EFFECT OF VARIOUS FILL MATERIALS BY THE SIDE OF FOUNDATION BLOCK ON ITS VIBRATION CHARACTERISTICS

by

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SYNOPSIS

The forced vibration of embedded footing is investigated experimentally in the field to find the effect of various types of fill material on the response characteristics of embedded foundations. The depth of embedment was also varied in all cases. Different backfill materials used are: (1) refill of natural soil of its own site, (2) coarse sand, (3) flyash (a waste from thermal stations). It is seen that the natural frequency increases with the increase in embedment depth of foundation and amplitude goes down. Flyash shows a behaviour giving little change in frequency and still sufficient reduction in amplitude. This is because of high damping properties offered by flyash and still a very cheap material.

EXPERIMENTS WITH EMBEDDED FOOTING AND DISCUSSION OF THE RESULTS

All the experiments are conducted when the foundation block is resting on natural soil and backfilled by different soil materials like natural soil at site, coarse sand and flyash from thermal stations. The foundation block size is 150 cm x 75 cm x 75 cm . The initial embedment depth is 15 cm and then it is changed to 30 cm and 40 cm by filling the material step-wise. A mechanical oscillator producing a frequency dependent horizontal exciting force driven by a separately excited motor is used in the study. The frequency and amplitude of vibrations are recorded with the help of a velocity pick-up fixed horizontally to the footing and is connected to a recorder. The following are the properties of fill material used.

Type of fill	Bulk density gm/c.c.	Specific gravity	Fineness modulus
Natural soil	1.920	2.77	3.28
Coarse sand	1.977	2.57	2.61
Flyash	1.716	1.73	3.06

The response curves for steady state vibrations are plotted for horizontal excitations of foundation block at various embedment depths. It is observed that the resonant amplitude decreases and the resonant frequency increases with the increase in depth of embedment and density of backfill. Experiments further indicate that the changes in amplitude and resonant frequency are small. The reason for this may be that the surrounding backfill does not provide a perfect bond with the sides of block. The flyash provides a good backfill material due to its high damping characteristic as it is evident from smaller resonant amplitudes seen in the response curves. However, it may be possible to conclude from these observations that natural soil can also serve the purpose as a backfill material for foundation block to reduce the resonant amplitude. The major factor dominating the dynamic response of block are depth of embedment, density of backfill soil its damping characteristics and the requirement of better adhesion between backfill soil and foundation block sides.

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