Appendix G
Pilaster Calculation

Masonry Pilaster

Worst Case Loading

$P = 177\ k$

$m = 35.4\ ^{'k}$

Trial Size $= \frac{177000\ lb}{(345\ psi)} = (492\ in^2) \approx 22" \rightarrow try\ 24" \times 24"$

Use 4 #7's

$A_s = .60 \times 4 = 2.40\ in^2$

$A_g = 24 \times 24 = 576\ in^2$

$F_s = 24000$

$h = 384"$

$r = .3D = 7.2$

Axial Force Capacity

$$P = \left(.25\, f'm\, A_g + .65\, A_s F_s\right)\left(1 - \left(\frac{h}{140r}\right)^2\right)$$

$$= \left(.25(1500)(576) + .65(2.40)(24000)\right)\left(1 - \left(\frac{384}{140 \cdot 7.2}\right)^2\right)$$

$= 215.4\ K_{ins} > 177\ K_{ins} \quad \therefore\ OK$

Check Moment Capacity

$A_s = 2.40\ in^2 \quad n = 21.5$

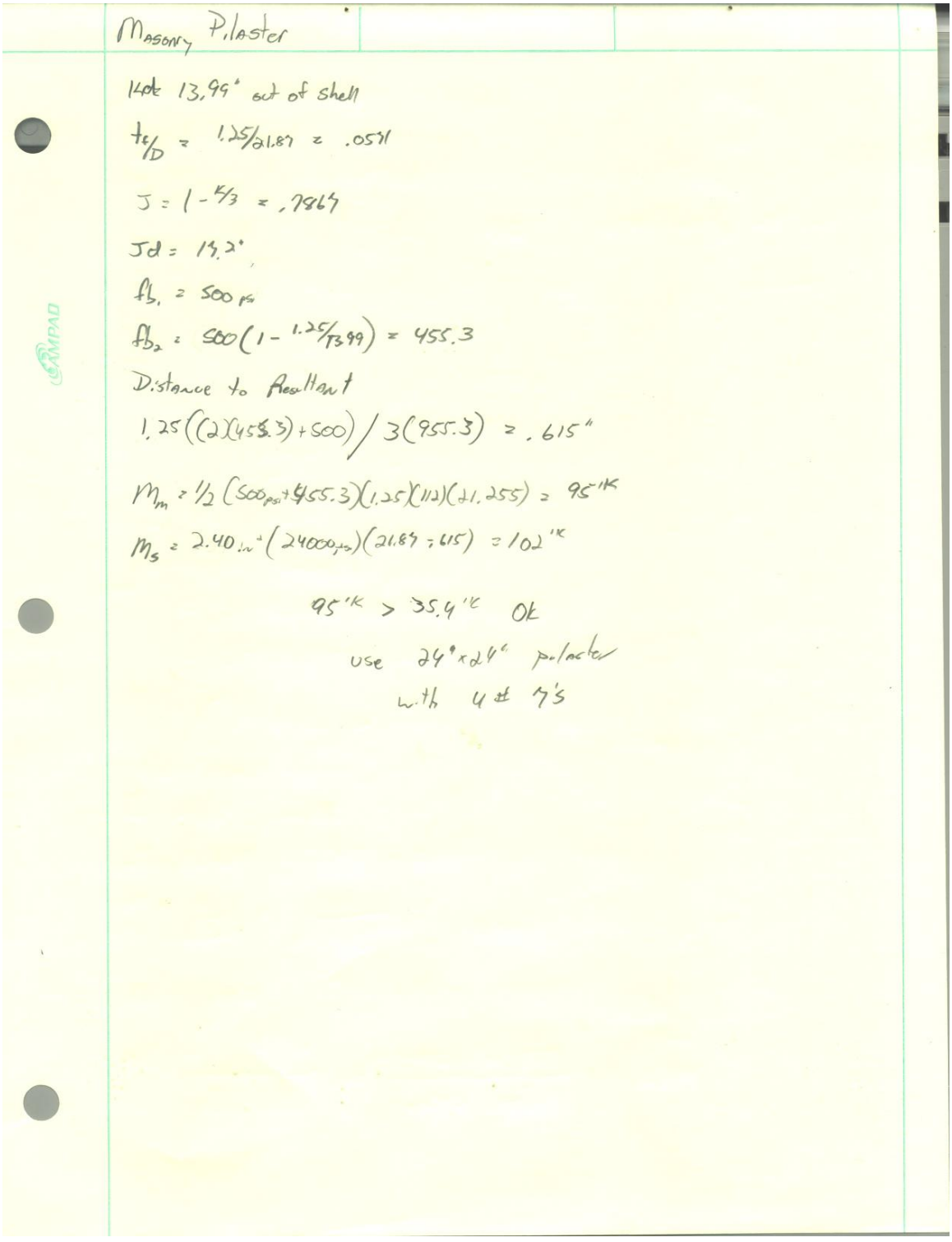
$d = 23.625 - 1.25 - 1.5" = 21.87$

$$\rho = \frac{A_s}{BD} = \frac{2.40}{(24)(21.87)} = .0046$$

$\rho_n = .0983$

$$K = \frac{\rho_n + \frac{1}{2}\left(\frac{t}{D}\right)^2}{\rho_n + \left(\frac{t}{D}\right)} = \frac{.0983 + \frac{1}{2}\left(\frac{1.25}{21.87}\right)^2}{.0983 + \left(\frac{1.25}{21.87}\right)} = .6399$$

Pilaster Calculation



Masonry Pilaster

Kpk 13.99° out of shell

$t_s/D = 1.25/21.87 = .057$

$J = 1 - K/3 = .7869$

$Jd = 13.2"$

$fb_1 = 500\ psi$

$fb_2 = 500(1 - 1.25/13.99) = 455.3$

Distance to Resultant

$1.25((2)(455.3) + 500) / 3(955.3) = .615"$

$M_m = 1/2\,(500_{psi} + 455.3)(1.25)(112)(21.255) = 95^{'k}$

$M_s = 2.40_{in^2}(24000_{psi})(21.87 - .615) = 102^{'k}$

$95^{'k} > 35.4^{'k}$ OK

use 24"x24" pilaster

with 4 #7's