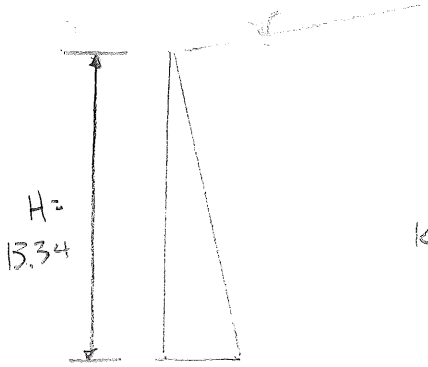
Pike Co. Germany Rd. 2/26/18 Wall #3

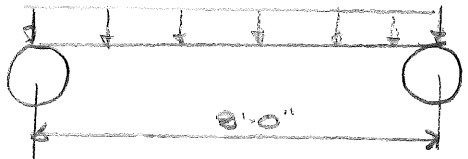
Precast Lagging Design



Shaft spacing = 8'-0" $K_a = 0.361$
$\gamma = 0.125$ kcf

max Lagging Height = 13.34

$K_a \gamma H = 0.36(.120)(13.34) = 0.576$ KSF @ bottom



$\gamma_{EH} = 1.5 \rightarrow 1.5(0.576) = 0.864$ KSF.

$M = \frac{wl^2}{8} = \frac{0.864(8)^2}{8} = 6.912$ K·ft

f'c = 4ks;
fy = 60 ks;

panel depth = 8" clear = 3" d: 8 - 3 - ½(#4) = 4.75"

$A_{s\,req'd} = \frac{M_u}{\phi(f_y)(.9)d} = \frac{6.912(12)}{0.9(60)(.9)(4.75)} = 0.36$ in²/ft

#4@6" = 0.4 in²/ft

VOID Above - Didn't account for Water

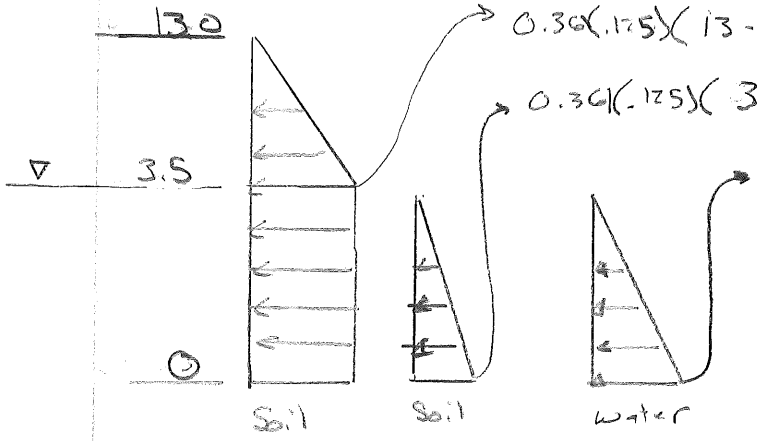
Borings 015, 014, 013

013 water @ 625.6
014 " " 610.0
015 " " 614.9

weep hole @ 6" Above ground @ front face - Ground @ 626.7
∴ hole @ 628.03

T/ Shaft = B/ lagging @ 623.33

$\gamma_{dry} = .125$ $\gamma_{sat} = 125$



$0.36(.125)(13 - 3.5) = 0.429$ K/ft

$0.36(.125)(3.5) = 0.1580$ K/ft

$\frac{62.4(1-0.36)(3.5)}{1000} = 0.14$

Pe Bottom: 0.429 + 0.1580 + .14
P = 0.727 ksf

$M = \frac{1.5(.727)(8)^2}{8} = 8.72$ K·ft

$A_s = \frac{8.72(12)}{.9(60)(.9)(4.75)} = 0.453$ in²/ft → #6@12" or #5@8"

used #5@6"

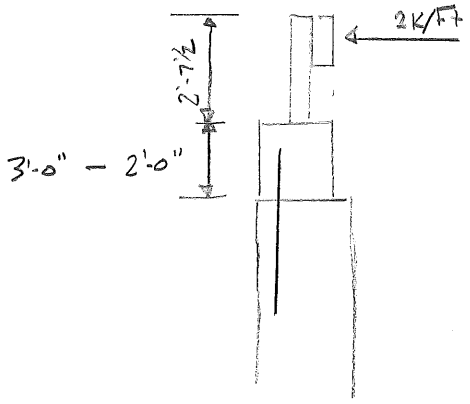
wall #2

2/26/18

Cap to Shaft transfer
↳ Check Moment w/ CT Force
↳ Check Shear w/ CT Force

CT: 2K/ft

30" ϕ shaft
&
36" ϕ Shaft



Moment = (3+2'-7½")(2) = 11.25 K/ft/ft

Extreme Event II CT Load Factor = 1.0

Shaft Spacing = 6'

M_u/shaft = (1)(6)(11.25) = 67.5 K-ft

$A_s = \frac{67.5(12)}{.9(60)(.9)(27")} = 0.62 in^2 \rightarrow 2$ #5's

Calculate Shear from CT Force @ Each Shaft

2K/ft(6') = 12K/shaft (1.0) = 12K/shaft

Fuof Rebar: 0.17 f'c x A_s → 0.17(90ksi)(x) = 12K

$x = 0.784 in^2$ → Try #5 → $\frac{0.784}{0.31}$: 3 bars - Pile-CR 50 used 3 bars EF.

Assumed is 2'-6" - 3" : 2'-3" = 27"

Try w/ a lesser d say ½ shaft ϕ → $\frac{30"}{2}$: 15"

$\frac{67.5(12)}{.9(60)(.9)(15)} = \frac{1.11 in^2}{0.31} \rightarrow$ 3.6 bars #5 Bars → 4 bars

Plug Shafts → Avg = 87.43 High = 140 Avg Avg = $65.83
use $70/Ft

Geocomposite Drain → Avg: 16.09 High: 160 Avg Avg = 15.16
use $16/SF.

Precast Panel → Avg: 702.21 High: 2000 Avg Avg: 510.23
but what size are these? (5.75 x 2) = 11.50 S.F.

So $\frac{280}{11.5}$: $24.50/SF. Based on PID 103413

3'x9' = 23.25 SF (24.50) : $570 2x9' = 15.5(24.5) = $380
3x6' = 17.25 (24.50) : $425 2x6' = 11.5(24.5) : $285

HP14x89 DIK-50 $75/ft ≈ $0.85/ft
HP14x117 $90/ft ≈ $0.77/ft

Let's use $0.75/ft