Foundation Engineering

a) Interference effect of footings and anchors

A new laboratory set up has been designed to determine the interference effect of a number of footings and anchors. In contrast with the available information in literature, the proposed setup requires only one footing/anchor to be used in the setup (Figure 18). It requires much smaller size of the tank to be used. This setup was successfully used to determine the bearing capacity of a group of footings and anchors in the laboratory.

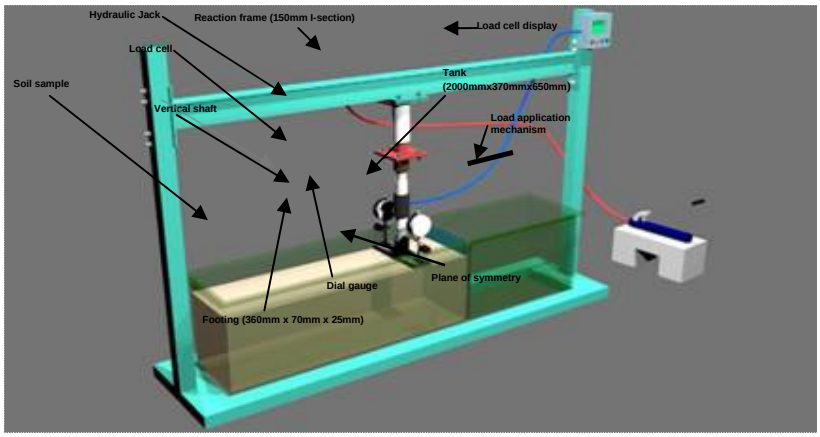

Figure 18: Model test setup for determining interference of two footings.

b) Seismic Bearing Capacity of Foundations and Seismic Earth Pressures

Seismic bearing capacity of foundations is evaluated using method of characteristics and finite element method (Figure 19). The bearing capacity factors were developed to account for the reduction in the ultimate bearing capacity on account of earthquakes. Passive earth pressure coefficients were also developed to account for the reduction in the passive resistance on account of earthquakes.

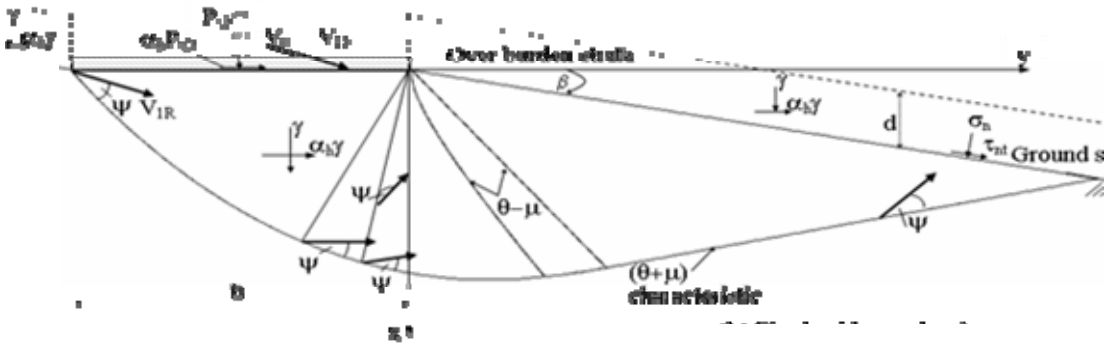

Figure 19: Seismic bearing capacity calculations for foundations

c) Dynamic response of machine foundations

The effect of the employment of the spring mounting base sandwiched in between the machine and its reinforced concrete footing, on the dynamic response of the footing as well as the machine base is explored (Figure 20). A number of block vibrations tests were carried out for this purpose by using a rotating mass type mechanical oscillator both with and without the spring mounting base. Under steady state vibration condition, the variation of the displacement amplitude of both the footing and machine base was obtained with respect to changes in (i) the frequency and eccentricity angle of the oscillator; and (ii) the stiffness of the springs. Experiments were conducted by employing two different stiffness values of the spring mounting system. The resonant displacement amplitudes of both the footing and the machine were found to become lower with the smaller stiffness value of the springs. The resonant frequency for the machine base, in all the experiments, was found to be invariably the same as that of the footing.

Figure 20: Experimental set-up of footing and machine with spring mounted base