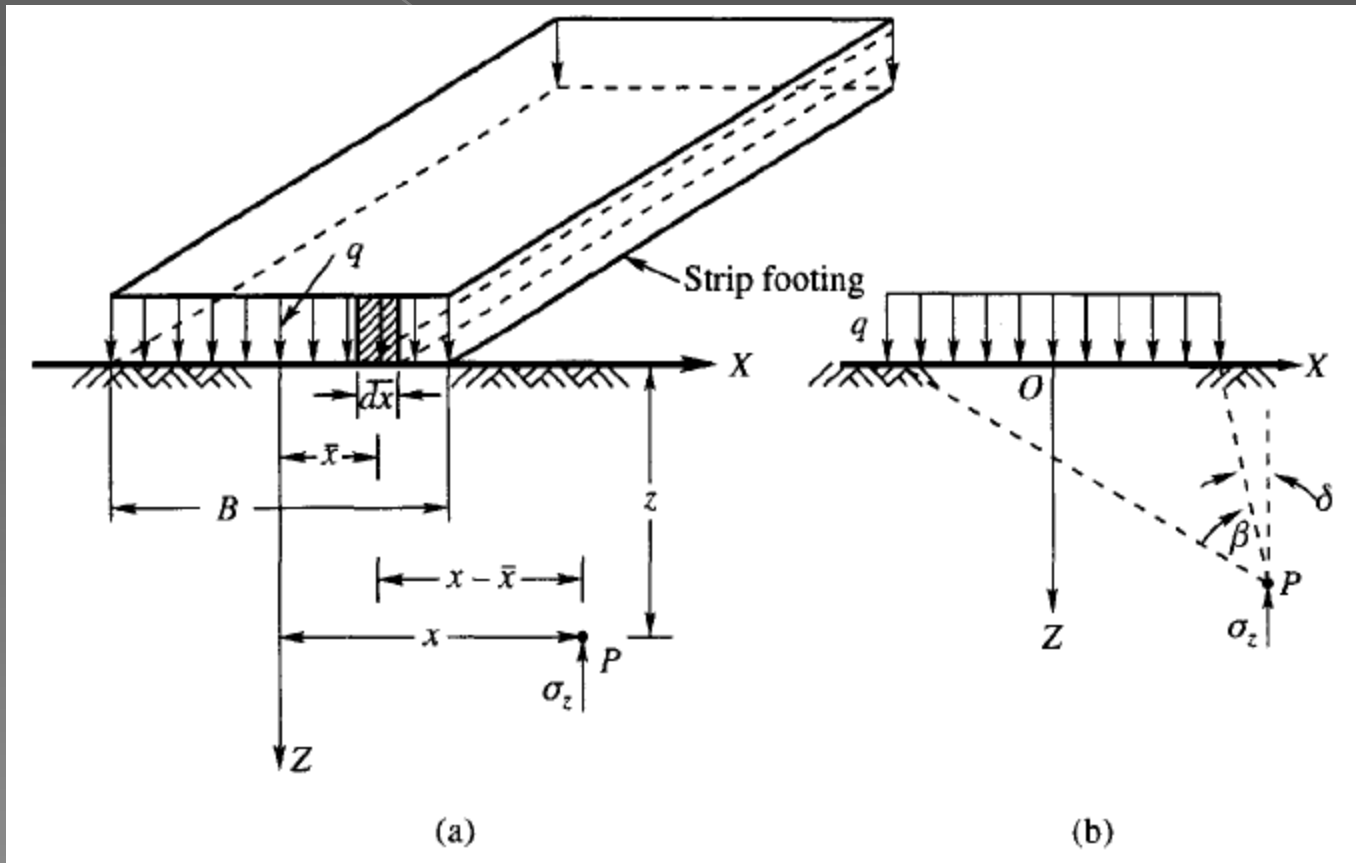


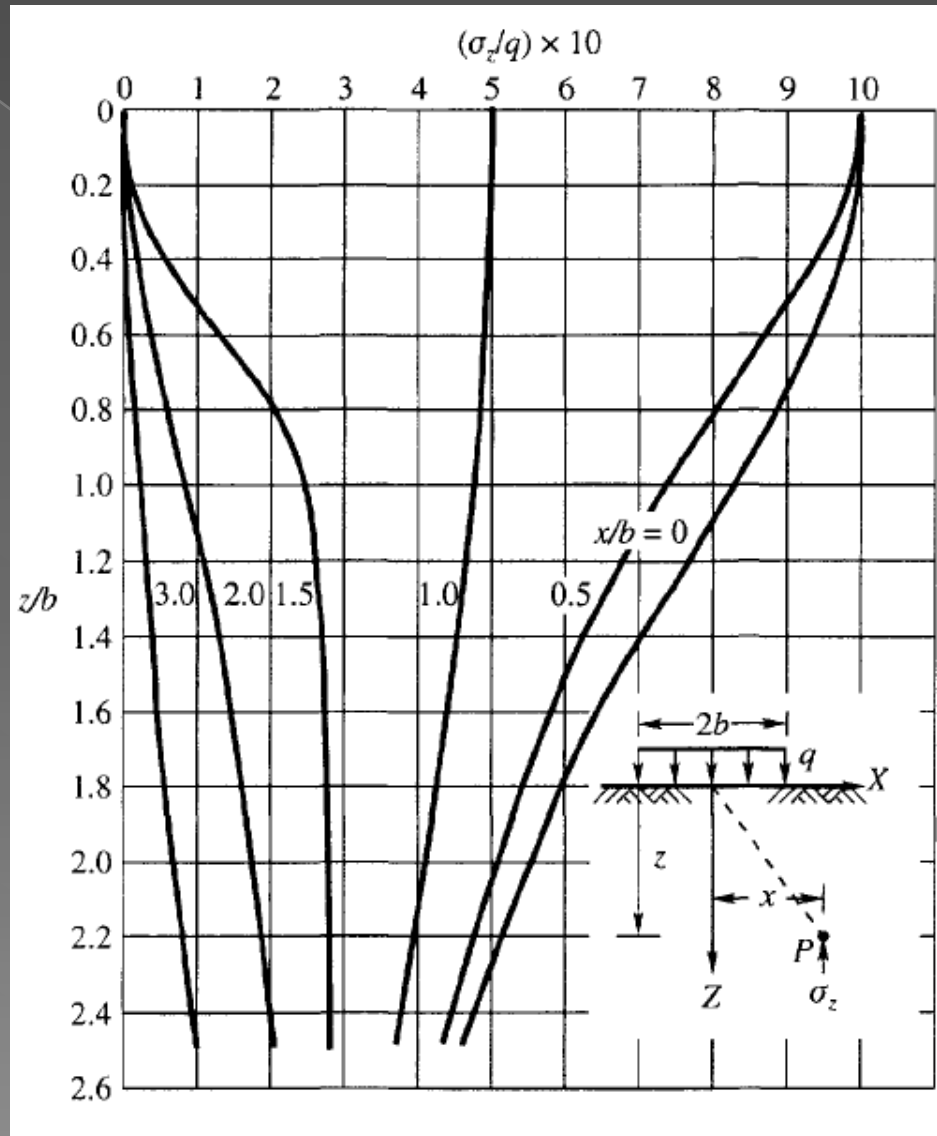
BEBAN MERATA MENERUS/STRIP

BOUSSINESQ

$$\sigma_z = \frac{q}{\pi} [\beta + \sin \beta \cos(\beta + 2\delta)]$$



BEBAN MERATA MENERUS/STRIP

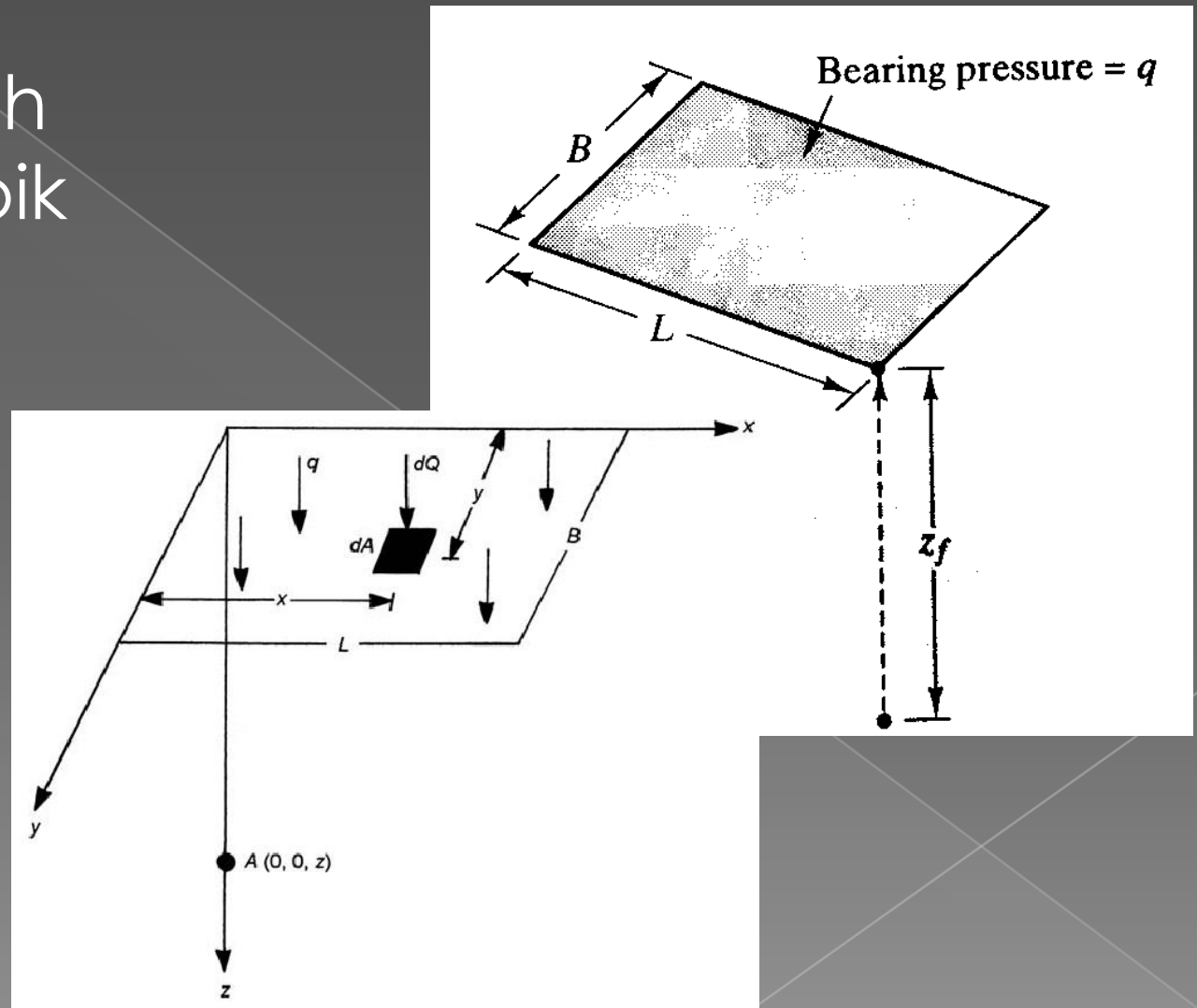


METODE BOUSSINESQ

ASUMSI : Tanah
adalah isotropik
(Tegangan ke
segala arah
sama, $K_0 = 1$)

$$m = B/z$$

$$n = L/z$$



METODE BOUSSINESQ

- Jika $m^2 + n^2 + 1 < m^2 n^2$

$$\Delta\sigma_v' = \frac{q'}{k\pi} \left[\frac{2mn\sqrt{m^2 + n^2 + 1}}{m^2 + n^2 + 1 + m^2 n^2} \cdot \frac{m^2 + n^2 + 2}{m^2 + n^2 + 1} + \pi - \sin^{-1} \left(\frac{2mn\sqrt{m^2 + n^2 + 1}}{m^2 + n^2 + 1 + m^2 n^2} \right) \right]$$

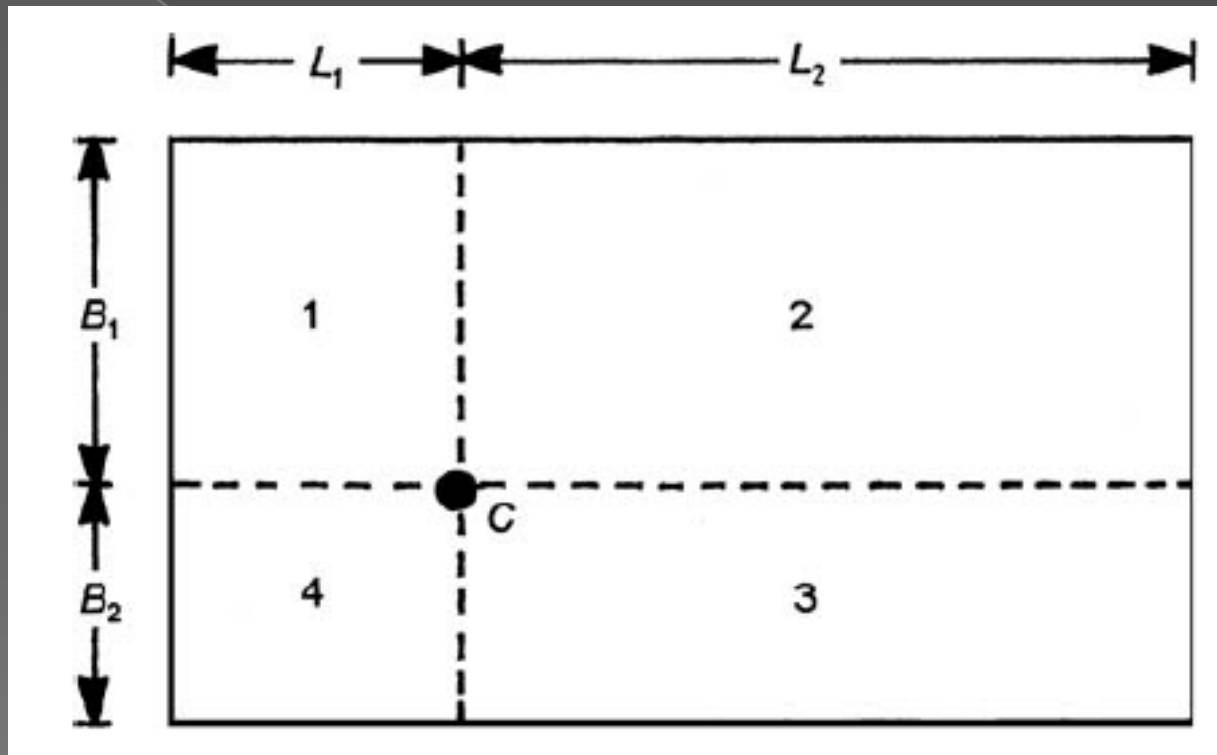
- Jika $m^2 + n^2 + 1 > m^2 n^2$

$$\Delta\sigma_v' = \frac{q'}{k\pi} \left[\frac{2mn\sqrt{m^2 + n^2 + 1}}{m^2 + n^2 + 1 + m^2 n^2} \cdot \frac{m^2 + n^2 + 2}{m^2 + n^2 + 1} + \sin^{-1} \left(\frac{2mn\sqrt{m^2 + n^2 + 1}}{m^2 + n^2 + 1 + m^2 n^2} \right) \right]$$

$k = 4$, untuk beban persegi dan titik di sudut

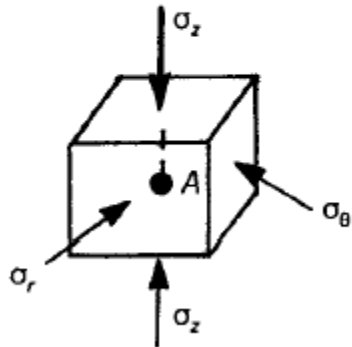
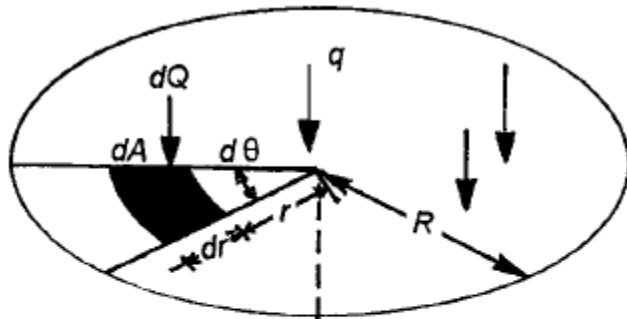
$\Delta\sigma = \text{penambahan beban} = q \times l$

METODE BOUSSINESQ



$$\Delta\sigma = q \times (l_1 + l_2 + l_3 + l_4)$$

METODE BOUSSINESQ



$$\sigma_z = q \left[1 - \frac{z^3}{(R^2 + z^2)^{3/2}} \right]$$

METODE BOUSSINESQ PONDASI MENERUS

METODE BOUSSINESQ

Untuk pondasi menerus :

- Jika $m > 1$:

$$\Delta\sigma_v' = \frac{q'}{k\pi} \left[\frac{2m}{1+m^2} + \pi - \sin^{-1} \left(\frac{2m}{1+m^2} \right) \right]$$

- Jika $m < 1$:

$$\Delta\sigma_v' = \frac{q'}{k\pi} \left[\frac{2m}{1+m^2} + \sin^{-1} \left(\frac{2m}{1+m^2} \right) \right]$$

Catatan : \sin^{-1} dinyatakan dalam radian

METODE BOUSSINESQ

SHAPE	POSITION	k	m	n
Square	Corner	1	$0.5 \times B/z$	$0.5 \times L/z$
Square	Midpoint of edge	2	$0.5 \times Bz$	L/z
Square	Corner	4	B/z	L/z
Rectangular	Corner	1	$0.5 \times B/z$	$0.5 \times L/z$
Rectangular	Midpoint of short edge	2	$0.5 \times B/z$	L/z
Rectangular	Midpoint of long edge	2	B/z	$0.5 \times L/z$
Rectangular	Corner	4	B/z	L/z
Continuous	Corner line	1	$0.5 \times B/z$	
Continuous	Edge	2	B/z	

METODE WESTERGAARD

ASUMSI : Tanah adalah material lunak yang elastis, bisa untuk tanah anisotropi

$$\Delta\sigma_v' = \frac{2q'}{k\pi} \cot^{-1} \sqrt{\left(\frac{1-2\nu_p}{2-2\nu_p}\right)\left(\frac{1}{m^2} + \frac{1}{n^2}\right) + \left(\frac{1-2\nu_p}{2-2\nu_p}\right)\left(\frac{1}{m^2 n^2}\right)}$$

dimana :

ν_p = Poisson's ratio ($\nu_p < 0.5$)

\cot^{-1} dinyatakan dalam radian

Untuk pondasi segi empat

METODE SEDERHANA

Untuk pondasi segi empat atau bujursangkar :

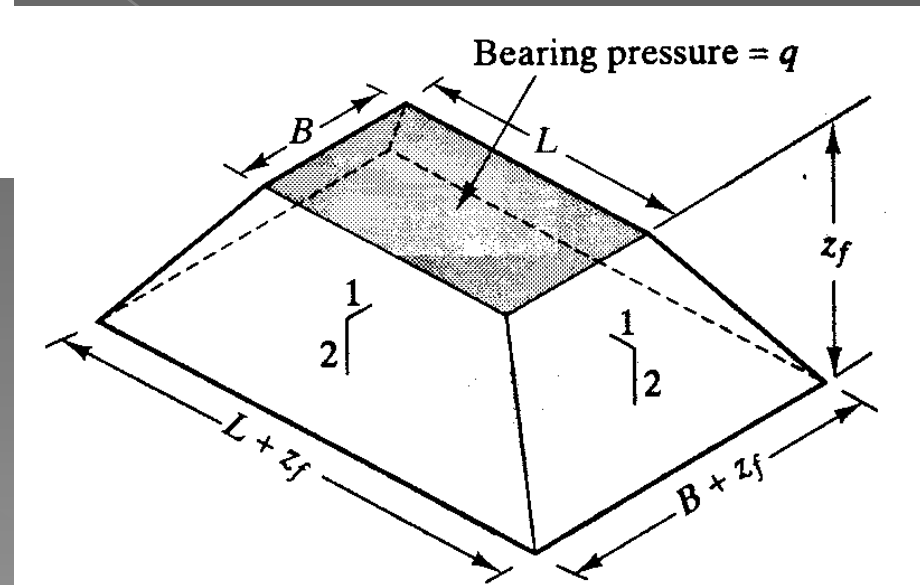
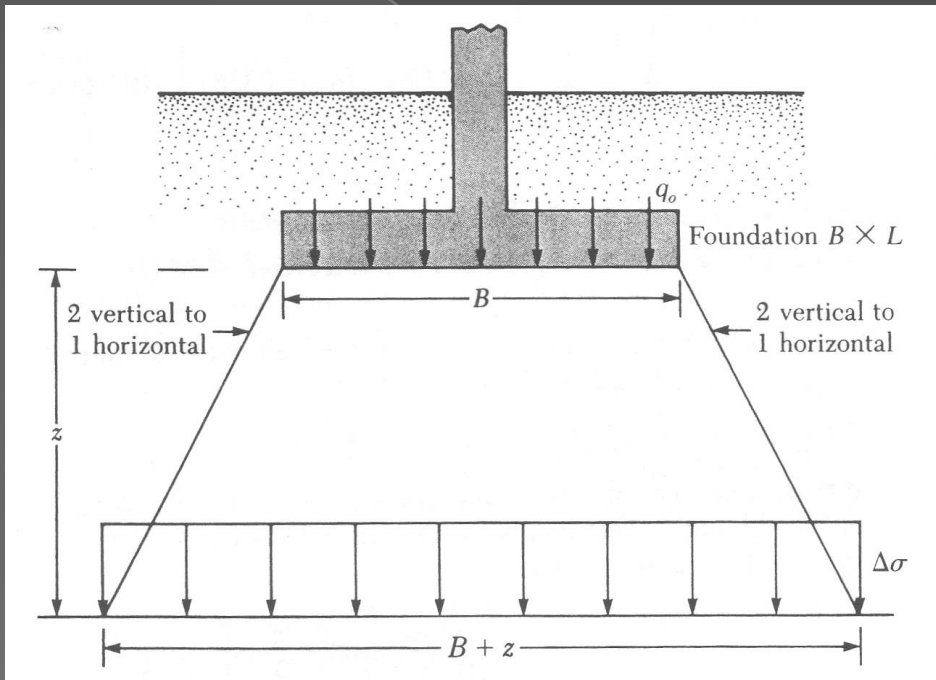
$$\Delta\sigma_v' = \left(\frac{1.7P}{(B + z_f)(L + z_f)} \right) - 0.05q' \quad 0 \leq \Delta\sigma_v' \leq q'$$

Untuk pondasi menerus :

$$\Delta\sigma_v' = \left(\frac{1.4 \frac{P}{b}}{(B + 1.3z_f)} \right) - 0.05q' \quad 0 \leq \Delta\sigma_v' \leq q'$$

- $\Delta\sigma_v'$ = peningkatan tegangan vertikal di titik yang ditinjau pada tengah pondasi
- P = beban kolom
- P/b = beban dinding per satuan panjang
- B = lebar pondasi
- L = panjang pondasi
- z_f = kedalaman dihitung dari dasar pondasi
- q' = beban kerja

METODE 2 : 1 (Fled)



METODE 2 : 1 (Fled)

$$\Delta\sigma = \frac{q_o \times B \times L}{(B + z)(L + z)} \text{ atau } \Delta\sigma = \frac{Q}{(B + z)(L + z)}$$

dimana :

$\Delta\sigma$ = peningkatan tegangan (t/m^2)

q_o = ground pressures (t/m^2)

B = lebar pondasi (m)

L = panjang pondasi (m)

z = kedalaman (m)

Q = beban kerja (ton)

Formula ini mempunyai asumsi bahwa tegangan pondasi menyebar melalui garis dengan kemiringan vertikal terhadap horisontal sebesar 2 : 1,