psf < 3000 allow. OK

7. Calculate horiz shear stress on long side



$L_H = 3.74 - \frac{1.0}{2} - 0.5 = 2.74'$

$V = 3(1484 \times 2.74)$

$= 12198$ lbs

$H = \frac{3V}{2A} = \frac{3(12198)}{2(216)} = 85$ psi

85 psi < 140 allow. OK

Check Corbel

Corbel OK by inspection (Load at ℄ < load at A)