

## Vertical Pressures

### Soil:

Stiff/Med Clay

$w = 120$  pcf

$\phi = 25^\circ = 0.436$  radians

$f = \delta = -0.2$

$\delta / \phi = -0.2 / 0.436 = -0.46$

Caquot-Kerisel Chart:

$R = 0.788$  for  $\delta / \phi = -0.46$

$K_a = 0.36$

$K_p = 4.5 \times 0.788 = 3.55$

$$P_a = (0.5)(K_a)(w)(H^2) \\ = 1,058 \text{ plf}$$

$$(7 \times 120) \\ = 840 \text{ psf}$$

$$120(D) + 840$$

$$q = 2,582 \text{ psf}$$

$$120(D)$$

Treat as Simple Support  
Reaction from Ground Floor  
Primary Lateral Loads at Basement Floor

$$P_v = (P_a)(\sin \delta) \\ = 1,058 \times 0.2 \\ = 212 \text{ plf}$$

At Bottom of Basement Wall:

$DL = 2,700$  plf

$LL = 530$  plf

$DL + LL = 3,230$  plf

$S = DL + LL + 212 = 3,230 + 212 = 3,442$  plf

$q = 3,442 / (16'' / 12'') = 2,582$  psf

$D_t$

$D$

7'

## Lateral Pressures

### Soil:

Stiff/Med Clay

$w = 120$  pcf

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$f = \delta = -0.2$

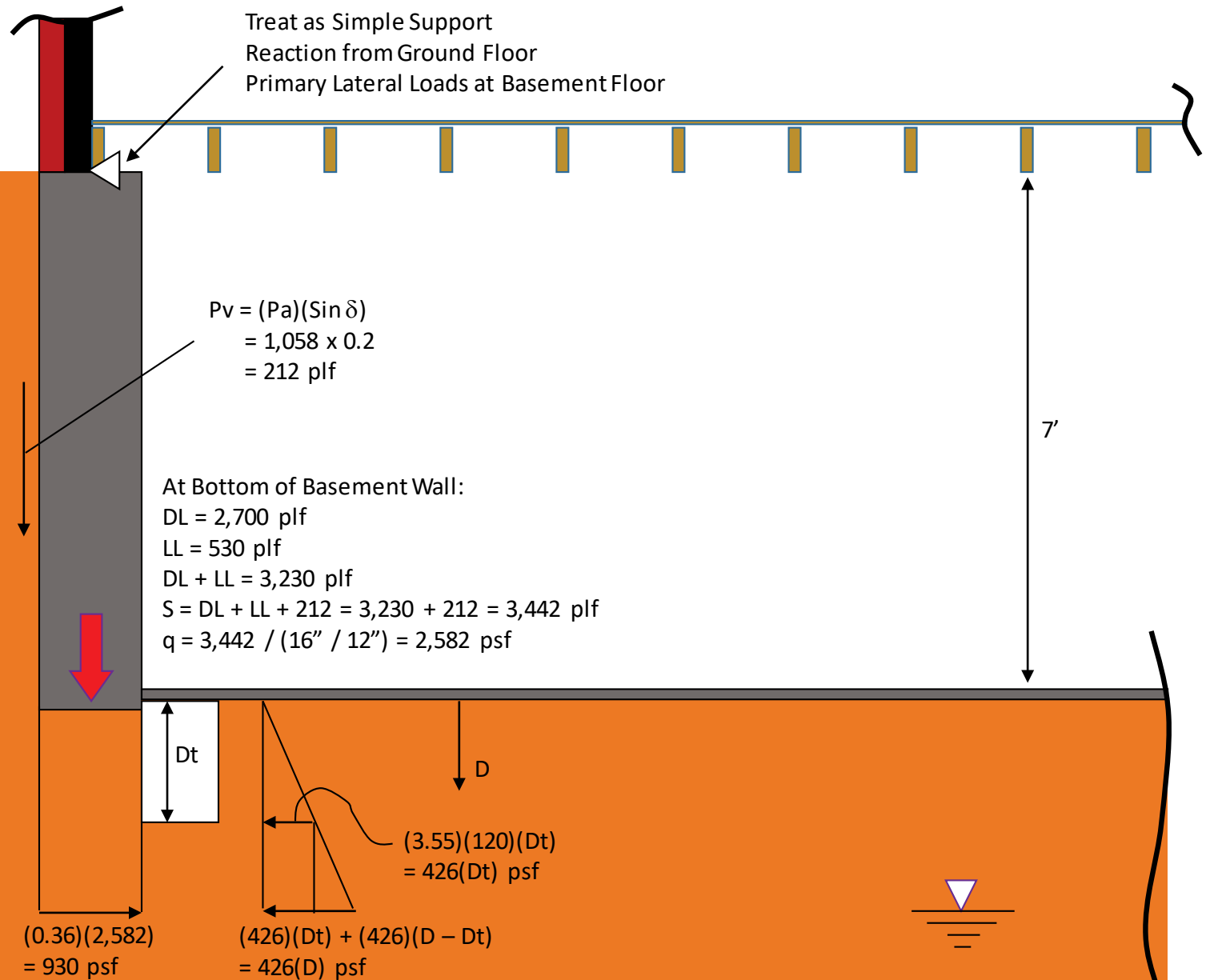
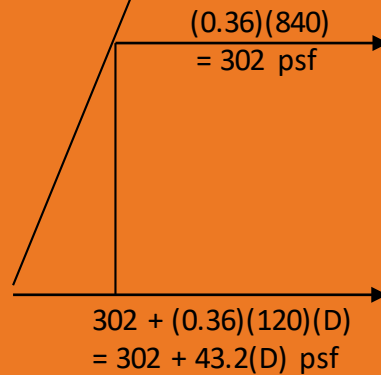
$\delta / \phi = -0.2 / 0.436 = -0.46$

Caquot-Kerisel Chart:

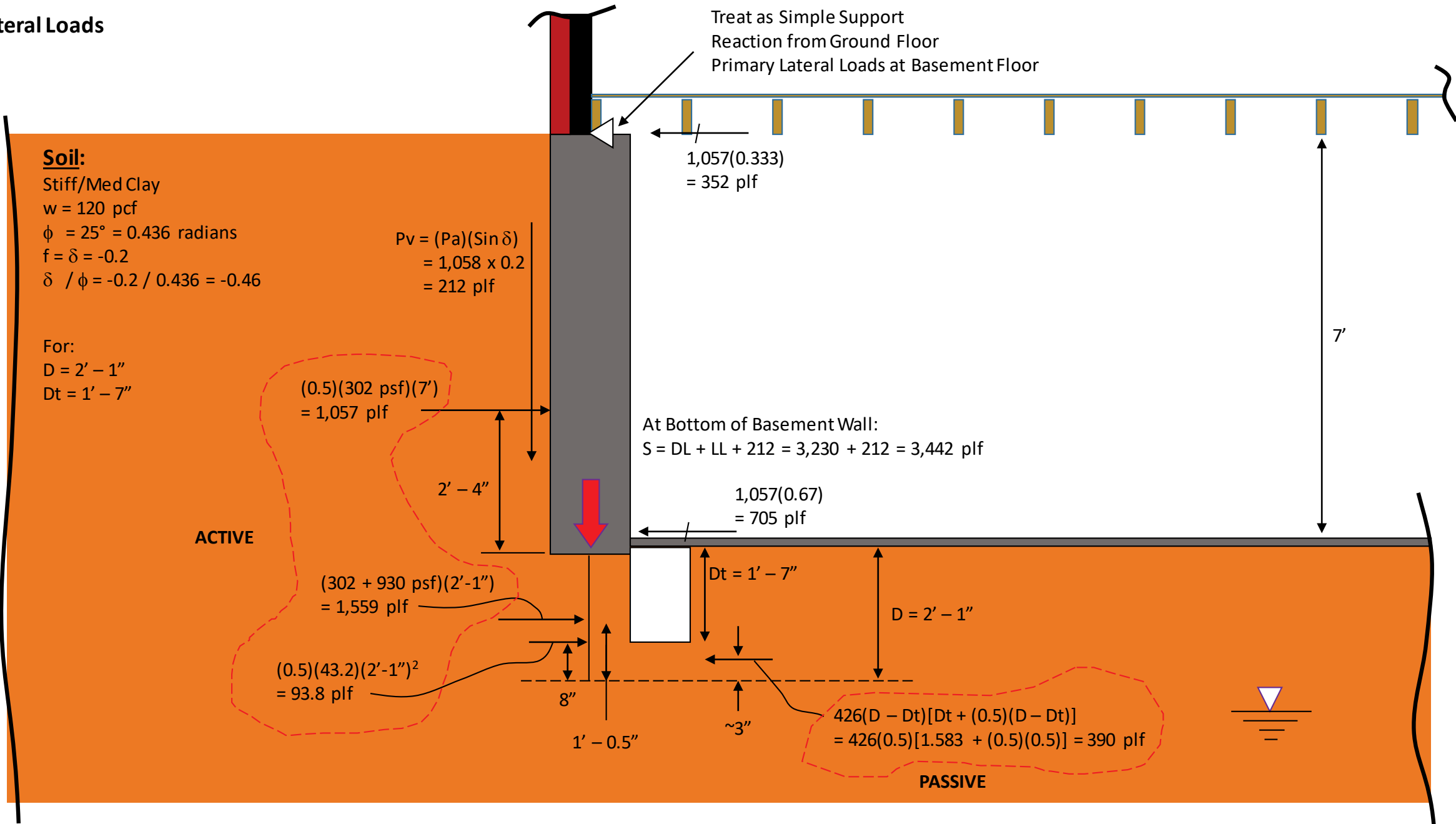
$R = 0.788$  for  $\delta / \phi = -0.46$

$K_a = 0.36$

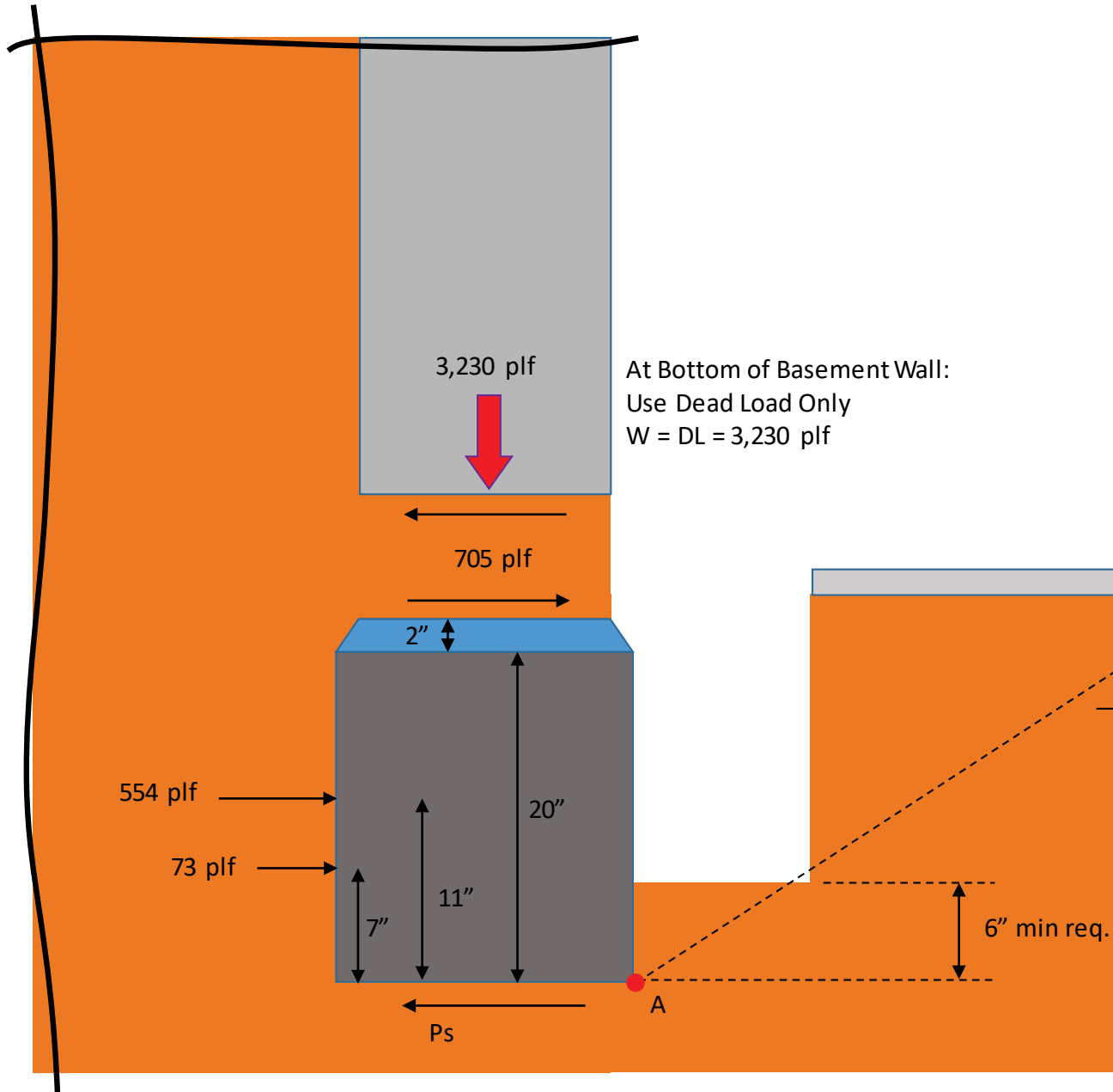
$K_p = 4.5 \times 0.788 = 3.55$



Lateral Loads



## Sliding & Overturning Checks (While Trench is Open)



At Bottom of Basement Wall:  
Use Dead Load Only  
 $W = DL = 3,230 \text{ plf}$

$1,057(0.67) = 705 \text{ plf}$   
 $f_c = 705 / (12" \times 1.5") = 39 \text{ psi}$

$3,230 \text{ plf}$

$2"$

$20"$

$7"$

$11"$

$554 \text{ plf}$

$73 \text{ plf}$

$P_s$

A

$6" \text{ min req.}$

$45 - \phi / 2 = 33^\circ$

**Sliding:**  
At bottom of pier  
Need:  $FS \geq 1.5$   
 $Ph = (0.5)(554) + (0.67)(73) = 326 \text{ plf}$   
 $Ps = f \times W = (0.2)(3,230) = 646 \text{ plf}$   
 $FS = 646 / 326 = 1.98 \dots \text{OK}$

**Over-turning:**  
Not a concern with floor support... OK

Since the trench bisects the passive resistance shear plane, neglect passive resistance

At bottom of pier

$$P_h = (0.5)(554) + (0.67)(73) = 326 \text{ plf}$$
$$P_s = f \times W = (0.2)(3,230) = 646 \text{ plf}$$
$$FS = 646 / 326 = 1.98 \dots \text{OK}$$

Not a concern with floor support... OK

Since the trench bisects the passive resistance shear plane, neglect passive resistance