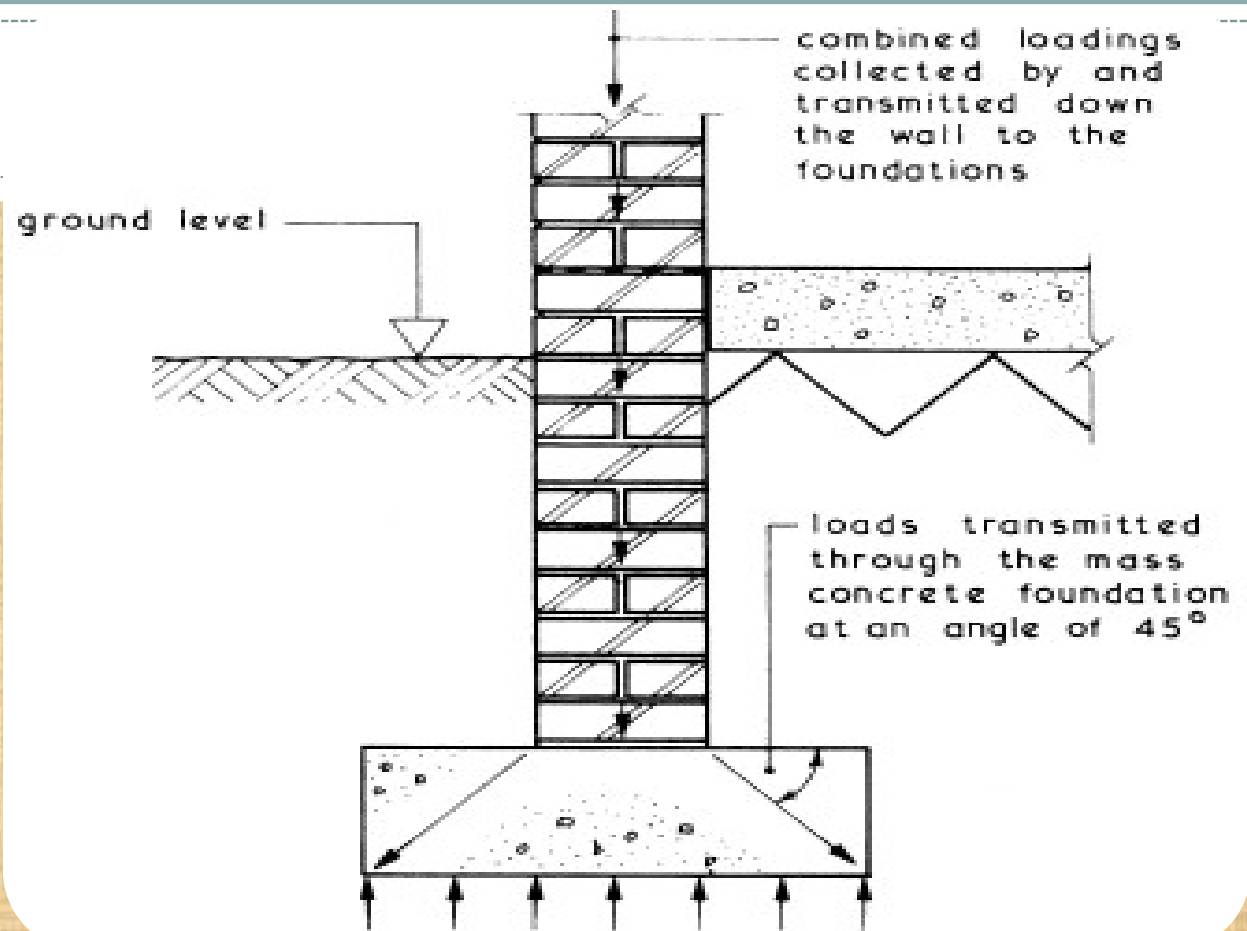


1

Building Constructi on



Foundation

CONTENTS

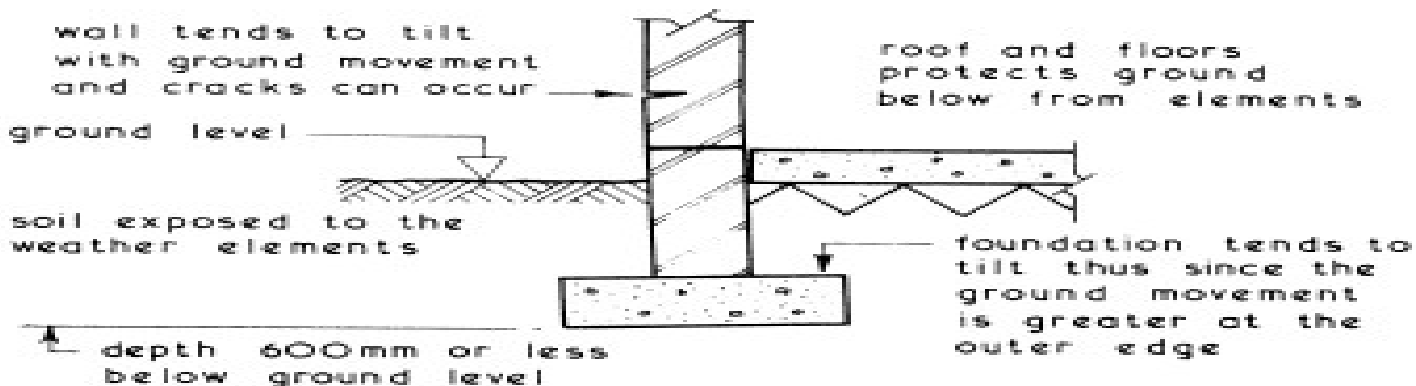
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- ❑ Introduction
- ❑ Functions of foundation
- ❑ Essential requirements of a foundation
- ❑ Types of foundation
 - Shallow foundation
 - Deep foundation
- ❑ Excavation for foundation
- ❑ Foundation failure

INTRODUCTION

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- ❑ Every building consists of two basic parts: The **Super-structure** and **Sub-structure** (foundation).
- ❑ Foundation is that part of the structure which is in direct contact with the ground to which the loads are transmitted.
- ❑ The function of a foundation is to distribute the load of super-structure over a larger area.
- ❑ A foundation should be sufficiently strong to



FUNCTIONS OF FOUNDATION

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□ Foundations serve the following purposes:

1. **Reduction of load intensity:** Foundation distribute the loads of superstructure, to a larger area so that the intensity of the load at its base does not exceed the safe bearing capacity of the sub-soil.
2. **Even distribution of load:** foundations distribute the non-uniform load of the superstructure evenly to the sub soil.
3. **Provision of level surface:** foundations provide levelled and hard surface over which the superstructure can be built.
4. **Lateral stability:** it anchors the superstructure to the ground, thus imparting lateral stability to the superstructure.
5. **Protection against soil movements:** minimises the distress on the superstructure due to expansion or contraction of sub-soil because of moisture movement in some problematic soil.

ESSENTIAL REQUIREMENTS OF A FOUNDATION

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- ❑ Foundations should be constructed to satisfy the following requirements:
 1. The foundations shall be constructed to **sustain all loads and transmit them** to the sub soil with out causing settlement which would impair the stability of the building or adjoining structure.
 2. Foundation base **should be rigid** so that differential settlements are minimised, specially for the case when super-imposed loads are not evenly distributed.
 3. Foundation should be taken **sufficiently deep** to guard the building against damage or distress caused by swelling or shrinkage of sub-soil.
 4. Foundations **should be ideally located** so that its performance may not be affected due to any unexpected future influence.

TYPES OF FOUNDATIONS

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- ❑ Foundations may be broadly classified under two heads:
 1. Shallow Foundations
 2. Deep Foundations

SHALLOW FOUNDATIONS

- ❑ Shallow foundations are those founded near to the finished ground surface. generally where the founding depth (D_f) is less than the width of the footing and less than 3m.
 - Shallows foundations are used when surface soils are sufficiently strong and stiff to support the imposed loads.
 - They are generally unsuitable in **weak** or **highly compressible** soils, such as poorly-compacted fill, peat, alluvial deposits, etc.

TYPES OF FOUNDATIONS

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DEEP FOUNDATIONS

- ❑ Deep foundations are those founding too deeply below the finished ground surface for their base bearing capacity to be affected by surface conditions,
 - This is usually at depths >3 m below finished ground level.
 - Deep foundations can be used to transfer the loading to a deeper, more competent strata at depth if

Shallow foundation

- Spread footings
- Combined footings
- Strap footings
- Mat foundation

Deep foundation

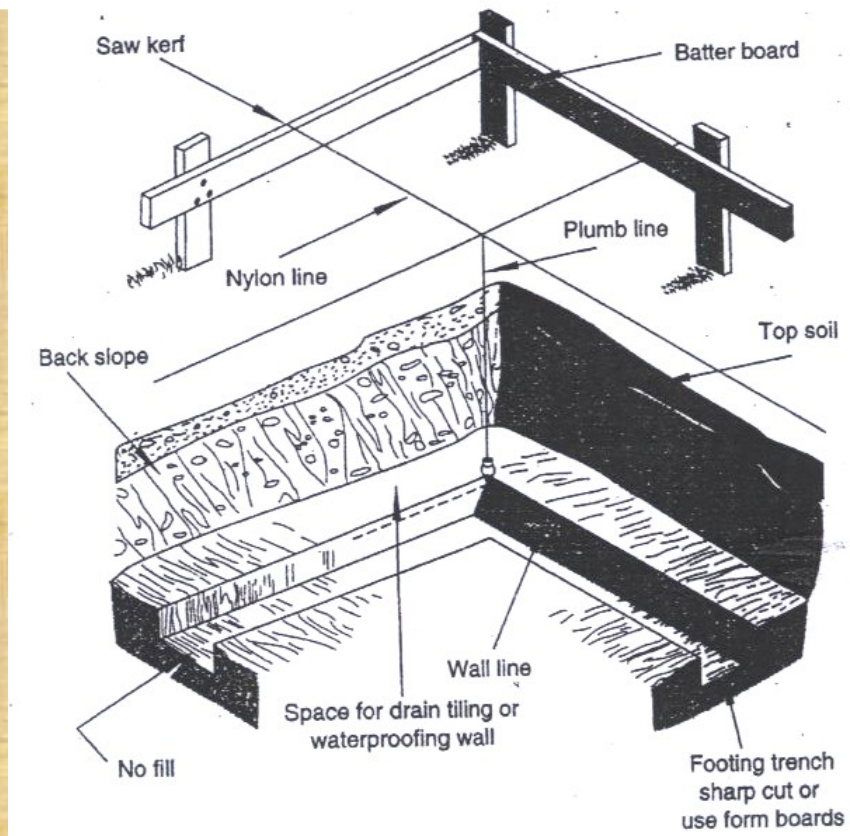
- Pile foundation
- Pier foundation
- Well or caissons foundation

EXCAVATION FOR FOUNDATIONS

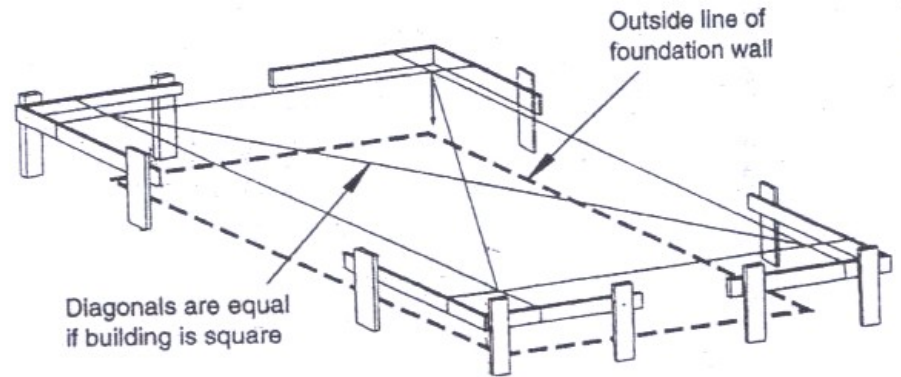
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- ❑ Steps before marking points of excavation:
 - ✓ Clearing the site of all plants, debris, etc.
 - ✓ Levelling the site to remove large inequalities
 - ✓ Preparing a setting out plan
- ❑ Steps in marking points of excavation is summarised as follow:
 1. Establish reference points
 2. Fix wooden pegs and batter boards (profile board) around the site to be excavated.
 3. Mark the center line of the walls, columns
 4. Mark the plinth lines: lines making the inside and outside of walls
 5. Mark the inside and outside line of excavation,
 6. By stretching strings, check right angles,
 7. If all dimensions are correct and all corners are right angle, mark the cutting on the ground

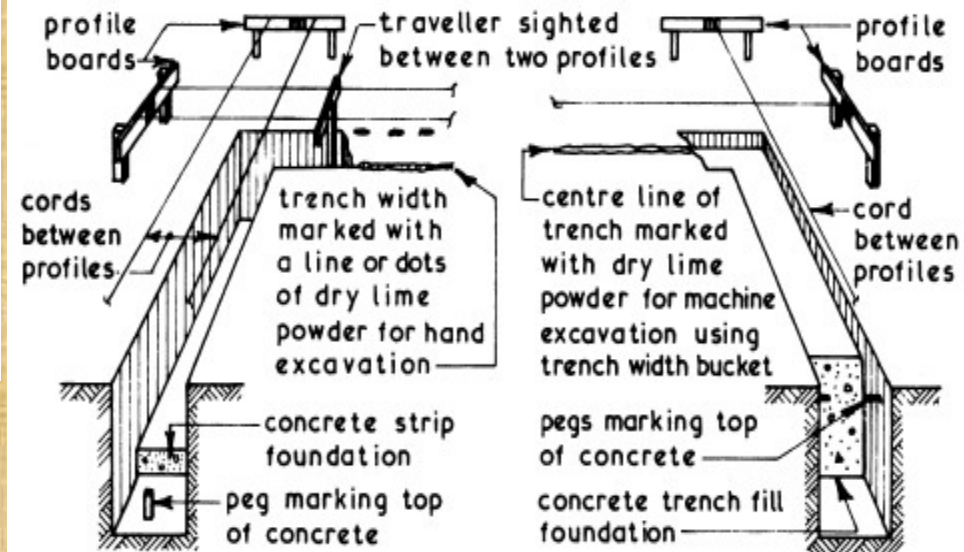
EXCAVATION FOR FOUNDATIONS



(a) Batter boards indicating the precise location a building



(b) Positioning of batter board



(c) Excavation for strip foundation

EXCAVATION FOR FOUNDATIONS

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- ❑ Excavations of foundation trenches in ground having **high water table**, or in **water-logged** area pose great problems.
- ❑ Excavations can be carried out by dewatering the subsoil water.
- ❑ Construction sites are dewatered for the following purposes:
 - To provide suitable working surface at the bottom
 - To stabilize the banks of excavation, avoiding the hazards of sliding
 - Prevent disturbance of soil at the bottom (which may reduce the bearing capacity)
 - Reduce lateral load on sheeting and bracing

FOUNDATION FAILURE

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Causes of foundation failure

- ❑ Foundations may fail due to the following reasons:
 - ✓ Unequal settlement of subsoil
 - ✓ Unequal settlement of masonry
 - ✓ Sub-soil moisture movement
 - ✓ Lateral pressure on the walls
 - ✓ Lateral movement of sub soil
 - ✓ Weathering of sub-soil due to trees
 - ✓ Atmospheric action

Sites with potential hazards

- ✓ Clay of high shrinkage or swelling potential
- ✓ Sloping ground
- ✓ Deep fill
- ✓ Mining areas
- ✓ Peat or other soft soils
- ✓ Old building foundations and basements

✓ Groundwater

Quiz

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1. The selection of the appropriate structural system depends up on?
2. What is reinforced concrete structure and what are the members?
3. Define the term; Building, construction & building construction?
4. What is foundation? Types of foundation and define them?
5. What are the materials used for construction of structural system of building?