

Given:

Reinforced concrete retaining wall located in Philadelphia, PA
Design Code = IBC 2012
Concrete unit weight $w_c = 150$ pcf
Soil unit weight $\gamma = 120$ pcf
Angle of internal friction $\phi = 32^\circ$
Base friction coefficient $\mu = 0.4$
Active Earth pressure coefficient $K_a = 0.33$
Passive earth pressure coefficient $K_p = 3.0$
At rest earth pressure coefficient $K_o = 0.5$
Allowable bearing pressure = 4000 psf
Surcharge live load = 250 psf
Soil above and in front of the toe of the wall is considered to be loose backfill
Adequate drainage is provided behind the wall
Ignore seismic load on the wall

Determine:

- Predict the limiting failure mode prior to performing any calculations.
- Determine the factor of safety for sliding, overturning, and bearing.
- If needed, discuss how you would modify the retaining wall to meet all acceptable factors of safety.

