

Structural elements of building

The building basically consists of two Structural elements;

- 1) Sub structure
- 2) Super structure

Sub structure: It is the lowest artificially prepared part below the surface of the surrounding ground which transmits all the loads to the ground (or sub-soil)

Super Structure: It is that part of the structure which is constructed above the plinth level (i.e.,) ground level.

Building in general made of the following structural components

1. Foundation
2. Plinth
3. Walls and piers in super structure
4. Ground, basement and upper floors
5. Doors and windows
6. Sills, Lintels and weather shades
7. Roofs
8. Steps and stairs
9. Finishes for walls
10. Utility fixtures

Foundation

The primary function of foundations is to provide adequate support to the structures which they carry. This implies sufficient load bearing capacity to safely resist the effects of the various combinations of permanent and transient loads transmitted to the founding strata, without excessive deformation, which could otherwise compromise the integrity of the structure or impair its use. The safe or allowable bearing pressure is therefore a function of the ultimate load bearing capacity of the ground at the founding level and the load-settlement characteristics of the underlying layers.

The purpose of foundation is to transmit the anticipated loads safely to the soil

Basic requirements:

1. To distribute the total load coming on the structure over a large bearing area so as to prevent it from any movement.
2. To load the bearing surface or area at a uniform rate so as to prevent any unequal or relative settlement.
3. To prevent the lateral movement of the structure
4. To secure a level or firm natural bed, upon which to lay the courses of masonry and also support the structure.
5. To increase the suitability of the structure as a whole, so as to prevent it from overturning or sliding against such as wind, rain, frost etc.

Foundations are provided for the following purposes

- 1) To distribute the total load coming on the structure on large area.

- 2) To support the structure
- 3) To give enough stability to the structures against various distributing forces such as wind, rain etc.
- 4) To prepare a level surface for concreting and masonry work.

Types of foundations:

Depending upon their nature and depth, foundations have been categorized as follows

- (i) Shallow foundations
- (ii) Deep foundations

Shallow Foundations- are usually located no more than 5 meter below the lowest finished floor. A shallow foundation system generally used when

- (1) The soil close the ground surface has sufficient bearing capacity,
- (2) Underlying weaker strata do not result in undue settlement.

The shallow foundations are commonly used most economical foundation systems.

Types of shallow foundation

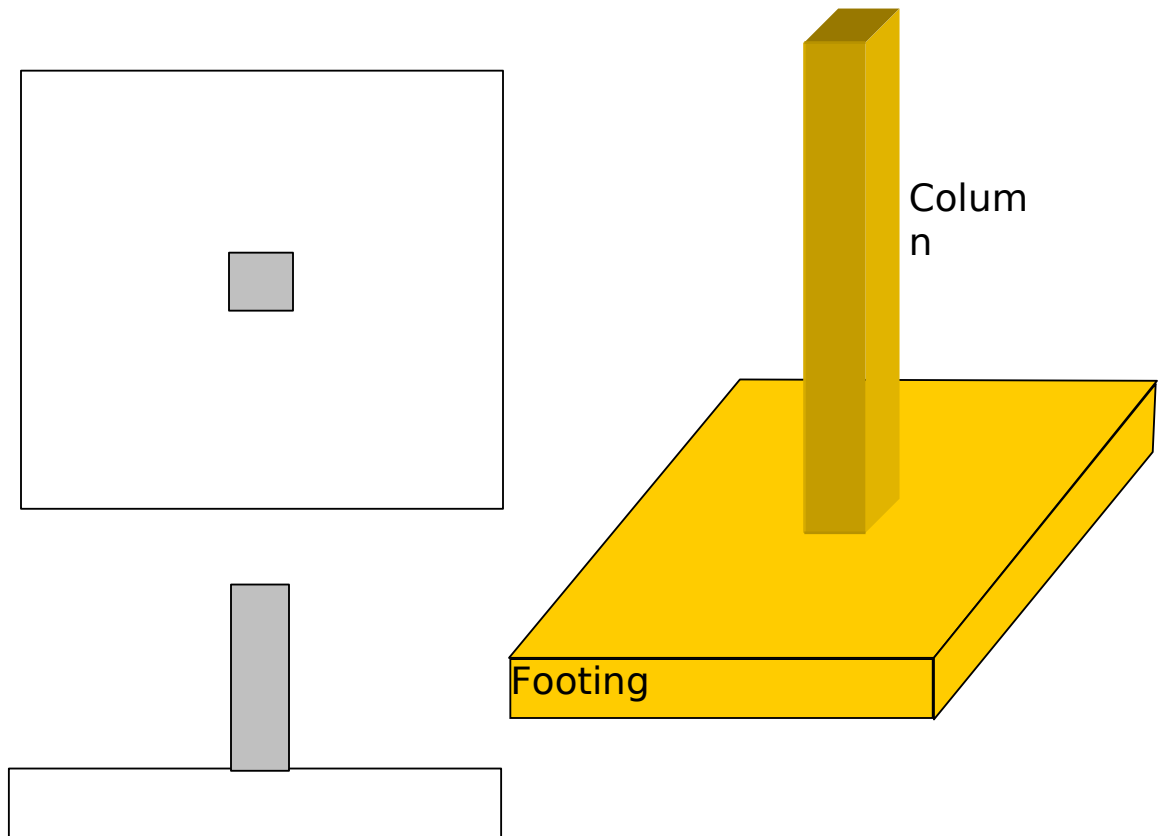
1. Isolated footing
2. Combined footing
3. Wall footing
4. Raft/Mat Foundation

Footings are structural elements, which transfer loads to the soil from columns, walls or lateral loads from earth retaining structures. In order to transfer these loads properly to the soil, footings must be design to

- Prevent excessive settlement
- Minimize differential settlement ,and
- Provide adequate safety against overturning and sliding.

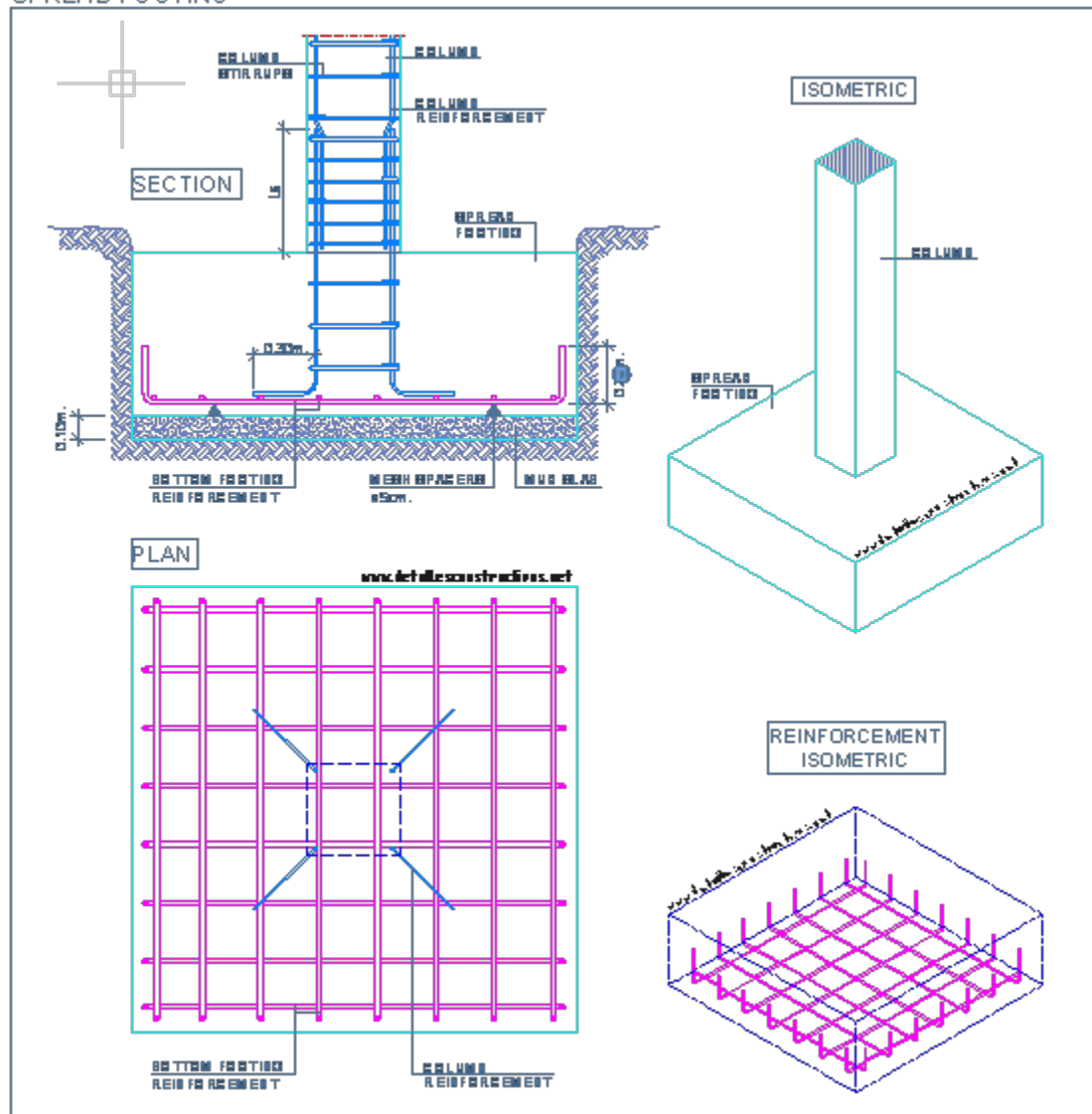
Types of shallow foundation

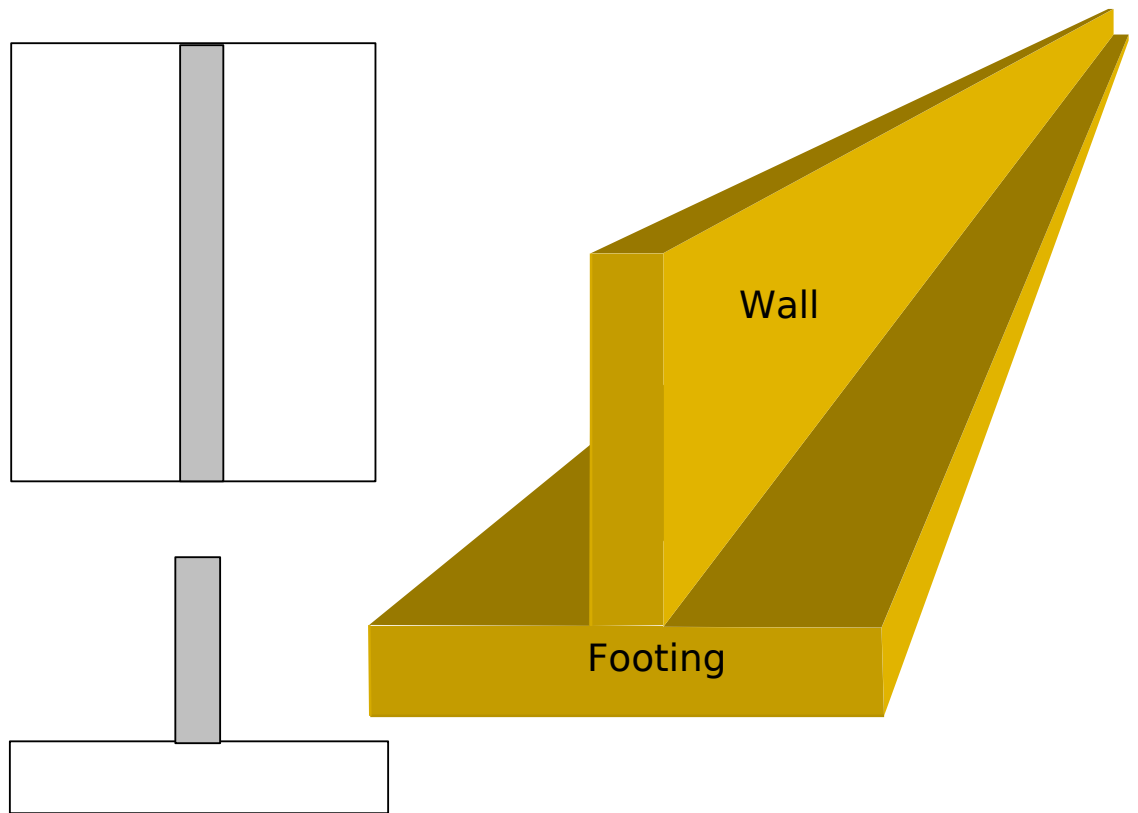
1. Isolated footing
2. Combined footing
3. Wall footing
4. Cantilever or strap footings
5. Raft/Mat Foundation



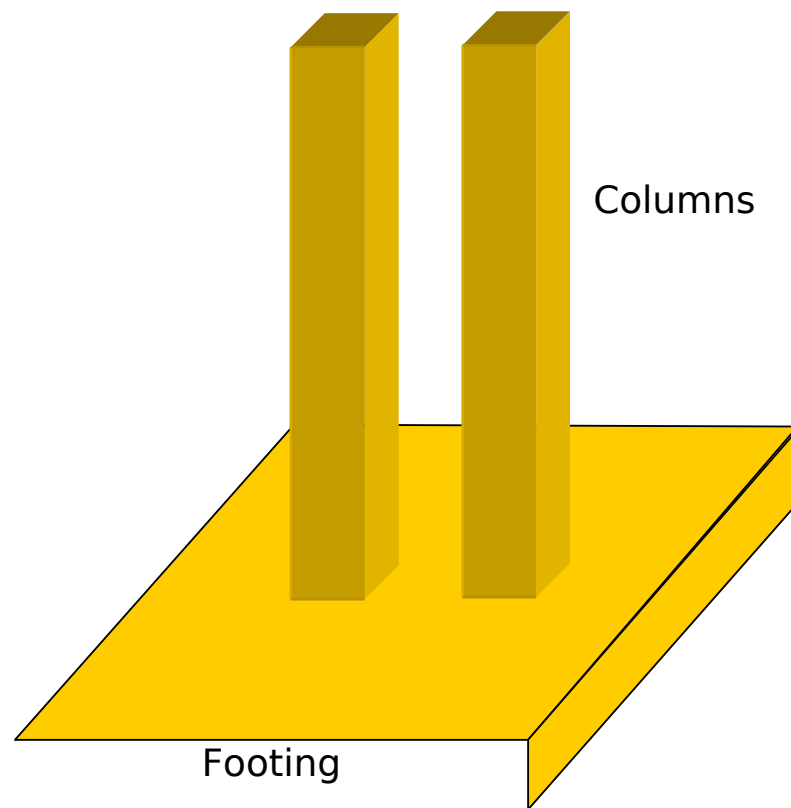
Isolated /spread footings under individual columns. These can be

SPREAD FOOTING

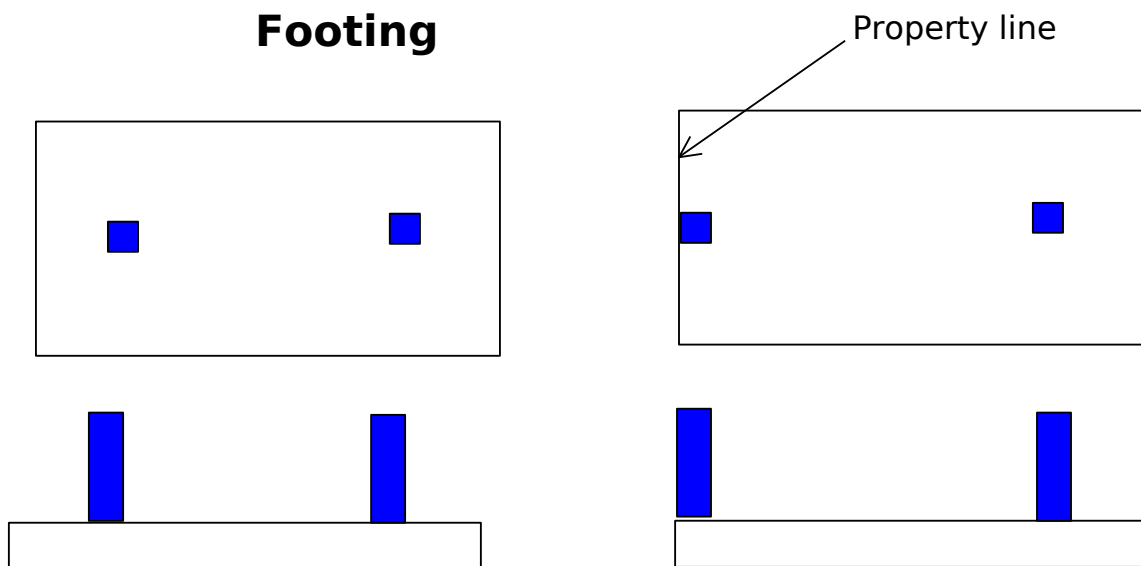




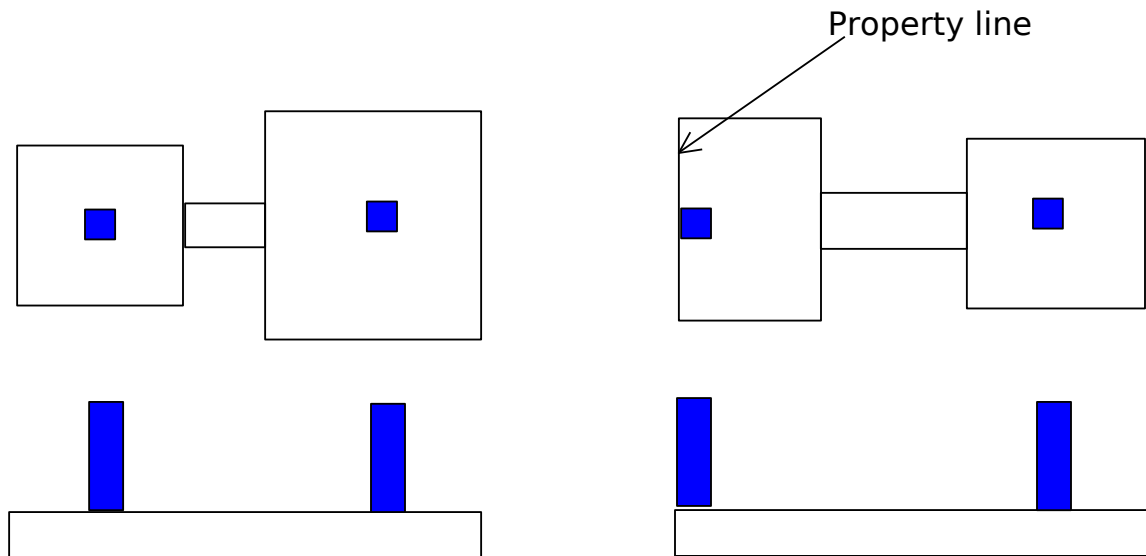
Wall footing is a continuous slab strip along the length of wall.



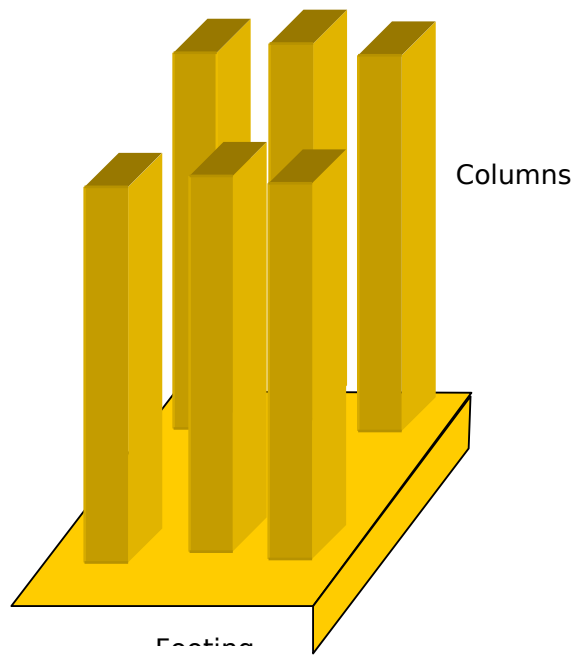
Combined Footing



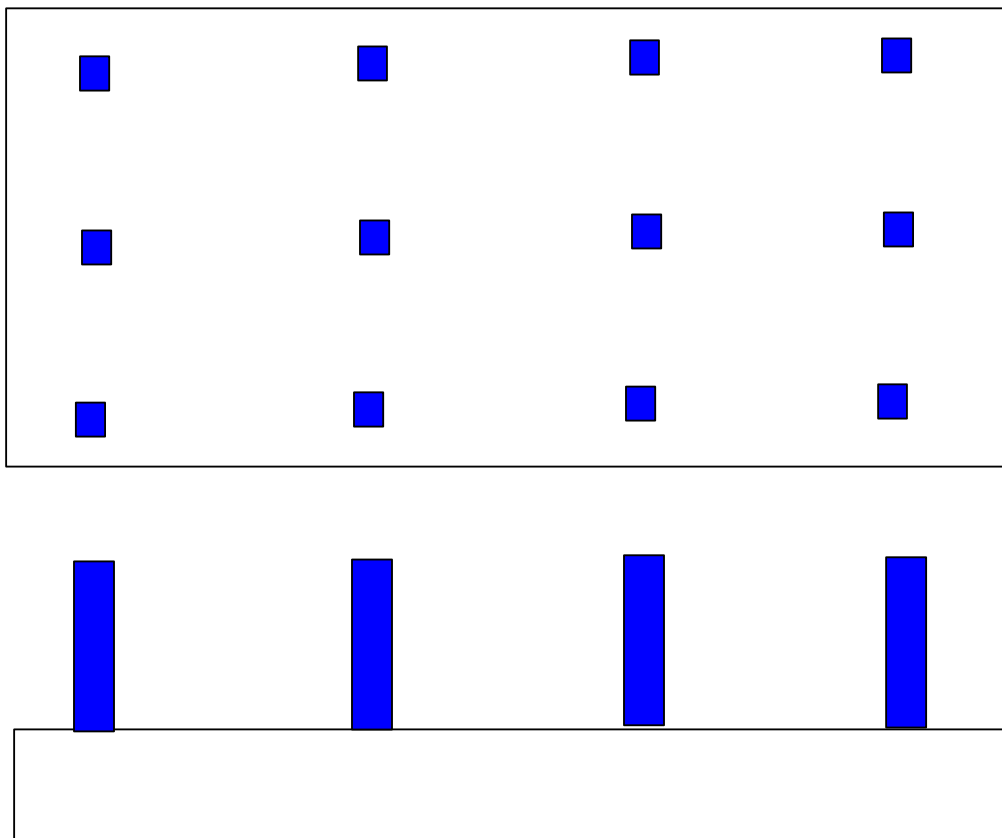
Combined footings support two or more columns. These can be rectangular or



Cantilever or strap footings: These are similar to combined footings, except that the footings under columns are built



Mat or Raft



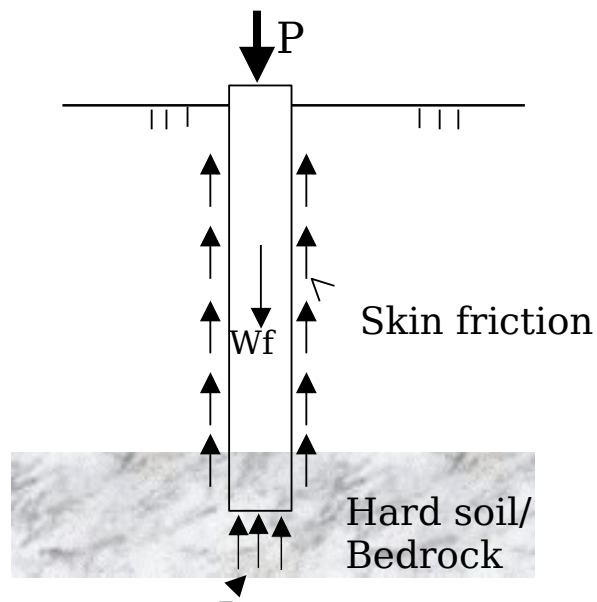
Raft or Mat foundation: This is a large continuous footing supporting all the columns of the structure. This is used when soil

Deep Foundations - The shallow foundations may not be economical or even possible when the soil bearing capacity near the surface is too low. In those cases deep foundations are used to transfer loads to a stronger layer, which may be located at a significant depth below the ground surface. eg Pile & Pier Foundation (Caisson)

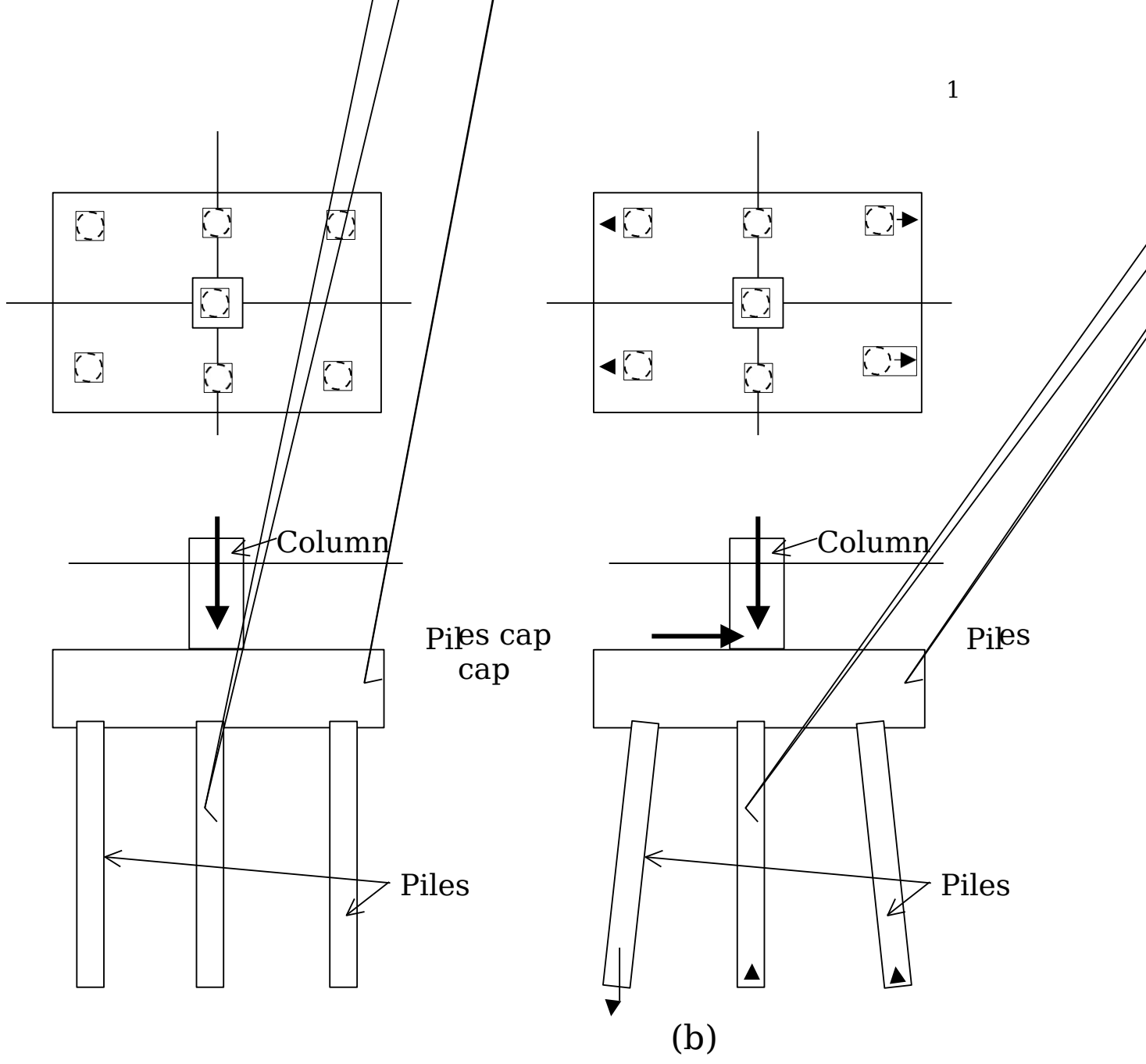
Pile Foundation

A pile is an element of construction composed of timber, concrete, or steel or a combination of them. Pile foundation may be defined as a column support type of a foundation, which may be cast in-situ or pre cast

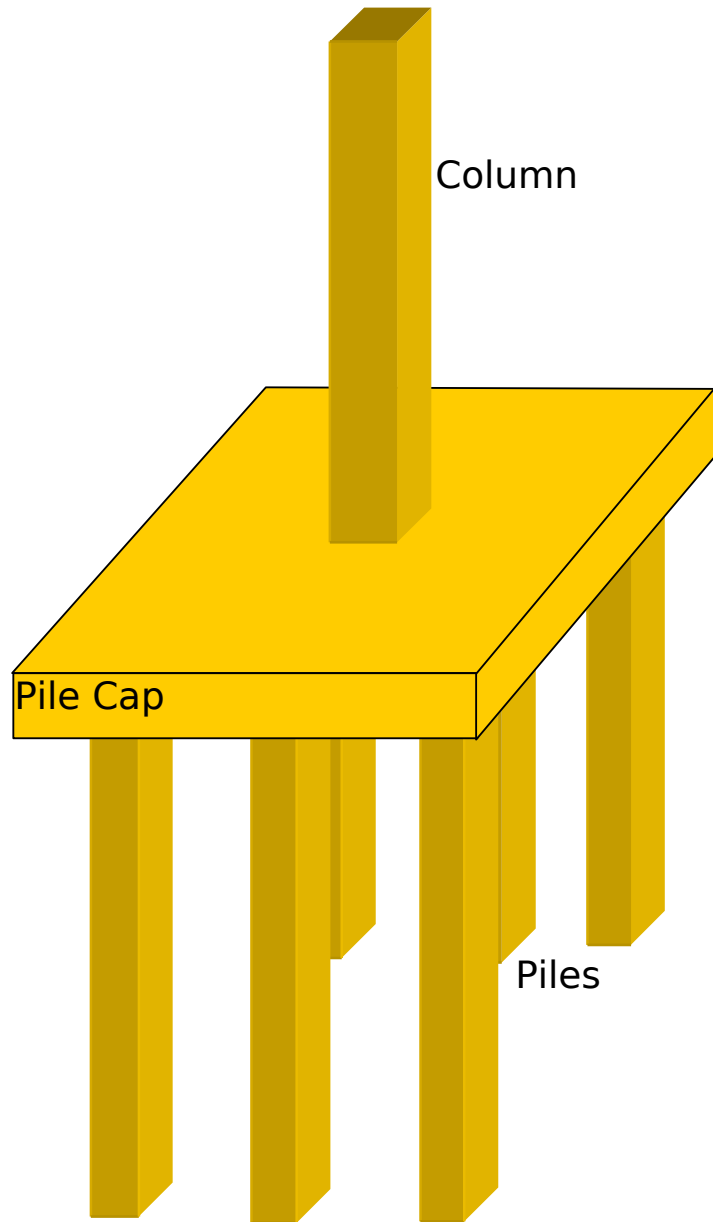
The load is transferred through skin friction and end bearing (Figure



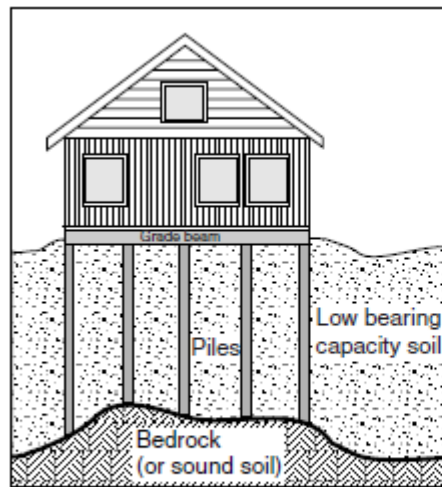
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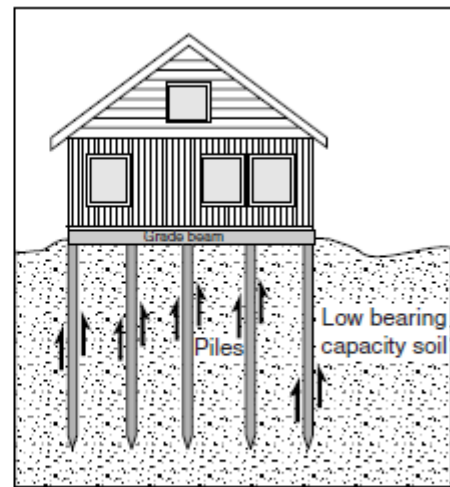
(a)
Fig. Pile Foundation- (a) Vertical Piles; (b) Battered Piles



Pile Foundation



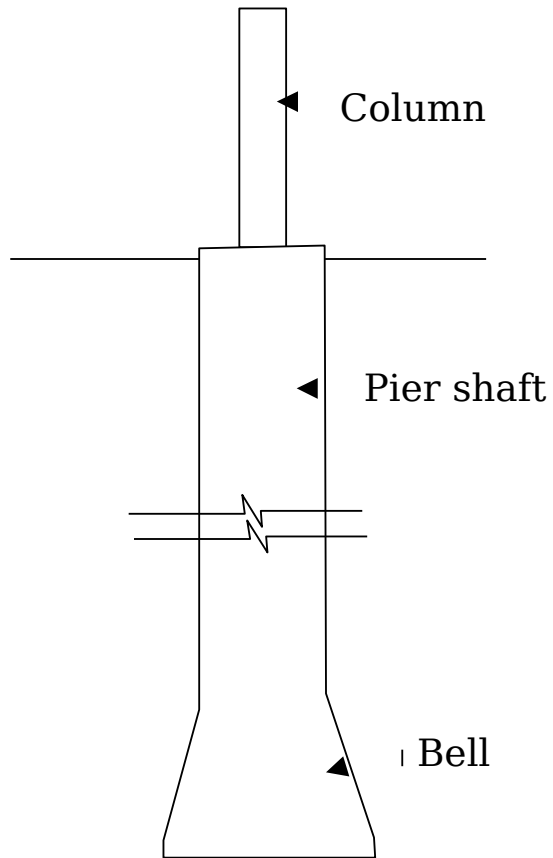
Piles bearing on bedrock
or sound soil below



Piles providing support
through skin friction

Pier Foundation (Caisson)

To substitute if numbers of piles are required and it uses for bridge .



Pier Foundation (Caisson)