

$$11517 \left(\frac{d-a}{2} \right) = 4.68 \times 371 \text{ Ft-k}$$

$$d = 12 \quad b = 18 \quad A_s = 5.06 \text{ in}^2$$

$$f_y = 60 \text{ ksi} \quad f_c' = 4 \text{ ksi}$$

$$a = 4.96 \quad c = 5.83 \quad \epsilon_t = 0.0031$$

Compression controlled.

Q no 1 part A

Q no 1 part A

$$P_{AD} = 142 \text{ k-Ft}$$

Q no 1 (A)

$$h = 21 \text{ in}$$

$$d = 18 \text{ in}$$

$$b = 14 \text{ in}$$

$$A_s = 4.68 \text{ in}^2$$

$$f_y = 675000$$

$$f_c' = 5000 \text{ psi}$$

Syed iftikhar alam

$$a = \frac{A_s f_y}{0.85 f_c b} = 5.9$$

ID 14233

$$c = \frac{5.9}{0.8} = 7.375$$

$$\epsilon_t = \frac{d-c}{c} \times 0.003 = 0.0043$$

$$\phi = 0.65 + \frac{(0.0043 - 0.002) 250}{3} = 0.843$$

$$\phi P_n = A_s f_y \left(\frac{d-a}{2} \right) = 4.68 \times 371 \text{ Ft-k}$$

Q no 02 (Ans)

$$P_u = 142 \text{ k}$$

$$F_c = 4$$

$$F_y = 60$$

Compression stress = 2400 psi

$$A_g = \frac{142}{2.4} = 59.17 \text{ in}^2$$

Column dimensions = 8 x 8

$$e = 1.18 \text{ in}$$

$$P_n = 218.46$$

$$k_n = 0.85$$

$$R_n = 0.12$$

$$\nu = \frac{4}{8} = 0.5$$

M T W T F S

FT - k.

Q no 1 part B

$$M_{10} = 142 \quad M_{11} = 410 \quad f_c = 4000 \quad f_y = 60 \text{ ksi}$$

$$M_{10} = 1.2M_{10} + 1.6M_{11} = 826.4$$

$$\Gamma_{10} = \frac{826.4}{0.9} = 918.22$$

$$A_{s1} = 0.0181 (15 \times 28)$$

$$= \text{~~5.13~~} = 7.602$$

$$R = 912$$

$$\Gamma_{101} = R \phi b d^2 = 804.38 \text{ ft-k}$$

$$\Gamma_{101} = 893.8 \text{ ft-k}$$

$$a = 8.94 \text{ in} \quad c = 10.52$$

$$\epsilon_s' = 0.003$$

$$\Gamma_{102} = 24.42 \text{ ft-k} \quad A_s' = 0.20 \text{ in}^2$$

$$A_s = \text{~~7.62~~} 7.80 \text{ in}^2$$

eck

$$a = 9.176 \quad c = 10.8$$

$$\epsilon_s' = 0.0021 \quad \epsilon_r = 0.002$$

$$\epsilon_r = 0.0047$$

$$\phi = 0.84$$

$$\phi \Gamma_{10} = 920 \text{ ft-k}$$

M T W T F S

Beam dimension

$$h = 231$$

$$d = 28$$

$$d' = 3$$

$$b = 15$$

Q no 03 (Ans)

$$R_n = \frac{923.3 \times 12000}{20 \times 12 \times 19.5^2}$$

$$S = 0.0021$$

$$A_s = 0.0021 \times 19.5 \times 20 \times 12 = 9.828 \text{ in}^2$$

A_s (shrinkage) = ~~0.0018~~ = 8.424.

$$N_1 = 42.432.$$

$$N_2 = 53.04.$$

$$\sqrt{\frac{A_2}{A_1}} < 2$$

Q no 03 (Ans)

900

$$d = 24 - 3 - 1.5 = 19.5 \text{ in}$$
$$b_0 = 4 (16 + 19.5) = 142$$
$$c + d = 35.5 \text{ in}$$
$$V_{u2} = 417$$
$$d_1 = 17.87 < 19.5$$
$$V_{u1} = 163.24$$
$$d = 8.2 < 19.5$$
$$r_n = 923.3$$
$$R_n = \frac{923.3 \times 12000}{20 \times 12 \times 19.5^2} = 121.417$$
$$S = 0.0021$$
$$A_s = 0.0021 \times 19.5 \times 20 \times 12 = 9.828 \text{ in}^2$$
$$A_s (\text{shrinkage}) = 0.18 = 8.424$$

Q no 03 (Ans)

Footings

① Depth of footing = 2.5 ft.

effective soil pressure = $1412 - (2 \times 150) \cdot 300 = 212 \text{ psf}$

② Area of footing = $\frac{142 + 160 - 371.92}{0.812}$

side of footing = 20 ft.

③ $q_u = \frac{426.4}{400} = 1.066 \text{ ksf}$

④ $d = 24 - 3 - 15 = 19.5 \text{ in}$

$b_o = 4(16 + 19.5) = 142$

$c + d = 35.5 \text{ in}$

$142 = 417$

195