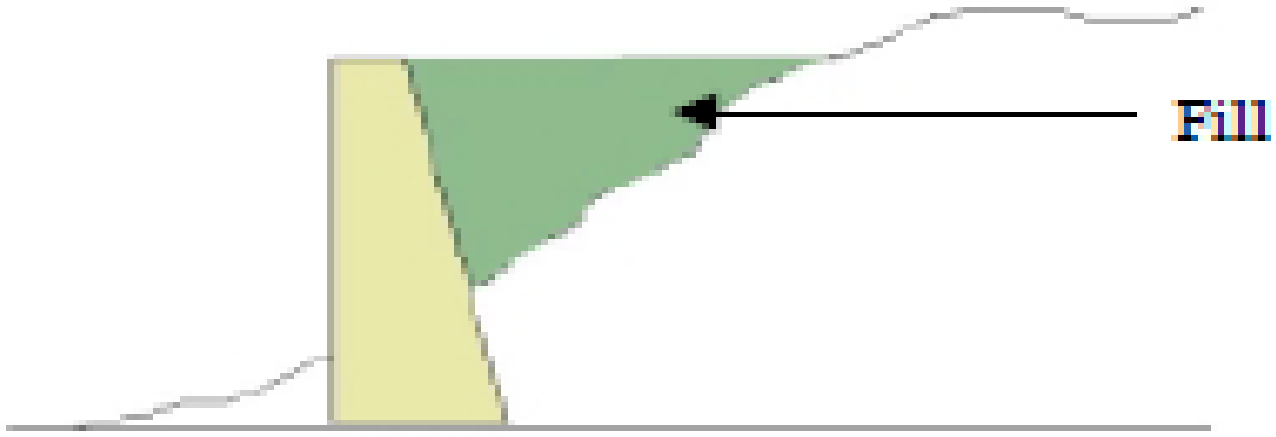
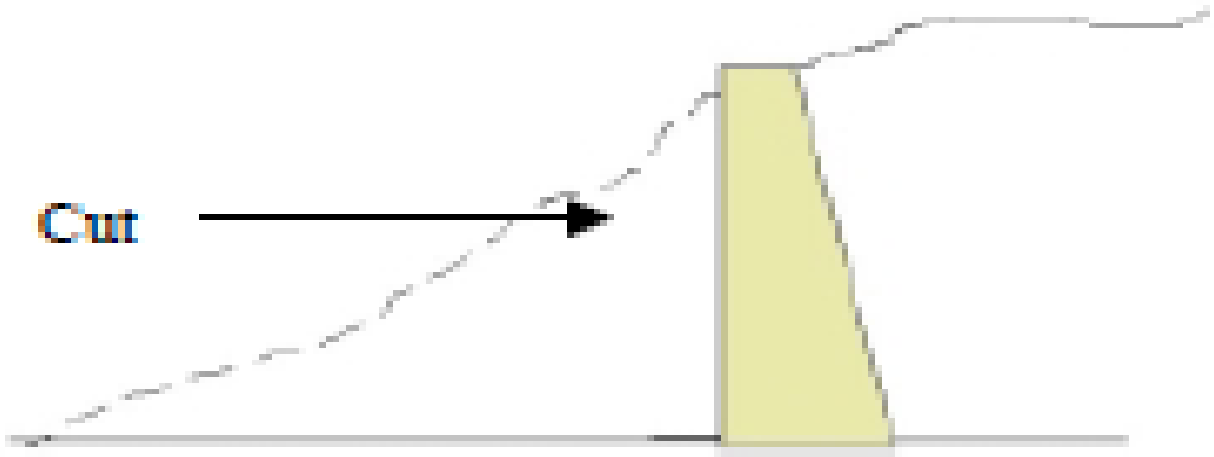
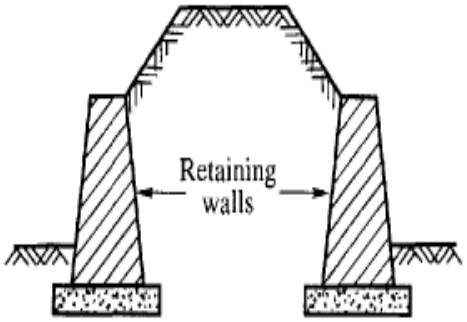
Lateral Earth Pressure



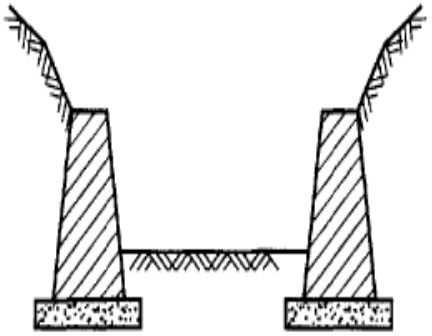
Retaining Wall to Support a Fill.



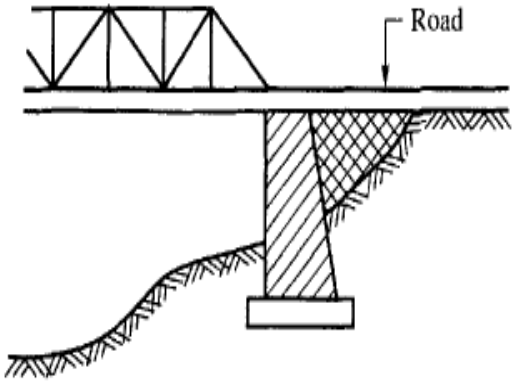
Retaining Wall to Support a Cut.



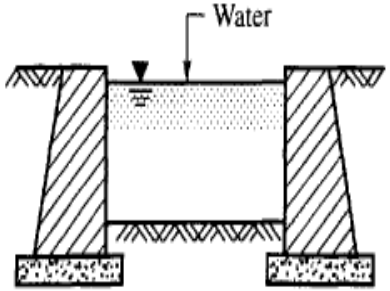
(a) Embankment



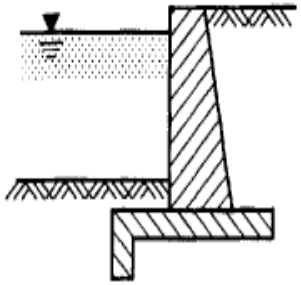
(b) Cut



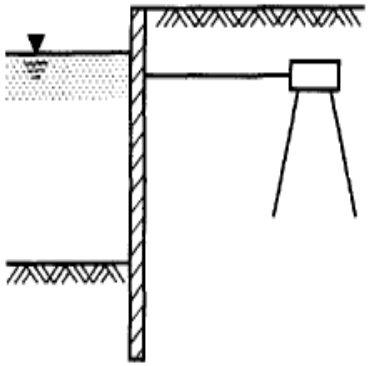
(c) A bridge abutment



(d) Water storage



(e) Flood walls



(f) Sheet pile wall


AVIS


Sheet pile wall

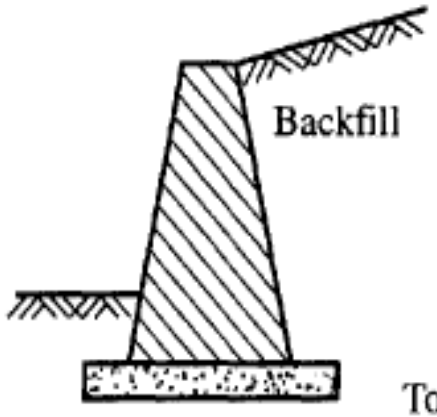
Types of retaining walls

1. Gravity retaining walls
2. Cantilever retaining walls
3. Counter fort retaining walls.

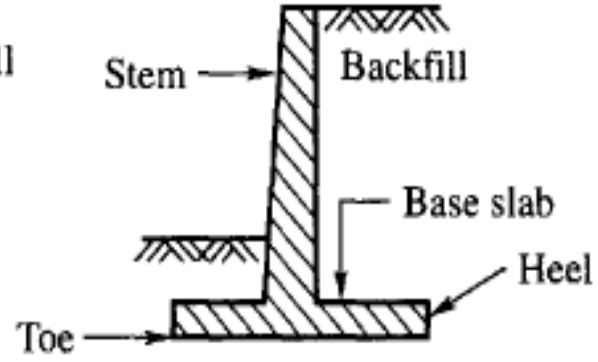
Gravity Wall

Cantilever wall

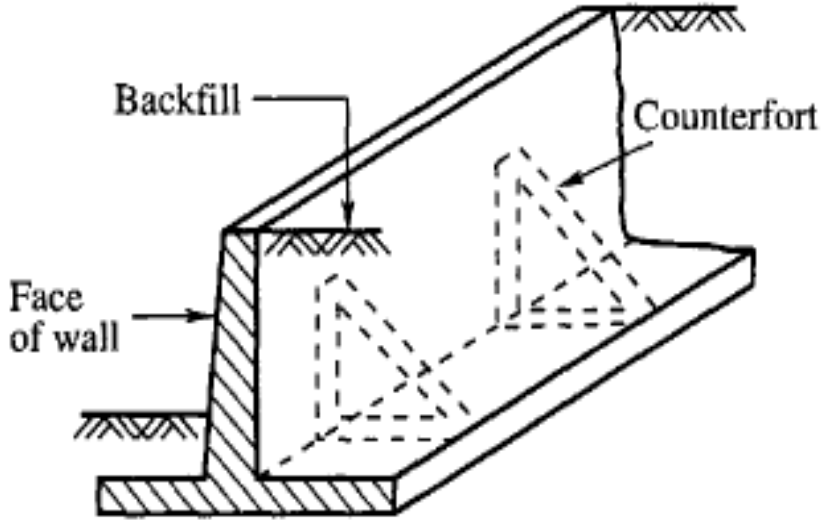
(a) Gravity walls



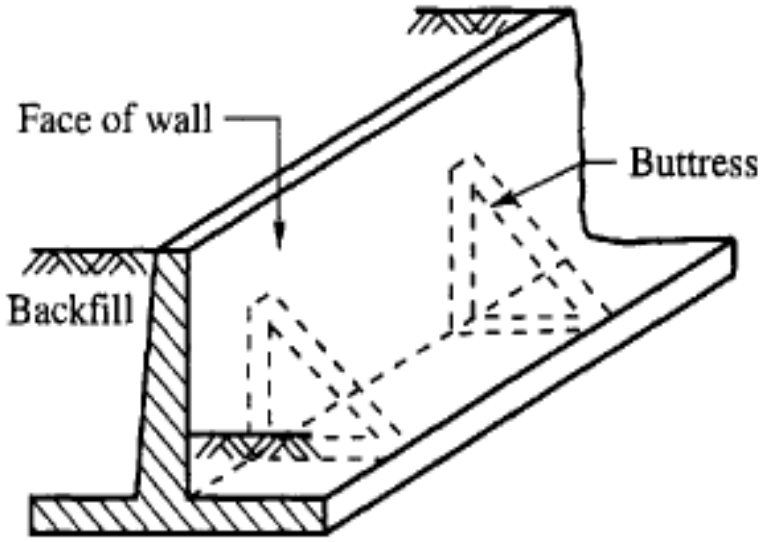
(b) Semi-gravity walls



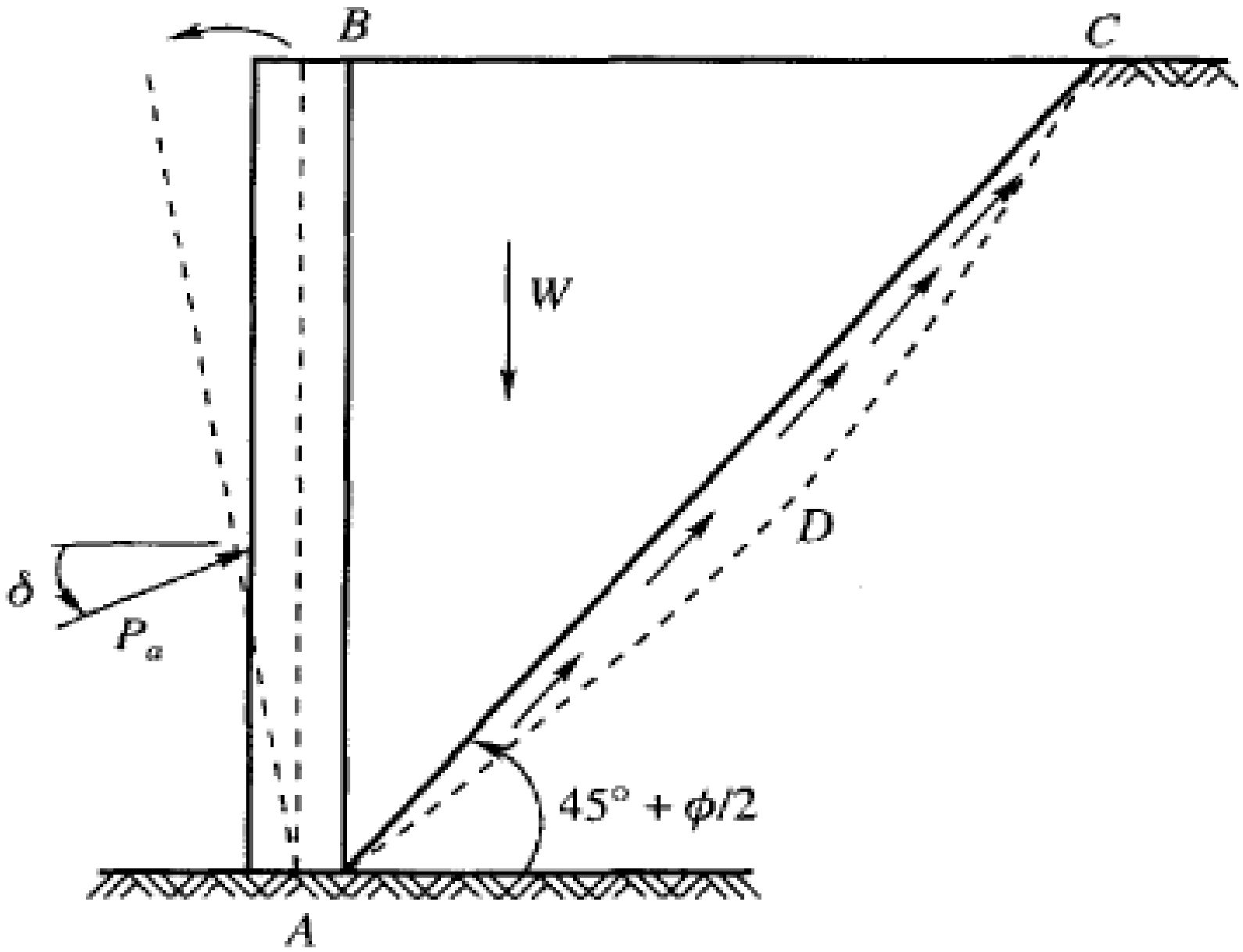
(c) Cantilever walls



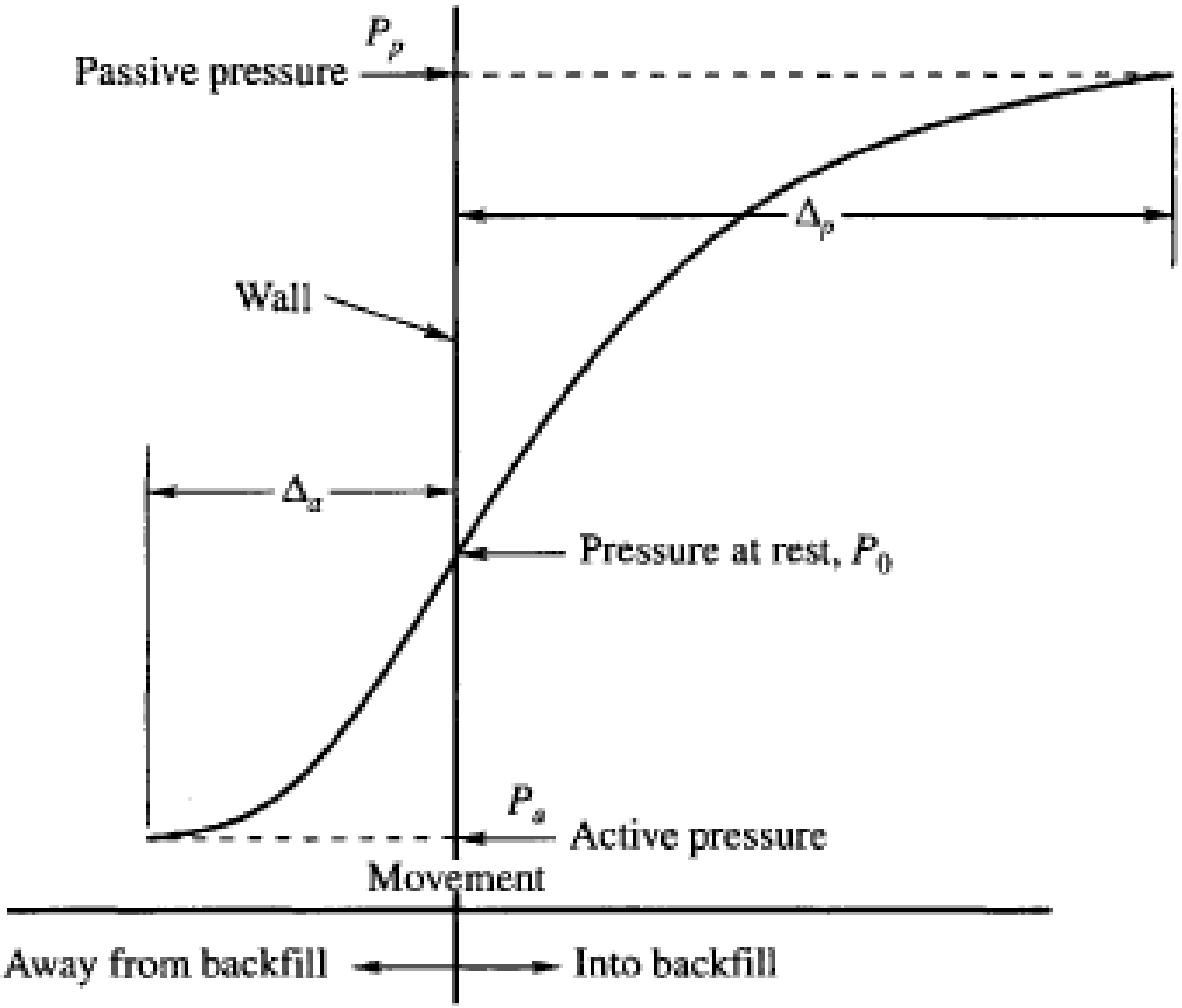
(d) Counterfort walls

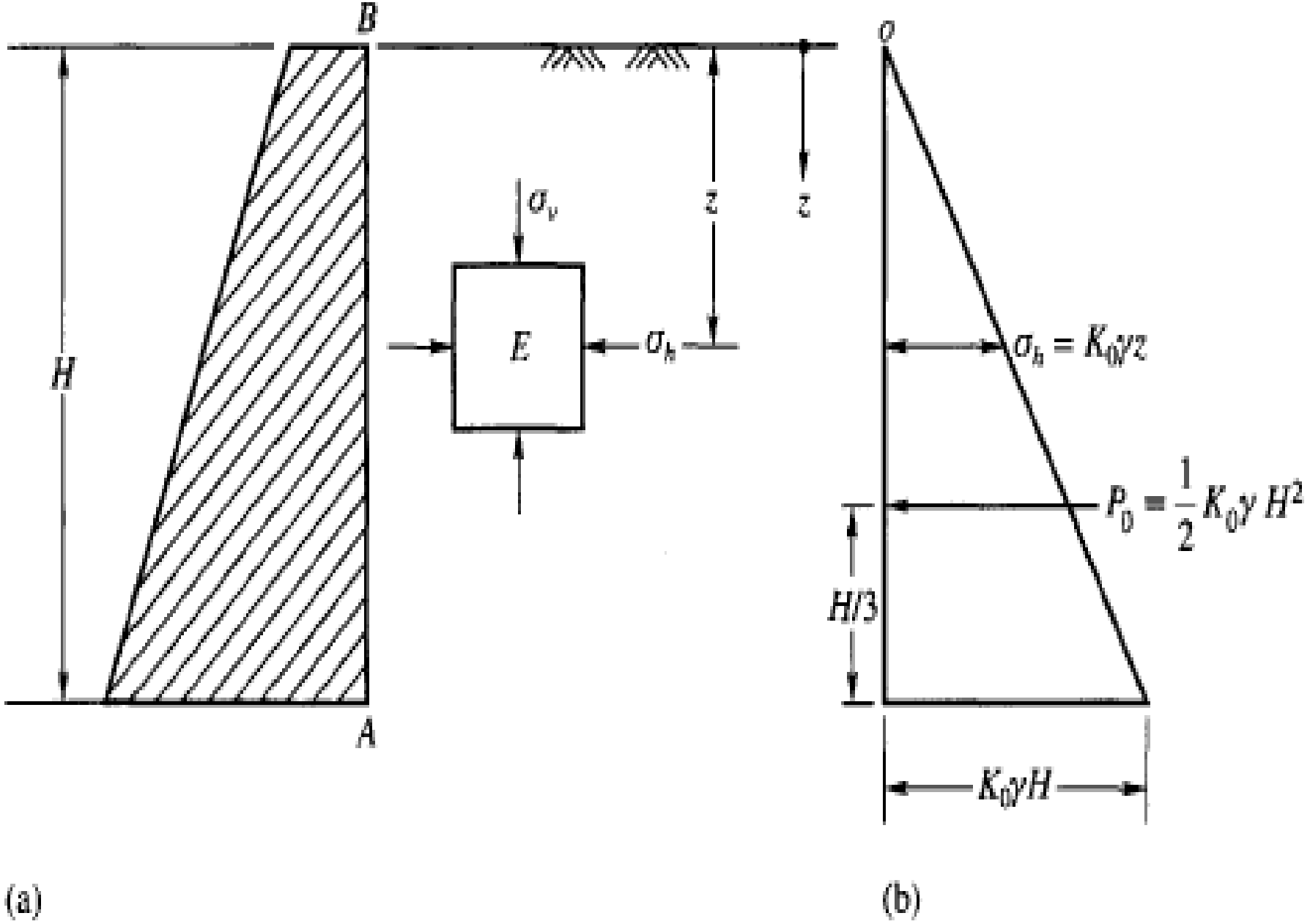


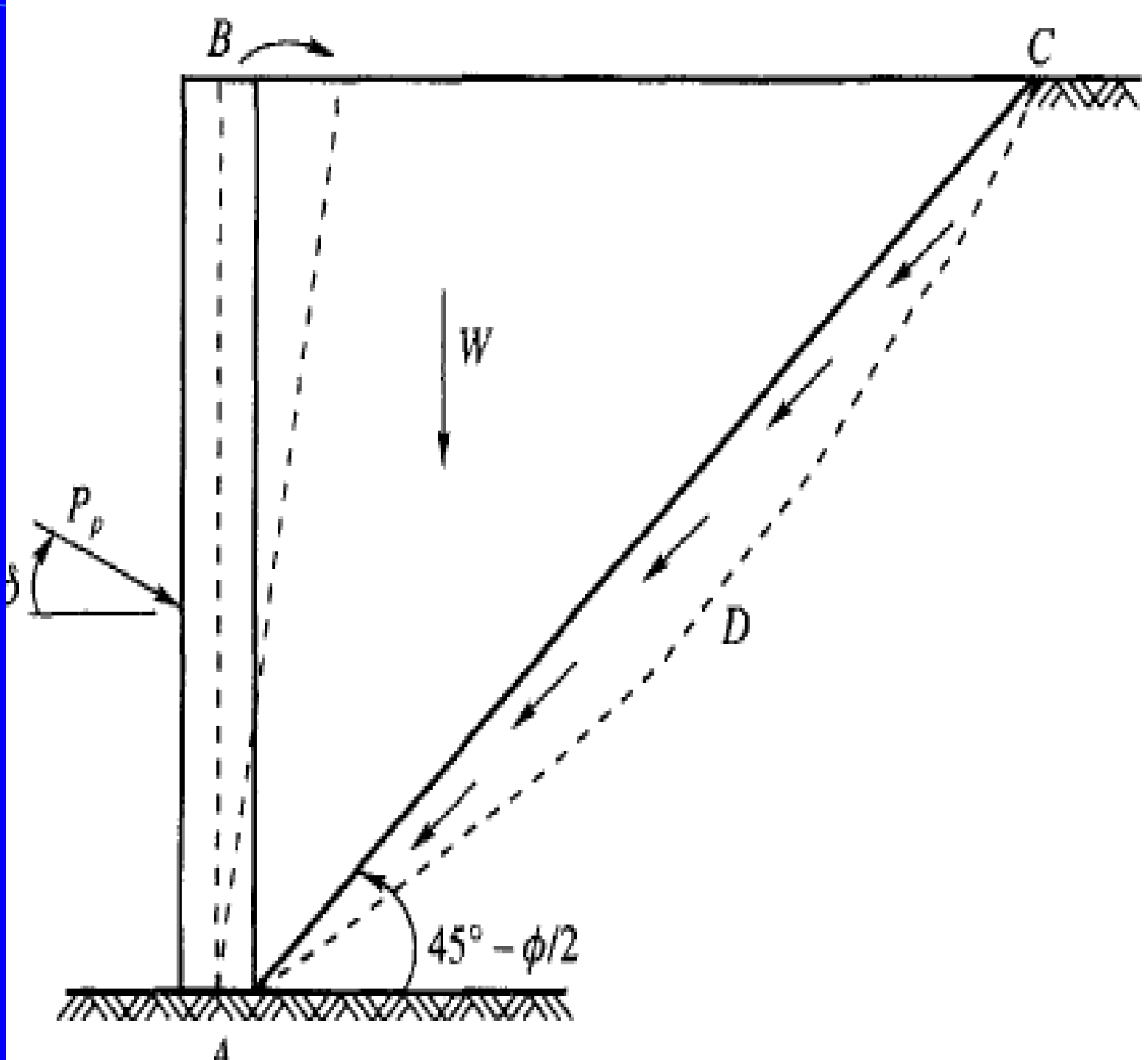
(e) Buttressed walls



(a) Active earth pressure


P_p
Passive pressure
Δ_p
Wall
Δ_a
Pressure at rest, P_0
P_a
Active pressure
Movement
Away from backfill
Into backfill


B
A
H
σ_v
E
σ_h
z
z
O
$\sigma_h = K_0 \gamma z$
$P_0 = \frac{1}{2} K_0 \gamma H^2$
H/3
$K_0 \gamma H$
(a)
(b)


B
C
W
P_p
D
$45° - \phi/2$
A

Earth Pressure Theories

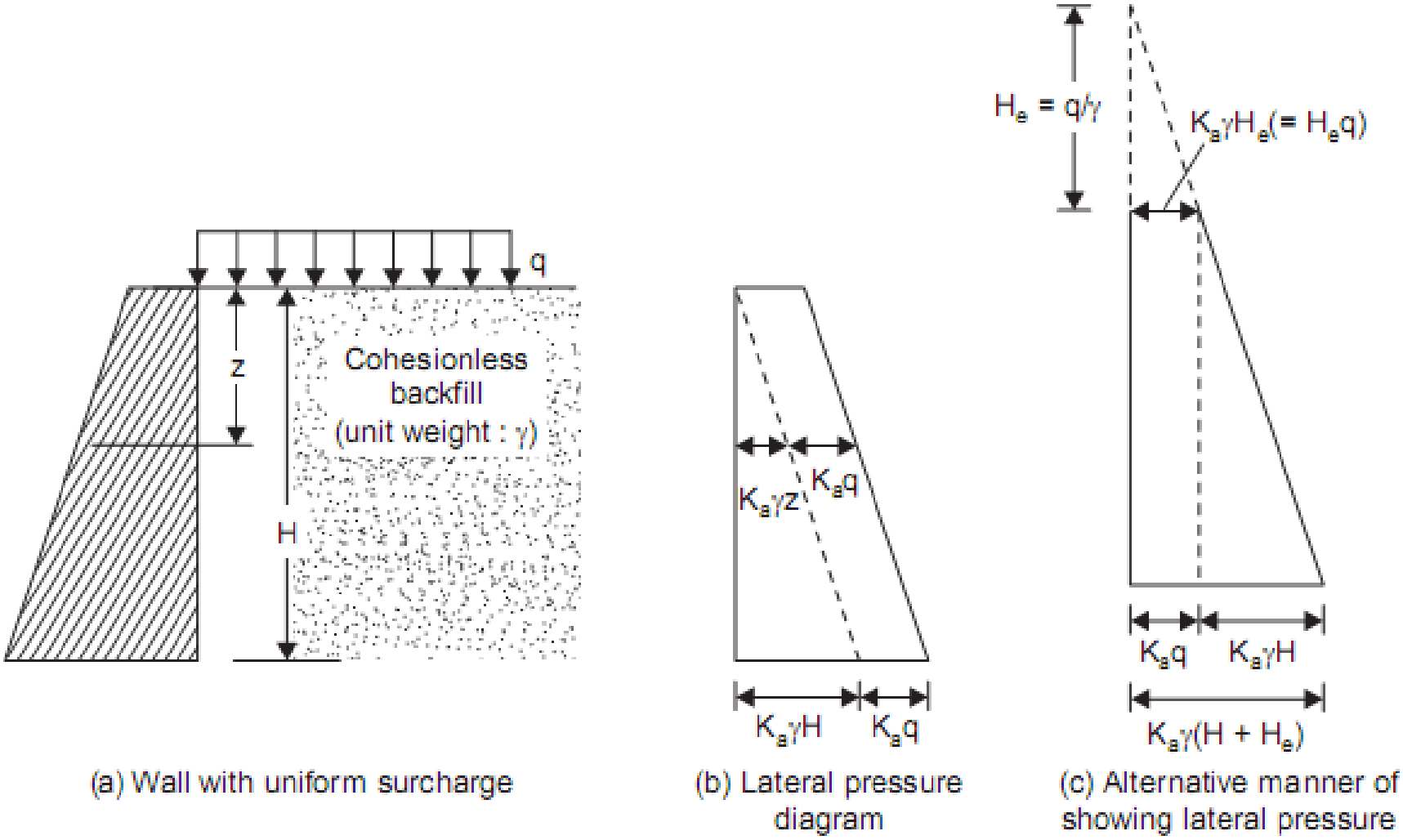
- Rankine Earth Pressure Theory
- Coulomb Earth Pressure Theory

Rankine's Theory

- Soil mass is semi-infinite, homogeneous, dry and cohesionless
- Friction between the wall and soil is neglected
- Lateral pressure is limited to vertical walls
- Failure along an assumed failure plane defined by φ.

Rankine's Theory

- Lateral pressure varies linearly with depth and the resultant pressure is located
- one-third of the height (H) above the base of the wall
- Resultant force is parallel to the backfill surface
- The wall yields about the base sufficiently for the active pressure conditions to develop

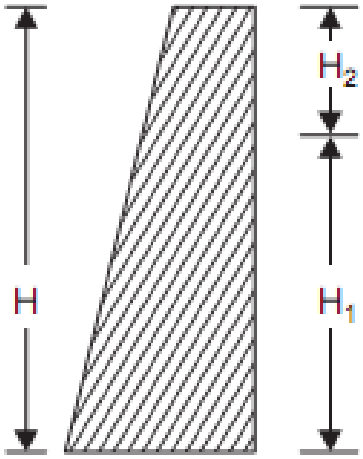


(a) Wall with uniform surcharge

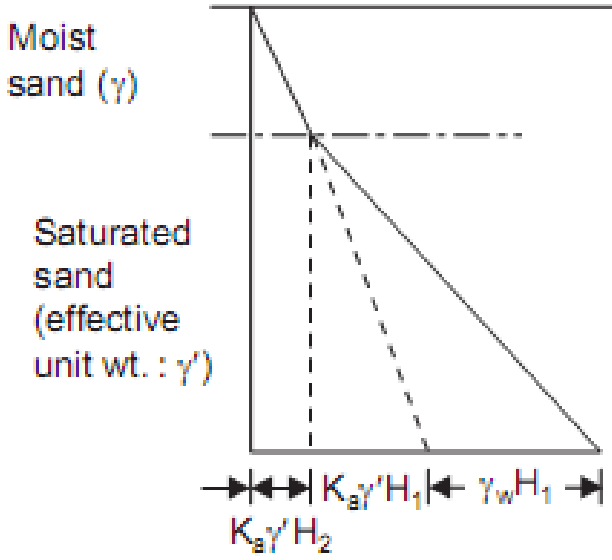
(b) Lateral pressure diagram

(c) Alternative manner of showing lateral pressure

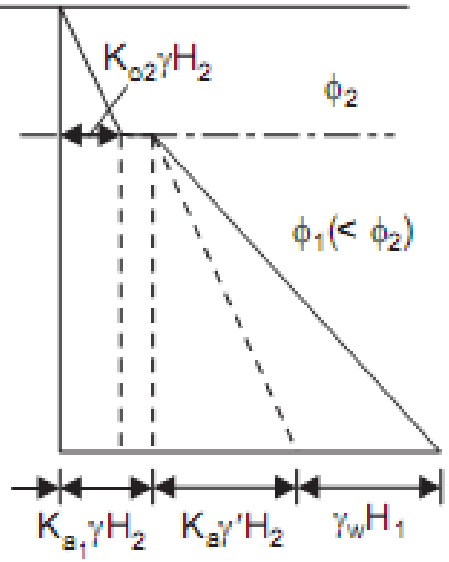
Effect of uniform surcharge on lateral pressure



(a) Partly submerged backfill

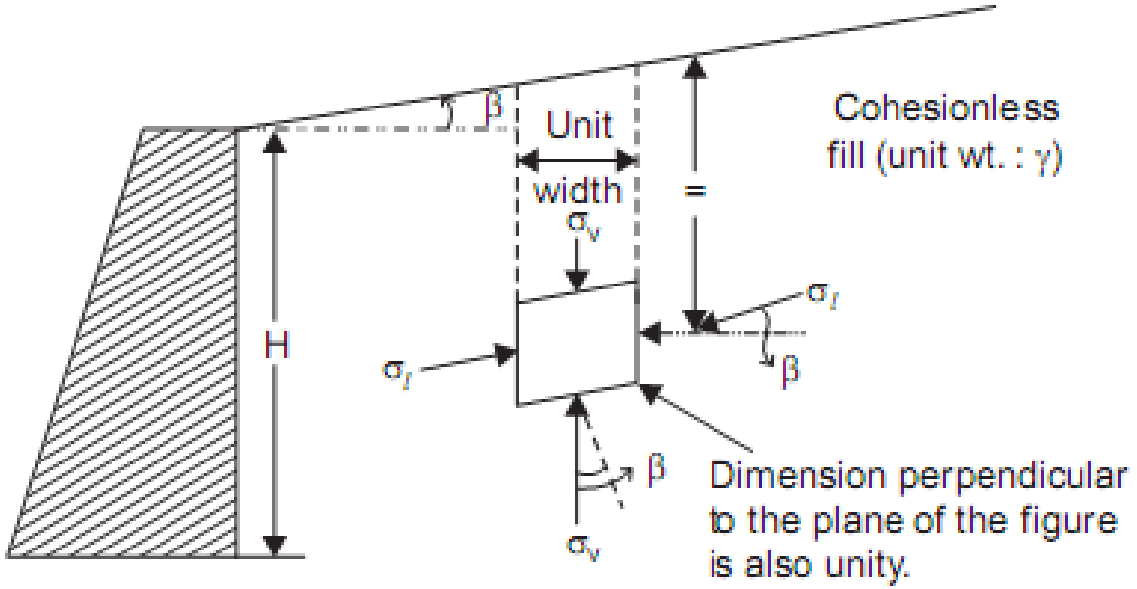


(b) Lateral pressure for partly submerged backfill

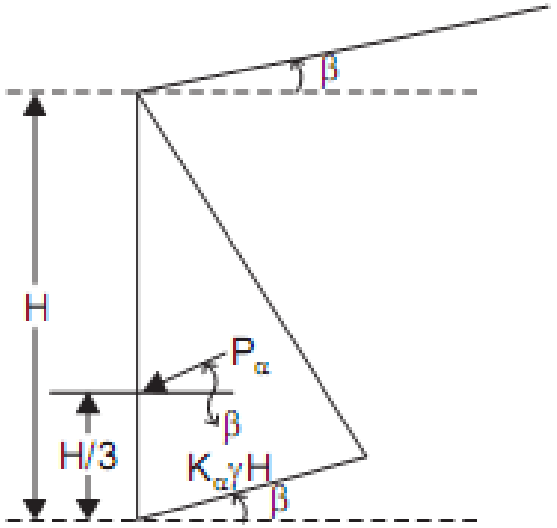


(c) Partly submerged backfill with different friction angles above and below the water table

Submerged Backfill and Stratified Backfill

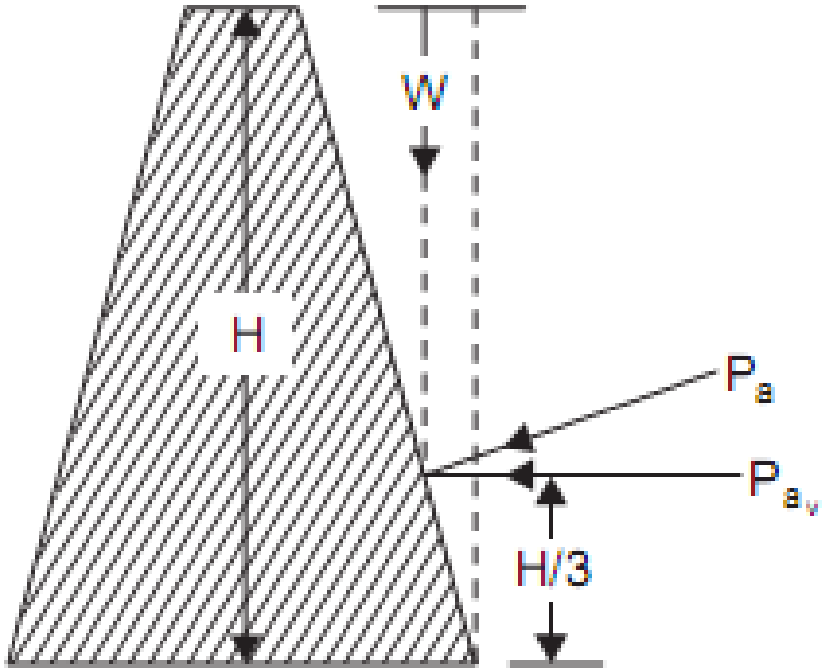


(a) Conjugate stresses on an element

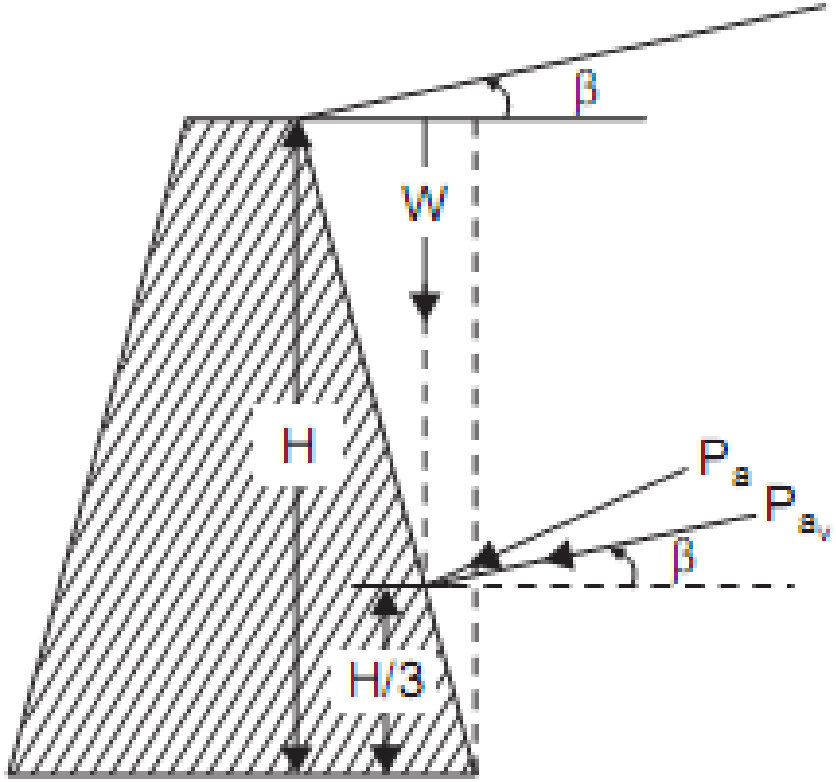


(c) Active pressure distribution

Inclined Surcharge or Sloping Backfill



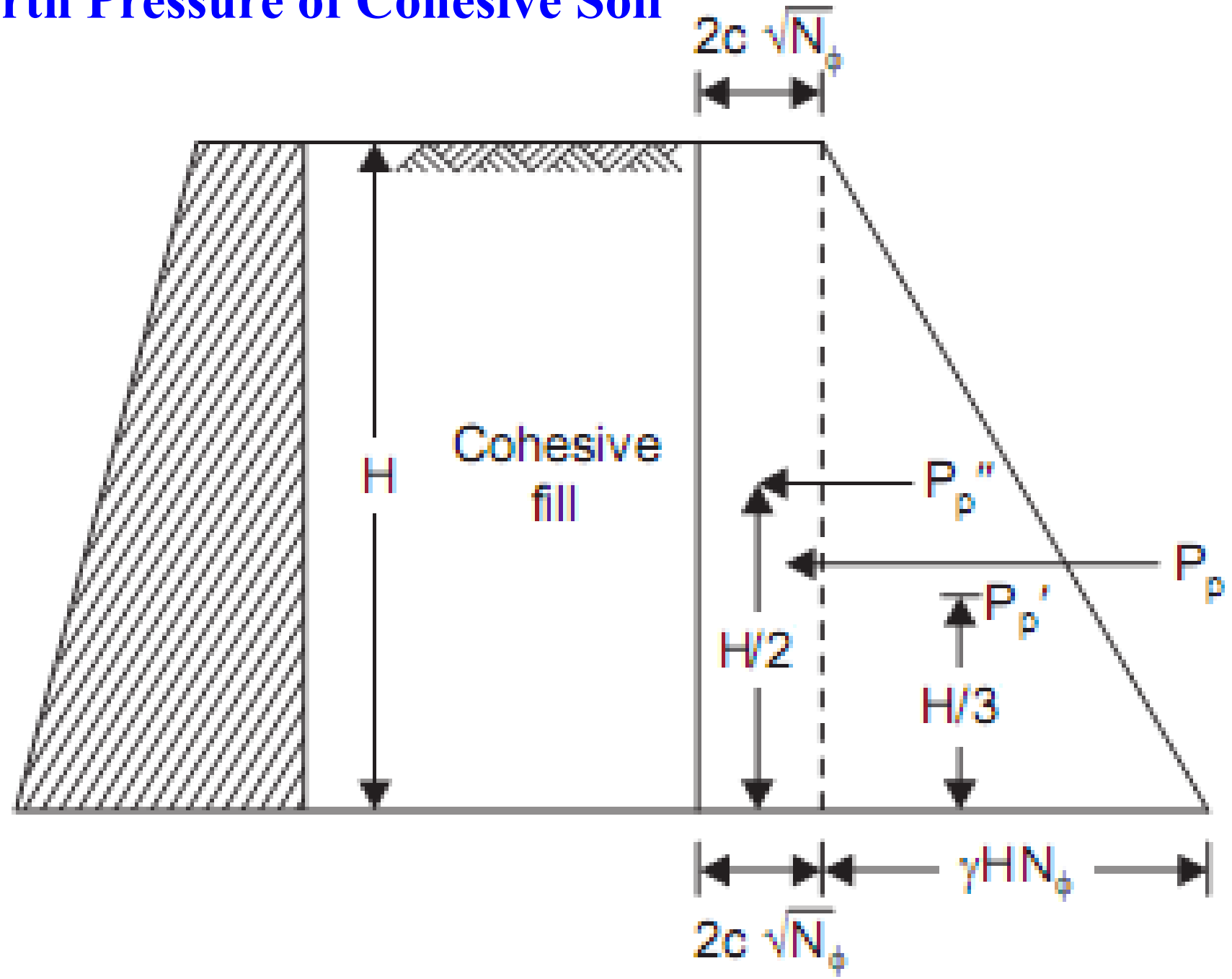
(a) Inclined back of wall—
Horizontal backfill

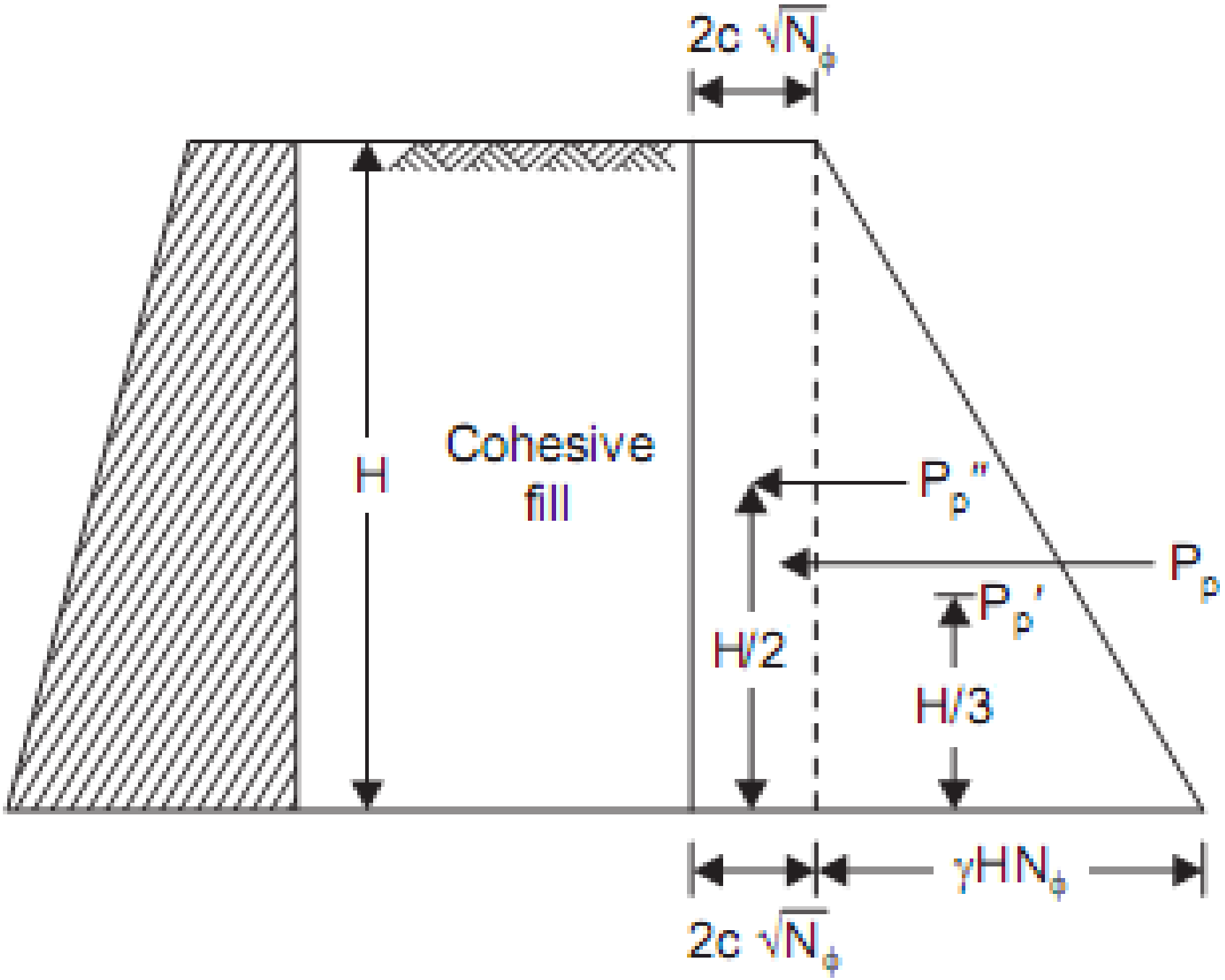


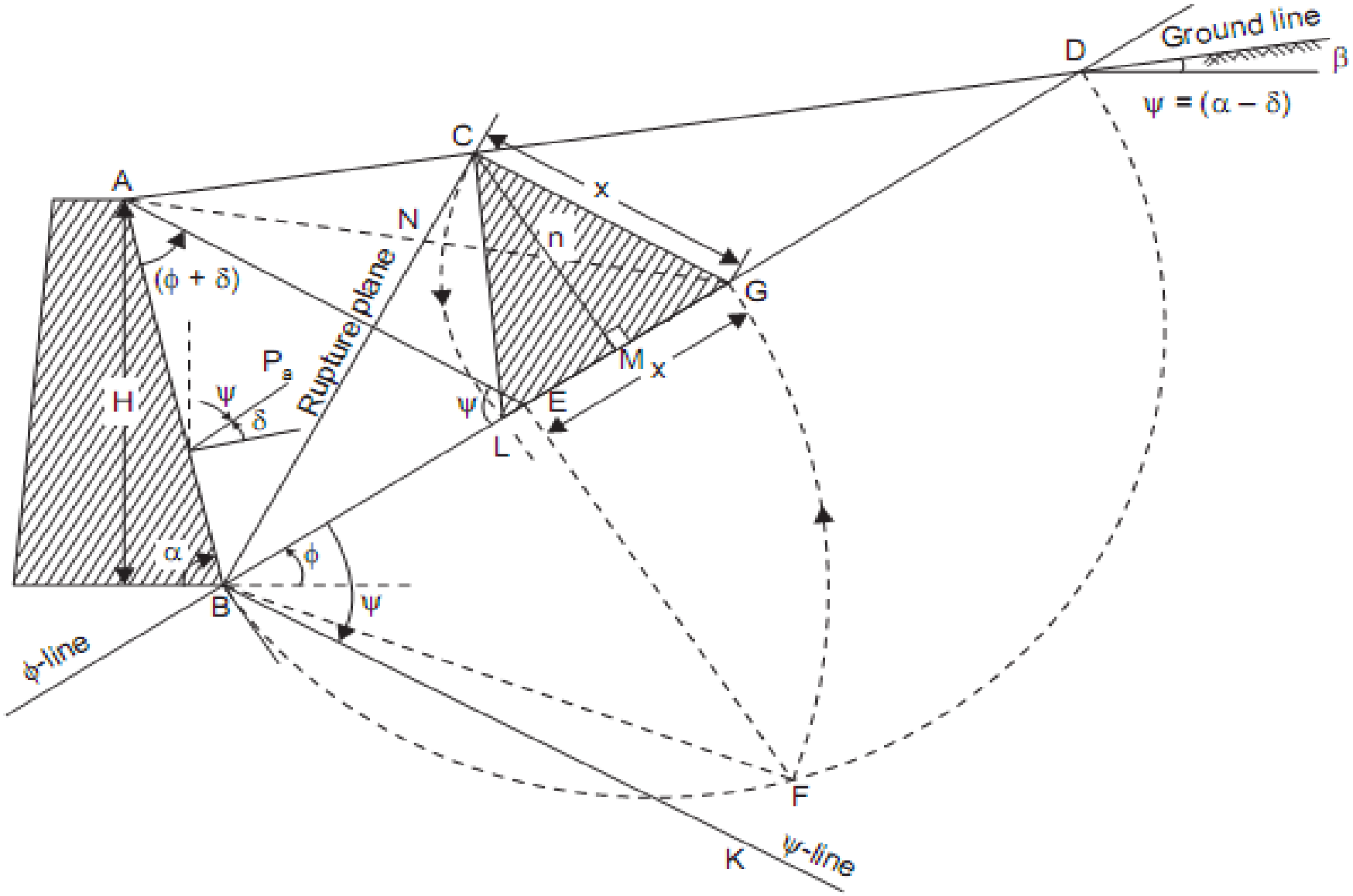
(b) Inclined back of wall—
Inclined backfill

Inclined Back of Wall

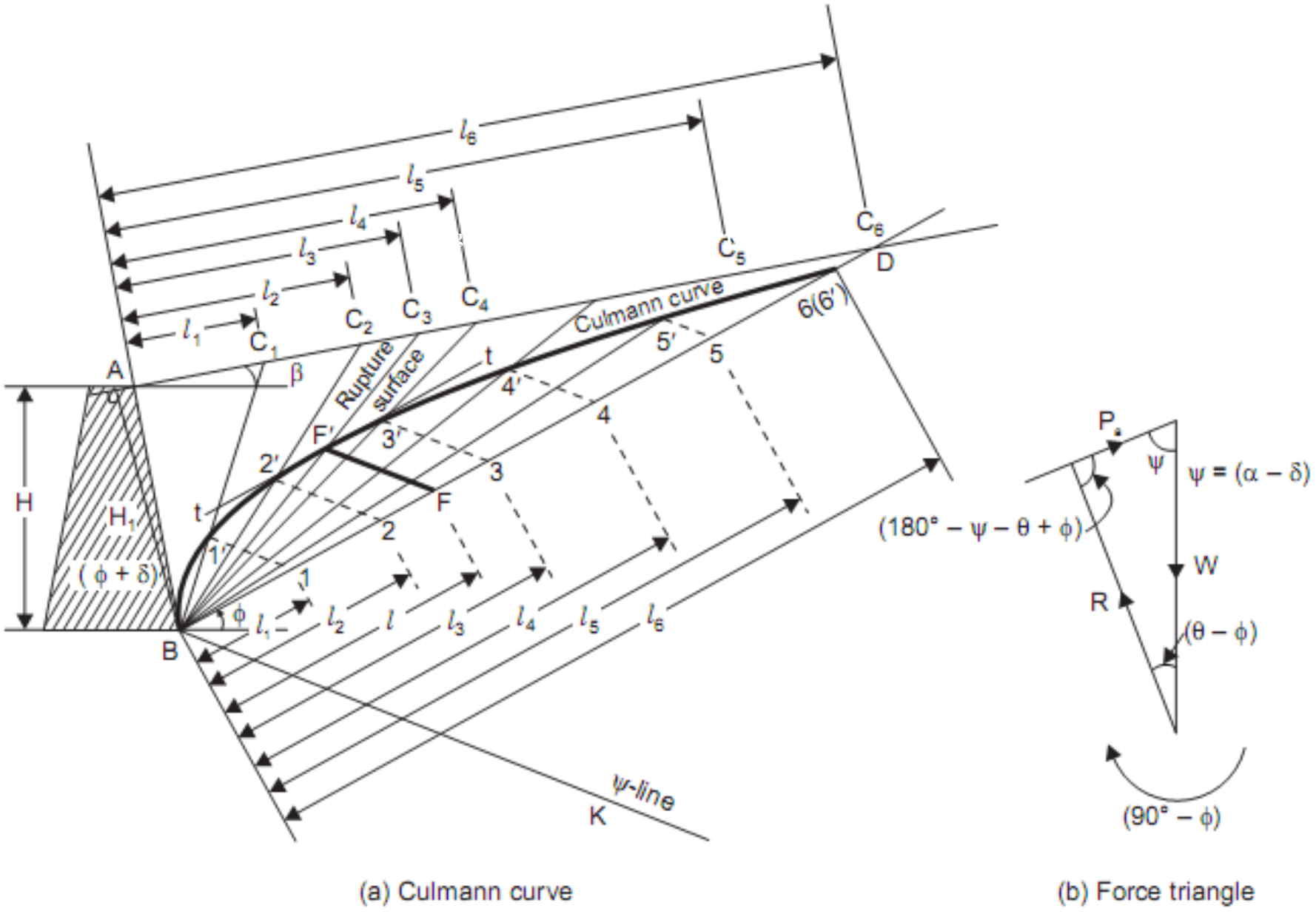
Earth Pressure of Cohesive Soil




2c √N_φ
H
Cohesive
fill
P_p''
P_p
P_p'
H/2
H/3
γHN_φ
2c √N_φ



Rebhann's graphical method



(a) Culmann curve

(b) Force triangle

Culmann's graphical method