Effect of Anisotropy and Heterogeneity on Bearing Capacity of Shallow Foundations

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Abstract : Naturally occurring cohesive soil deposits are inherently anisotropic with respect to different properties amongst which is the shear strength. The anisotropy is primary due to the process of sedimentation followed by predominantly one-dimensional consolidation. However, most soils in their natural states exhibit some anisotropy with respect to shear strength and some non-homogeneity with respect to depth. In this paper the standard Mohr-Coulomb yield criterion was modified to consider the anisotropic shear strength properties. The term non-homogeneity used in this paper refers to only the cohesion intercept which is assumed to vary linearly with depth. The effect of both anisotropy and deterministic non-homogeneity on bearing capacity of shallow foundation was investigated using finite difference method. Result of numerical analysis indicates that the cohesion anisotropy has a significant effect on bearing capacity of shallow foundation. Furthermore, the linear and bilinear heterogeneity affects the bearing capacity in a similar way although the anisotropy issue emerges to be more important as far as shallow foundations are considered.

Keywords : anisotropic ratio, finite difference analysis, bearing capacity, heterogeneity

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