Module 5:- Dynamic Bearing Capacity of shallow foundations

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LECTURE 1
Foundations may be subjected to dynamic loads due to earthquakes, bomb blasts and operations of machines.

Following types of dynamic loading may induce large permanent deformation in foundations:

- Horizontal: mostly due to earthquakes.
- Vertical: due to nuclear blasts.

During the analysis of the time dependent motion of a foundation subjected to dynamic loading or estimating the bearing capacity under dynamic conditions, forces to be considered may be:

a) Nature of variation of the magnitude of the loading pulse.
b) Duration of the pulse.
c) Strain rate response of the soil during deformation.

Basically there are two types of approaches getting the solution namely

(i) pseudo-static analysis, and
(ii) dynamic analysis for??

BEARING CAPACITY OF FOOTINGS:

It may be obtained by carrying out a load test on the footing which gives a curve between average load per unit area and settlement of the footing. Based on pressure-settlement characteristics of a footing and pattern of shearing zones, three modes of shear failure have been identified as

(i) General shear failure,
(ii) Punching shear failure and
(iii) Local shear failure

• Among the available methods to compute the seismic bearing capacity of shallow foundations, for the design purpose, the method which gives the minimum value of bearing capacity of the soil under a particular earthquake condition should be considered.
As per the reduced bearing capacity from the static condition, the section required for the foundation has to be determined.

If anticipated settlement of the foundation under earthquake conditions exceeds the permissible limit, foundation alternative should be explored which can reduce the bearing pressure.

For soil layers the liquefaction analysis during the design earthquake can be done through two types:

- First deals with a shear failure where the footing punches into the liquefied soil layer.

- Second case uses the traditional Terzaghi’s bearing capacity equation with a reduction in the bearing capacity to account for the loss of shear strength of the underlaying liquefied soil layer.