

WELCOME

TO FOUNDATION ENGINEERING

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MYMENSINGH POLYTECHNIC INSTITUTE

CIVIL TECHNOLOGY

6th Semester Student

Subject: Foundation Engineering

Subject Code: 66465

Per Week: Theory– 2 Practical – 1 Credit-3

REFERENCE BOOKS FOR FOUNDATION ENGINEERING (6451)

- 1 Foundation Engineering
- Peck and Henson
- 2 Soil Mechanics & Foundation
- B.C Punmia
- 3 Foundation Engineering
- Leonard
- 4 Soil Mechanics
- Craig
- 5 Building Construction
- S.C Rangwala
- 6 LGED Manual for soil investigation

AIMS OF FOUNDATION ENGINEERING

- To understand the foundation and foundation engineering.
- To understand the soil stabilization.
- To underst and the bearing capacity of soil.
- To understand the facto rs determining types of foundation.
- To understand the foundation on sand and non-plastic soil, plastic soil, non-uniform soil, rock.
- To understand the excavating and bracing.
- To understand the sheet pile wall, cofferdam and bulk head.
- To understand the damages due to construction operations.

CHAPTER-1

Understand the foundation and foundation engineering

1.1 State the meaning of foundation and foundation engineering.

1.2 Mention the requirements of a satisfactory foundation.

1.3 Mention the classification of foundation.

1.4 Mention the factors governing the depth of foundation.

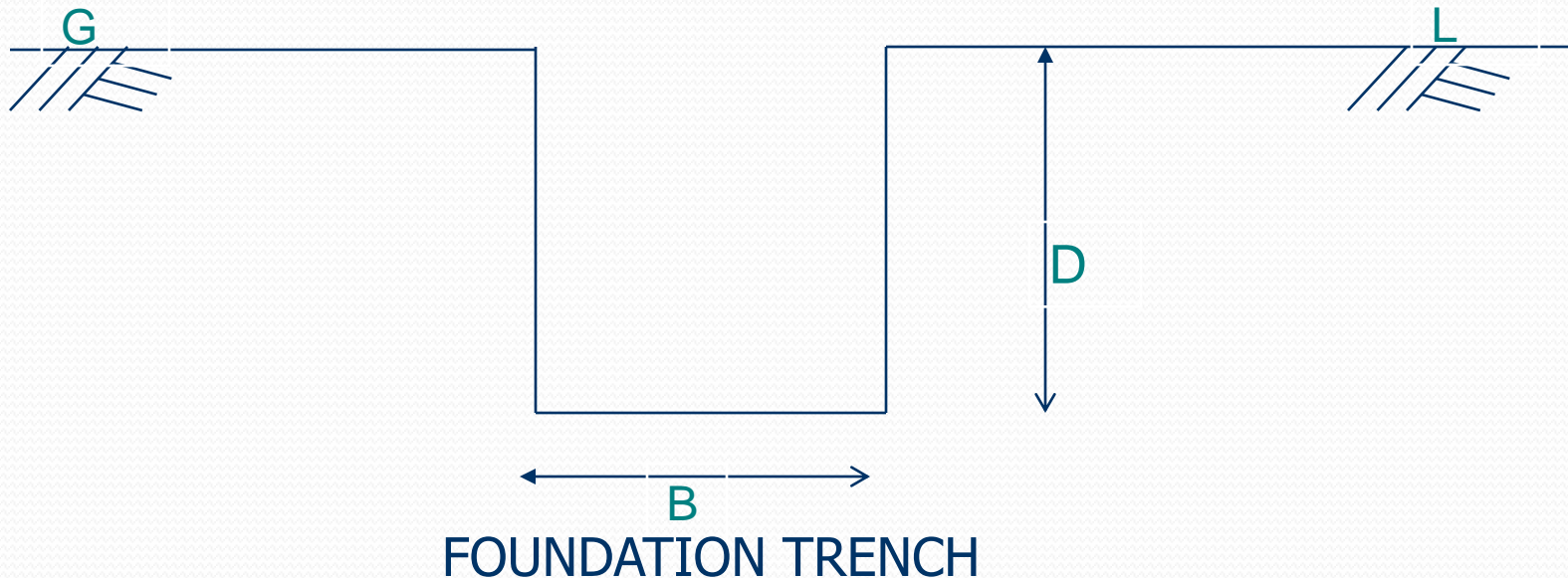
FOUNDATION

- Every structure consists of two parts:
 - ▶ Sub-structure or foundation and
 - ▶ Super structure
- Foundation : It is the lowest part of a structure which is constructed below the ground level.
- The function of foundation is to transmit the weight of super structure to the sub soil.

TYPES OF FOUNDATIONS

FOUNDATION MAINLY TWO TYPES

1. SHALLOW FOUNDATIONS ($D \leq B$)
2. DEEP FOUNDATIONS ($D > B$)



TYPES OF FONDATIONS

1. SHALLOW FOUNDATIONS

- WALL FOUNDATION
- ISOLATED COLUMN FOUNDATION
- COMBINED FOUNDATION
- MAT OR RAFT FOUNDATION

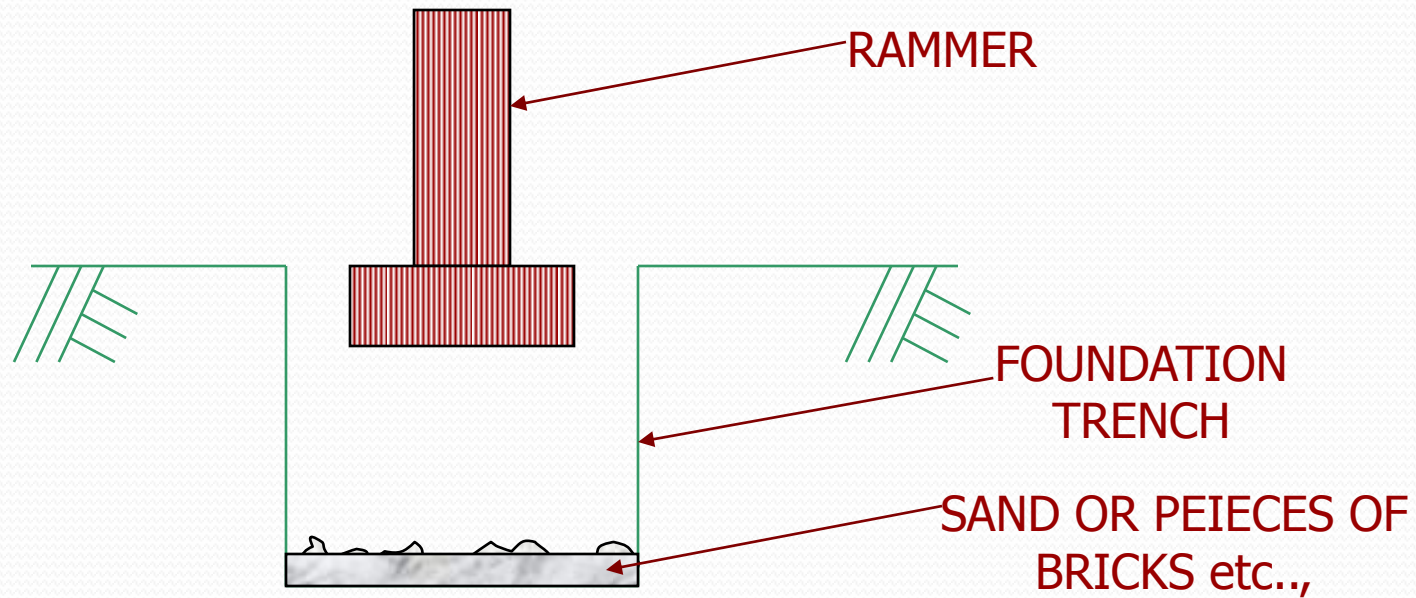
2. DEEP FOUNDATIONS

- PILE FOUNDATIONS
- UNDER-REAMED PILE
- WELL FOUNDATIONS

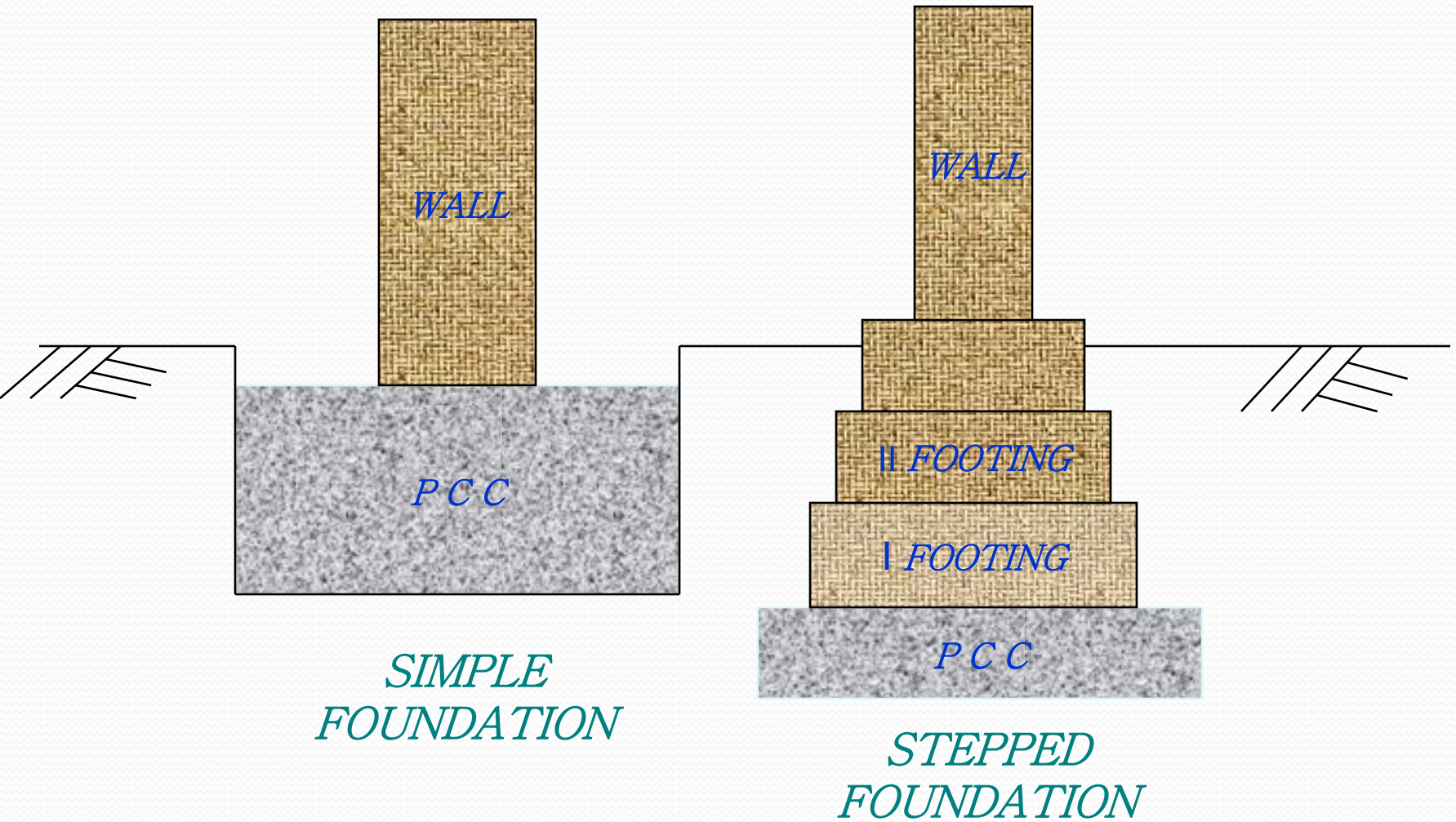




Wall foundation



WALL FOUNDATION



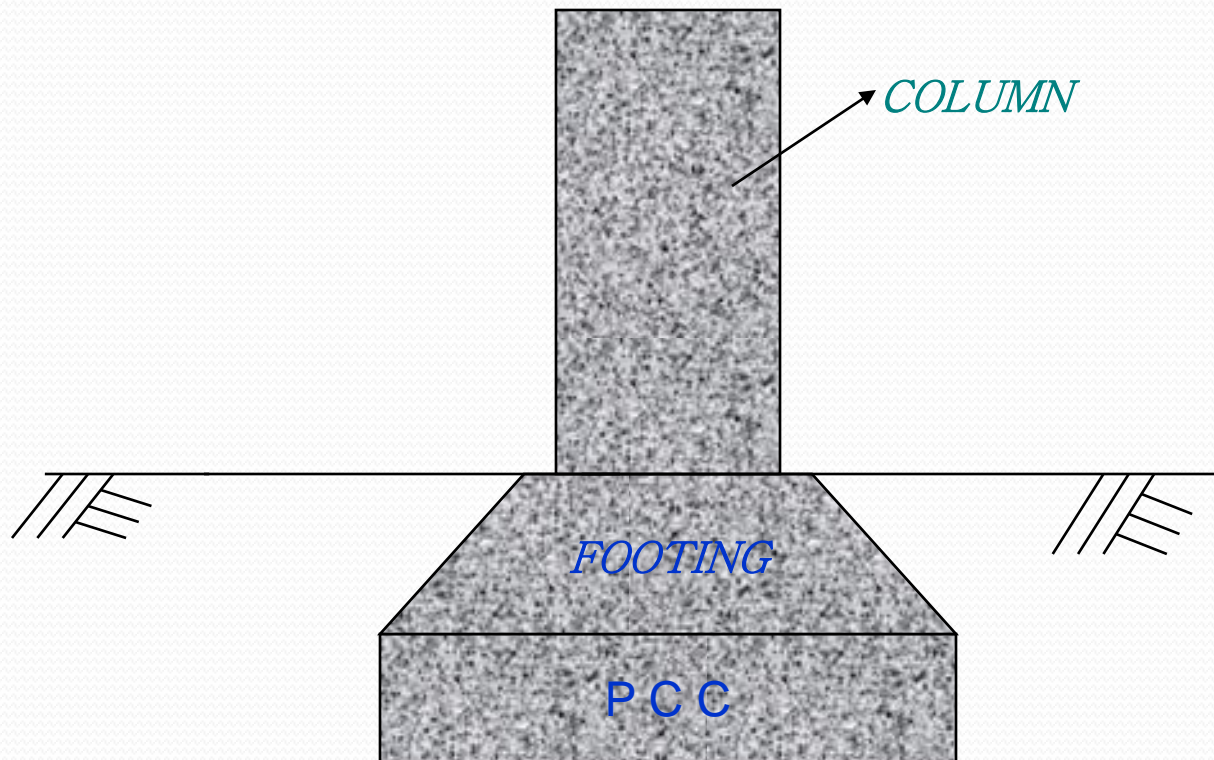
ISOLATED FOOTING

- ▶ It is provided under columns to transfer the load safely to bed soil
- ▶ These footings may be slab, stepped or sloped ones.









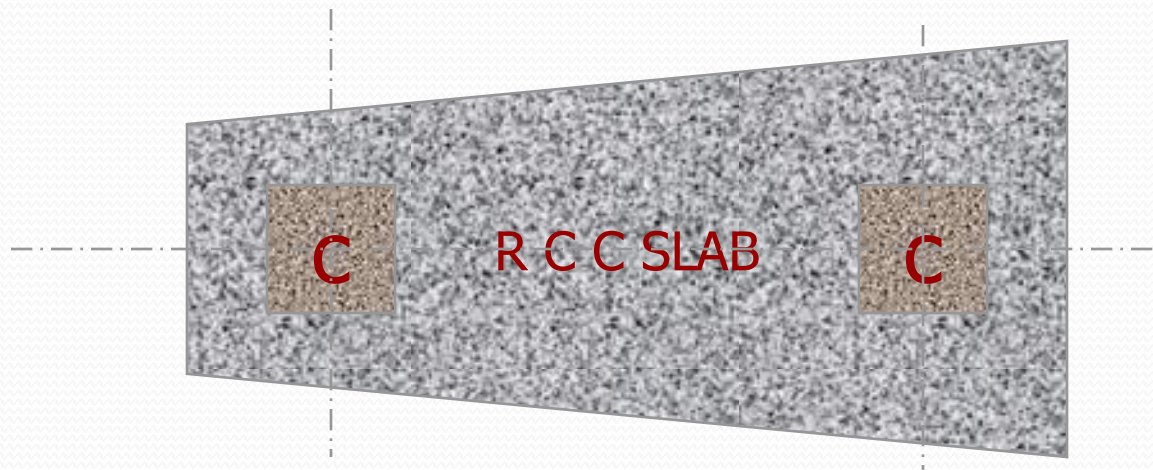
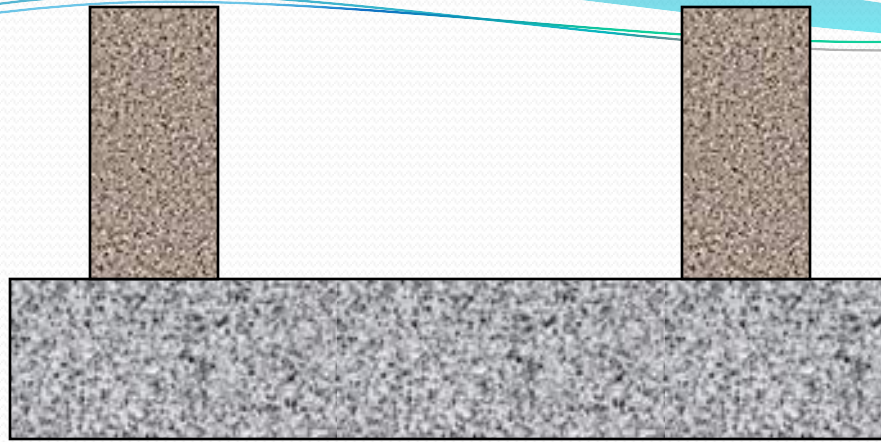
*ISOLATED COLUMN
FOUNDATION*

COMBINED FOOTING

- ▶ A combined footing is the one which supports two columns and it may be rectangular or trapezoidal in plan.
- ▶ The aim is to get uniform pressure distribution under the footing. For this the center of gravity of the footing area should coincide with the center of gravity of the combined loads of the two columns.

Combined footings are used in the following situations:

- ▶ When the columns are very near to each other so that their footings overlap.
- ▶ When the bearing capacity of the soil is less, requiring more area under individual footing.
- ▶ When the end column is near a property line so that its footing cannot spread in that direction.



COMBINED FOOTING

MAT FOUNDATION

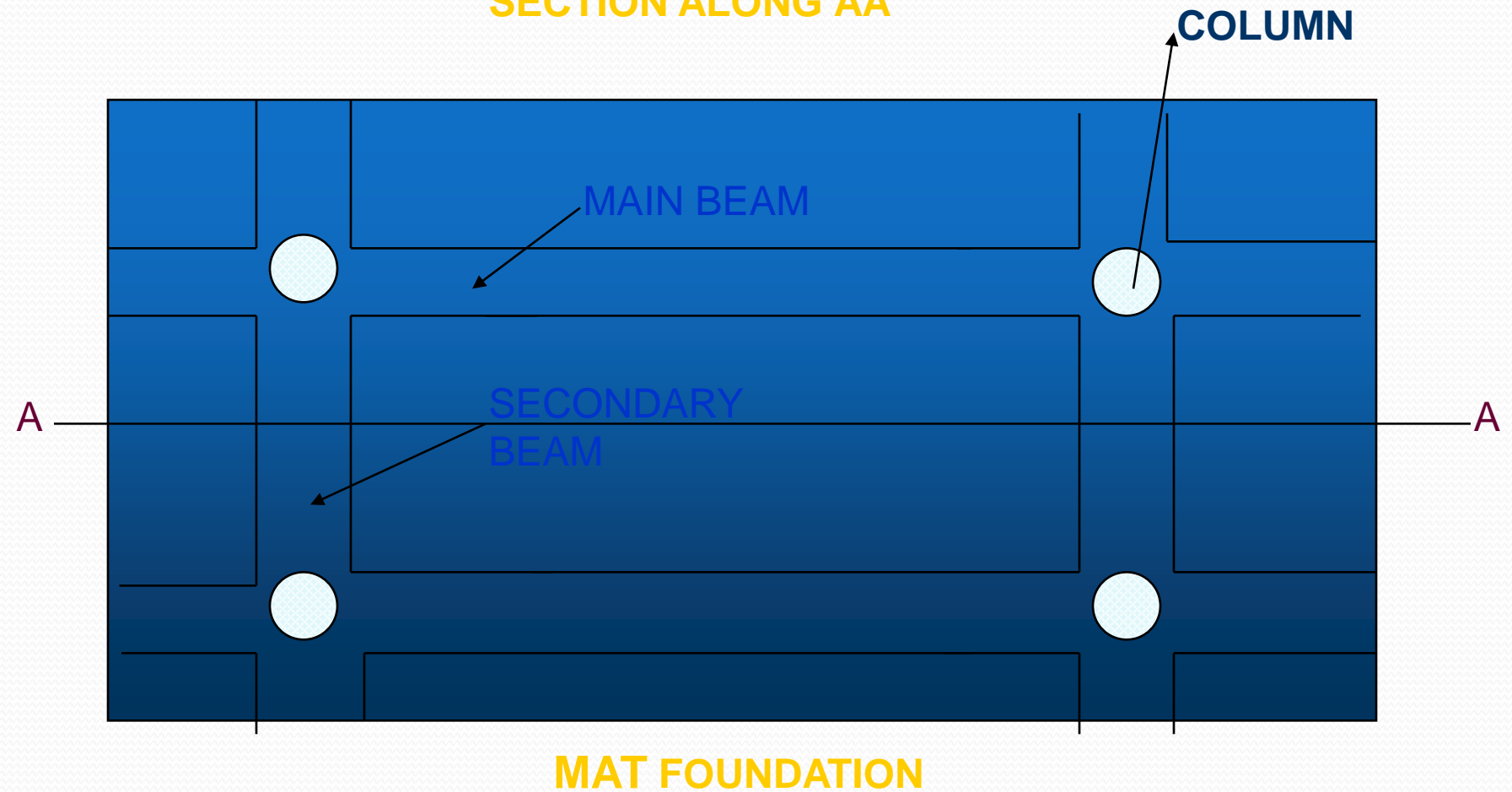
- ▶ It is most suitable foundation when the soil at the site proposed for the construction of a structure is erratic, soft clay, made up ground or marshy land with low bearing capacity.
- ▶ Mat foundation is constructed of RCC slab covering the whole area of the bottom of the structure. The slab is provided with steel reinforcing bars in both directions. When column loads are heavy, the main beams and secondary beams are provided monolithically with raft slab.







SECTION ALONG AA



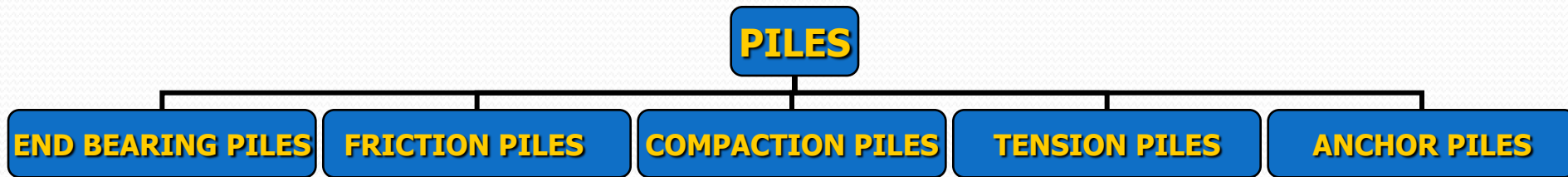
PILE FOUNDATIONS

- ▶ Pile foundation is more commonly used in building construction.

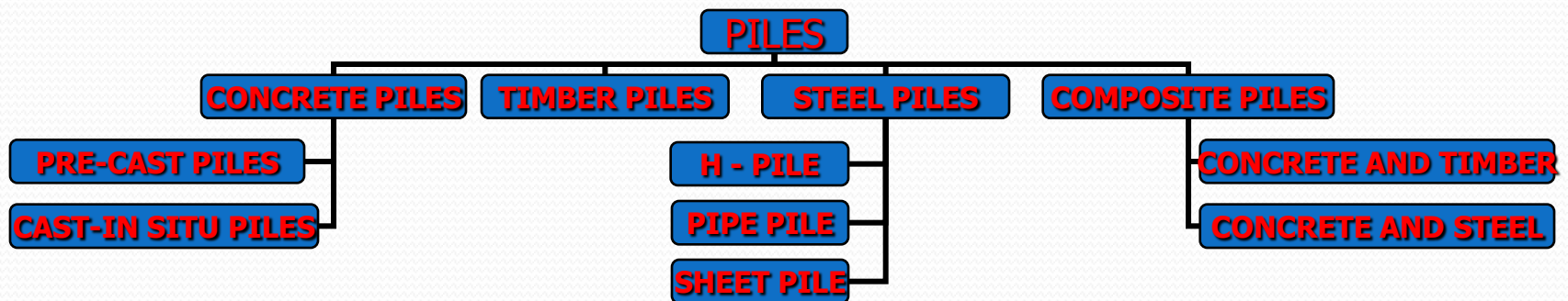
Pile foundations are used in the following situations:

- ▶ The load of the super structure is heavy and its distribution is uneven
- ▶ The top soil has poor bearing capacity
- ▶ The subsoil water level is high
- ▶ There is large fluctuations in subsoil water level
- ▶ Canal or deep drainage lines exist near the foundation
- ▶ The structure is situated on the sea shore or river bed

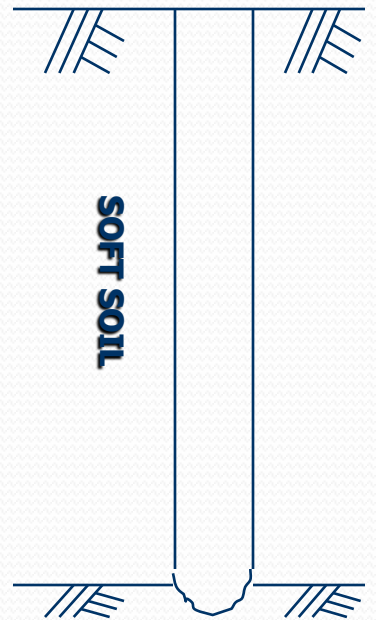
CLASSIFICATION OF PILES BASED ON FUNCTION



CLASSIFICATION OF PILES BASED ON MATERIALS AND COMPOSITION

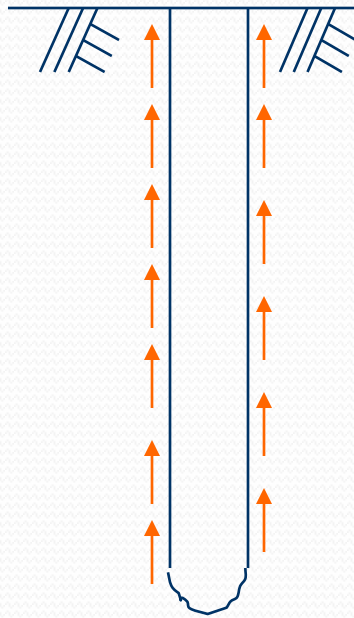


END BEARING PILE : These piles are used to transfer load through water or soft soil to a suitable bearing stratum.



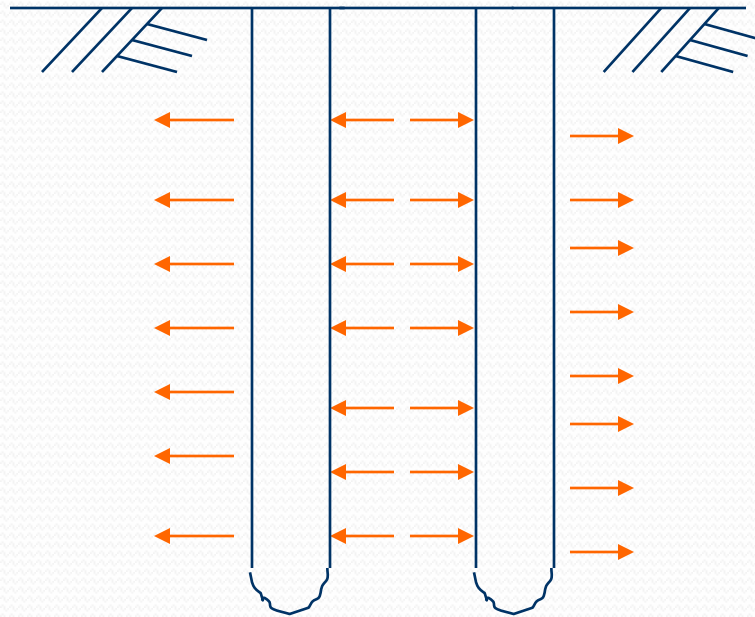
END BEARING PILE

FRICTION PILE: These piles are used to transfer loads to a depth of a friction load carrying material by means of skin friction along the length of pile.

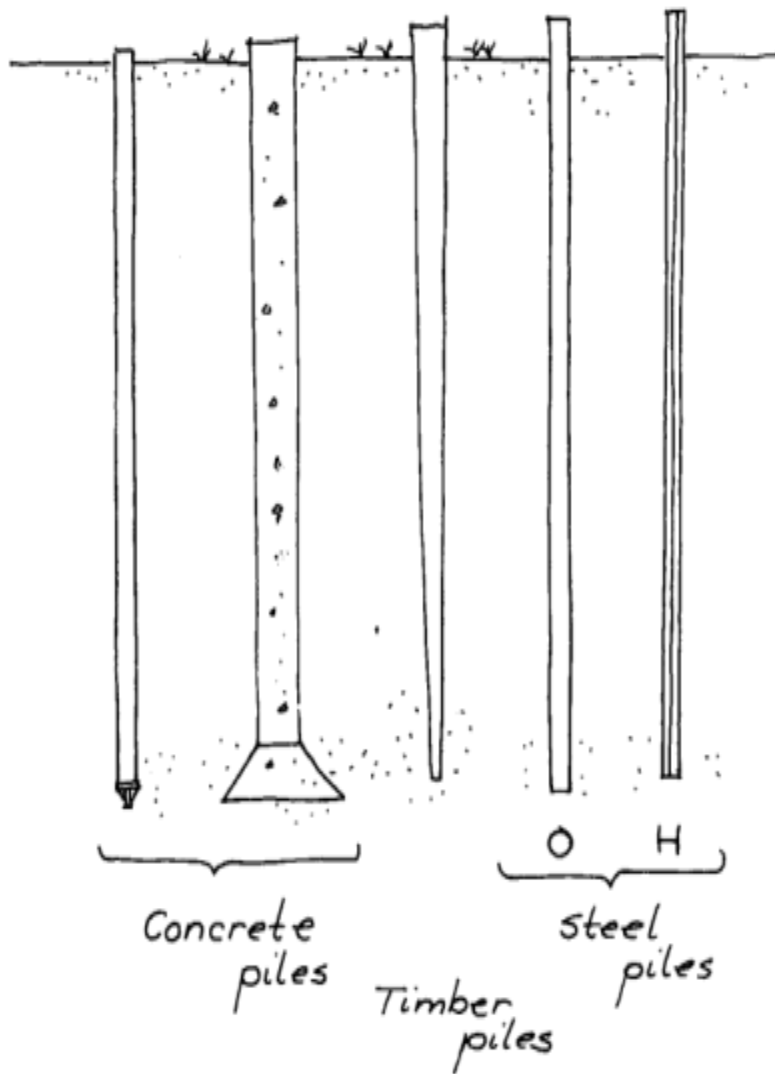


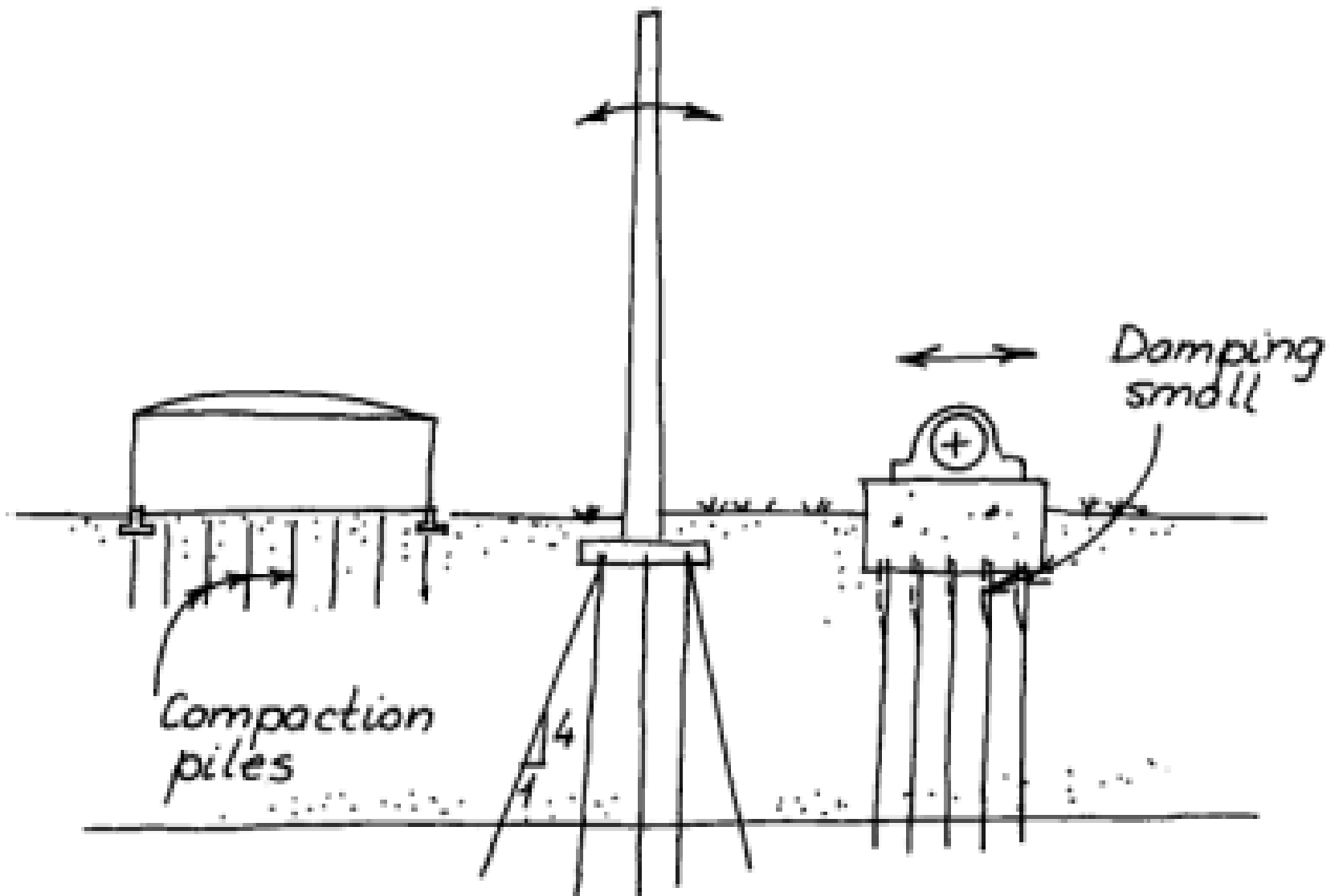
FRICTION PILE

COMPACTION PILE: These piles are used to compact loose soils, thus increasing their bearing capacity. The compaction piles themselves do not carry any load. Hence they may be of weaker material (sand). The pile tube, driven to compact the soil, is gradually taken out and sand is filled in its place thus forming a 'sand pile'.



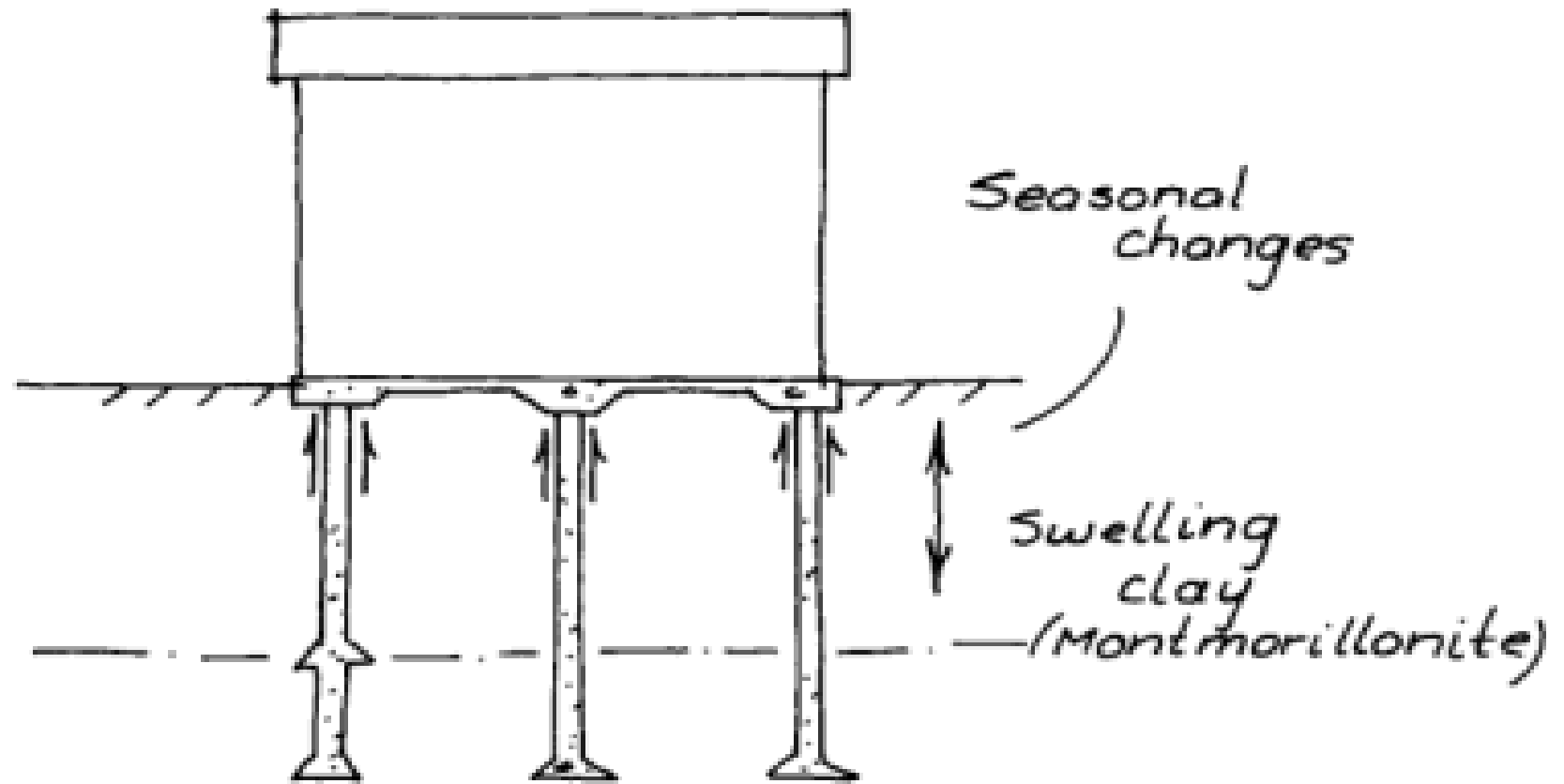
COMPACTION PILE





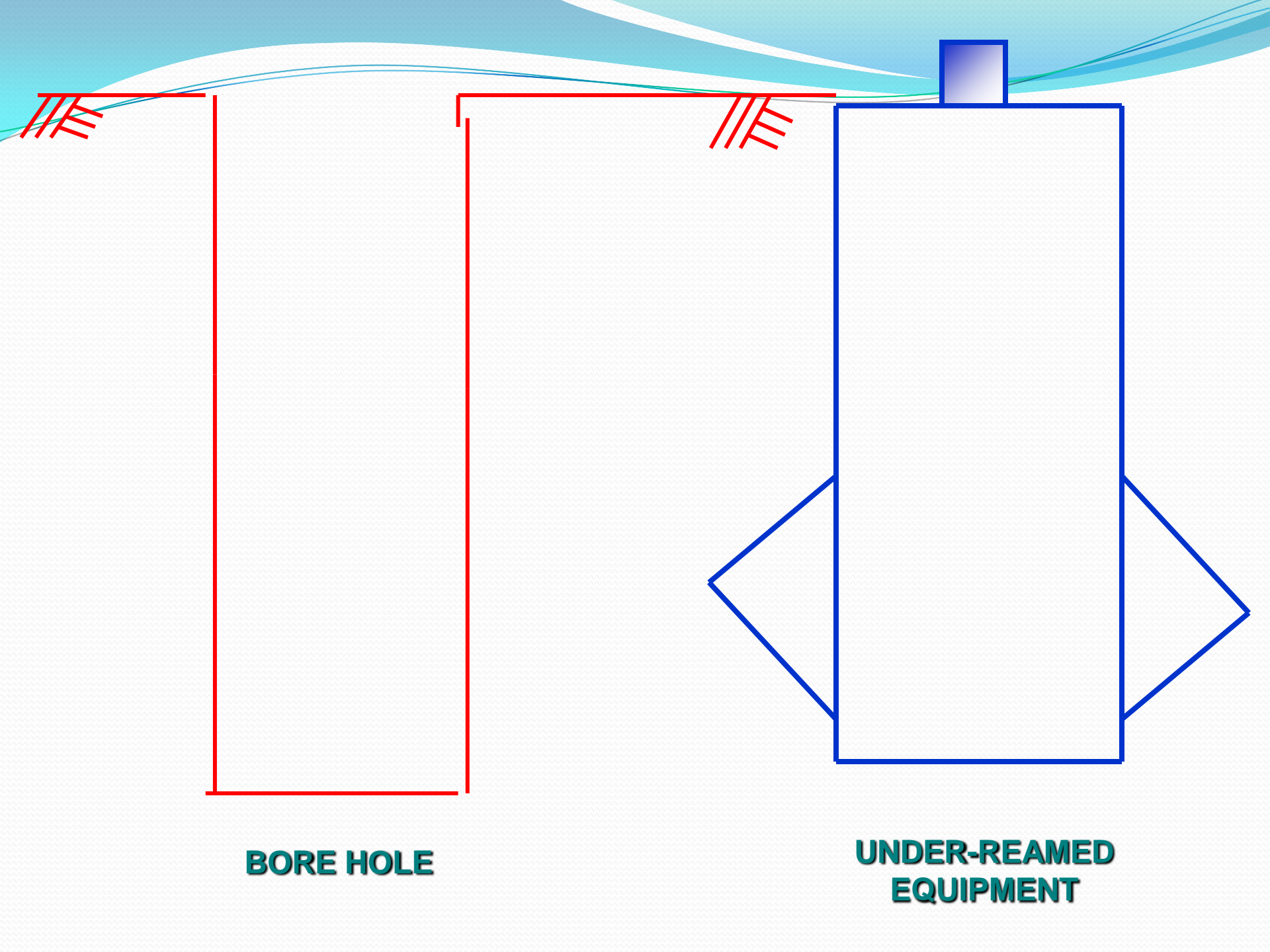
UNDER REAMED PILE

- *In black cotton soils and other expansive type of soils, buildings often crack due to relative ground movements. This is caused by alternate swelling and shrinking of the soil due to changes in its moisture content.*
- *The under-reamed pile is used to safe guard this movement effectively. Generally this foundation is used for machine foundation, factory building, transmission line towers and other tall structures also.*



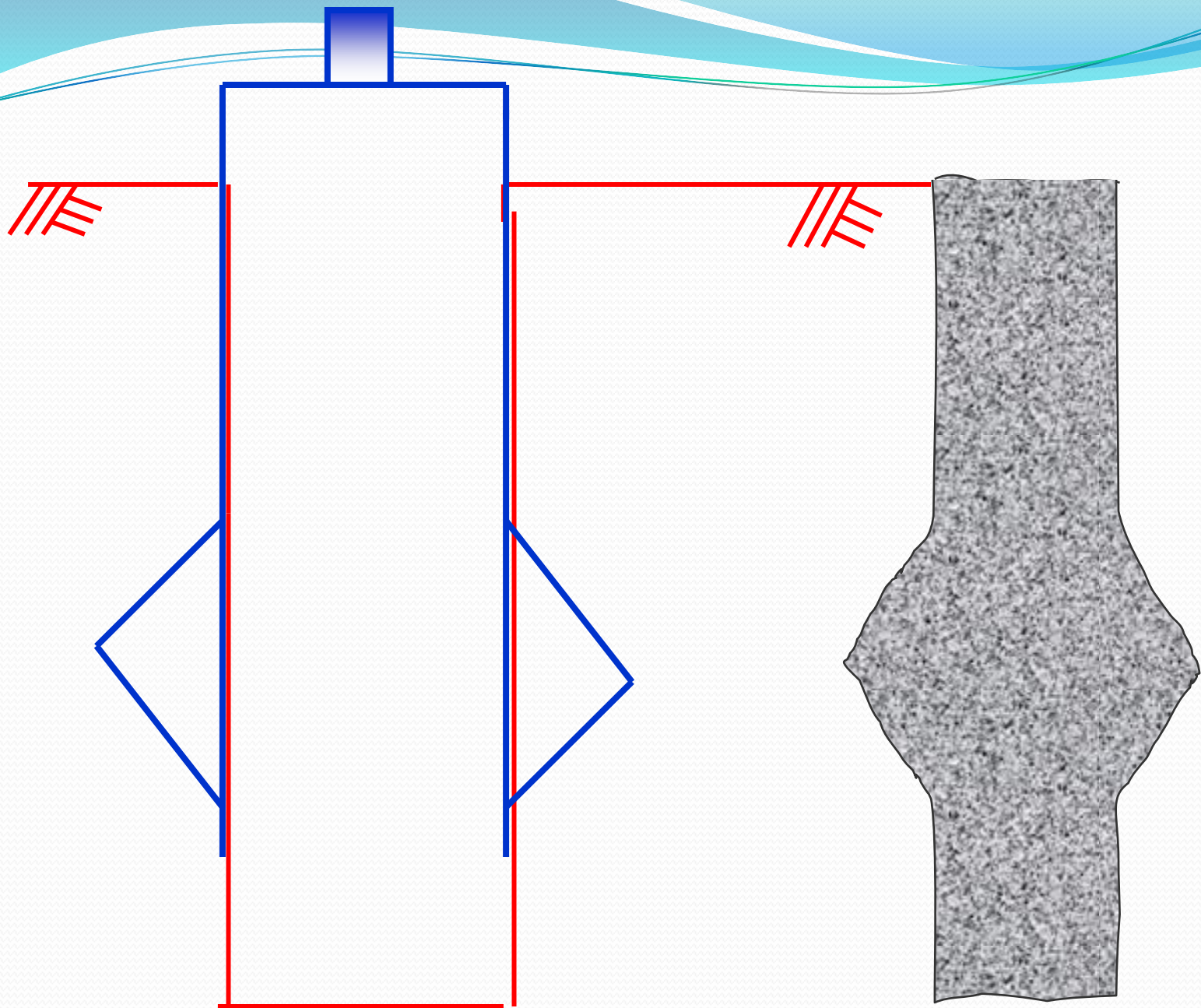
India: Black cotton soil

High w_L , I_p



BORE HOLE

**UNDER-REAMED
EQUIPMENT**



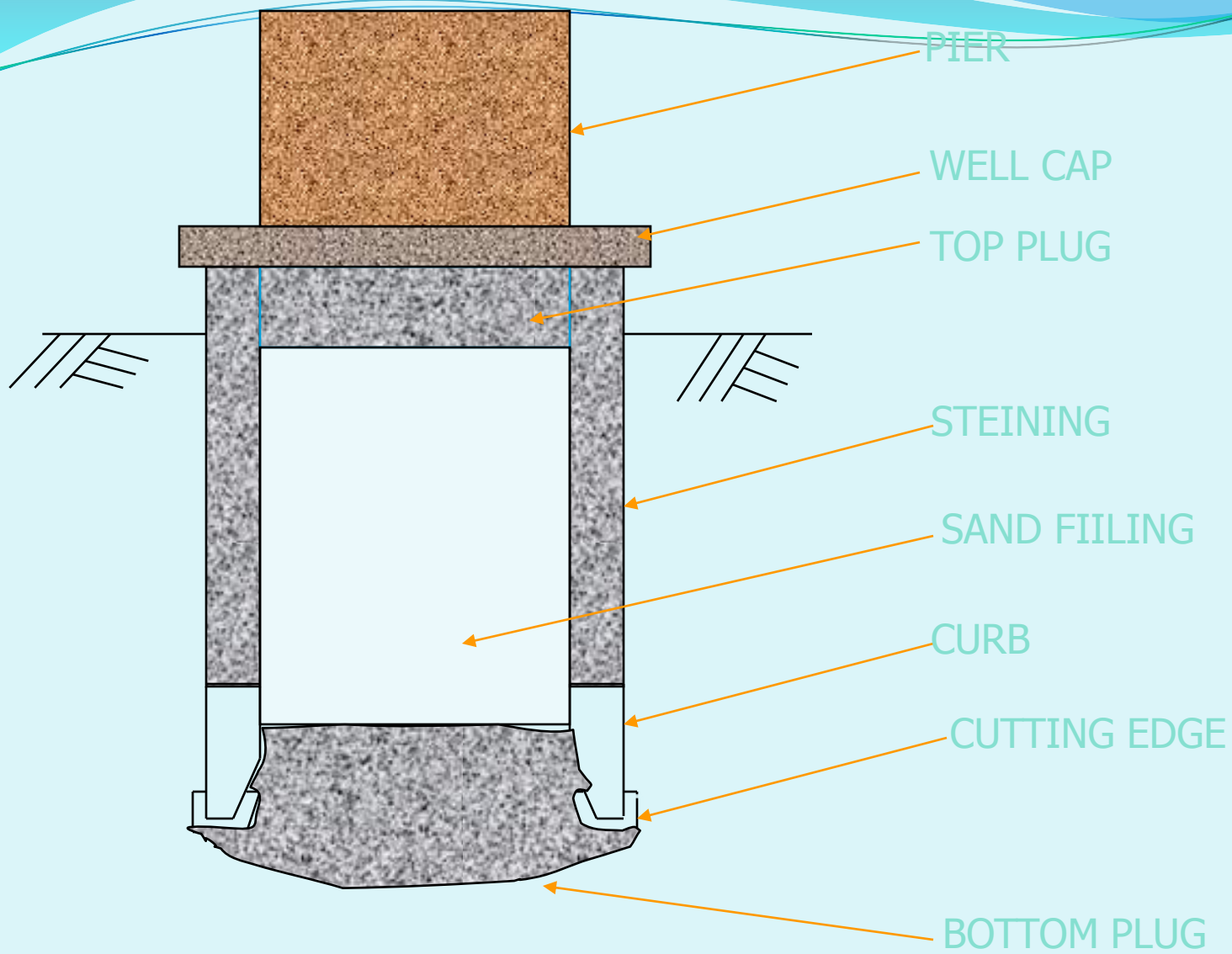
UNDER-REAMED PILE

WELL FOUNDATION

- ▶ Well foundation is a box of timber, metal, reinforced concrete or masonry which open both at the top and bottom, and is used for building for building and bridge foundations.

Types of well shapes:

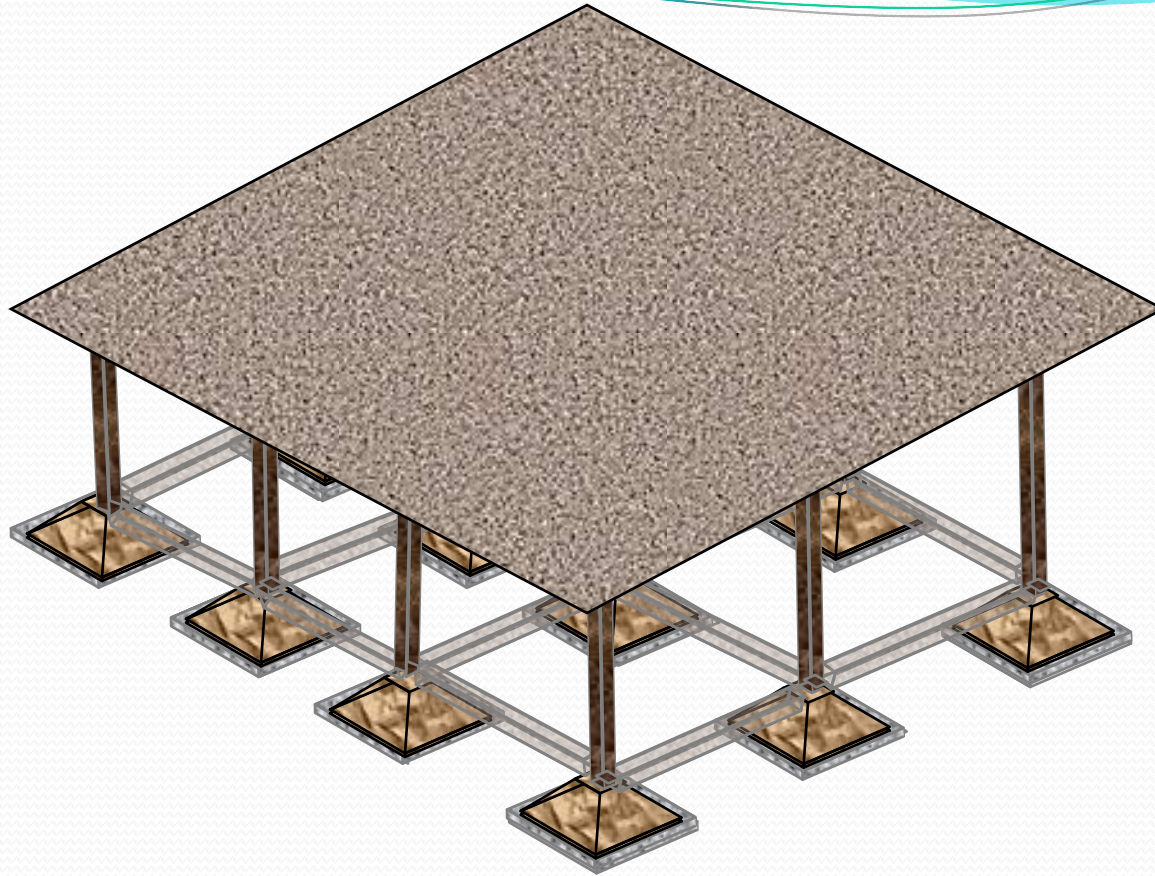
- ▶ Circular
- ▶ Rectangular
- ▶ Double – D
- ▶ Twin circular etc..,



WELL FOUNDATION







FRAMED STRUCTURE

THANK YOU

