TYPICAL RETAINING WALL PARAMETERS

Note: Variables below refer to the Typical Equations that follow and the Typical Retaining Wall Analysis Parameters diagrams shown on Plate No.'s A1 and A2.

Wall Variables:

H	-	Exposed wall height
H_a	-	Effective wall height retaining soil
h	-	Wall embedment depth
b	-	Width of wall base
γ_w	-	Unit weight of wall components
q	-	Surcharge loading
i	-	Angle of backfill with the horizontal
α	-	Angle of wall batter from vertical
β	-	Angle between a line connecting the back of the wall, with the horizontal
W_x	-	Weight of components of typical cross section of wall
d_x	-	Distance from the toe of the wall to the centroid of components of cross section

Soil Variables:

γ_s	-	Unit weight of soil
δ_a	-	Angle of wall friction
ϕ	-	Angle of internal friction
f	-	Frictional coefficient at base
K_a	-	Active earth pressure coefficient
K_p	-	Passive earth pressure coefficient
B_a	-	Allowable soil bearing pressure
B_p	-	Design soil bearing pressure

Load Variables:

F_r	-	Forces resisting sliding along the base
F_s	-	Forces causing sliding along the base
M_r	-	Moments resisting overturning about the toe
M_o	-	Moments causing overturning about the toe
P_a	-	Active soil force
P_p	-	Passive soil force
P_s	-	Active soil force due to surcharge
FS_s	-	Factor of safety against sliding
FS_o	-	Factor of safety against overturning

TYPICAL EQUATIONS FOR RETAINING WALL ANALYSIS USING THE COULOMB METHOD

Note: The equations make use of the previous list of variables and repair to the typical retaining wall analysis diagrams shown on Plate No.'s A1 and A2.

A. Forces acting on wall due to:

1. Active Pressure

$$P_a = 1/2\ K_a\ \gamma_s\ H_a^2$$

Where

$$K_a = \left[\frac{\text{cosec } \beta \sin (\beta - \phi)}{\sqrt{\sin (\beta + \delta)} + \sqrt{\frac{\sin (\delta + \phi) \sin (\phi - i)}{\sin (\beta - i)}}} \right]^2$$

2. Passive Pressure

$$P_p = 1/2\ K_p\ \gamma_s\ h^2$$

Where

$$K_p = \left[\frac{\text{cosec } \beta \sin (\beta + \phi)}{\sqrt{\sin (\beta - \delta)} - \sqrt{\frac{\sin (\delta + \phi) \sin (\phi + i)}{\sin (\beta - i)}}} \right]^2$$

3. Surcharge Pressure

$$P_s = K_a\ q\ H_a$$

B. Stability Against Sliding Along the Base:

1. Sliding Forces:

$$\Sigma F_s = (\Sigma \text{ horizontal sliding forces})$$

$$= P_a \cos (\delta + \beta - 90) + P_s \cos (\delta + \beta - 90)$$

2. Resisting Forces:

$$\Sigma F_r = (\Sigma \text{ vertical forces}) \ (f) + P_p$$

$$= [P_a \sin (\delta + \beta - 90) + P_s \sin (\delta + \beta - 90) + \Sigma W_x] \ (f) + P_p$$

3. Factor of Safety Against Sliding:

$$\mathbf{FS_s} = \frac{\Sigma \text{Resisting Forces}}{\Sigma \text{ Sliding Forces}} = \frac{\Sigma F_r}{\Sigma F_s} \geq \mathbf{1.5} \text{ if passive resistance } P_p \text{ is ignored}$$

C. Stability Against Overturning About the Toe:

1. Overturning Moment:

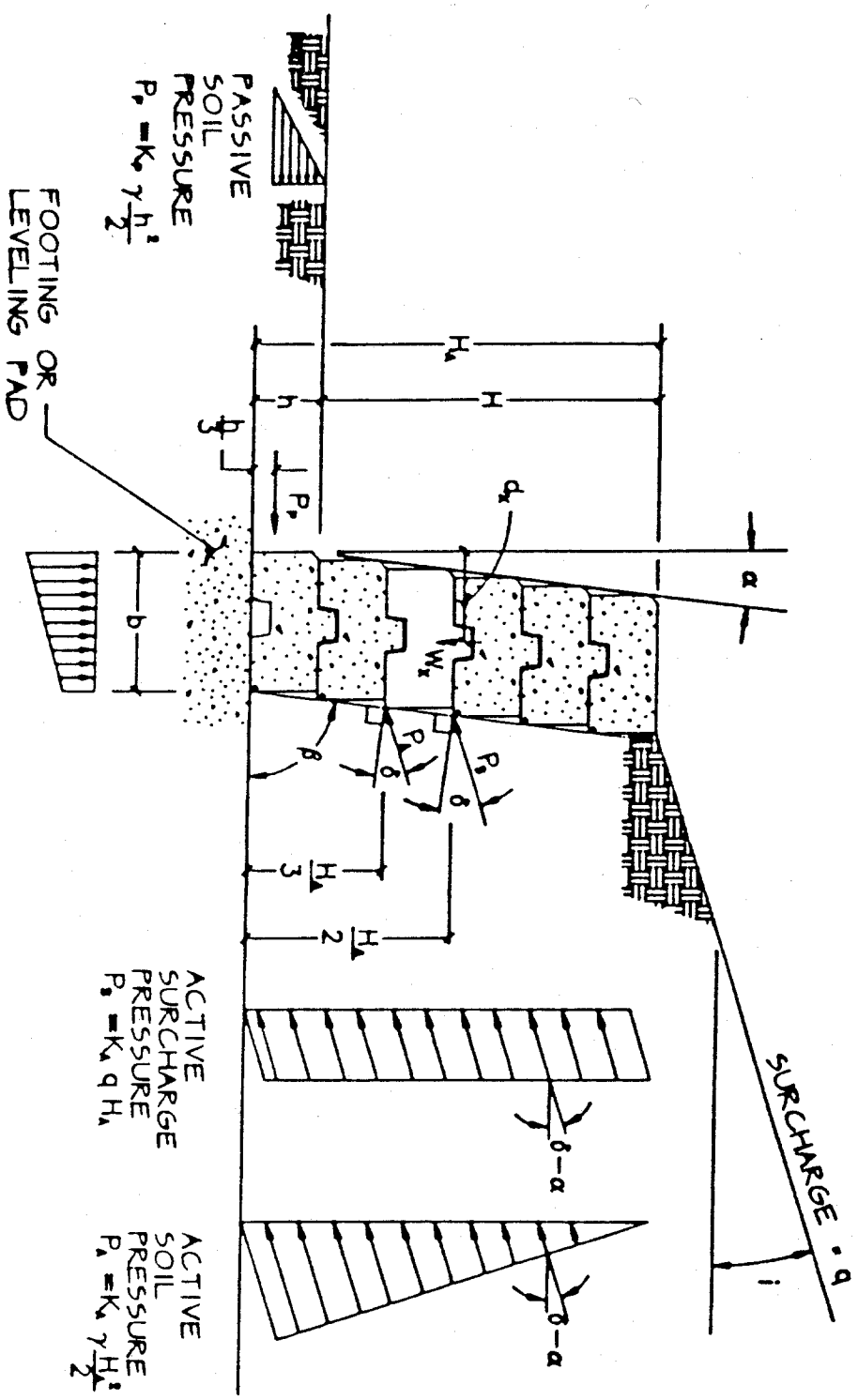
$$\Sigma M_o = [P_a \cos (\delta + \beta - 90)] \ (H_a/3) + [P_s \cos (\delta + \beta - 90)] \ (H_a/2)$$

2. Resisting Moment:

$$\Sigma M_r = \Sigma(W_x)(d_x) + [P_a \sin (\delta + \beta - 90)] \ (d_a) + [P_s \sin (\delta + \beta - 90)] \ (d_s)$$

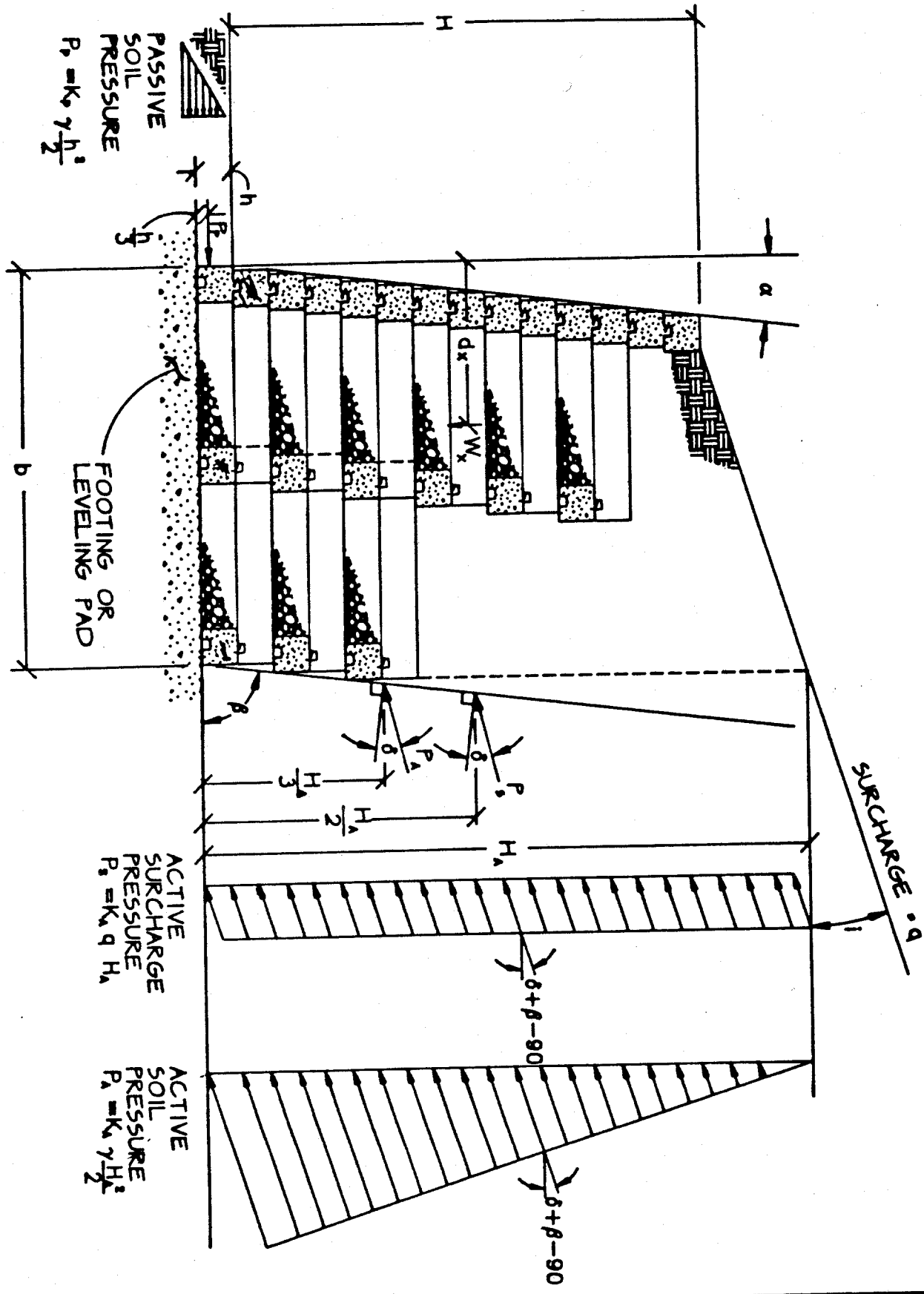
3. Factor of Safety Against Overturning:

$$\mathbf{FS_o} = \frac{\Sigma \text{ Resisting Moments}}{\Sigma \text{ Overturning Moments}} = \frac{\Sigma M_r}{\Sigma M_o} \geq \mathbf{2.0}$$



TYPICAL GRAVITY WALL ANALYSIS PARAMETERS

Scale: 3/8" = 1'-0"		Plate No. A-1



TYPICAL CRIB WALL ANALYSIS PARAMETERS

Scale: 1/4" = 1'-0"

Plate No. A-2