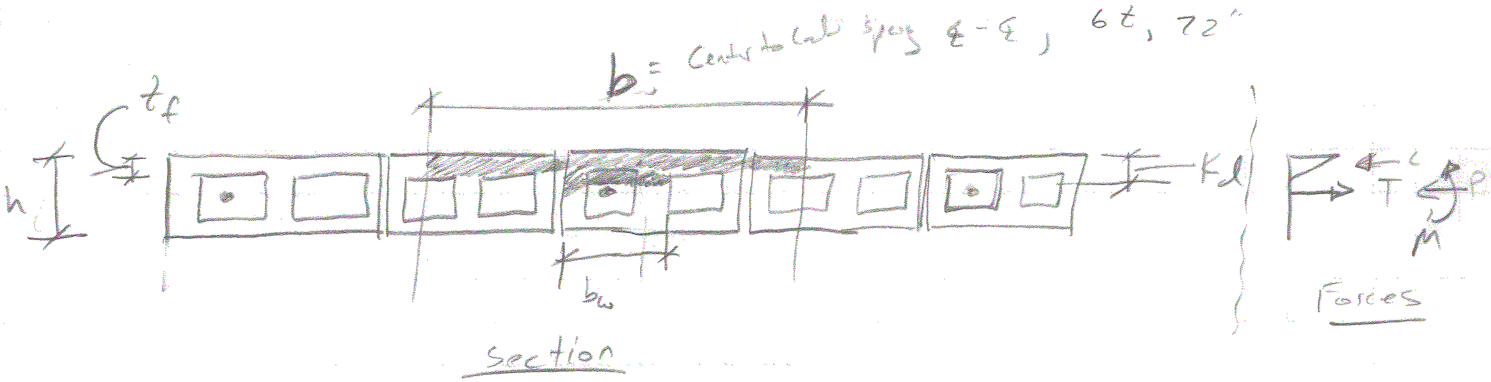
JOB: Partial Grout Out-of-Plane

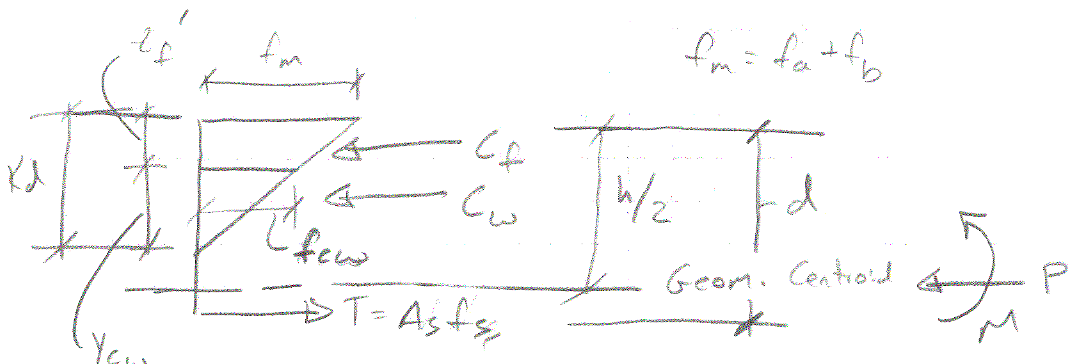
SHEET NO.: 1 OF

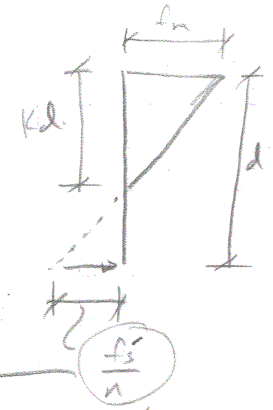
CALCULATED BY: RSF DATE:

CHECKED BY: DATE:

SCALE: Masonry Wall ASD







right?

use $\frac{f_s}{n}$? → n

yes

$$\frac{f_m}{Kd} = \frac{f_s/n}{d-Kd}$$

$$f_s' = n\,\frac{f_m}{Kd} \times (d-Kd)$$

$$t_f' = \min(t_f,\ Kd)$$

$$f_{cw} = f_m\,\frac{(Kd - t_f')}{Kd}$$

$$Y_{cw} = \max(0,\ Kd - t_f')$$

$$C_f = \frac{1}{2}\left[f_m + f_{cw}\right] \times t_f' \times b$$

$$C_w = \tfrac{1}{2}\, Y_{cw} \times f_{cw} \times b_w$$

$$f_s' = n\,\frac{f_m}{Kd} \times (d - Kd)$$

$$f_s = \min(F_s,\ f_s') \qquad F_s = 24^{ksi} \times 4/3 \text{ if applicable.}$$

$$T = A_s f_s$$

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SHEET NO. 2 OF

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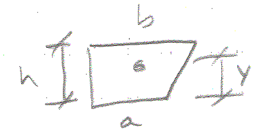
$\underline{\Sigma F} = C_f + C_w + P - T = 0$

$\underline{\Sigma M}$ @ Geom. Centroid.



$$y = \frac{h(2a+b)}{3(a+b)}$$

<u>Moment Arms</u>

Flange $\Rightarrow$ $X_{Cf} = \frac{h}{2} - \frac{t'_f\,(2f_{cw} + f_m)}{3(f_{cw} + f_m)}$

web $\Rightarrow$ $X_{Cw} = \frac{h}{2} - \left(t'_f + \frac{y_{cw}}{3}\right)$

steel $\Rightarrow$ $X_{S1} = h/2 - d$

use "+" This will determine if Neg.

$\Sigma M = X_{Cf} \times C_f + X_{Cw} \times C_w + T X_{S1} + M = 0$

→ For given P, M, & Geometry,

→ Assume Kd and $f_m = F_m$ where $F_m = \frac{f'_m}{3} \times 4/3$

→ Perform iteration until $\Sigma F = 0$ & $\Sigma M = 0$

or

$e_{req'd} = \frac{M_a}{P_a} = \frac{M_n}{P_n}$ — (Find M_n, P_n From Above ΣF & ΣM solving for M & P respectively)

$f_a = \frac{P}{A_{net}}$ $\Rightarrow$ A_{net} = Flange + web + grouted cell

<u>Shear</u> – ⊥ to wall

→ use Area in Compression only?

<u>Checks</u>

$F_a = 0.25 f'_m R$ $\Rightarrow$ $\begin{cases} R = 1 - \left(\frac{h}{140r}\right)^2 & \frac{h}{r} \le 99 \\ R = \left(\frac{70r}{h}\right)^2 & \frac{h}{r} > 99 \end{cases}$

$f_a \le F_a$

$f_m \le F_m$

$\frac{t}{h} : \frac{1}{8}$

JOB

SHEET NO. 3 OF

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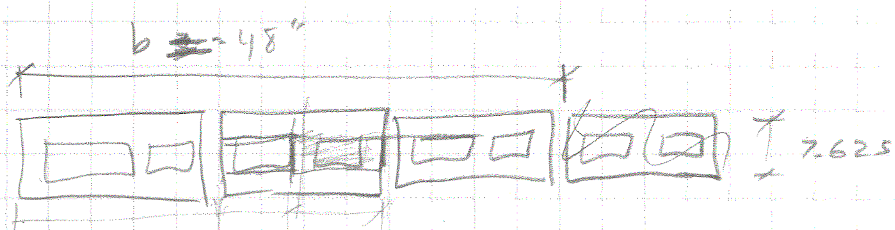
SCALE Properties



$h = 7.625$ $\quad h_w = h - 2t_f$ $\quad b_{unit} = 15.625"$ $\quad b_{grout} = 3/8"$

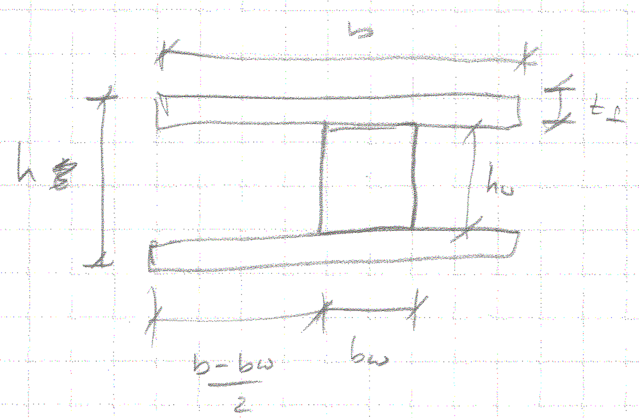
$t_f = 1.25"$ $\quad b_w = b_{cell} + 2t_w$ $\quad b_{Nunit} = 16"$

$t_w = 1.0"$ $\quad b_{cell} = (b_{unit} - 3t_w)/2 =$

$$A = 2(b \times t_f) + h_w \times b_w$$

$$A_{ft} = A/b \quad in^2/ft$$

$$I = \frac{bh^3}{12} - \frac{\left(\frac{b-b_w}{2}\right) \times h_w^3}{12} \times 2$$



$$I_{ft} = I/b = in^4/ft$$

$$r = \sqrt{I/A} =$$

JOB

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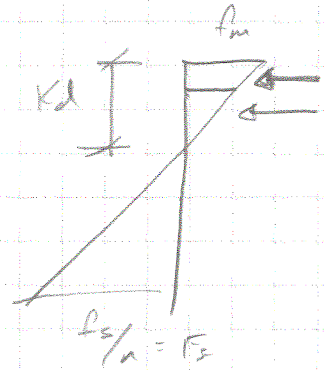
SCALE



$$\frac{f_m}{Kd} = \frac{f_s/n}{d-Kd}$$

$$f_m = \underbrace{\frac{f_s/n}{d-Kd}Kd \quad \text{or} \quad F_m}_{\text{yields same result.}}$$