

CODE

13.2.6.1 Foundations shall be proportioned for bearing effects, stability against overturning and sliding at the soil-foundation interface in accordance with the general building code.

13.2.6.2 For one-way shallow foundations, two-way isolated footings, or two-way combined footings and mat foundations, it is permissible to neglect the size effect factor specified in 22.5 for one-way shear strength and 22.6 for two-way shear strength.

13.2.6.3 Foundation members shall be designed to resist factored loads and corresponding induced reactions except as permitted by 13.4.2.

13.2.6.4 Foundation systems shall be permitted to be designed by any procedure satisfying equilibrium and geometric compatibility.

13.2.6.5 Foundation design in accordance with the strut-and-tie method, Chapter 23, shall be permitted.

COMMENTARY

R13.2.6.1 Permissible soil pressures or permissible deep foundation strengths are determined by principles of soil mechanics and in accordance with the general building code. The size of the base area of a footing on soil or the number and arrangement of deep foundation members are established by using allowable geotechnical strength and service-level load combinations or by using nominal geotechnical strength with resistance factor and factored load combinations.

Only the calculated end moments at the base of a column or pedestal require transfer to the footing. The minimum moment requirement for slenderness considerations given in 6.6.4.5 need not be considered for transfer of forces and moments to footings.

R13.2.6.3 To design a footing or pile cap for strength, the induced reactions due to factored loads applied to the foundation should be determined. For a single concentrically-loaded spread footing, the soil pressure due to factored loading is calculated as the factored load divided by the base area of the footing. For the case of footings or mats with eccentric loading, applied factored loads may be used to determine soil pressures. For pile caps or mats supported by deep foundations, applied factored loads may be used to determine member reactions. However, the resulting pressures or reactions may be incompatible with the geotechnical design resulting in unacceptable subgrade reactions or instability (Rogowsky and Wight 2010). In such cases, the design should be adjusted in coordination with the geotechnical engineer.

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R13.2.6.4 Foundation design is permitted to be based directly on fundamental principles of structural mechanics, provided it can be demonstrated that all strength and serviceability criteria are satisfied. Design of the foundation may be achieved through the use of classic solutions based on a linearly elastic continuum, numerical solutions based on discrete elements, or yield-line analyses. In all cases, analyses and evaluation of the stress conditions at points of load application or pile reactions in relation to shear and torsion, as well as flexure, should be included.

R13.2.6.5 An example of the application of this provision is a pile cap similar to that shown in Fig. R13.1.1. Pile caps may be designed using a three-dimensional strut-and-tie