

C-38: Design of pad foundations using spreadsheet techniques

N Gananathan, K Sureshwaran, H N Seneviratne
(Dept of Civil Engineering, University of Peradeniya)

A study has been made to determine the optimum, safe dimensions of a rectangular pad foundation, with the aid of computer software, namely the Microsoft Excel version 4.0 linked with its program language Macros. The developed software provides its assistance to perform the design of pad foundations in various types of soil, viz. clay under drained and undrained conditions and cohesionless soil. The cases of homogeneous or layered soils subjected to different loading systems, which are vertically central, vertically eccentric and inclined, can also be analysed. Also the effect of water table is considered.

The input data for the software package will be the soil parameters, soil properties and prescribed loading. The trial values, for depth, width and length of the pad foundation are to be given by the user.

Total stress analysis is carried out for clay under undrained condition whereas effective stress analysis is used for clay under drained condition and for sand. Suitable safe values for dimensions of pad foundation are found by calculating the ultimate bearing capacity, factor of safety and total settlement. In settlement calculation, immediate settlement and consolidation settlement using coefficient of volume compressibility of the soil are calculated in the case of clay, whereas settlement on cohesionless soil is calculated using standard penetration test data. The program was verified using hand calculations and worked examples from the literature.

In the execution of the above program, the user has to simply give the data according to the menu of the program, and the results will be readily displayed on a separate worksheet. The facilities were given for the user to either modify the given dimensions and run the program again, or to design another pad foundation, or to terminate the program. This program may be further developed to accommodate more complex configurations like tilted bases, ground inclinations etc. It may also be extended to include circular and strip foundations.