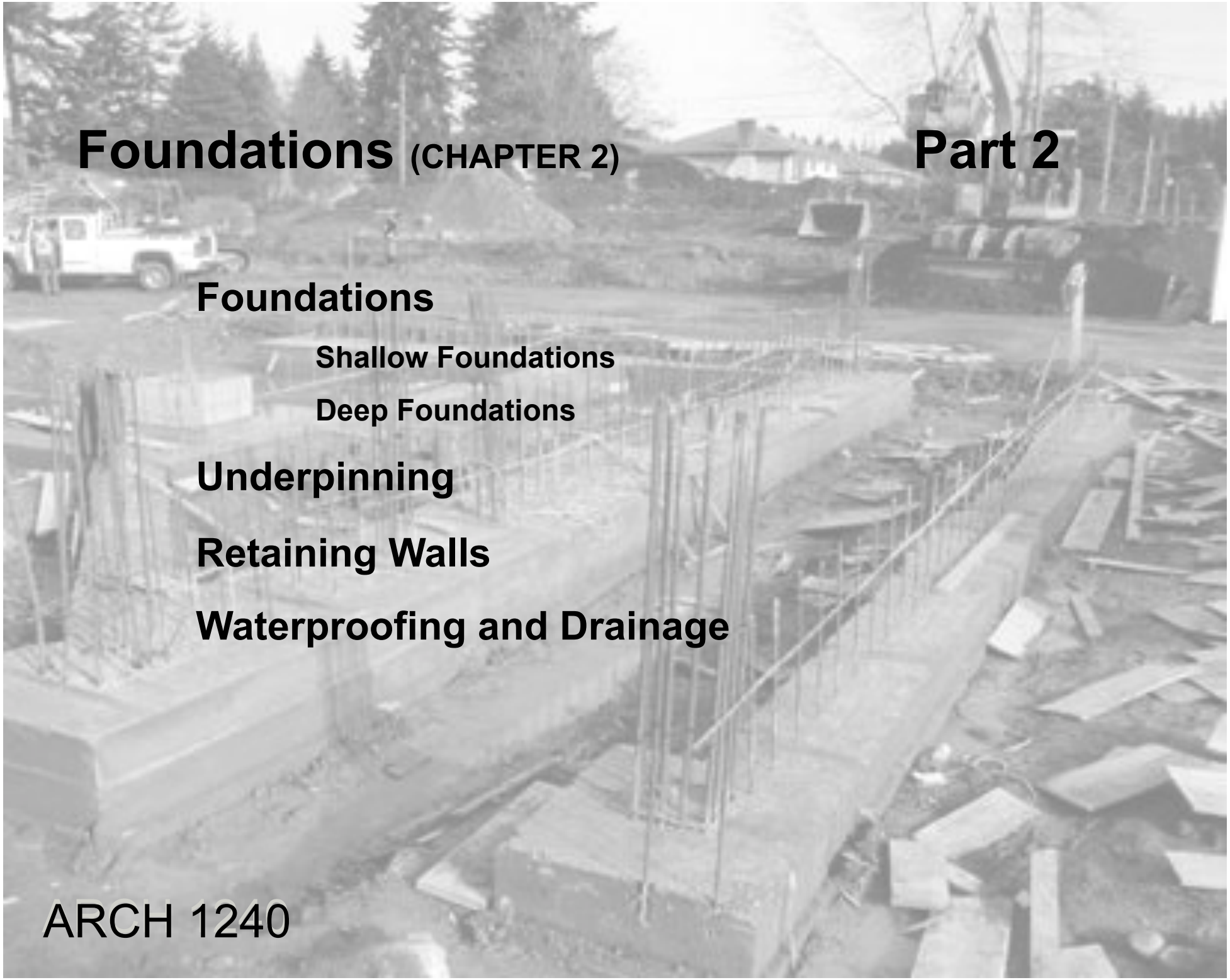
Arch 1240 Methods of Construction in Architecture

Professor Jason Montgomery



Foundations (CHAPTER 2) Part 2

Foundations

Shallow Foundations

Deep Foundations

Underpinning

Retaining Walls

Waterproofing and Drainage

ARCH 1240

Foundation Loading

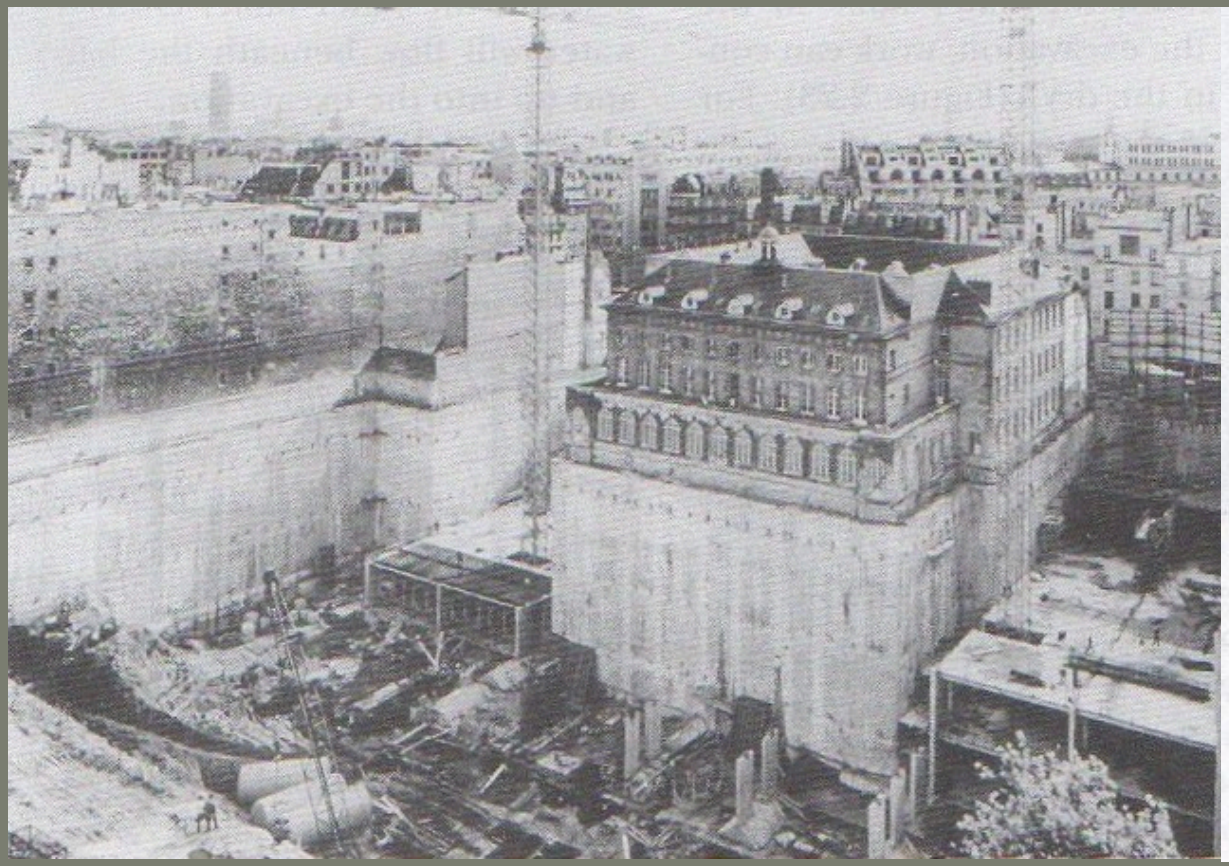
Must Meet Three Requirements:

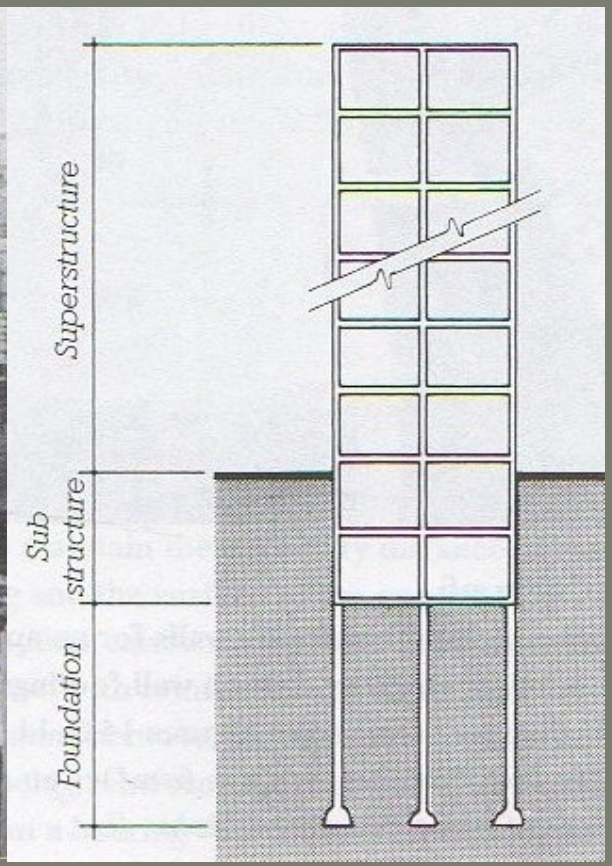
1. The foundation, underlying soil, and rock must be safe against a structural failure that could result in collapse.

2. During the life the building, the foundation must not settle in such a way as to damage the structure or impair its function.

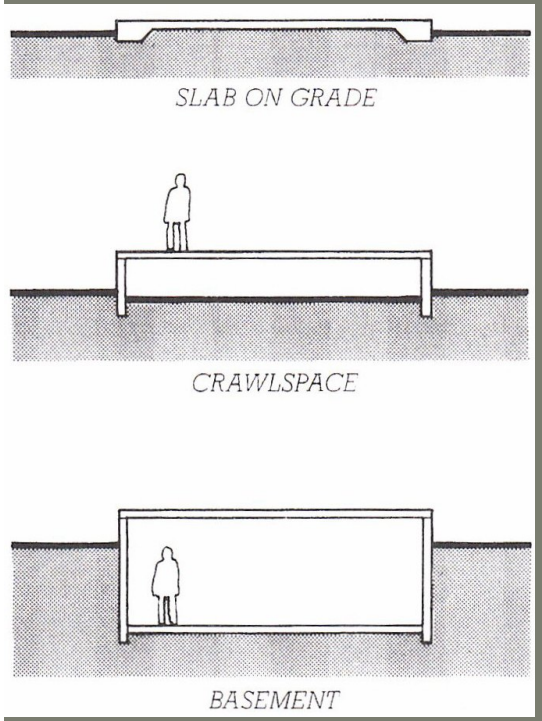
3. The foundation must be feasible both technically and economically and practical to build without adverse effects to surrounding property.

Foundations



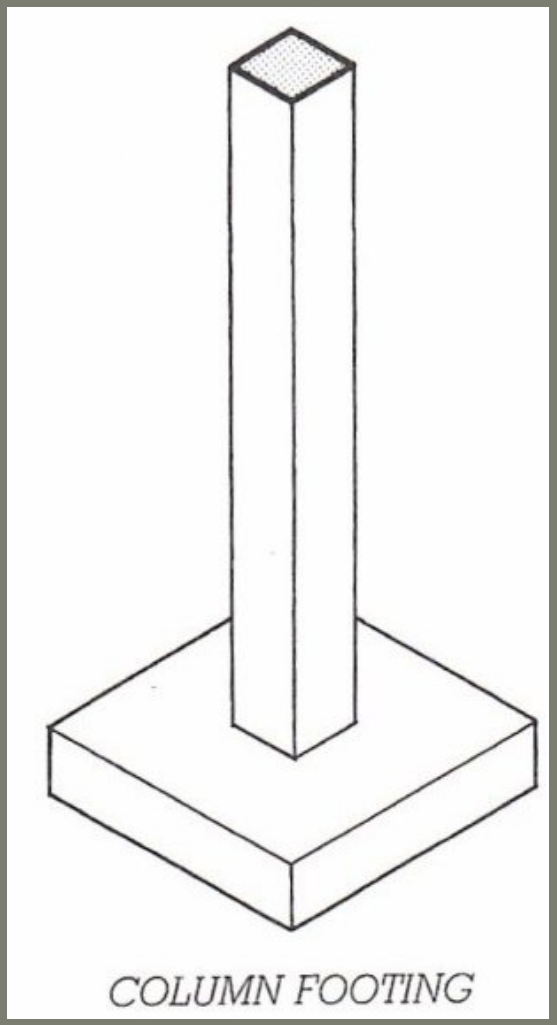


Shallow Foundations



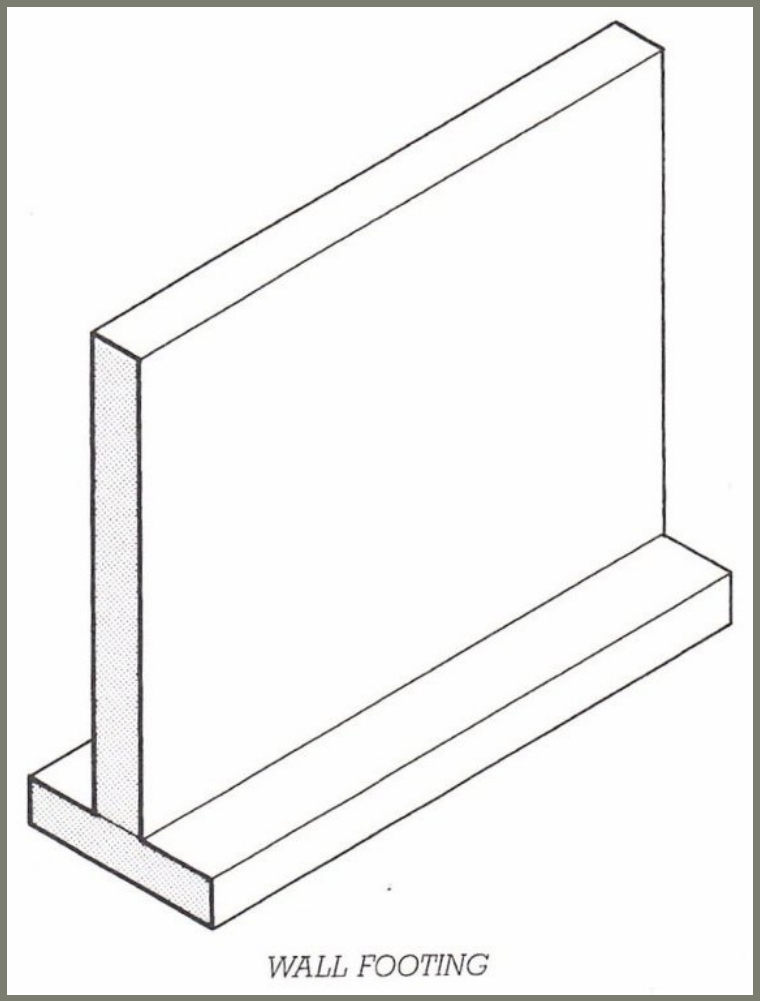
COLUMN FOOTING

Spreads the Load!



ARCH 1240

WALL FOOTING (STRIP FOOTING)



Special Foundations

Shallow Foundations on Soil w/ Low Bearing Capacity

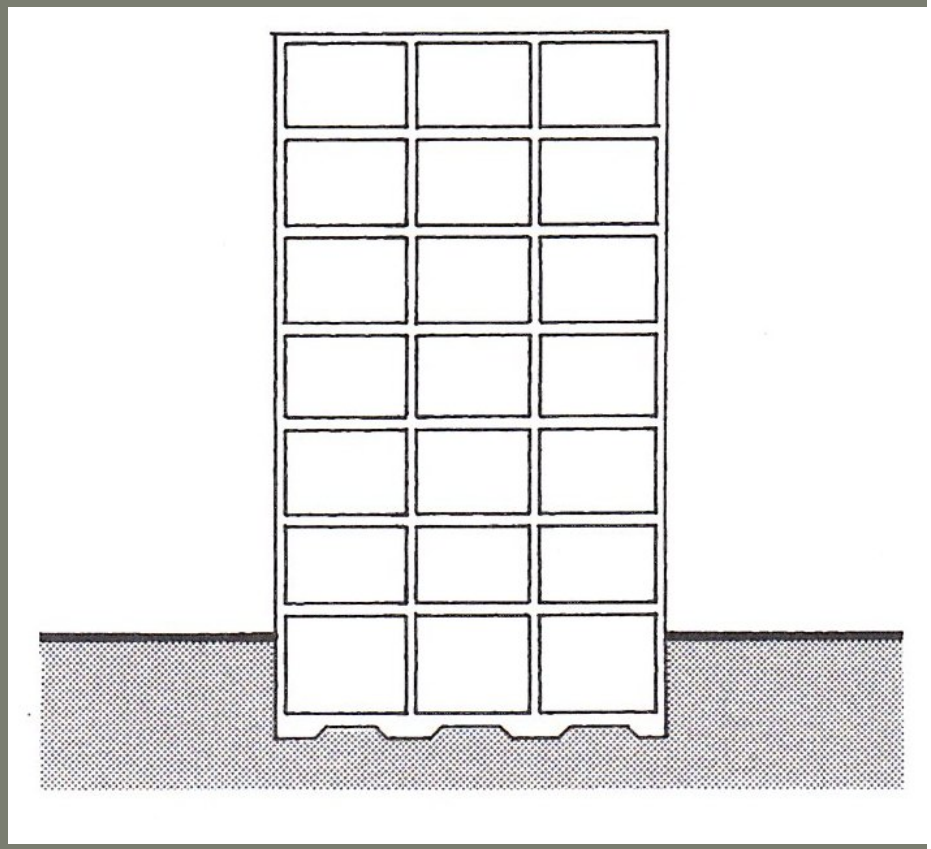
Mat or Raft Foundation

Floating Foundation

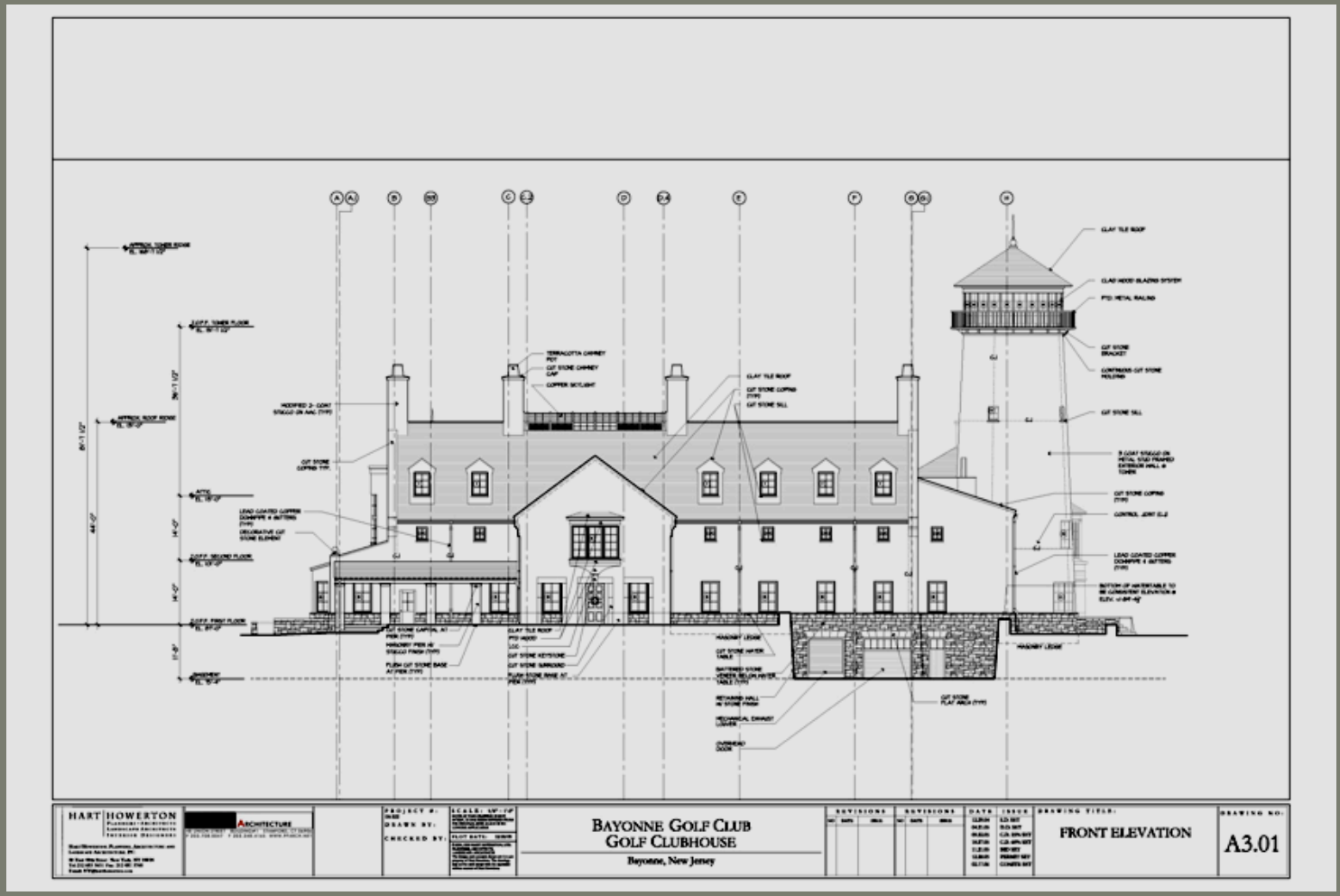
Floating Foundations

Balances the weight of soil removed with the weight of building to be constructed

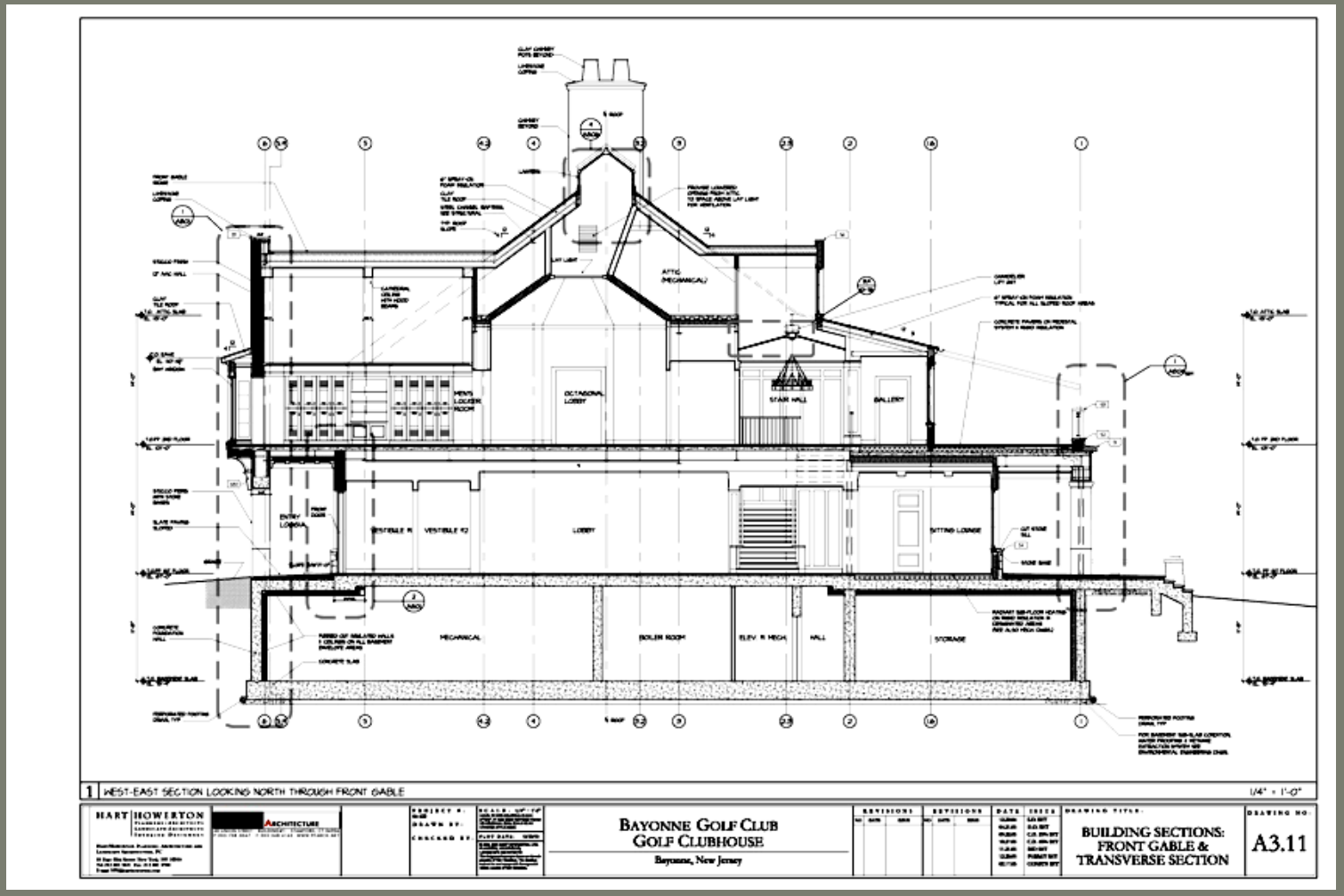
The load on the remaining soil is little changed.



Mat / Raft Foundations



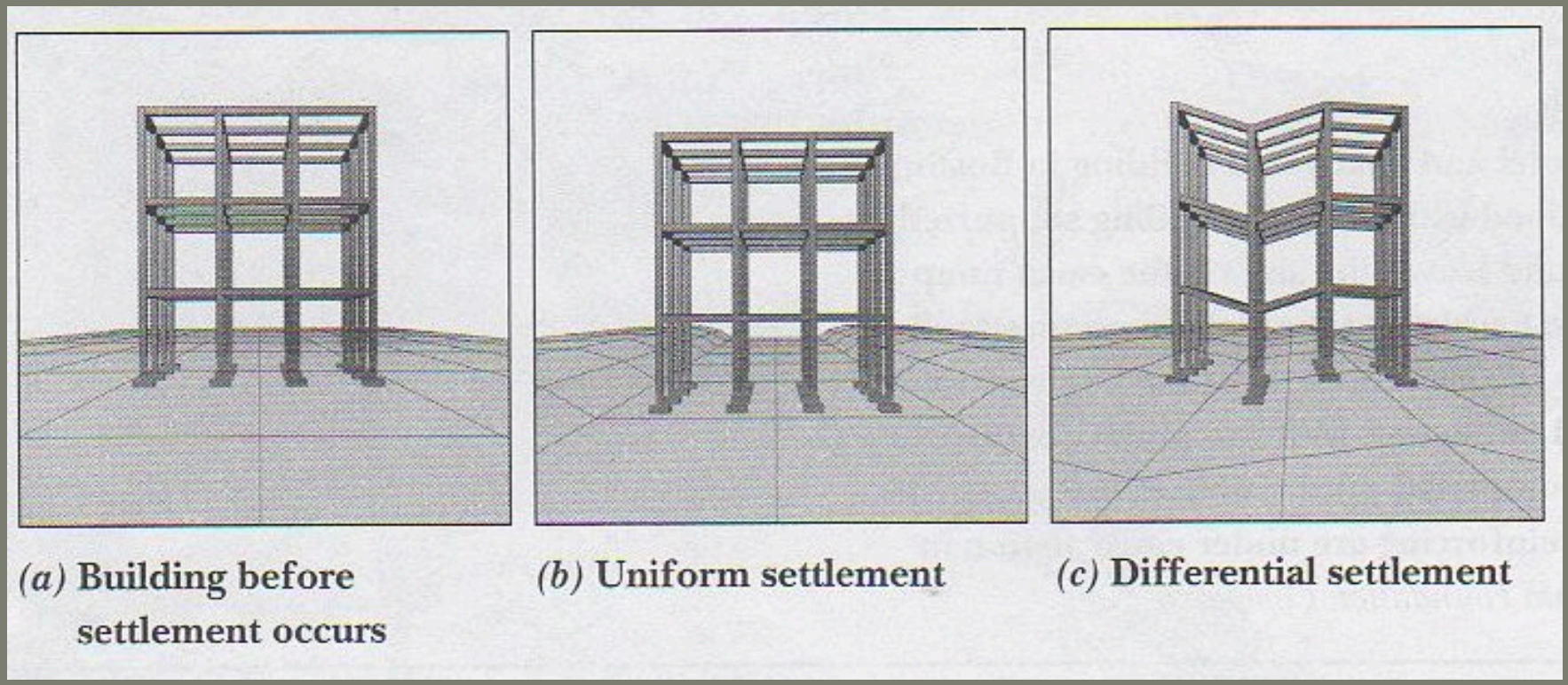
Mat / Raft Foundations



Mat / Raft Foundations

ARCH 1240

Foundation Settlement



(a) **Building before settlement occurs**

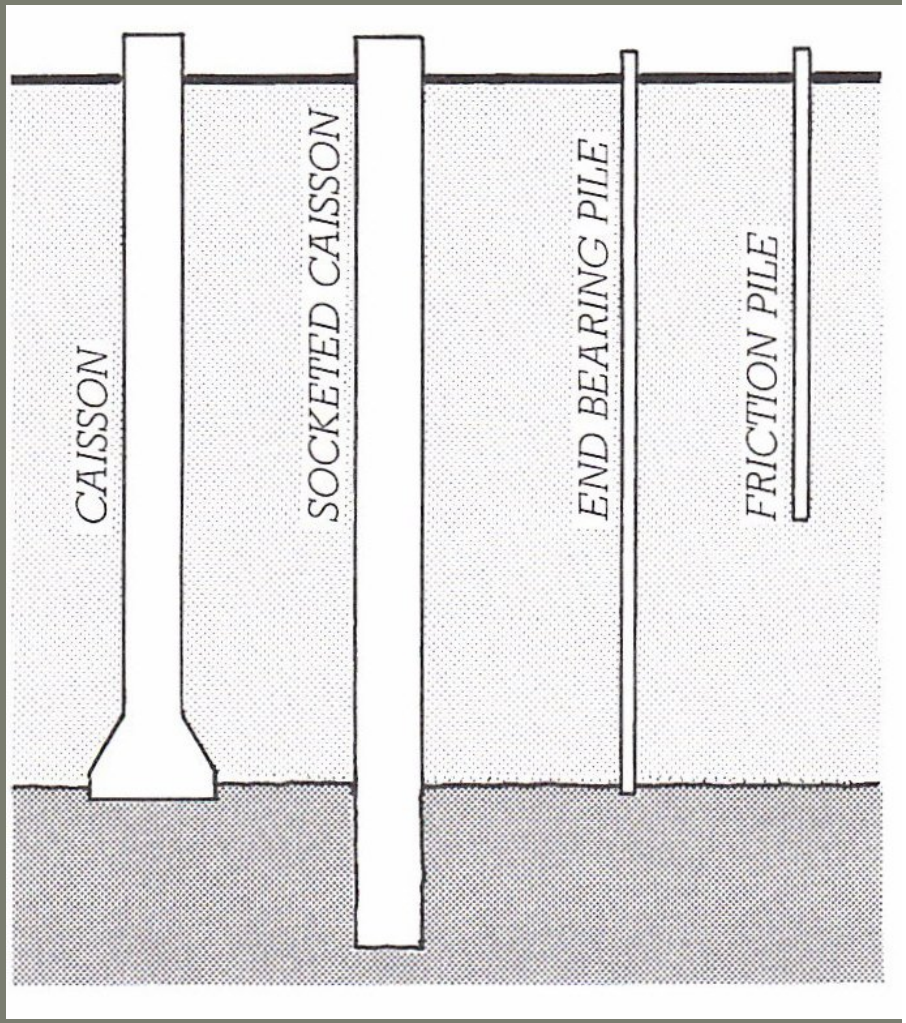
(b) **Uniform settlement**

(c) **Differential settlement**

Deep Foundations

Where the soils directly below the building substructure are weak or unstable.

Deep foundations transmit building loads to deeper, more competent, soils.



Piers (Caissons): drilled into earth

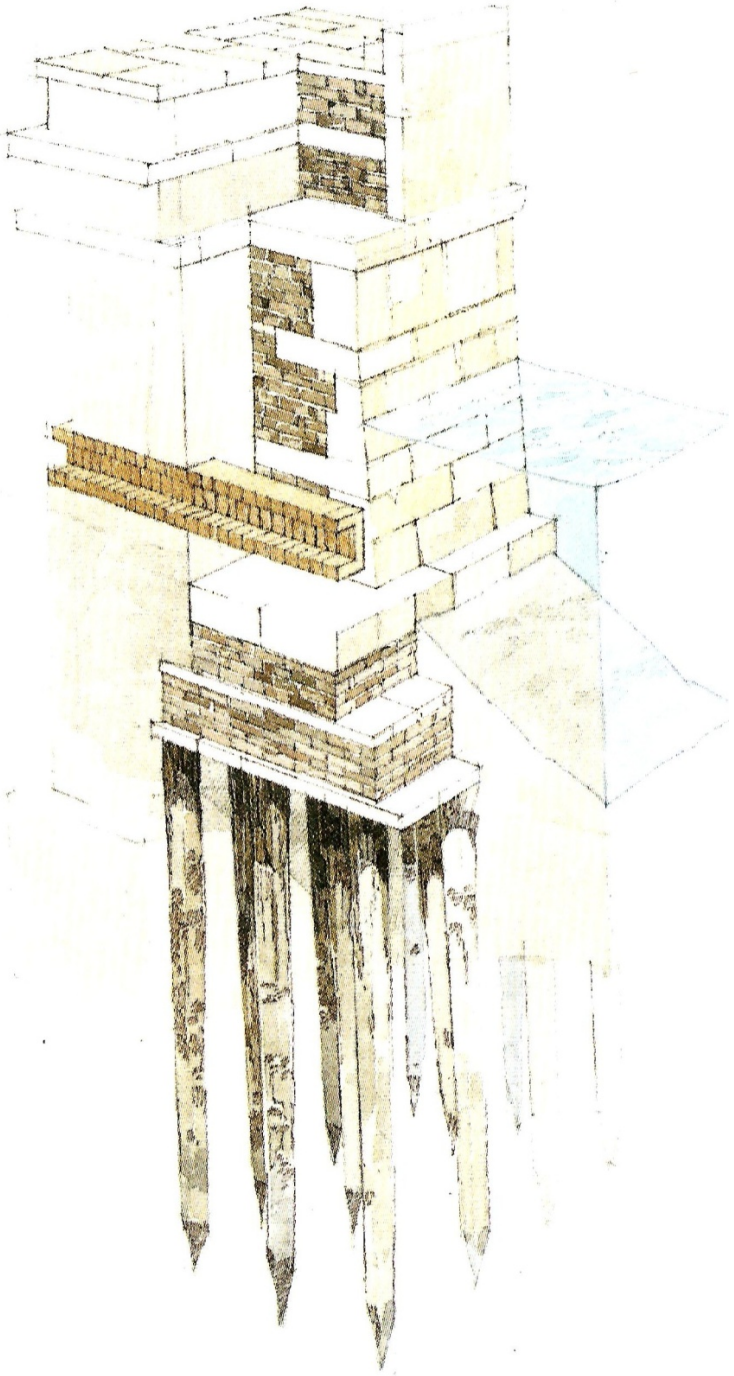
Steel reinforcing is being lowered into the drilled hole.

Once the reinforcing is positioned, concrete will be poured.

Piles: Driven into earth

May be made of steel, wood, or precast concrete (pictured here)

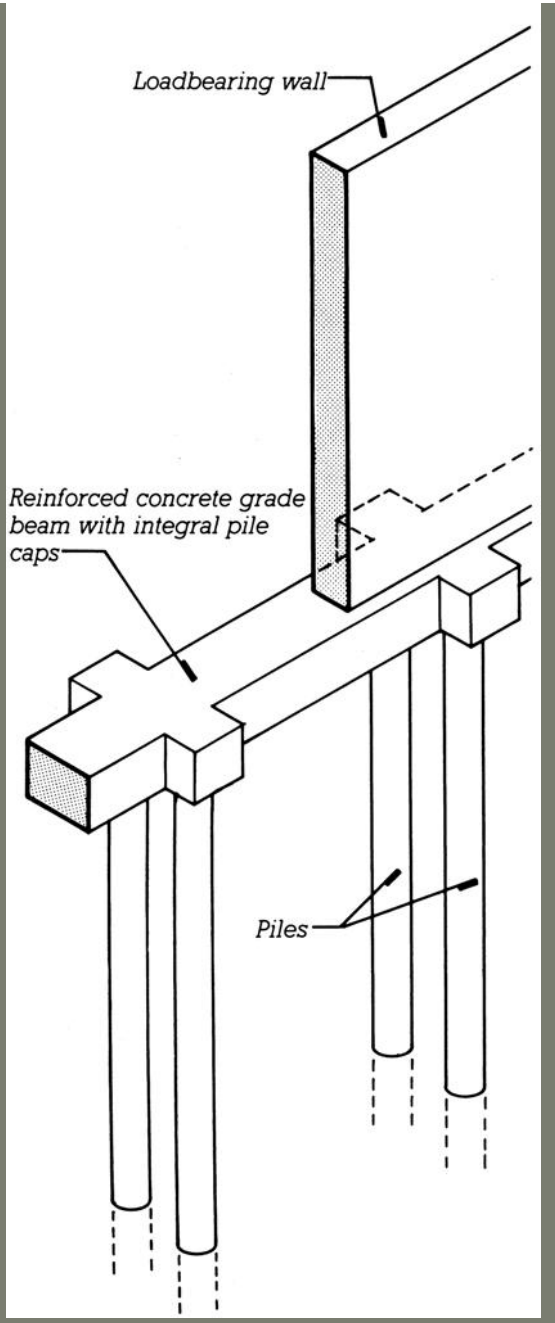
Piles: Driven into earth



Piles and Grade Beams

Pile caps share loads among clustered piles.

A *grade beam* spans between the piles to provide continuous support for the wall above.



Drilled Piers and Grade Beams

Reinforcing bars project from the tops of completed *drilled piers*.

Gravel is being deposited between the piers, to form a base for concrete *grade beams* which will span between the piers.

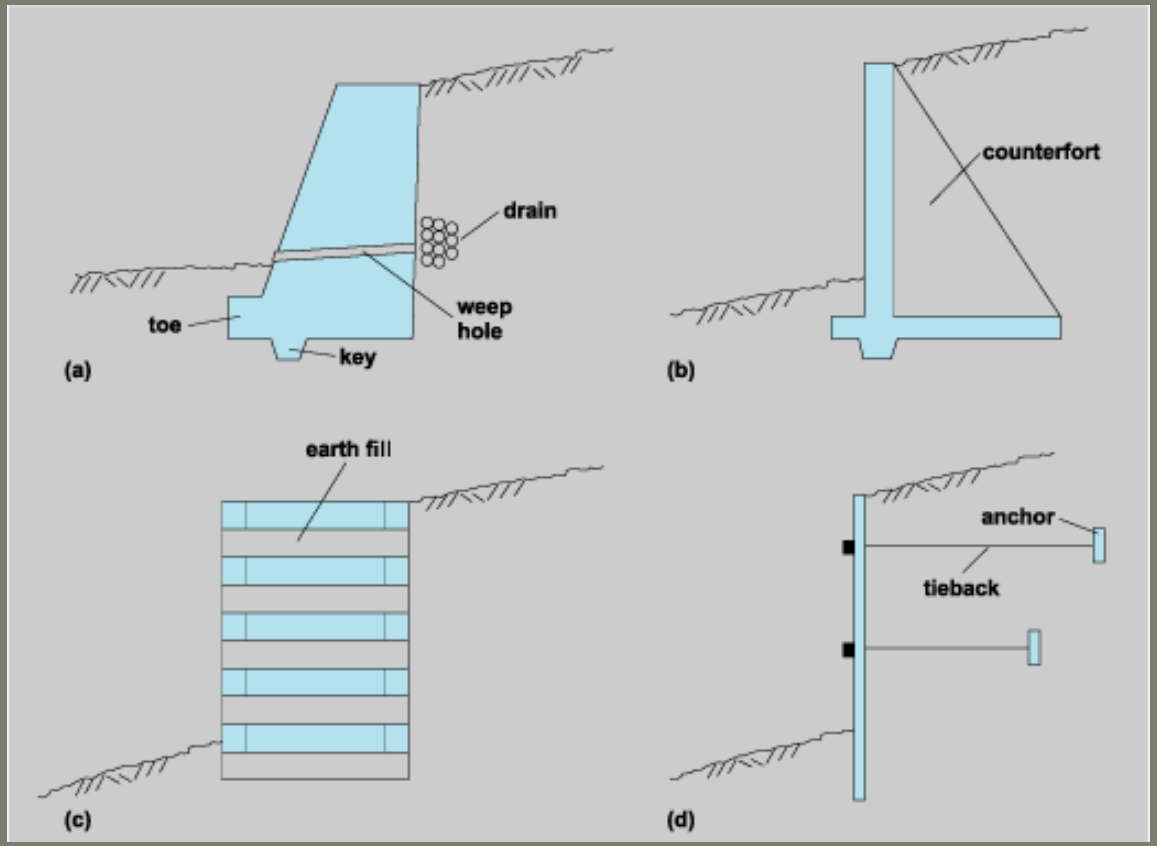
Underpinning

Excavation adjacent and below existing foundations.

Trenches dug at intervals. New foundation is poured, allowing additional trenches to be dug.

Retaining Walls

- Gravity Walls
- Cantilevered Walls
- Earth Reinforced
- Drainage is Critical



WATERPROOFING AND DRAINAGE

ARCH 1240

Dampproofing & Waterproofing

Dampproofing materials are water-resistant.

Waterproofing materials are resistant to hydrostatic pressure.

Drainage

Drainage mat and free-draining backfill material allow ground water to flow away from the substructure.

The machine in the foreground is used to compact the fill material as it is placed in *lifts* roughly 6 inches deep at a time.

Drainage

Perforated piping conducts water away from the substructure.

Filter fabric “socks” cover the piping to prevent soil particles from accumulating in and eventually clogging the pipes.

Foundations Summary:

Starts with Subsurface Exploration (Geotech)

Shallow or Deep

Bearing or Friction

Drainage is Critical

Economics