scenarios leads to the most critical bearing capacity for the actual foundation.

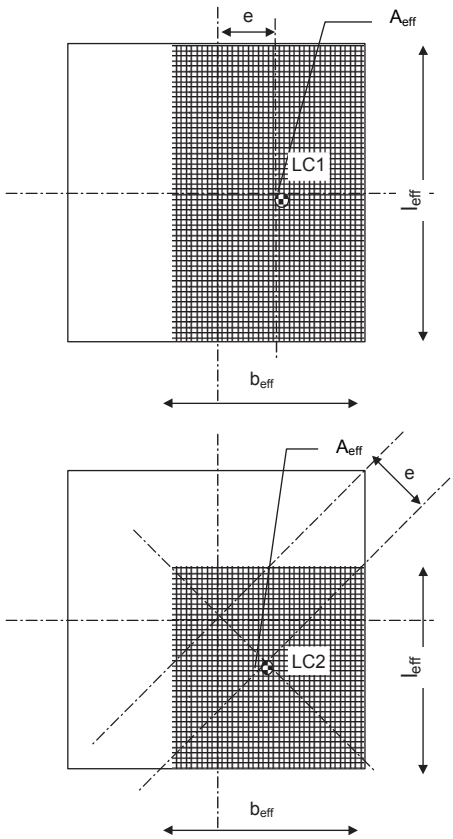

Figure 8-2. Quadratic footing with two approaches to how to make up the effective foundation area.

Scenario 1 corresponds to load eccentricity with respect to one of the two symmetry axes of the foundation. By this scenario, the following effective dimensions are used:

$$b_{eff} = b - 2 \cdot e \,,\; l_{eff} = b$$

Scenario 2 corresponds to load eccentricity with respect to both symmetry axes of the foundation. By this scenario, the following effective dimensions are used:

$$b_{eff} = l_{eff} = b - e\sqrt{2}$$

Reference is made to Figure 8-2. The effective area representation that leads to the poorest or most critical result for the bearing capacity of the foundation is the effective area representation to be chosen.

For a circular foundation area with radius R, an elliptical effective foundation area A_{eff} can be defined as

$$A_{eff} = 2\left[R^2 \arccos\left(\frac{e}{R}\right) - e\sqrt{R^2 - e^2} \right]$$

with major axes

$$b_e = 2(R - e)$$

and

$$l_e = 2R\sqrt{1 - \left(1 - \frac{b_e}{2R}\right)^2}$$

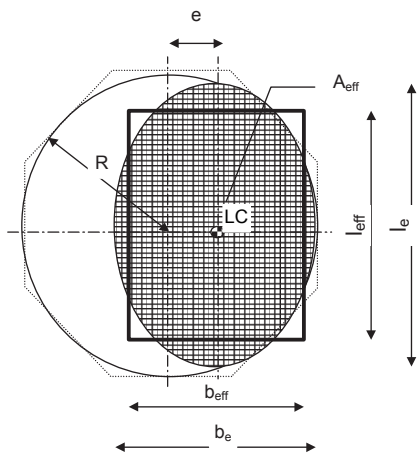

Figure 8-3. Circular and octangular footings with effective foundation area marked out.

The effective foundation area A_{eff} can now be represented by a rectangle with the following dimensions