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Project CE123
Subject MIDTERM 2 P1
Job No. P1CH1 By
Date Sheet 1/2

PROBLEM 1

a. 10'-0"

b. 150 PSF × 10' = 1.50 K/'

c. 70 PSF × 10' = 0.70 K/'

d. 1.2D + 1.6 L

e. 1.2 × 1.50 = 1.80 K/'

f. 1.6 × 0.70 = 1.12 K/'

h. $\ell_{n\,bm} = 28'$ 1. > 2 SPANS

2. $0.83 \le \frac{\ell_1}{\ell_2} \le 1.2$ ALL SPANS

3. $L \le 3D$

4. UNIFORM LOAD

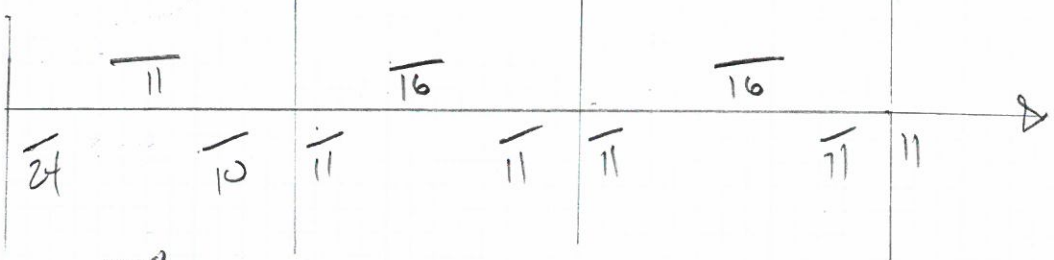
5. ALL MEMBERS PRISMATIC

i. gas

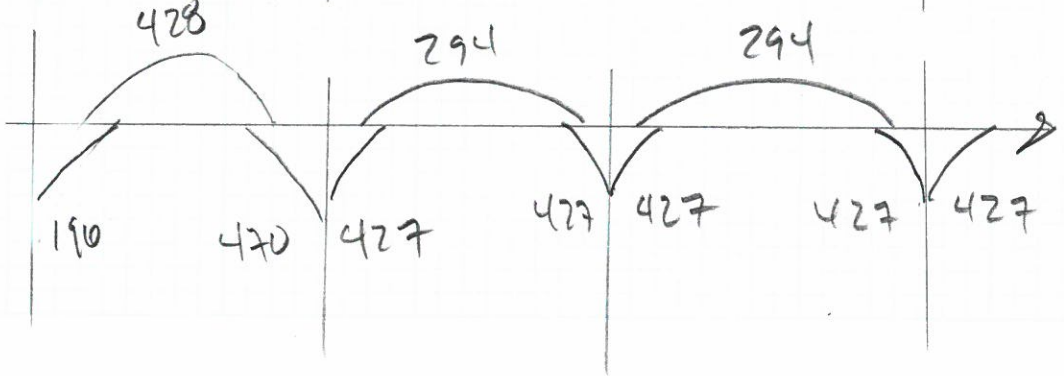
• $w_{u\,D+L} = (3.5 + 2.5)\,K/F = 6.0\,K/F$

$w_{u\,D+L}\,\ell_n^2 = 6.0 \times 28^2 = 4704$

j



k



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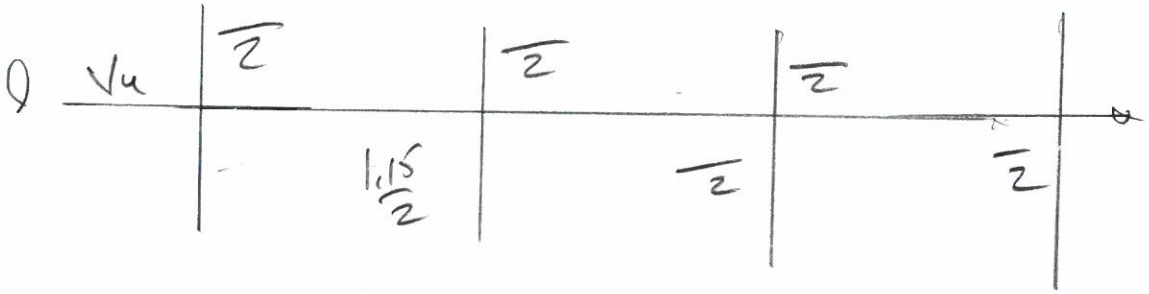
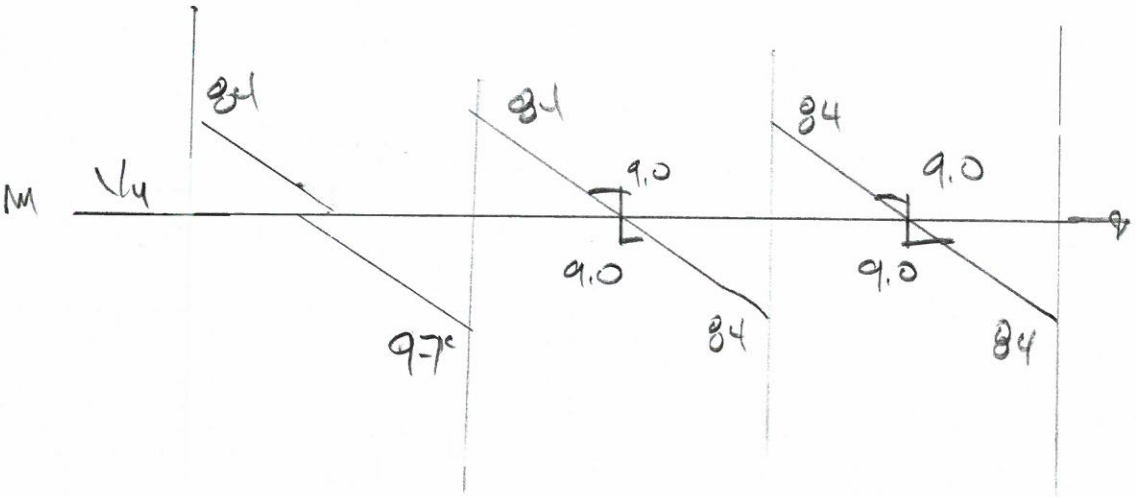
Project CE173
Subject MIDTERM 2
Job No. PROB 1 By
Date Sheet 2/2

PROBLEM 2





$n\, w_u l_n = 168^K$; $168/2 = 84^{K}$ $\times 1.15 = 97^K$

$\frac{1}{8} w_u l_n = \frac{2.5}{8} \times 28 = 9.0$

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Project CE 123
Subject MIDTERM 2
Job No. PROB 2 By
Date Sheet 1/1

PROBLEM 2

a. $b_w = 20"$

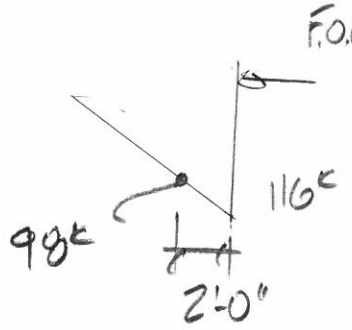
b. $d = 28 - 4 = 24"$

c. $V_c = 2\frac{\sqrt{4000}}{1000} \times 20 \times 24 = 60.7^k$

d. $\phi = 0.75$

e. d' from F.O. SUPPORT $= 110^k \times \frac{24}{12} \times 0^k/_{ft} = 98^k$

f.



g. $V_s = \frac{V_u}{\phi} - V_c = \frac{155}{.75} - 60.7 = 146^k$

h. (3) LEGS

i. $A_v = 3 \times 0.20 = 0.60^{in^2}$

j. $V_s = 100^k = A_v f_y \frac{d}{s}$; $s = \frac{0.60 \times 60 \times 24}{100^k} = 8.64"$ (in^2 k/in^2 in)

k. $4\frac{\sqrt{4000}}{1000} \times 20 \times 24 = 121.4^k > V_s$; $s_{max} =$ less of $\frac{24}{2} = 12"$ ← CONTROLS; $24"$

l. $s =$ less of $\frac{0.6 \times 60{,}000}{0.75\sqrt{4000} \times 20} = 37.9"$; $\frac{60{,}000 \times .6}{50 \times 20} = 36"$

m. USE 8"

n. $V_u = 2.5^k/_{ft} \times \frac{32'}{8} = 10.0^k$

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Project CE 123
Subject MIDTERM 2
Job No. PROB 3 By
Date Sheet 111

PROBLEM 3

a. $d_c = 30" - 3" = 27"$

b. $\rho_s = \frac{4A_s}{d_c s}$

c. $\rho_s = \frac{4 \times .31}{27 \times 3} = 0.0153$

d. $\rho_s \text{ REQ'D} = 0.45\left(\frac{A_g}{A_c} - 1\right)\frac{f'_c}{f_y}$

$= 0.45\left(\frac{30^2}{27^2} - 1\right)\frac{4}{60} = 0.0070$

e. $\alpha = 0.85$
Because § 25.7.3.3 SATISFIED

f. $A_s = 12.0^{in^2}$

g. $P_o = 0.85 \times 4\left(\frac{3.141 \times 30^2}{4} - 12 \times 1.0\right) + 12 \times 60 = 3082^{K}$

h. $\phi = 0.75$ - COMPRESSION

i. $T_o = 12.0 \times 60 = 720^{K}$

j. $\phi = 0.90$ - TENSION

k. $\phi = 0.75$ @ $\varepsilon_{t,1} = 0.00207$ (A TINY BIT MORE

$\left(\frac{.00207 - 0.002}{.003} \times .15\right) + .75 = 0.754$

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Project _____
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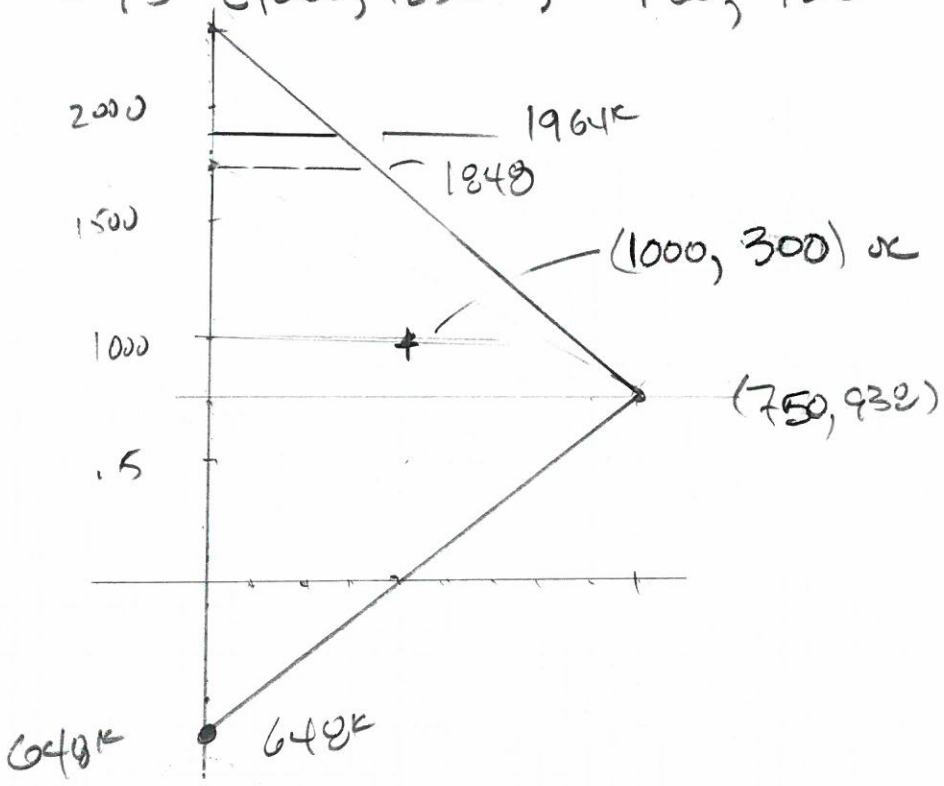
PROBLEM 3

$\phi P_n = 0.75 \times 3082 = 2311^k$

$\alpha \phi P_n = 0.85 \times 0.75 \times 3082 = 1964^k$

$\phi T_n = 0.9 \times 720 = 648^k$

1. $\phi P_n, M_n$ (.0007) $= 0.75\ (1000^k, 1250^{ft})$ $= 750^k, 938^{kft}$



1. AT $S = 6''$; $\rho_s = \frac{4 \times .31}{27 \times 6} = 0.0077$

YES AS $\alpha = 0.85$ BECAUSE
$\rho_s > \rho_s$ REQ'D

BUT $S > 3''$ SO SPACING NOT MET
SO USE α, ϕ FOR TIE = 0.80 & 0.65