

ARCHITECTURE

FOUNDATIONS

Shallow Foundations

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TYPES OF FOUNDATION

Types of foundation

Shallow foundations

- Not more than 5 m deep

- Not special equipment for earthworks

Deep foundations

- More than 5 m deep

- Special equipment required



SHALLOW FOUNDATIONS

Types of shallow foundations

Pad foundations

Strip foundations

Raft foundations



SHALLOW FOUNDATIONS

EXERCISE 1

For the 3 types of shallow foundations, write the following information:

- Shape
- When it is used
- Loads transmitted to the ground
- Main Reinforcement
- Additional reinforcement if needed
- Reinforcement to shear force



SHALLOW FOUNDATIONS. PAD FOUNDATIONS

Pad foundations

Concrete dices of squared surface

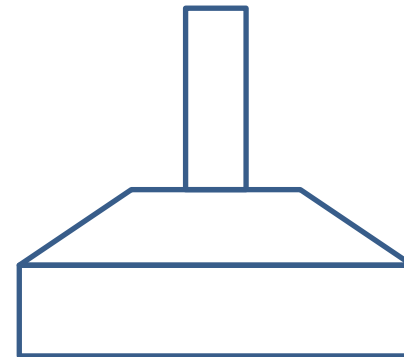
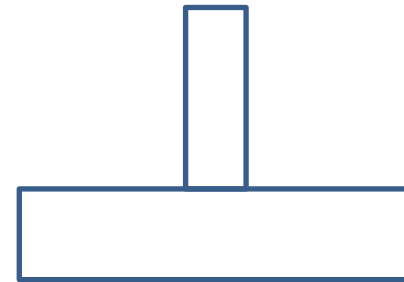
Upper surface – flat or pyramidal

Thickness – to support shear force

Steel reinforcement

- usually at the bottom
- in both directions

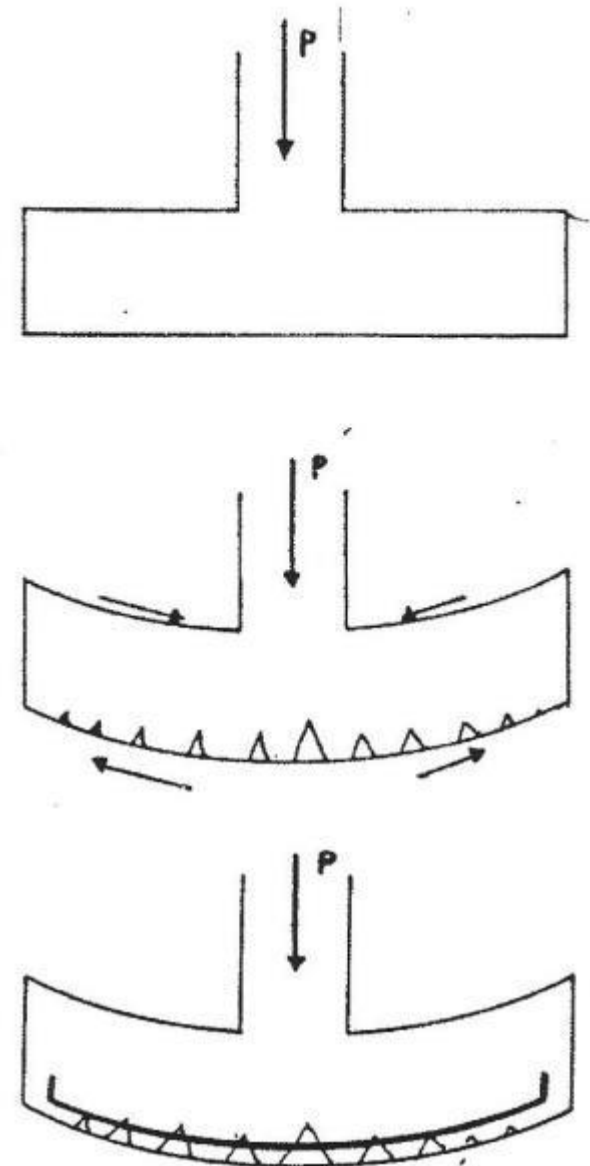
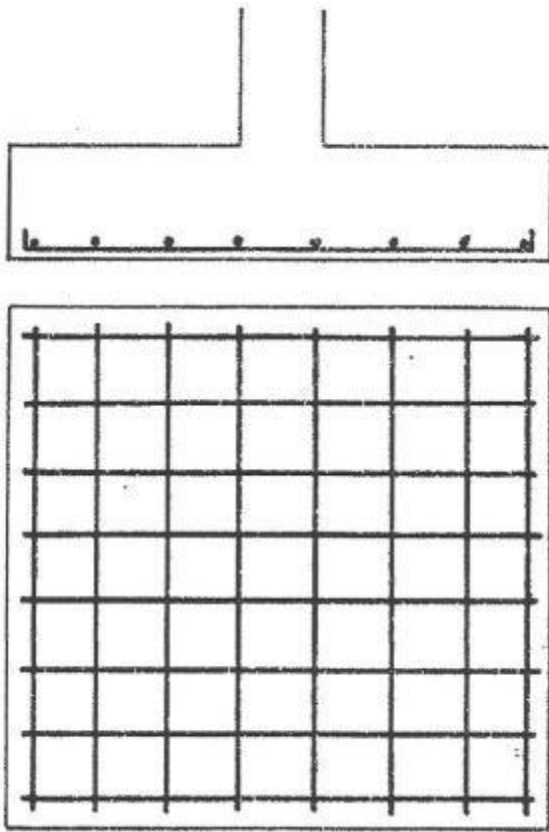
Suitable for nearly all soils except loose sands and gravels





SHALLOW FOUNDATIONS. PAD FOUNDATIONS

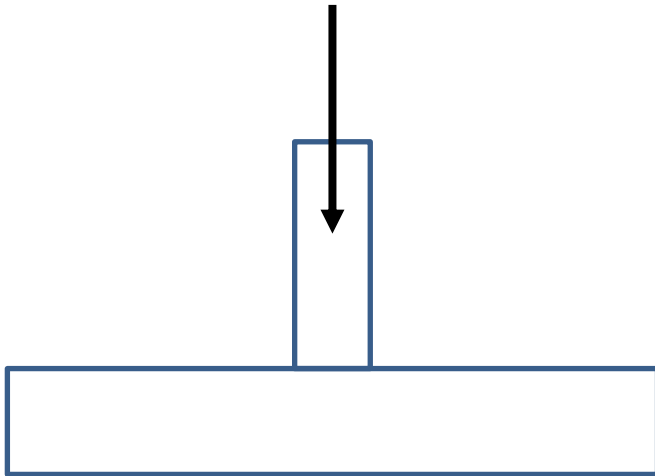
Pad foundations



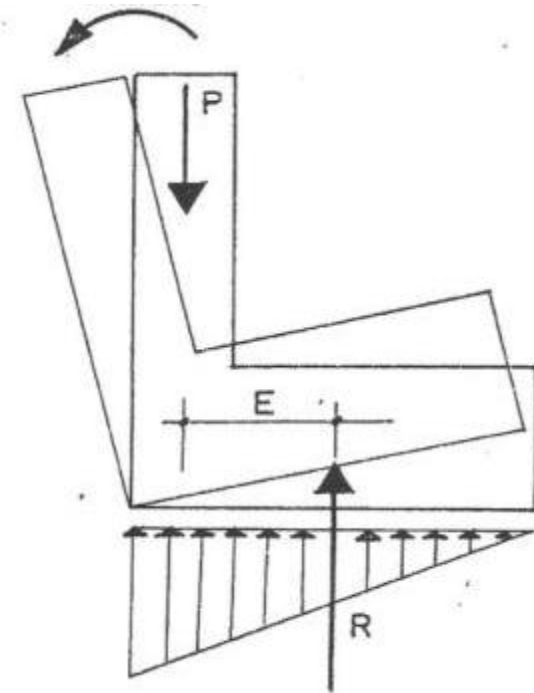


SHALLOW FOUNDATIONS. PAD FOUNDATIONS

Different situations



CENTRAL LOAD



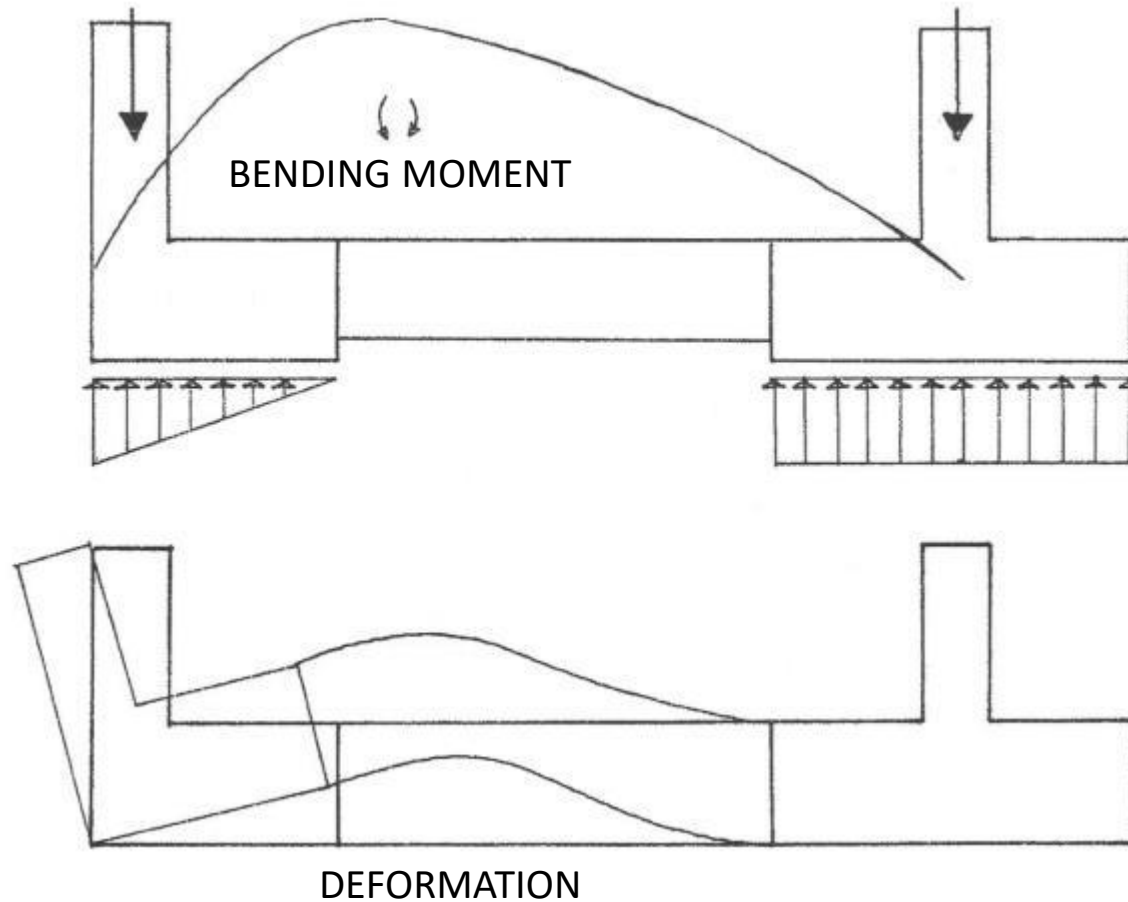
ECCENTRIC LOAD



SHALLOW FOUNDATIONS. PAD FOUNDATIONS

Different situations

USE OF TIE BEAMS

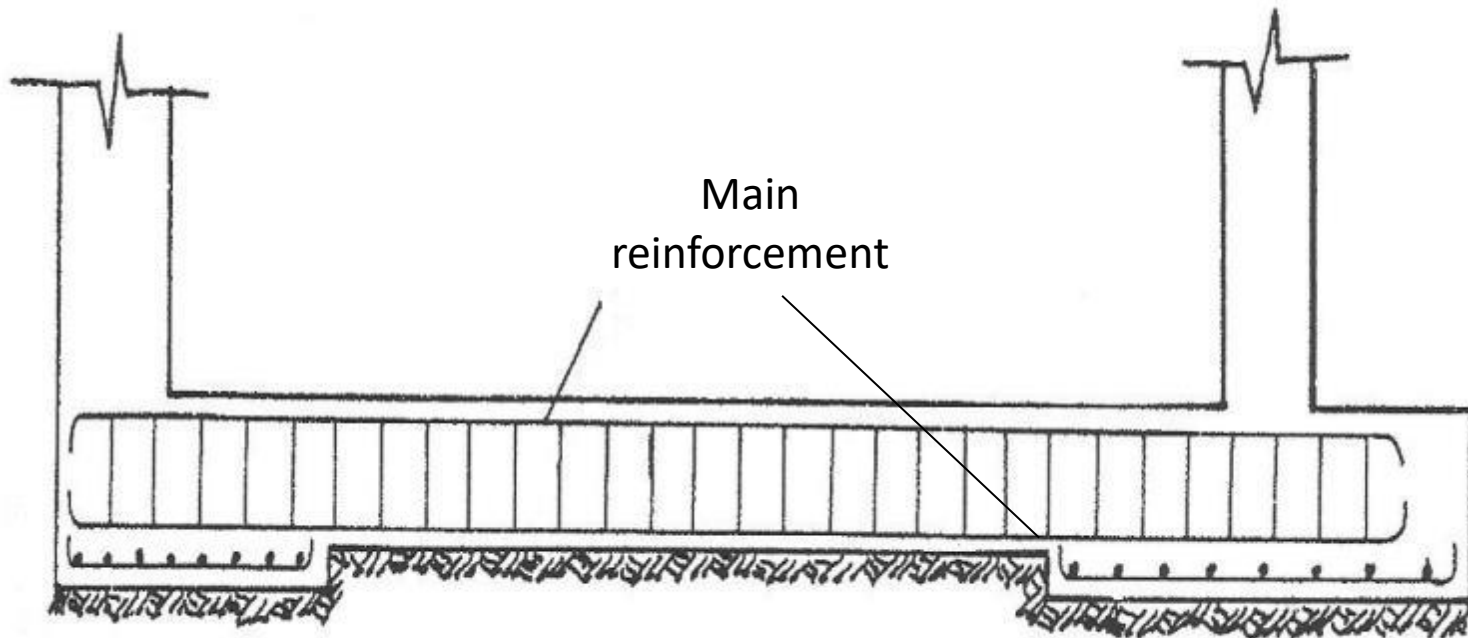




SHALLOW FOUNDATIONS. PAD FOUNDATIONS

Different situations

USE OF TIE BEAMS

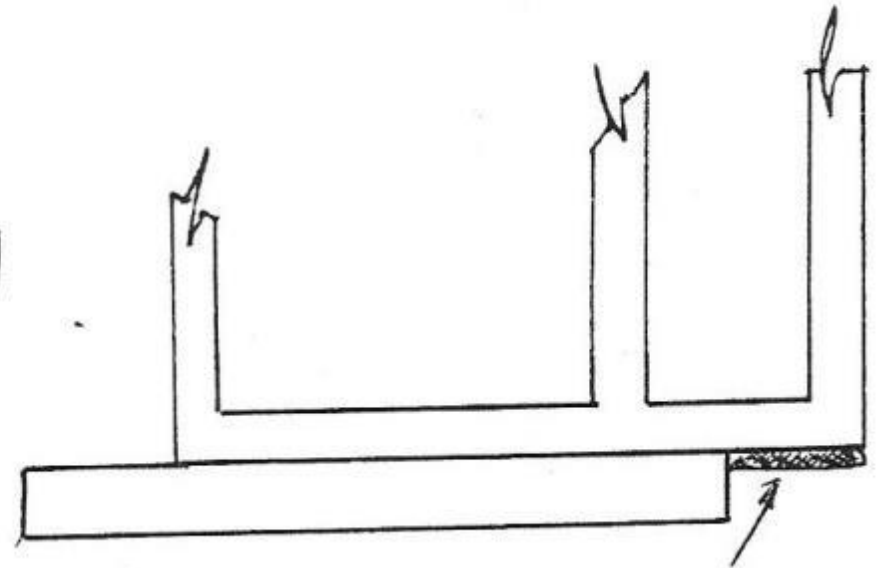
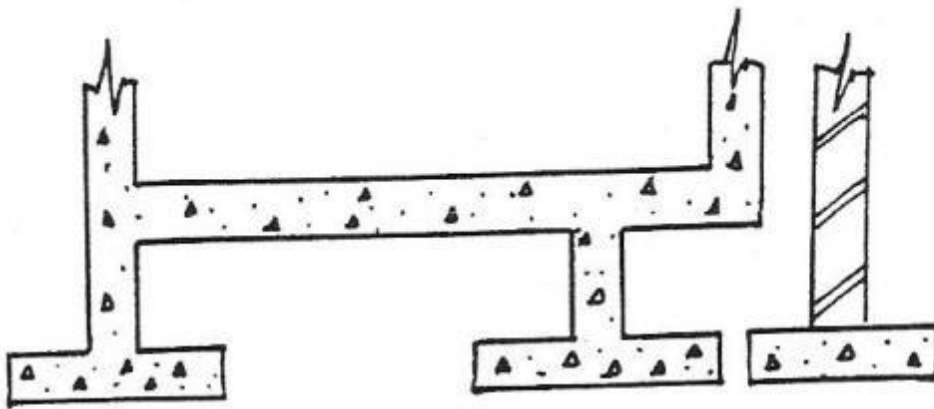




SHALLOW FOUNDATIONS. PAD FOUNDATIONS

Different situations

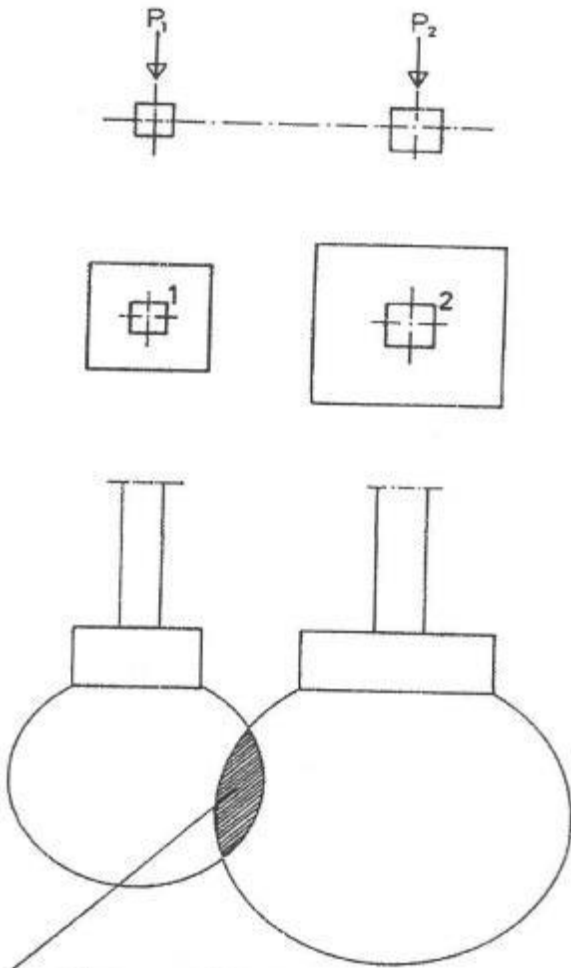
USE OF CANTILEVER BEAMS



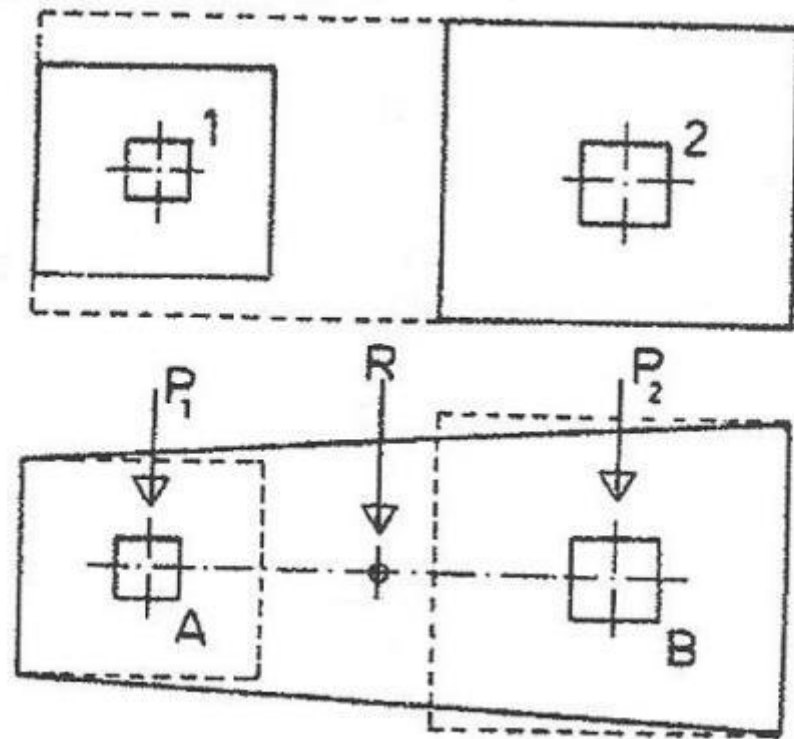


SHALLOW FOUNDATIONS. PAD FOUNDATIONS

Different situations



COMBINED PAD FOUNDATIONS

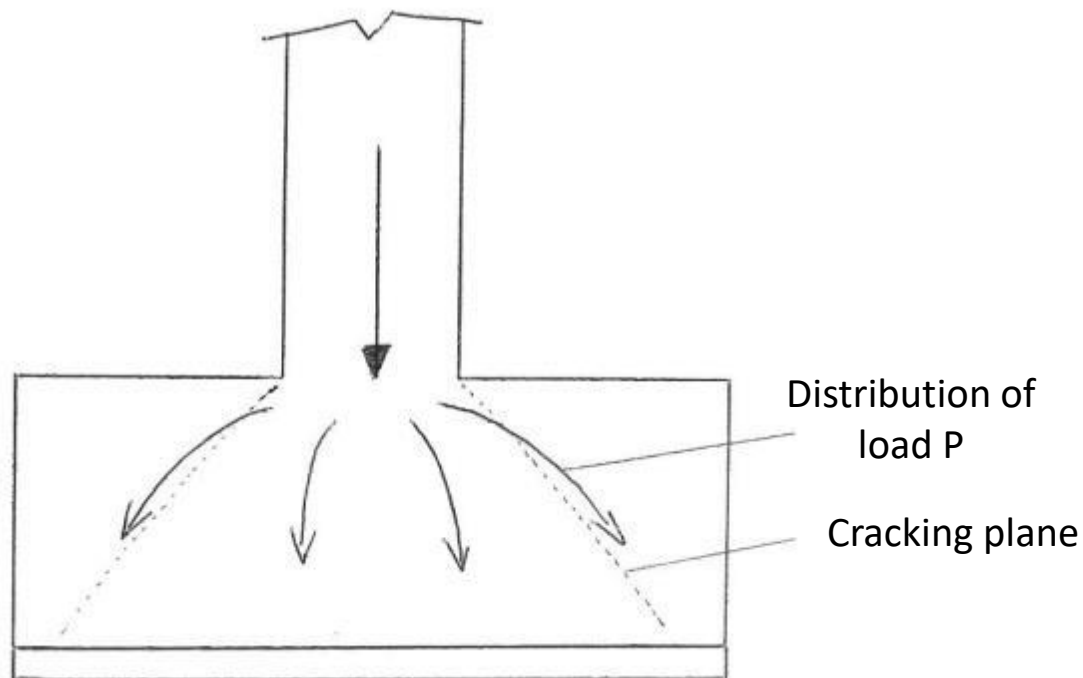




SHALLOW FOUNDATIONS. PAD FOUNDATIONS

Reinforcement to shear force

- Increasing the concrete section
- Introducing shear force reinforcement

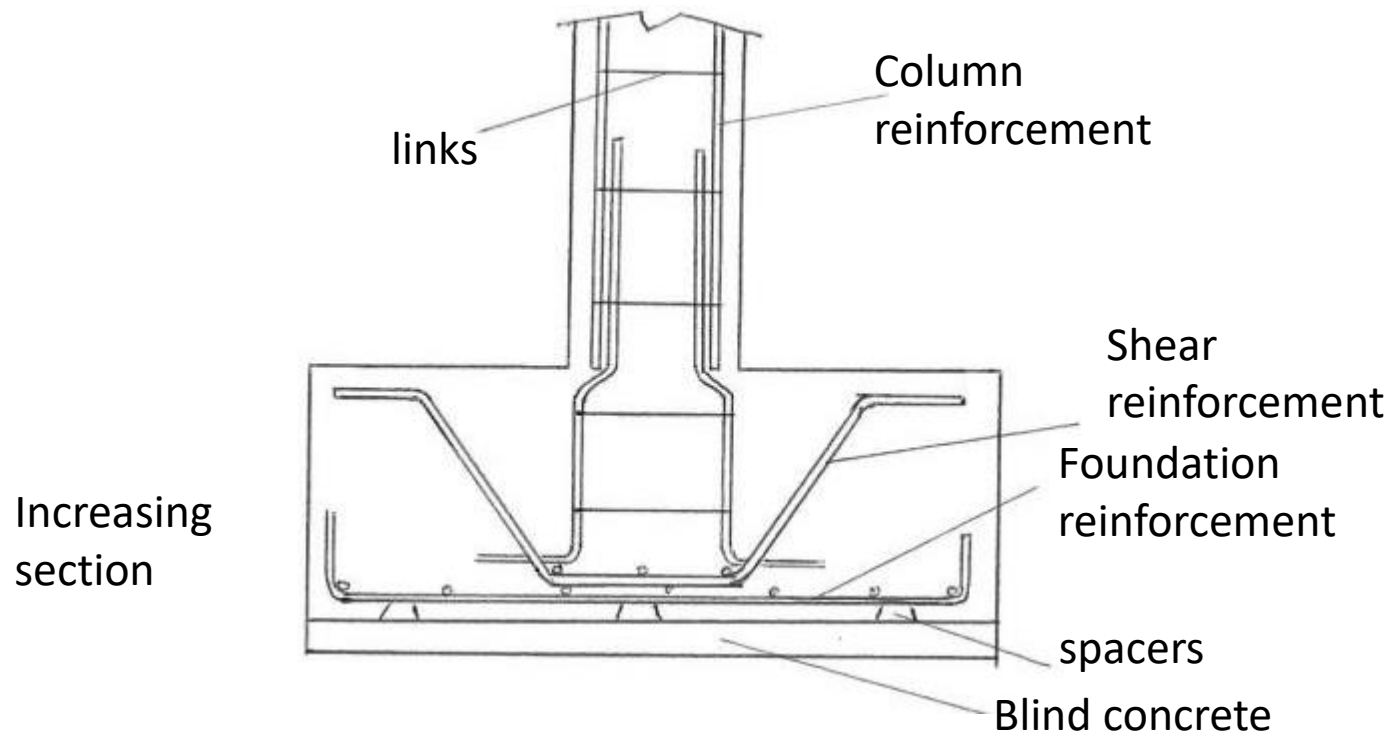




SHALLOW FOUNDATIONS. PAD FOUNDATIONS

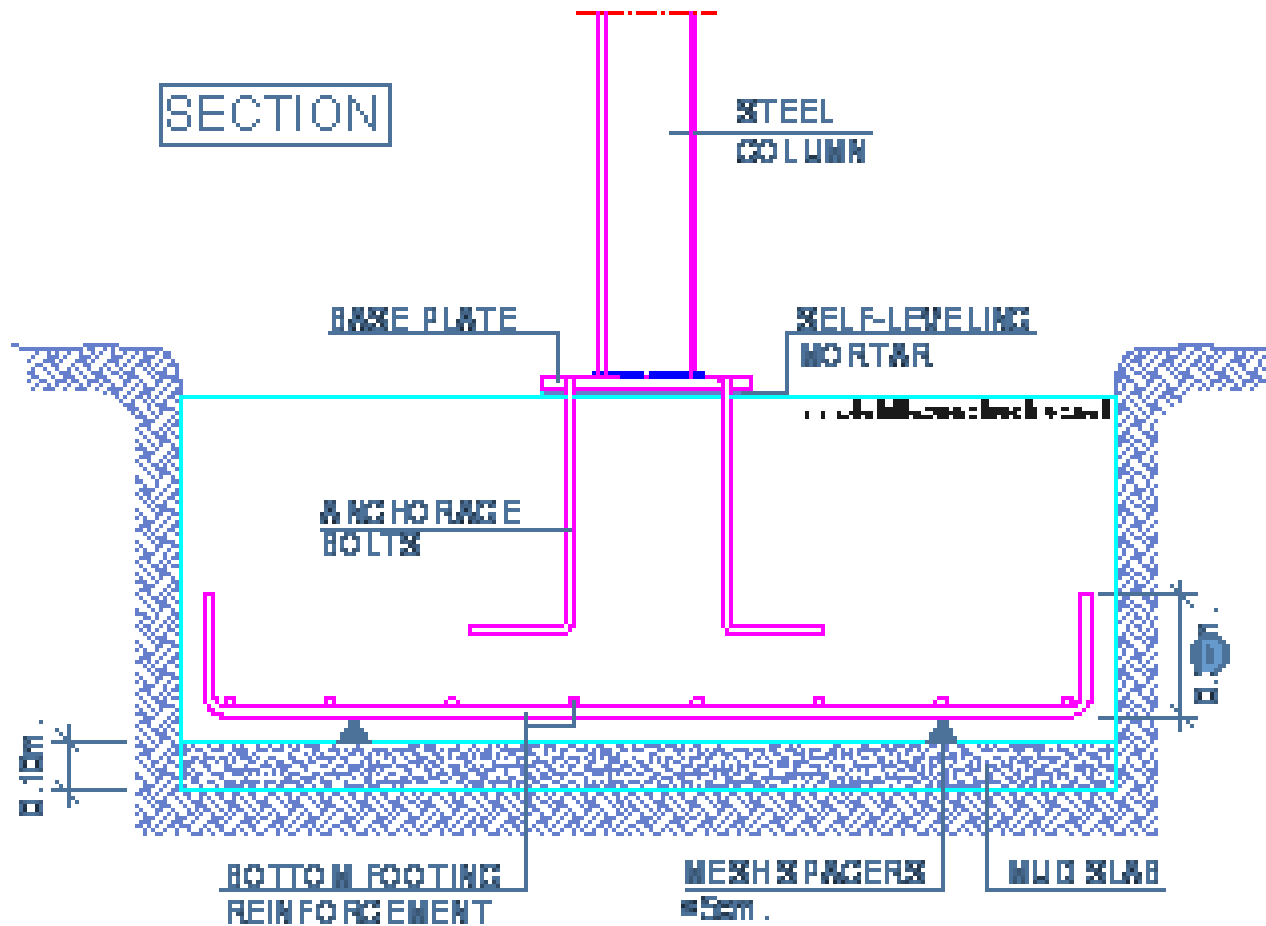
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SHALLOW FOUNDATIONS. PAD FOUNDATIONS



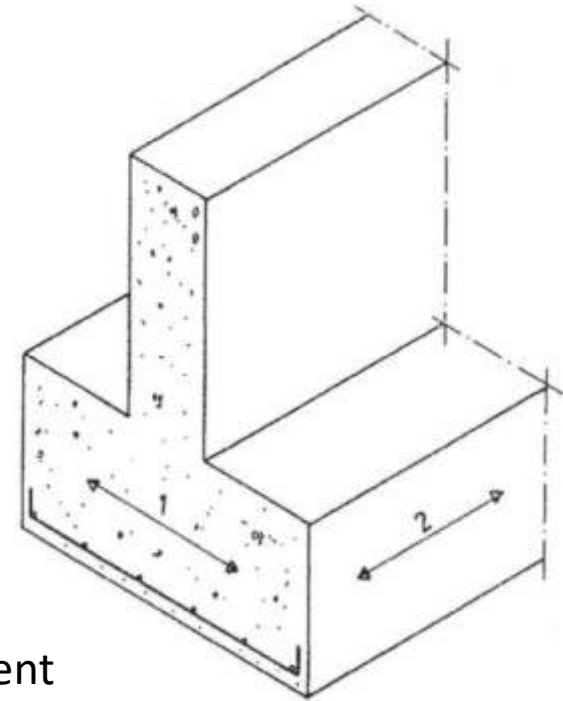


SHALLOW FOUNDATIONS. STRIP FOUNDATIONS

For walls and columns
More distribution of loads
Less transmission of loads

For most subsoils and light structural loadings
Typical foundation for dwellings

1. Main reinforcement
2. Secondary reinforcement

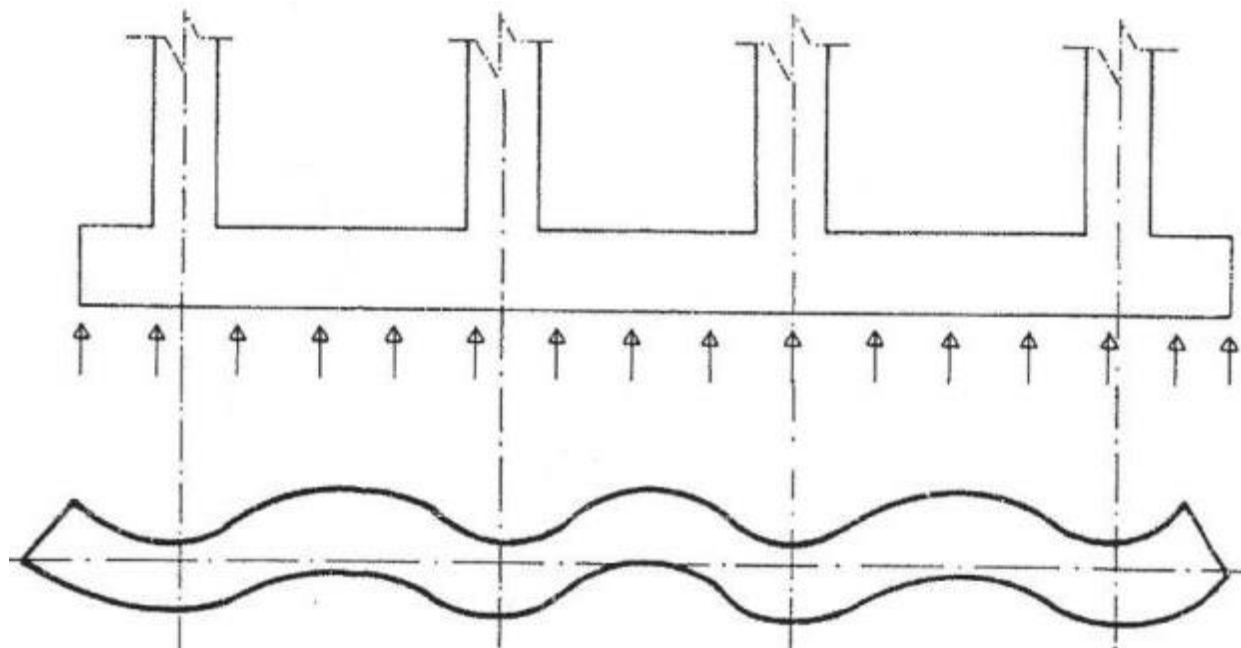




SHALLOW FOUNDATIONS. STRIP FOUNDATIONS

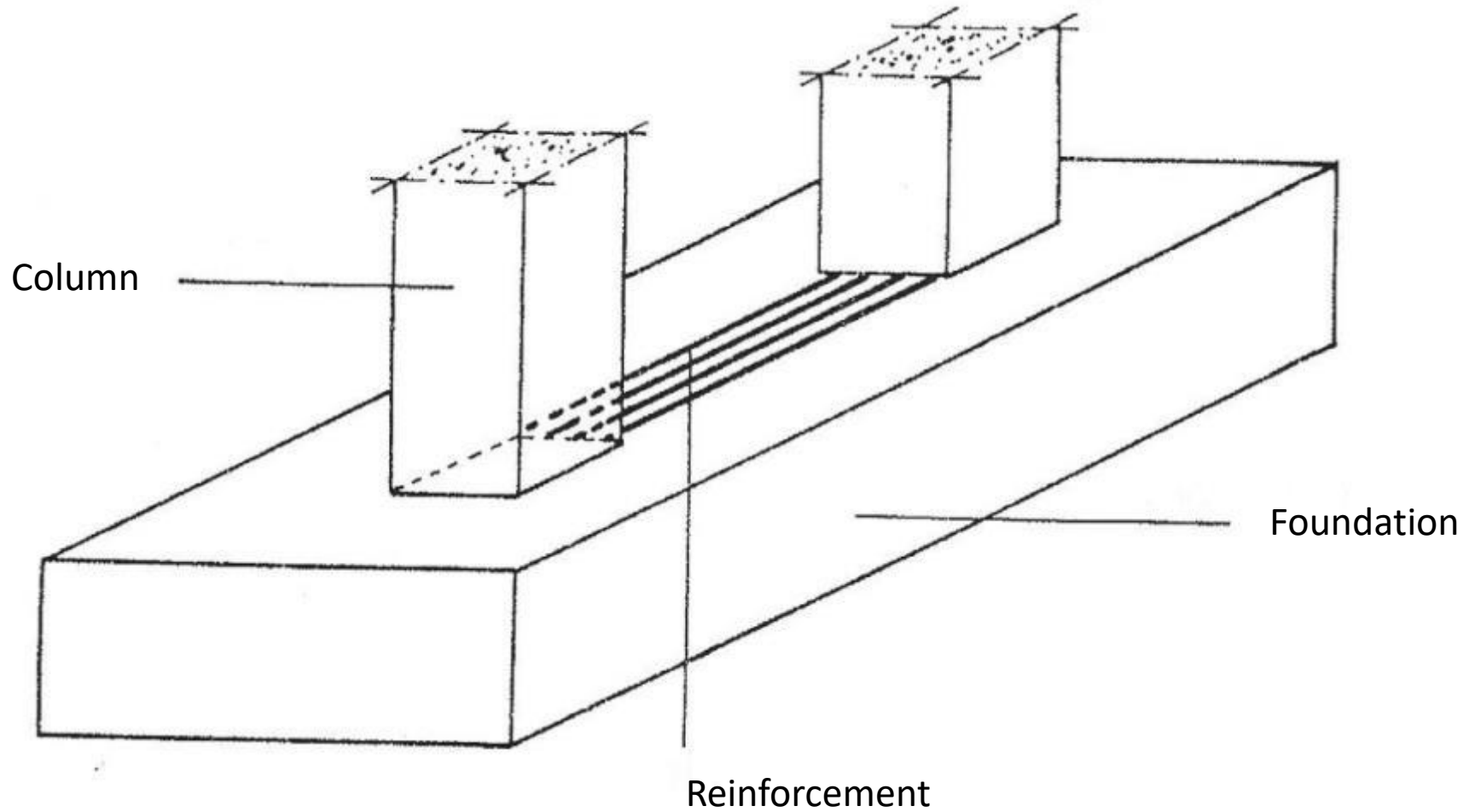
Important to study deformation

A wall will transmit similar loads along the foundation
Different columns will transmit punctual loads





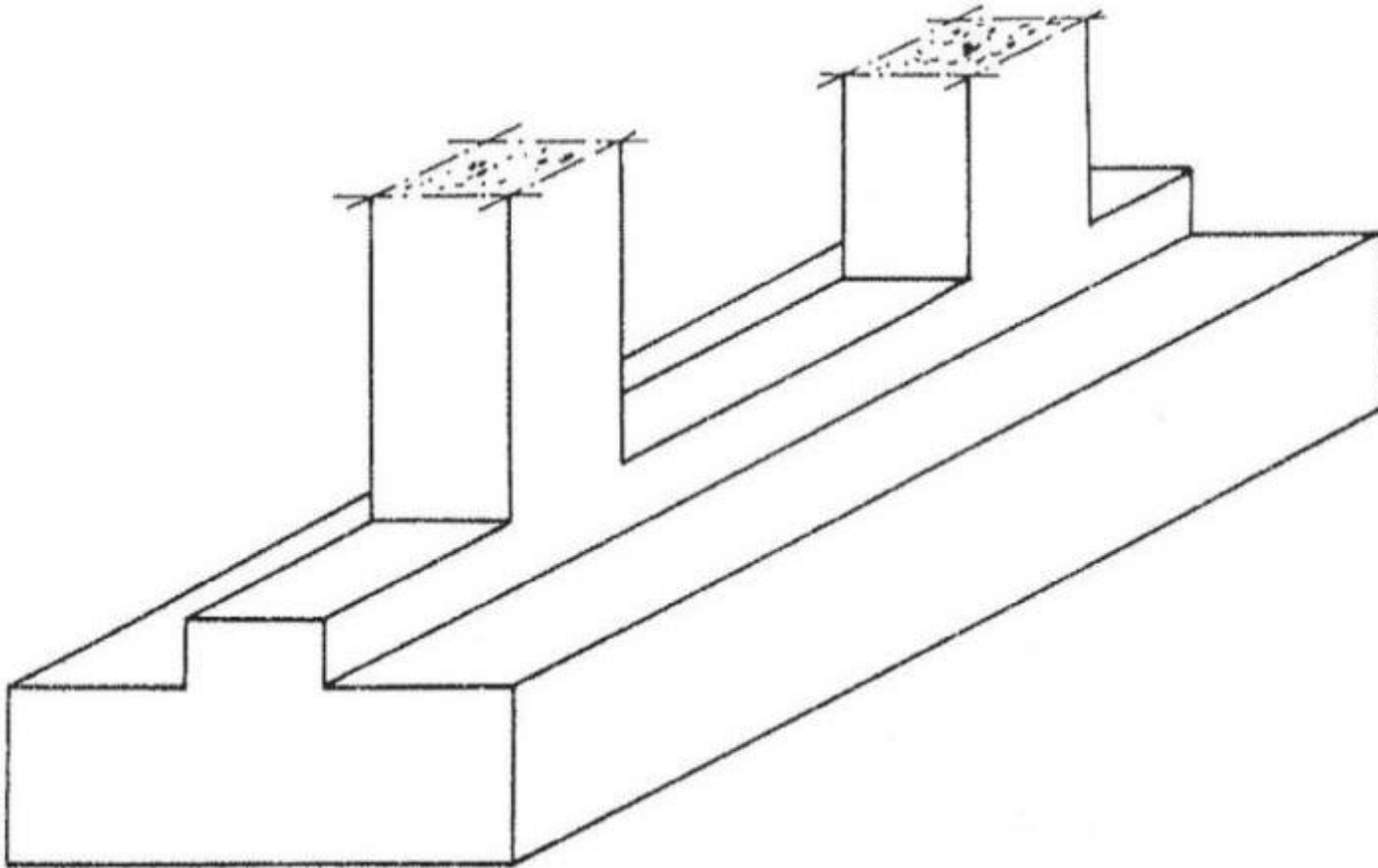
SHALLOW FOUNDATIONS. STRIP FOUNDATIONS





SHALLOW FOUNDATIONS. STRIP FOUNDATIONS

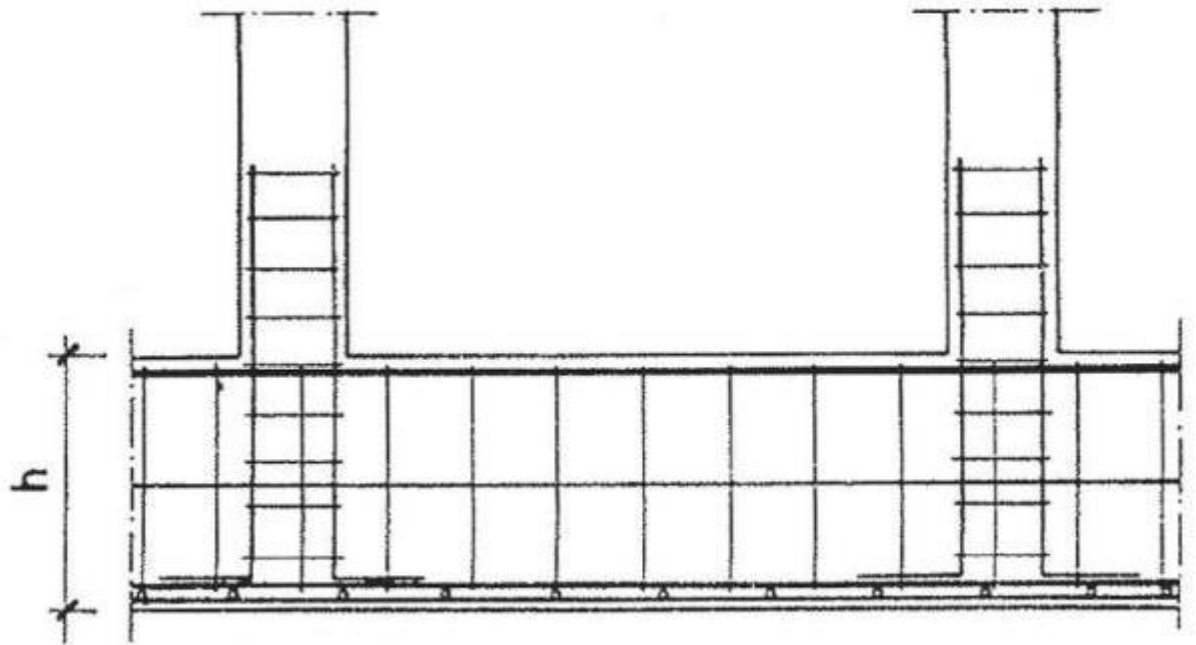
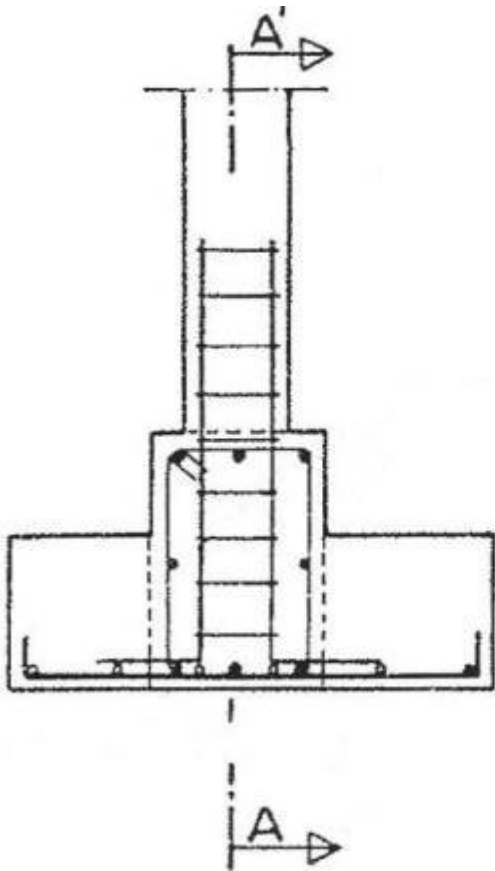
In that case, the easiest solution is to construct a beam





SHALLOW FOUNDATIONS. STRIP FOUNDATIONS

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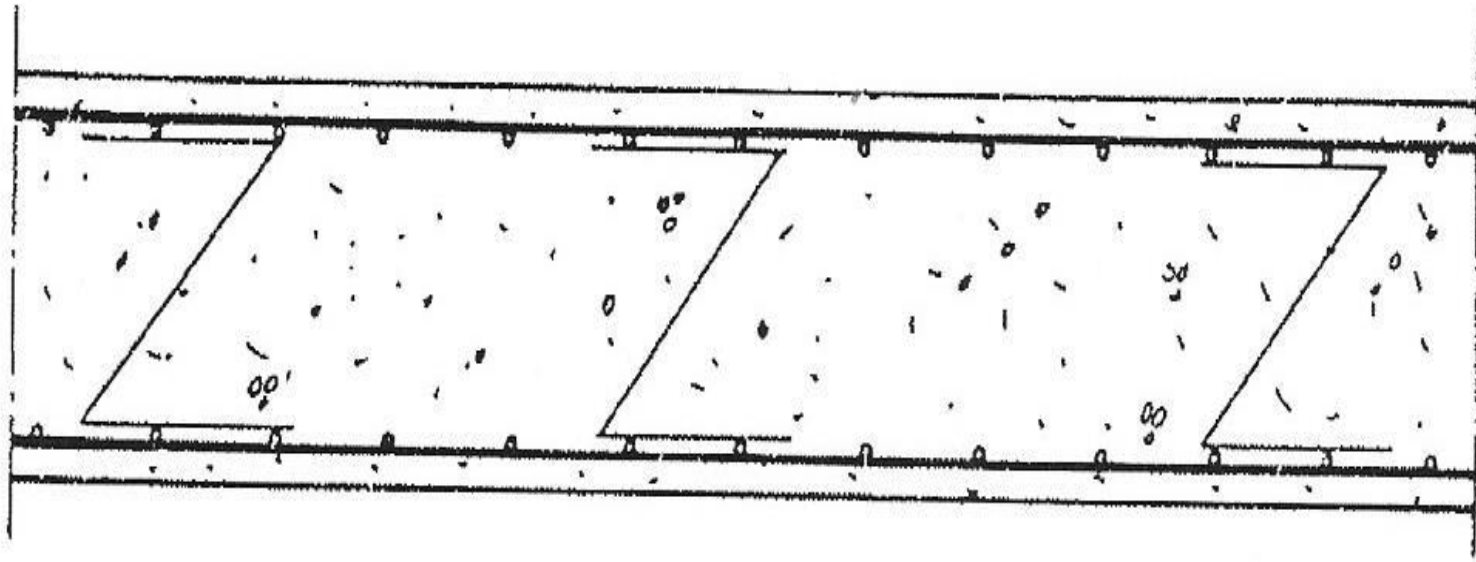




SHALLOW FOUNDATIONS. RAFT FOUNDATIONS

Distribution of loads over the whole area of the site
Loads transmitted are considerably reduced

Useful for heavy loads and/or low bearing capacity

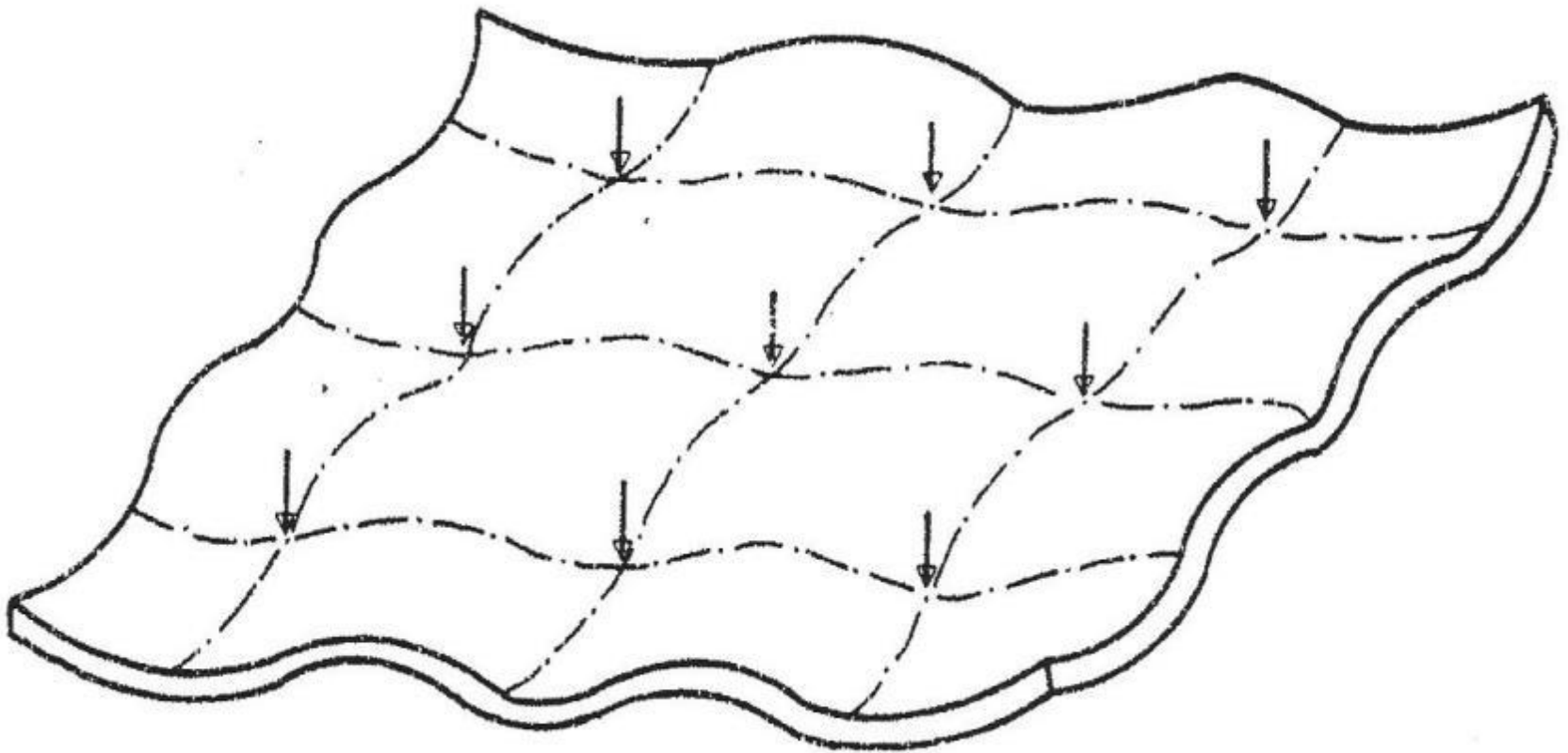


Reinforcement in both directions and both sides



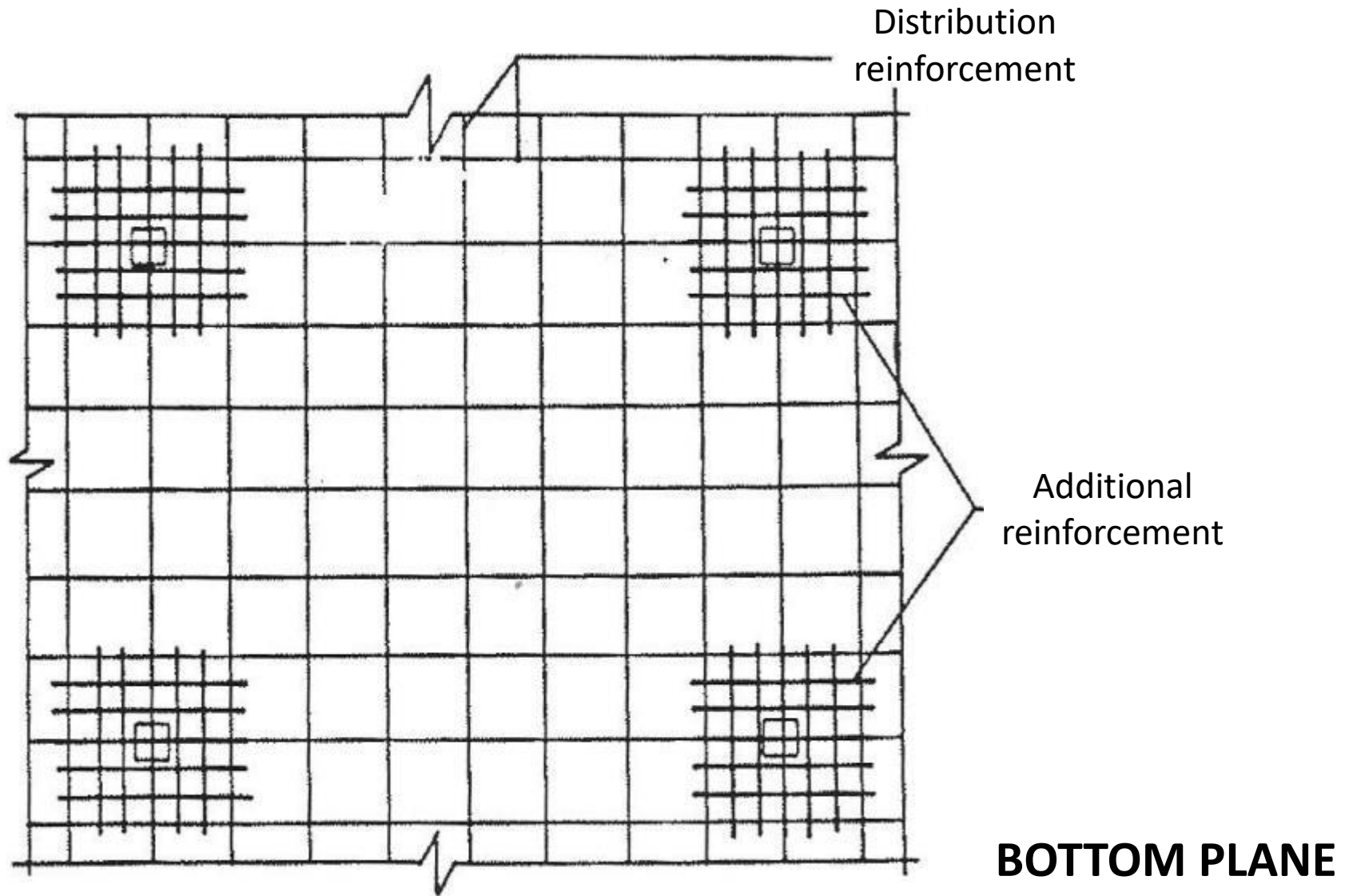
SHALLOW FOUNDATIONS. RAFT FOUNDATIONS

Columns transfer punctual loads



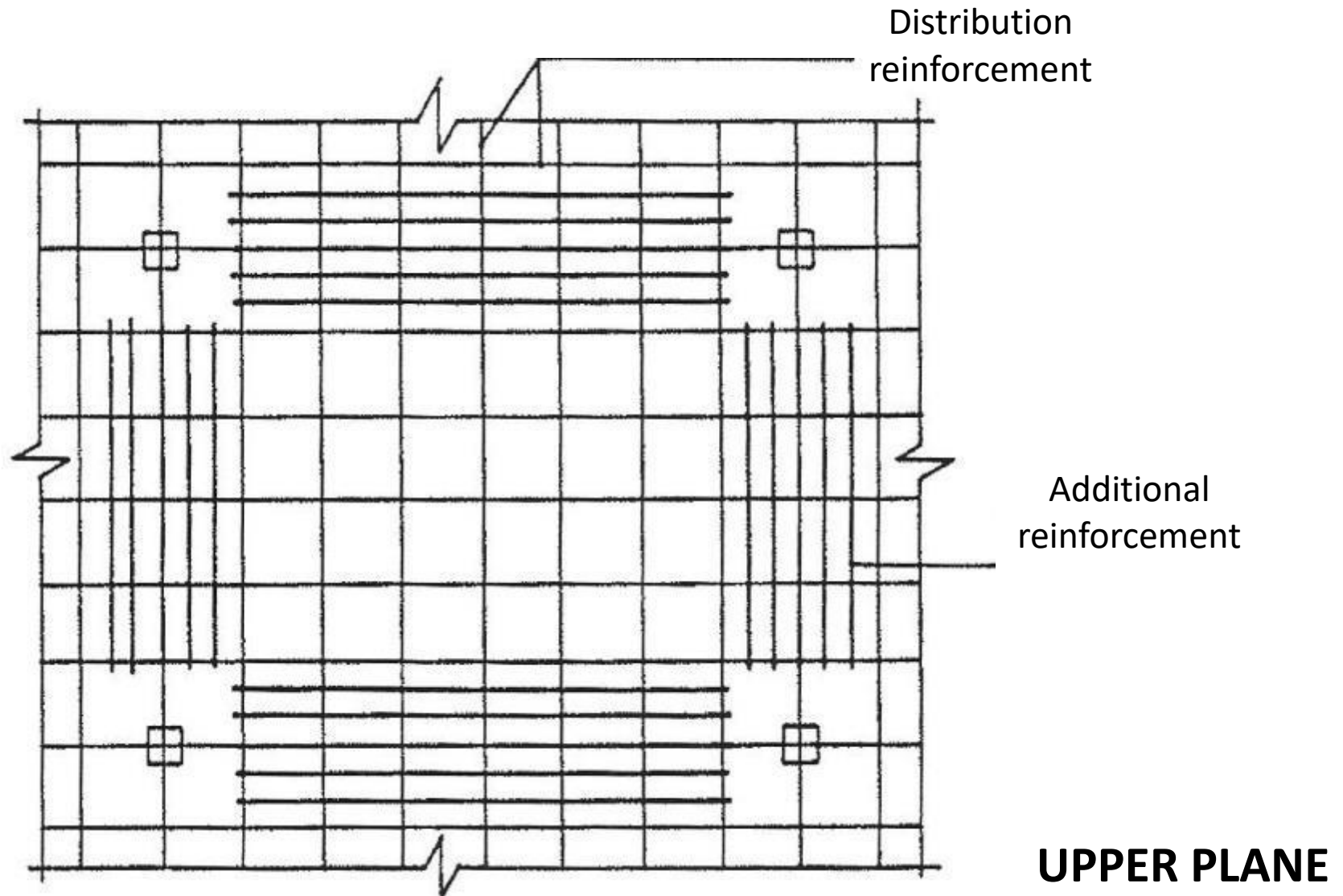


SHALLOW FOUNDATIONS. RAFT FOUNDATIONS





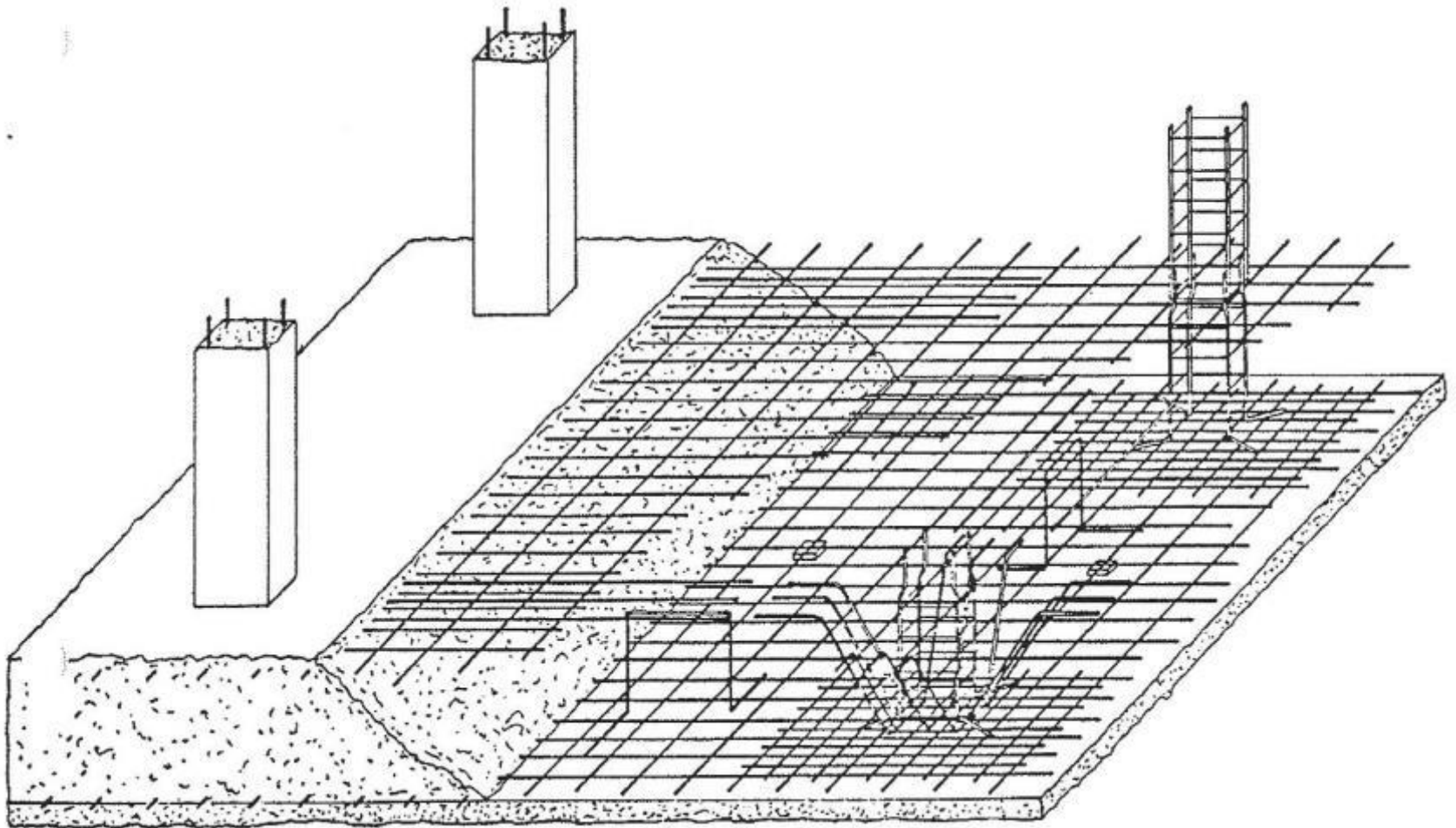
SHALLOW FOUNDATIONS. RAFT FOUNDATIONS





SHALLOW FOUNDATIONS. RAFT FOUNDATIONS

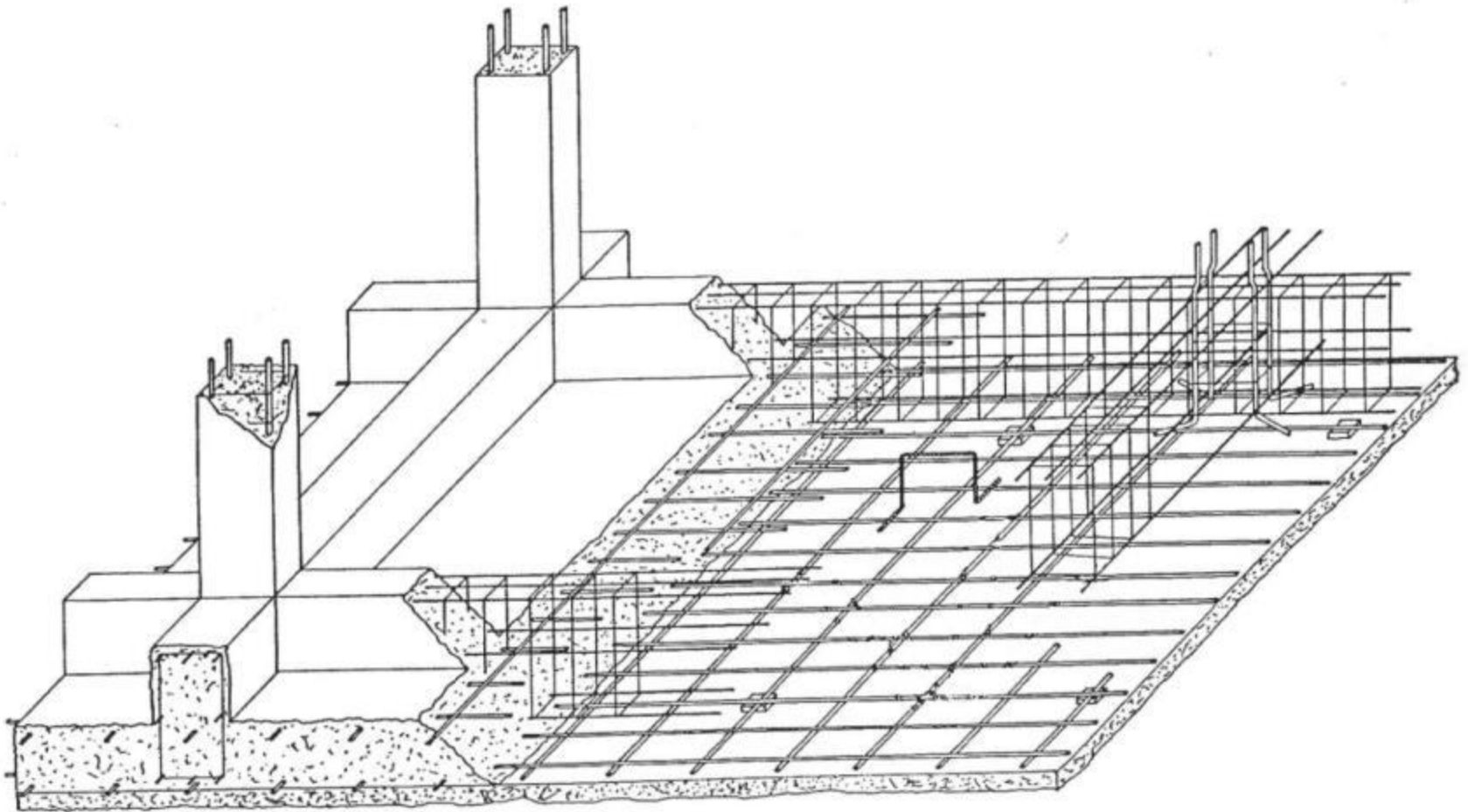
Reinforcement to shear force





SHALLOW FOUNDATIONS. RAFT FOUNDATIONS

Reinforcement to shear force





SHALLOW FOUNDATIONS

EXERCISE 1

CAN YOU EXPLAIN WHAT YOU SEE?























7 FOUNDATIONS





































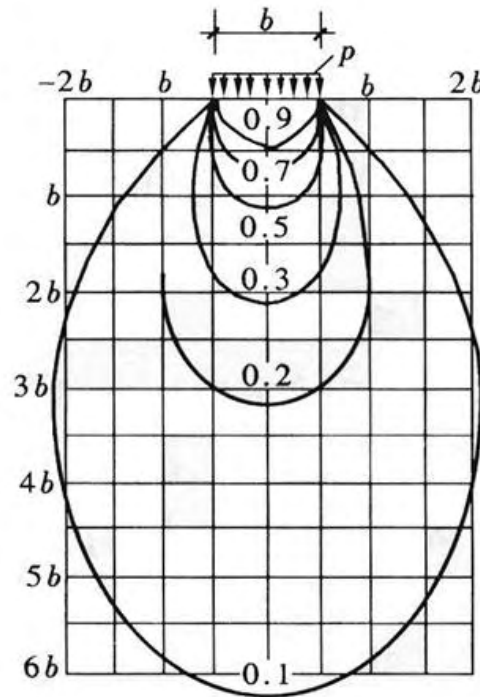


SHALLOW FOUNDATIONS

EXERCISE 3

Answer the following questions:

1. Supposing the ground can have a pressure bulb like this, which is the minimum distance between two pads to avoid any overlapping?





SHALLOW FOUNDATIONS

EXERCISE 3

Answer the following questions:

2. We have a high-rise building and the bearing capacity of the soil is not very high. Which is the best solution for a shallow foundation?
3. With a granular soil, what kind of foundation would you use?
4. What type of shallow foundation does have the largest depth affection?
5. Draw a pad foundation with an eccentric load, put the reinforcement needed and explain how to balance it.
6. Explain 3 solutions for reinforcement to absorb shear force in a raft foundation.
7. Explain how to reinforce a cantilever beam.
8. Explain how to solve any construction joint when concreting a foundation.