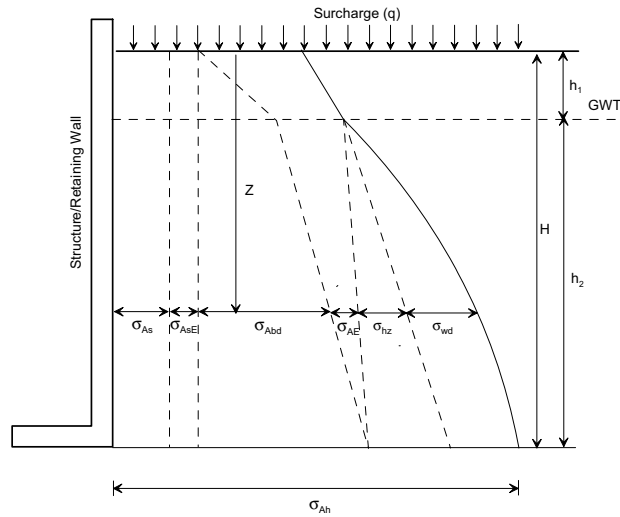


Comanche Peak Nuclear Power Plant, Units 3 & 4
COL Application
Part 2, FSAR



$$k_A = \tan^2(45 - \frac{\phi'}{2}) \cong 0.307$$

Static active earth pressure coefficient

$$\Delta K'_{AE} = K'_{AE} - k_A \cong 0.133$$

Seismic active earth pressure coefficient (submerged case)

$$\sigma_{As} = k_A q \cong 0.307q$$

Static lateral pressure due to surcharge

$$\sigma_{AsE} = \Delta K'_{AE} q \cong 0.133q$$

Seismic lateral pressure due to surcharge

$$\sigma_{Abd} = k_A \gamma_t Z \cong 38.41Z$$

Static lateral pressure due to backfill above GWT ($Z \leq h_1$)

$$\sigma_{Abd} \cong 38.41h_1 + 19.23(Z - h_1)$$

Static lateral pressure due to backfill below GWT ($Z > h_1$)

$$\sigma_{AE} = \Delta K'_{AE} \gamma_e (H - Z) \cong 8.33(H - Z)$$

Seismic lateral pressure due to backfill

$$\sigma_{hz} = \gamma_w (Z - h_1) \cong 62.4(Z - h_1)$$

Hydrostatic lateral pressure due to GWT ($Z > h_1$)

$$\sigma_{wd} = \frac{7}{8} k_h \gamma_w \sqrt{h_2 (Z - h_1)} \cong 5.46 \sqrt{h_2 (Z - h_1)}$$

Hydrodynamic lateral pressure due to GWT ($Z > h_1$)

$$\sigma_{Ah} = \sigma_{As} + \sigma_{AsE} + \sigma_{Abd} + \sigma_{AE} + \sigma_{hz} + \sigma_{wd}$$

Static plus seismic active horizontal pressure

Notes:

- Units: lbs/ft² for pressure and ft for dimensions.
- Assumed compacted backfill properties:
 - Total unit weight: $\gamma_t = 125$ lbs/ft³
 - Internal effective friction angle: $\phi' = 32^\circ$
 - Effective cohesion intercept: $C' = 0$
- Hydrodynamic component does not apply to low permeability soils ($k < 10^{-3}$ cm/sec).
- Compaction earth pressure is not included based on the assumption that light compaction equipment is used for compaction of soil adjacent to below-grade walls.

Figure 2.5.4-242 Active Earth Pressure