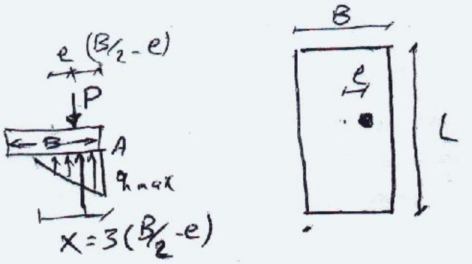
ظرفیت باربری پی با خروج از مرکزیت یک طرفه خارج از هسته (Kernel)



$e > \frac{B}{6}$

برای محاسبه P و X از روابط تعادل استفاده کردیم

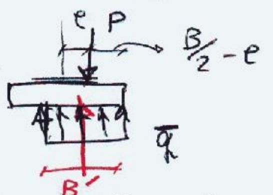
$$\Sigma F_y = 0 \Rightarrow P = \frac{q_{max} X}{2} \times L$$

$$\Sigma M_A = 0 \Rightarrow P\left(\frac{B}{2} - e\right) = \frac{q_{max} X}{2} \times L \times \left(\frac{X}{3}\right) = P\left(\frac{X}{3}\right) \Rightarrow X = 3\left(\frac{B}{2} - e\right)$$

$$q_{max} = \frac{2P}{LX} = \frac{4P}{3(B-2e)} \le q_a = \frac{q_u}{F.S}$$

عرض مؤثری بر اساس مطالعات مایرهوف و هنسن B-2e اعلام شده است و با X به دست آمده از بالا (X=1,5B-3e) متفاوت است و اما دلیل آن:

مایرهوف و هنسن در مطالعات خود برای به دست آوردن B' یعنی عرض مؤثر فرض کرده اند که تنش زیر پی یکنواخت است یعنی شکل زیر



برای اینکه برآیند تنش زیر پی با نیروی P هم امتداد باشد باید داشته باشیم

$$B' = 2\left(\frac{B}{2} - e\right) \Rightarrow B' = B - 2e$$

به عبارت دیگر برای محاسبه q_{max} از تعادل و روابط مربوطه بهره می‌بریم لیکن برای محاسبه عرض مؤثر از روابط B-2e و یا L-2e مطابق کتاب استفاده می‌کنیم.

موفق و پیروز باشید.

3.3 FOUNDATIONS SUBJECTED TO ECCENTRIC LOAD

3.3.1 Continuous Foundation with Eccentric Load

When a shallow foundation is subjected to an eccentric load, it is assumed that the contact pressure decreases linearly from the toe to the heel; however, at ultimate load, the contact pressure is not linear. This problem was analyzed by Meyerhof[1] who suggested the concept of *effective width B′*. The effective width is defined as (Figure 3.6)

$$B' = B - 2e \tag{3.21}$$

where

e = load eccentricity

According to this concept, the bearing capacity of a continuous foundation can be determined by assuming that the load acts centrally along the effective contact width as shown in Figure 3.6. Thus, for a continuous foundation [from equation (2.82)] with vertical loading,

$$q_u = cN_c\lambda_{cd} + qN_q\lambda_{qd} + \tfrac{1}{2}\gamma B'N_\gamma\lambda_{\gamma d} \tag{3.22}$$

Note that the shape factors for a continuous foundation are equal to one. The ultimate load *per unit length* of the foundation Q_u can now be calculated as

$$Q_u = q_u A'$$

where

A' = effective area = $B' \times 1 = B'$

3.3.1.1 Reduction Factor Method

Purkayastha and Char[8] carried out stability analyses of eccentrically loaded *continuous foundations* supported by sand ($c = 0$) using the method of slices proposed by Janbu.[9] Based on that analysis, they proposed that

$$R_k = 1 - \frac{q_{u(\text{eccentric})}}{q_{u(\text{centric})}} \tag{3.23}$$

where

R_k = reduction factor

$q_{u(\text{eccentric})}$ = ultimate bearing capacity of eccentrically loaded continuous foundations

$q_{u(\text{centric})}$ = ultimate bearing capacity of centrally loaded continuous foundations

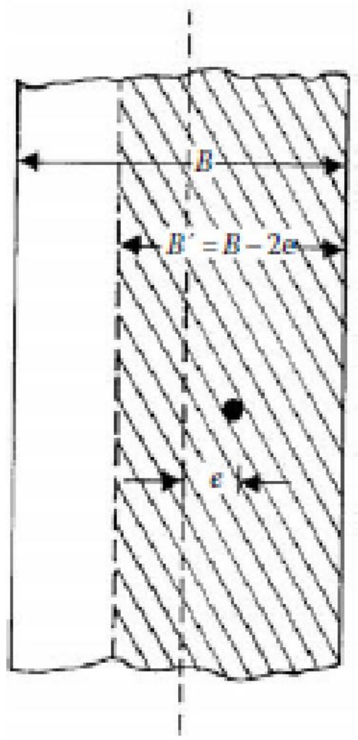


FIGURE 3.6 Effective width B′.

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SHALLOW FOUNDATIONS

Bearing Capacity and Settlement

Braja M. Das

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16.7 Ultimate Load for Shallow Foundations Under Eccentric Load

One-Way Eccentricity

To calculate the bearing capacity of shallow foundations with eccentric loading, Meyerhof (1953) introduced the concept of *effective area*. This concept can be explained with reference to Figure 16.13, in which a footing of length L and width B is subjected to an eccentric load, Q_u. If Q_u is the ultimate load on the footing, it may be approximated as follows:

1. Referring to Figures 16.13b and 16.13c, calculate the effective dimensions of the foundation. If the eccentricity (e) is in the x direction (Figure 16.13b), the *effective dimensions* are

$$X = B - 2e$$

and

$$Y = L$$

However, if the eccentricity is in the y direction (Figure 16.13c), the effective dimensions are

$$Y = L - 2e$$

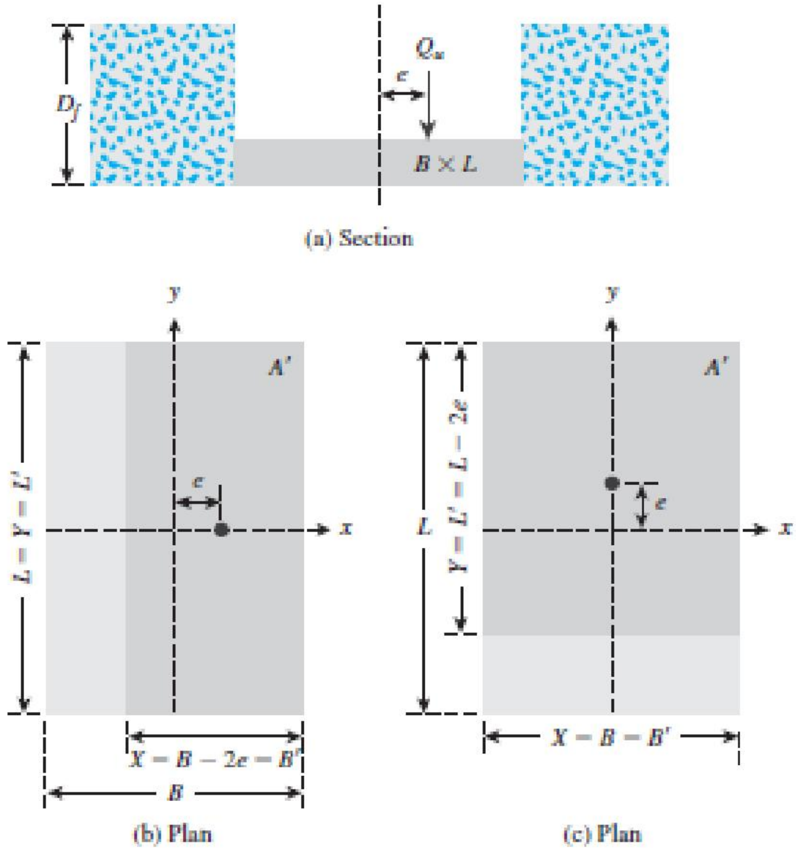

Figure 16.13 Ultimate load for shallow foundation under eccentric load

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