

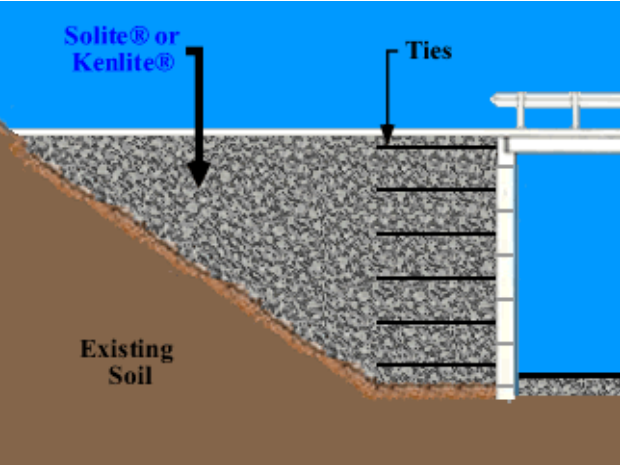
MSE Wall Project

Geotechnical Design

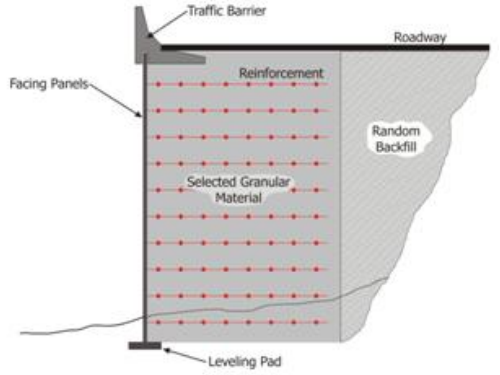
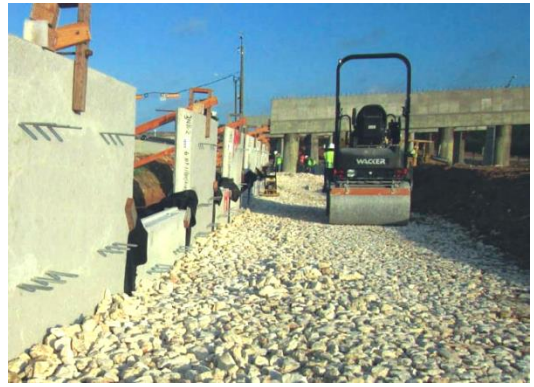
CEG 4801

Fall 2019

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Design Concept

Mechanical Stabilized Earth (MSE) Wall



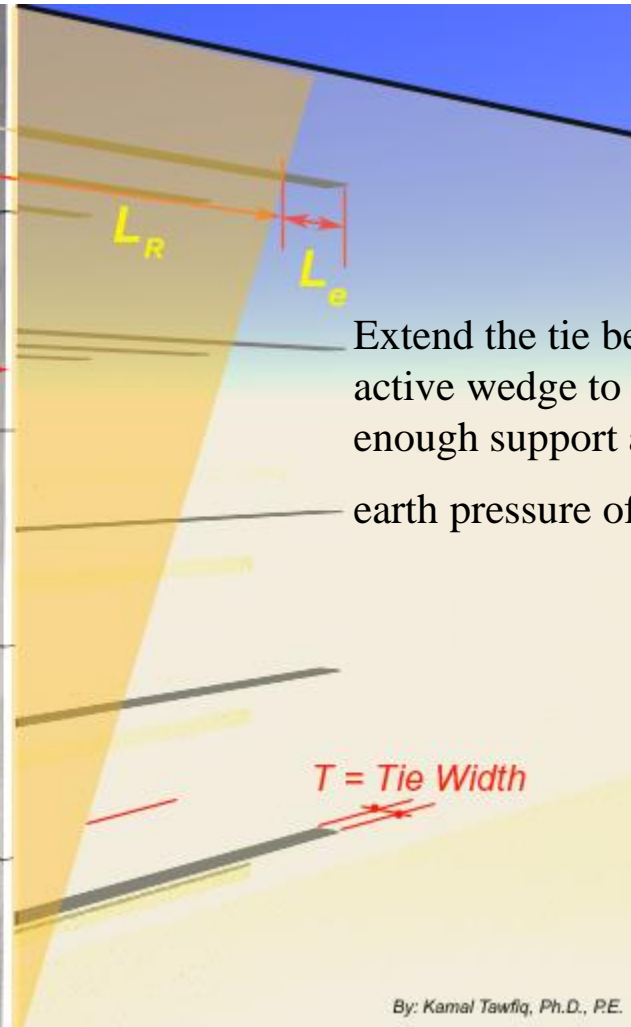
S_H = Horizontal Distance

S_V = Vertical Distance

L_R = Rankine's Length

L_e = Effective Length

$$L_{total} = L_R + L_e$$



Extend the tie beyond the active wedge to provide enough support against earth pressure of the panel

T = Tie Width

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Mechanically Stabilized Earth (MSE) Wall

- $L_{total} = L_R + L_e$
- $L_R = \text{Rankine's Length}$
- $L_e = \text{Effective Length}$
- $S_H = \text{Horizontal Distance}$
- $S_v = \text{Vertical Distance}$

Yield Strength of Steel H

$t = \text{thickness of tie}$

Tie Force = $F = \sigma_a * S_v * S_H$

$w t f$

$FS_{(tie\ Breaking)} = \frac{w t f}{\sigma_a * S_v * S_H} = 2.5 \text{ to } 3$

Friction angle between steel and soil (given)

$FS_{(tie\ pullout)} = \frac{2 L_e w \sigma_v \tan \phi_H}{\sigma_a * S_v * S_H} = 2.5 \text{ to } 3$

Skin Panel

Steel Tie

$w = \text{Tie Width}$

$\gamma H k_a$

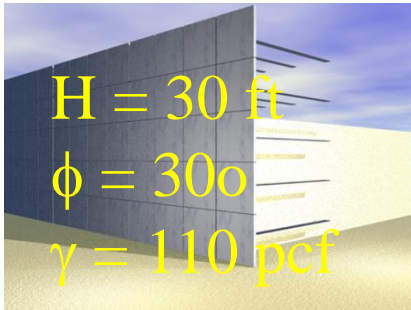
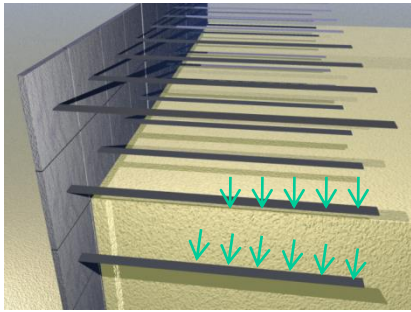
Rankine's Earth Pressure

$45 + \phi/2$

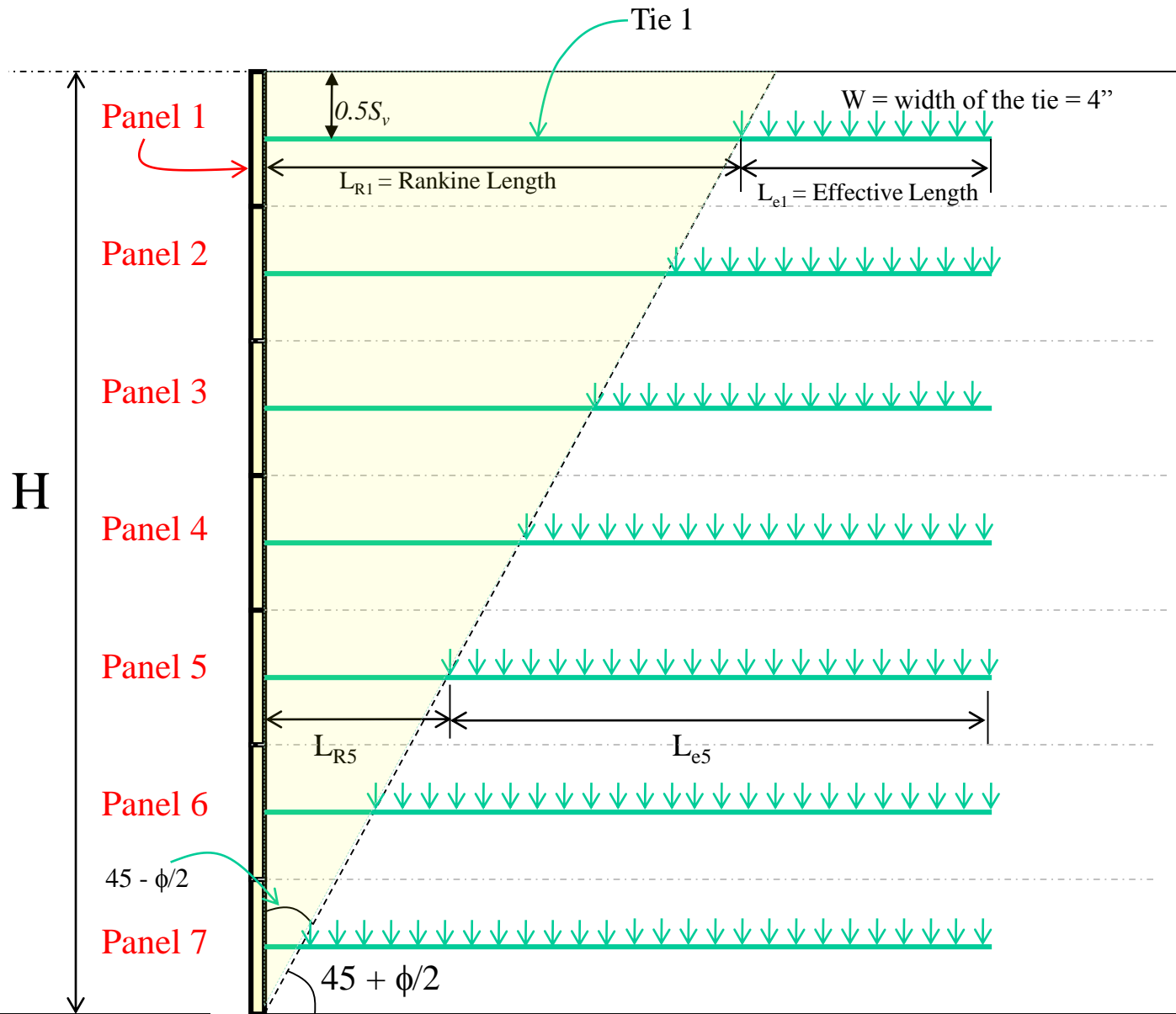
$$L_{R1} = (H - 0.5 S_v) \tan (45 - \phi/2)$$

$$L_{e1} = \frac{2.5(\sigma_a \cdot S_v \cdot S_H)}{2 w \sigma_v \tan \phi_\mu}$$

$$L_1 = L_{R1} + L_{e1}$$



H



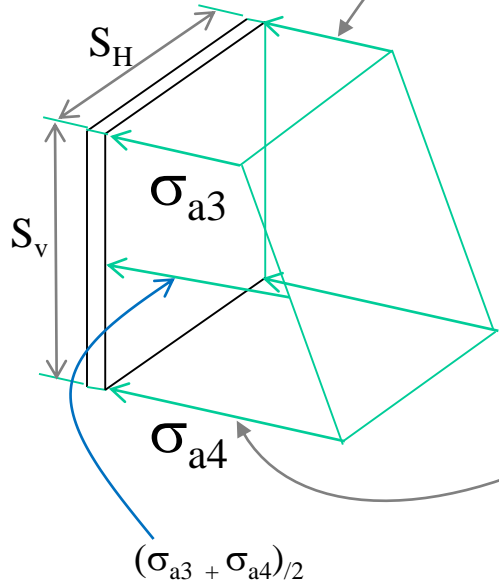
$$L_{R1} = (H - d_1) \tan(45 - \phi/2)$$

$$L_{e1} = \frac{2.5(\sigma_a \cdot S_v \cdot S_H)}{2w \sigma_v \tan \phi_\mu}$$

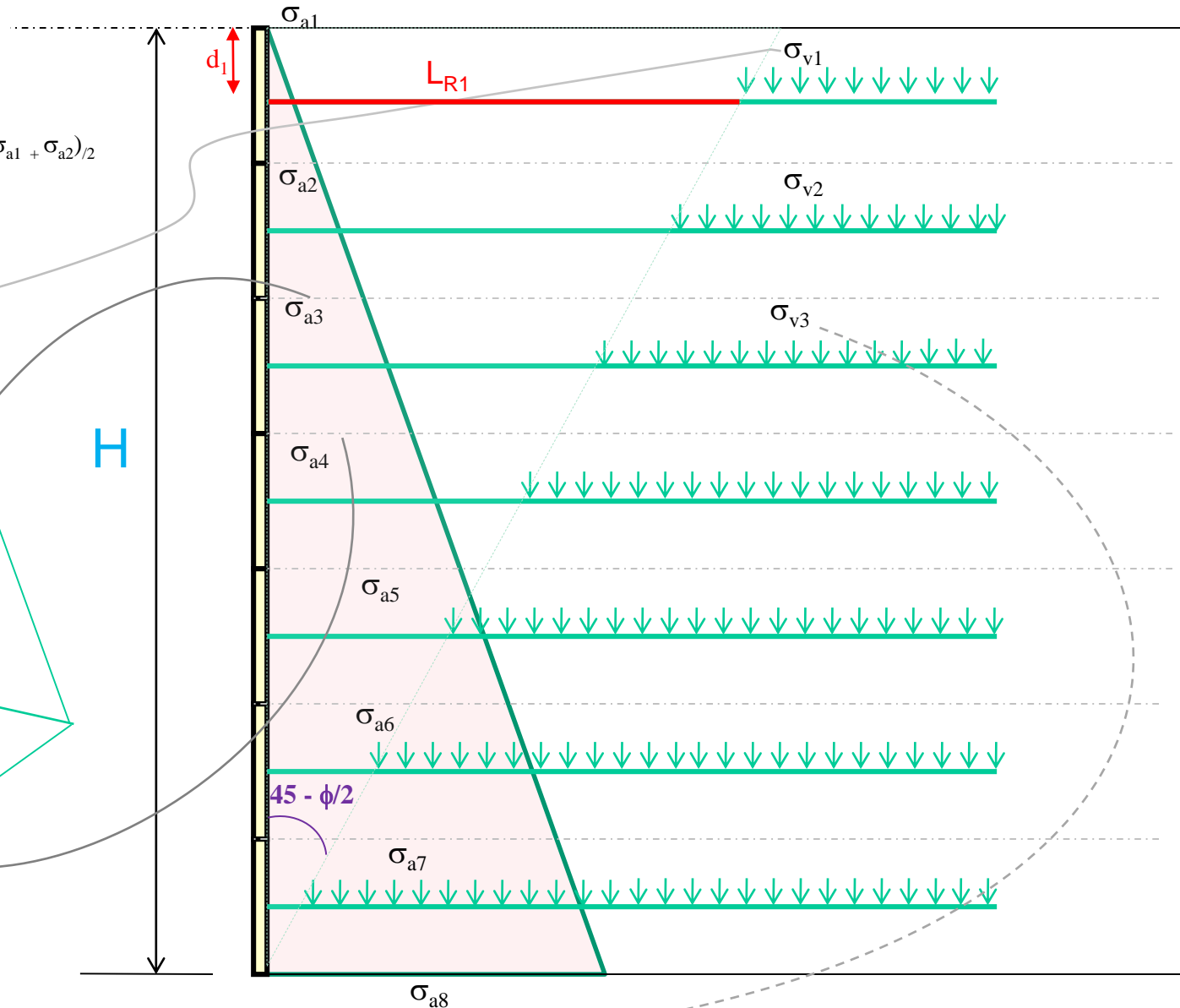
$(\sigma_{a1} + \sigma_{a2})/2$
 Tie width

$$L_1 = L_{R1} + L_{e1}$$

For Example



$$\text{or } = \sigma_{v3} k_a$$



Homework Problem:

A reinforced earth retaining wall is to be **35 ft high**. The properties of the backfill material are $\gamma = 110 \text{ lb/ft}^3$ and $\phi = 30^\circ$. Galvanized steel ties are to be used for the construction of the wall. Design the Reinforcements with $FS_{(B)} = 3$, $FS_{(p)} = 3$, $f_y = 29,000 \text{ psi}$ and $\phi_{\text{tie}} = 20^\circ$. The properties of the in-situ soil below the retaining wall are $\gamma = 120 \text{ lb/ft}^3$, $\phi = 30^\circ$, and $c = 150 \text{ lb/ft}^2$. Design the panels and the ties of the wall.

