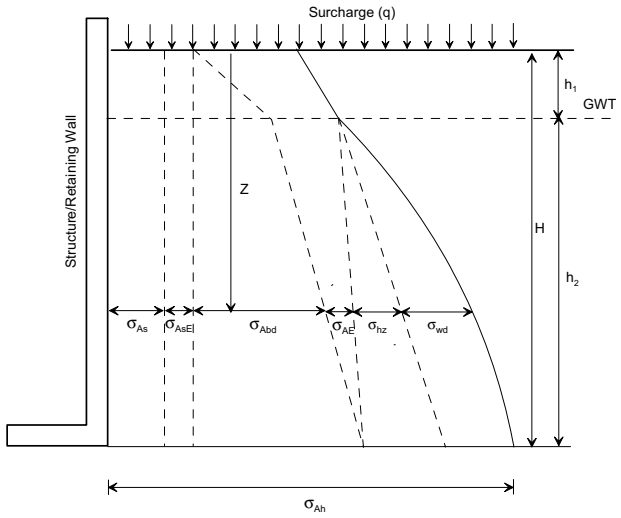

$k_A = \tan^2(45 - \frac{\phi'}{2}) \cong 0.307$ Static active earth pressure coefficient

$\Delta K'_{AE} = K'_{AE} - k_A \cong 0.133$ 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/ft^2 for pressure and ft for dimensions.
- Assumed compacted backfill properties:
  - Total unit weight: γ_t =125 lbs/ft^3
  - Internal effective friction angle: ϕ' = 32°
  - 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