

**ARCHITECTURE**

# **FOUNDATIONS**

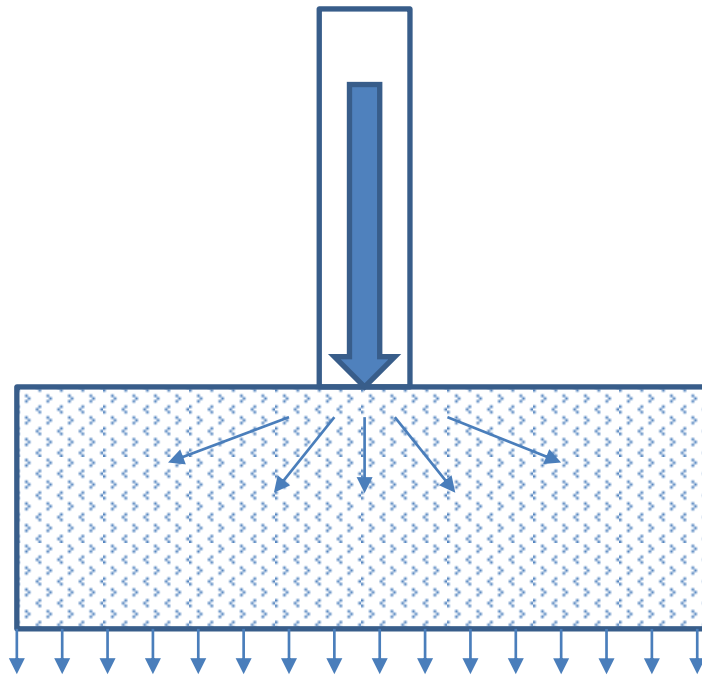
## **Introduction**

**Juan Antonio Ferriz-Papi**



## INTRODUCTION

Objective:  
Transmit loads to the ground

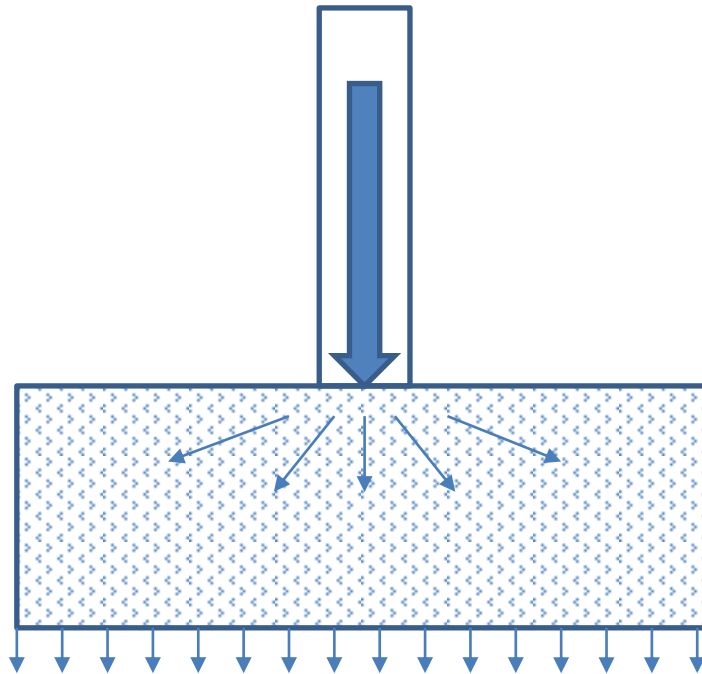




## INTRODUCTION

**EXERCISE**

A column transmits a vertical load of 200 kN to one square foundation. If the permissible bearing pressure of the soil is  $0.15 \text{ N/mm}^2$ , calculate the horizontal surface needed to distribute this load.

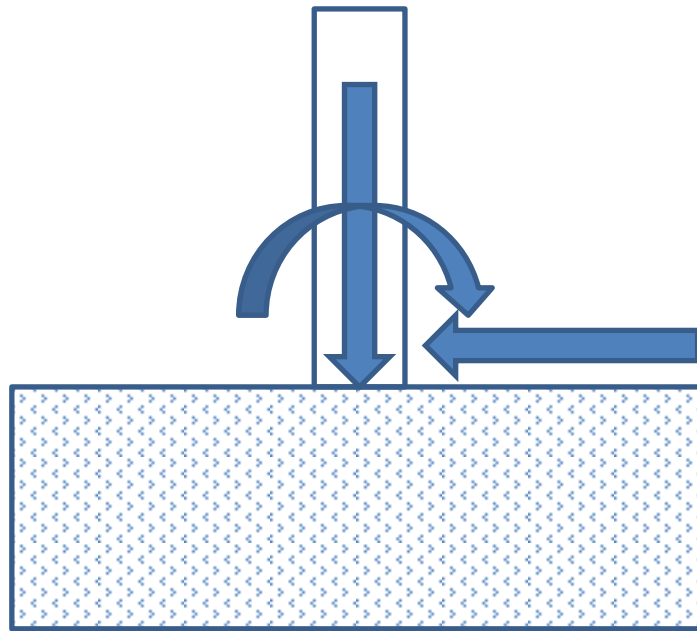




## INTRODUCTION

But It is not so easy...

Dead loads  
Imposed loads  
Wind  
Snow  
Etc.



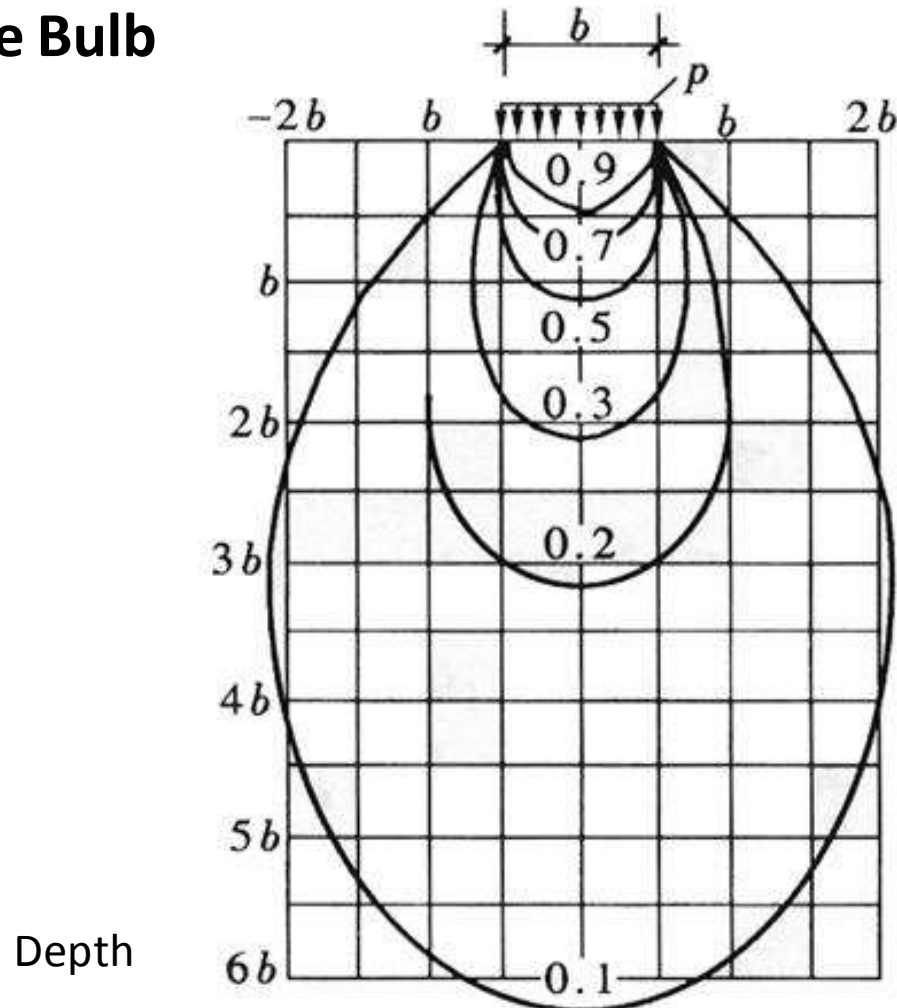
Different soils  
Bearing capacity



## INTRODUCTION

Transmission of loads to the ground

## Pressure Bulb



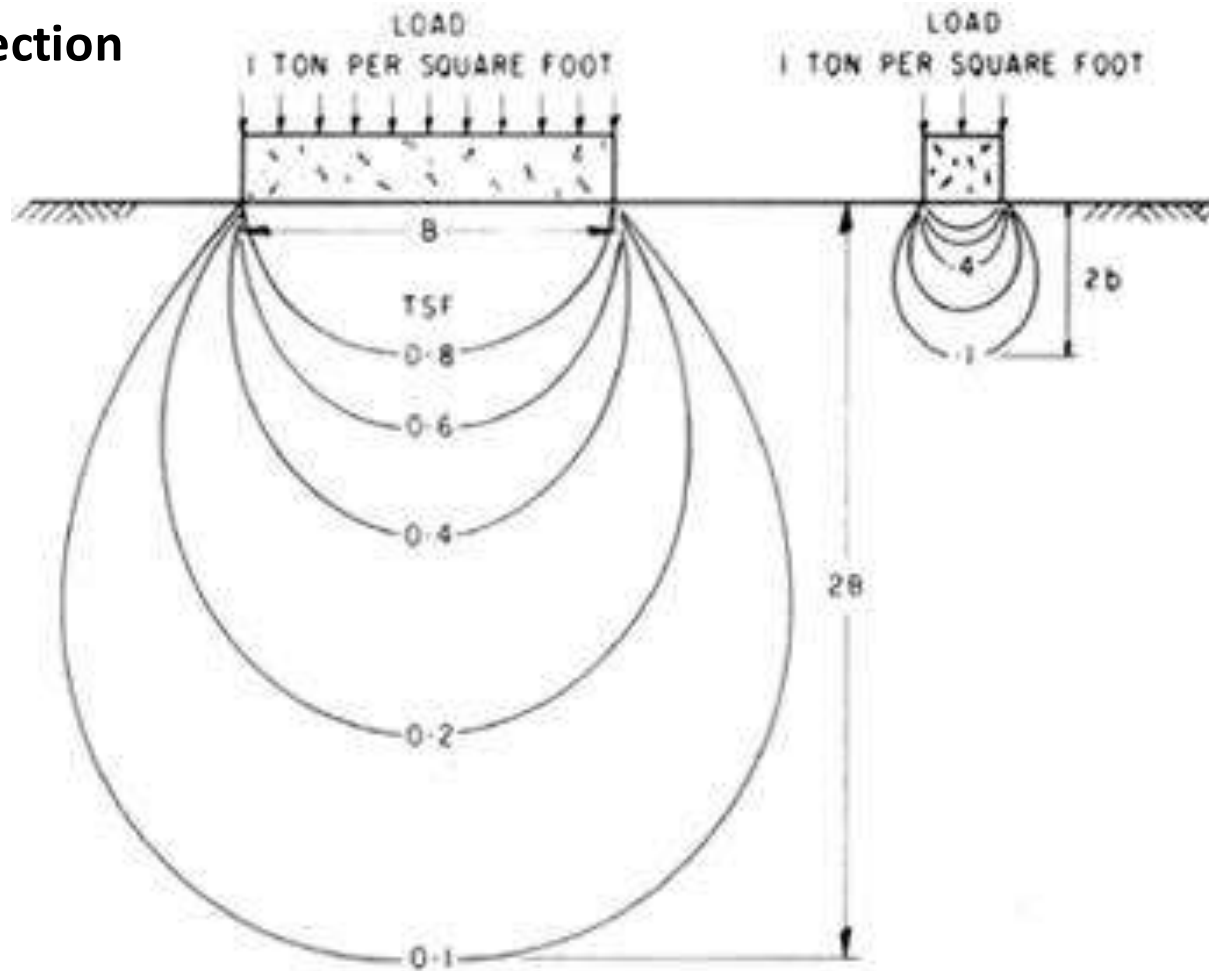
Pressure bulb for vertical stress in an elastic soil (plate loading test example)



## INTRODUCTION

Transmission of loads to the ground

**Depth affection**

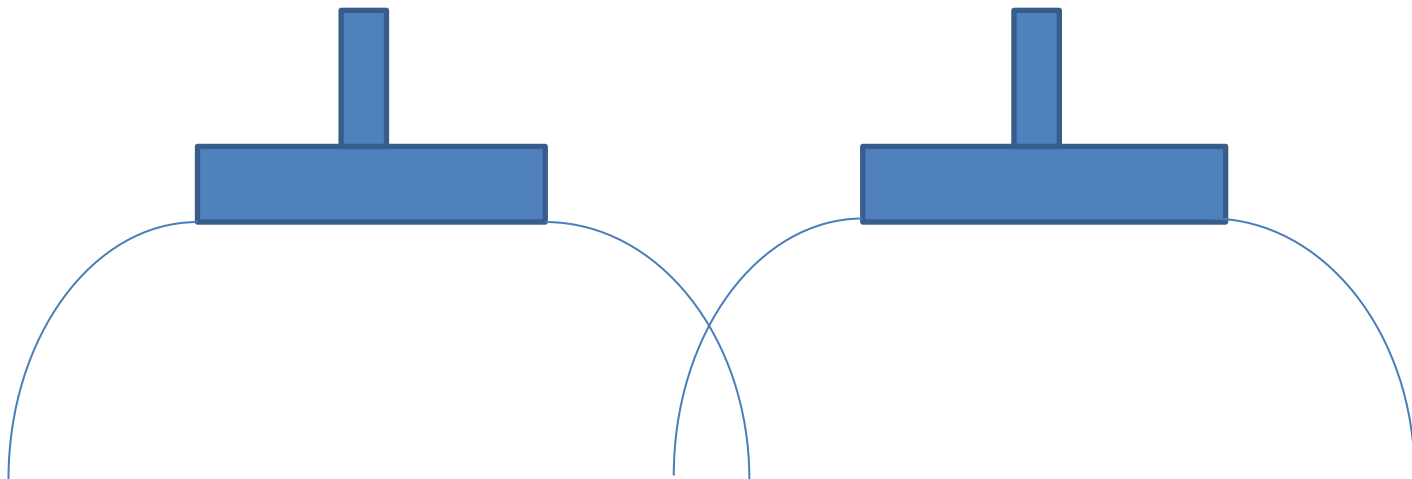




## INTRODUCTION

Transmission of loads to the ground

**Pressure bulb overlapping**

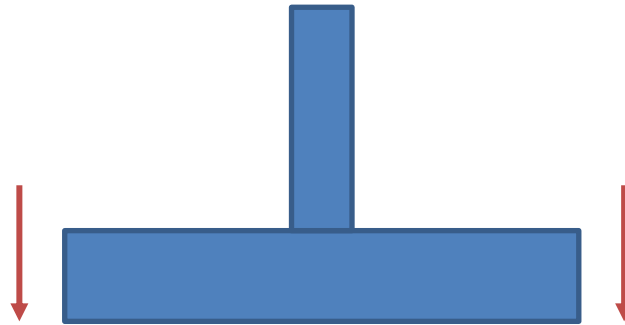




## INTRODUCTION

Transmission of loads to the ground

### Settlements



### Under control

We know they are going to happen and we calculate the foundation according to it

### Not controlled

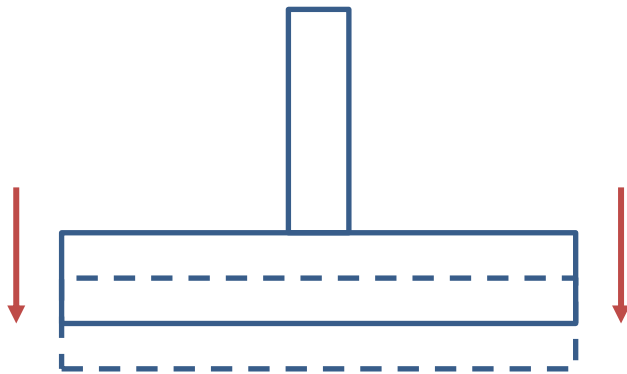
Unpredictable. We don't know what will happen



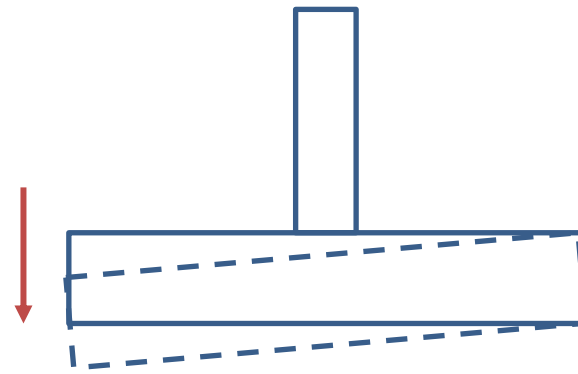
## INTRODUCTION

Transmission of loads to the ground

### Settlements



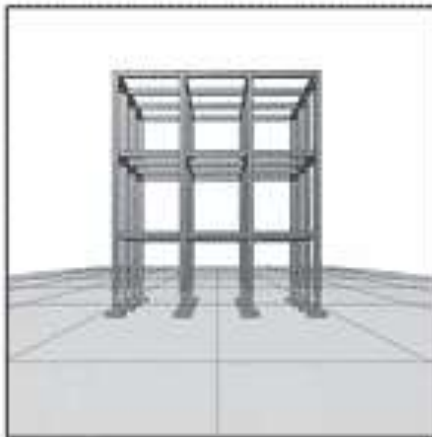
Equal settlement



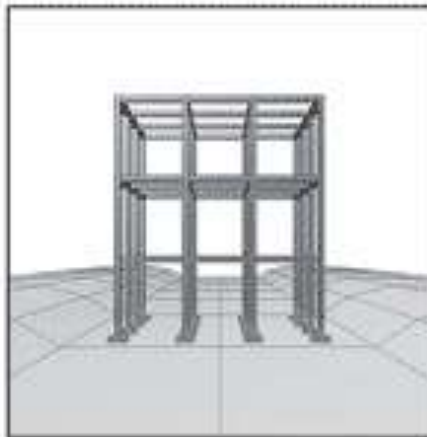
Differential settlement



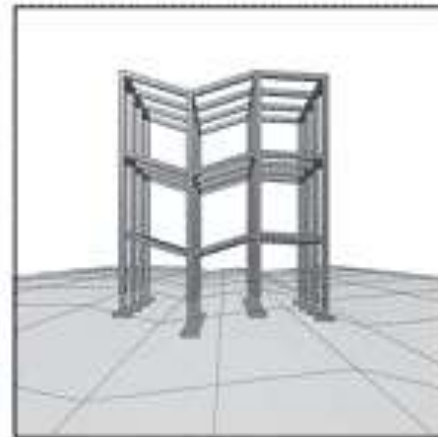
### INTRODUCTION



*(a) Building before settlement occurs*



*(b) Uniform settlement*



*(c) Differential settlement*



### INTRODUCTION





### INTRODUCTION

For a good foundation design:

- Geotechnical study to know bearing capacity
- Study of bearing capacity for all affected layers
- Decide about the bearing layer and depth
- Decide about the type and shape of foundation
- Foundation always embedded in bearing layer