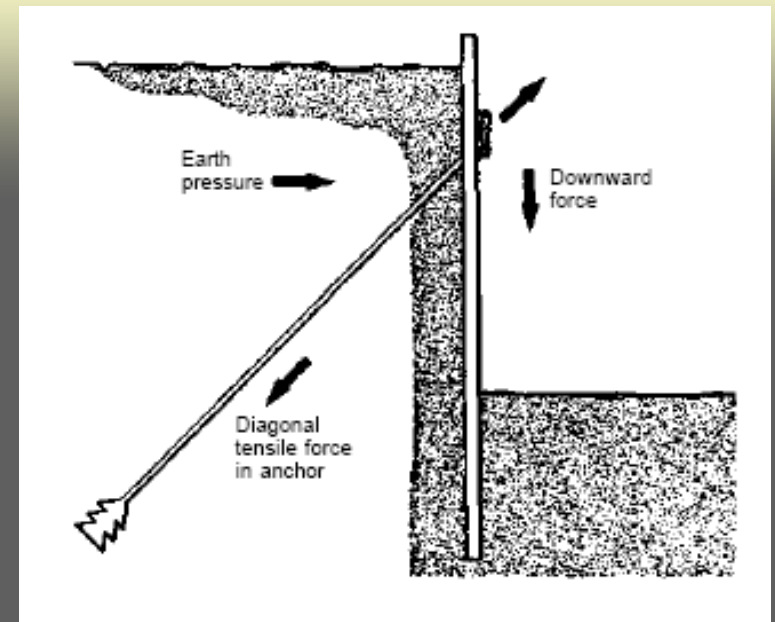
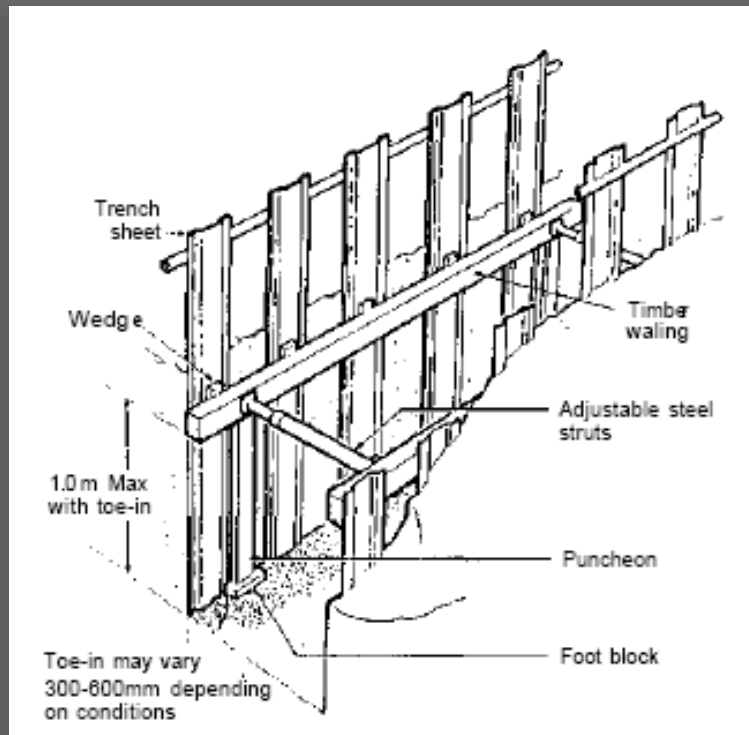


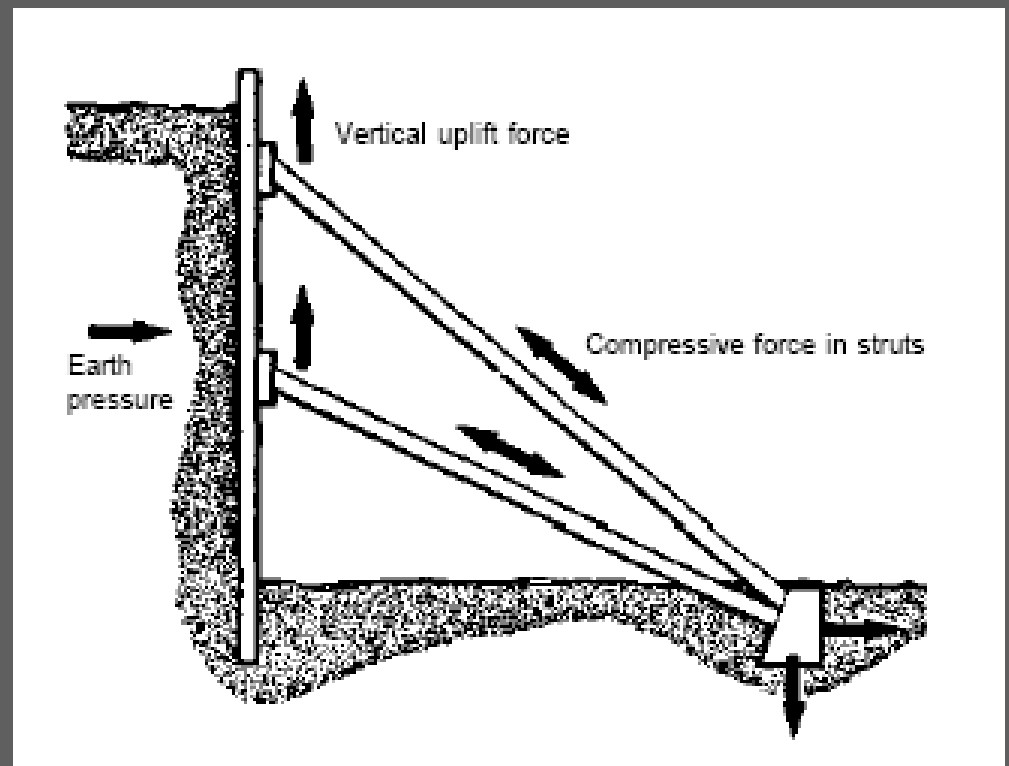
Construction Technology



Earthwork support

Earthwork support

...the temporary and permanent retention of soil or groundwater



Earthwork support



⇒ Soil performance

- Trial pits
- Bore holes
- Core samples
- Seismic testing etc

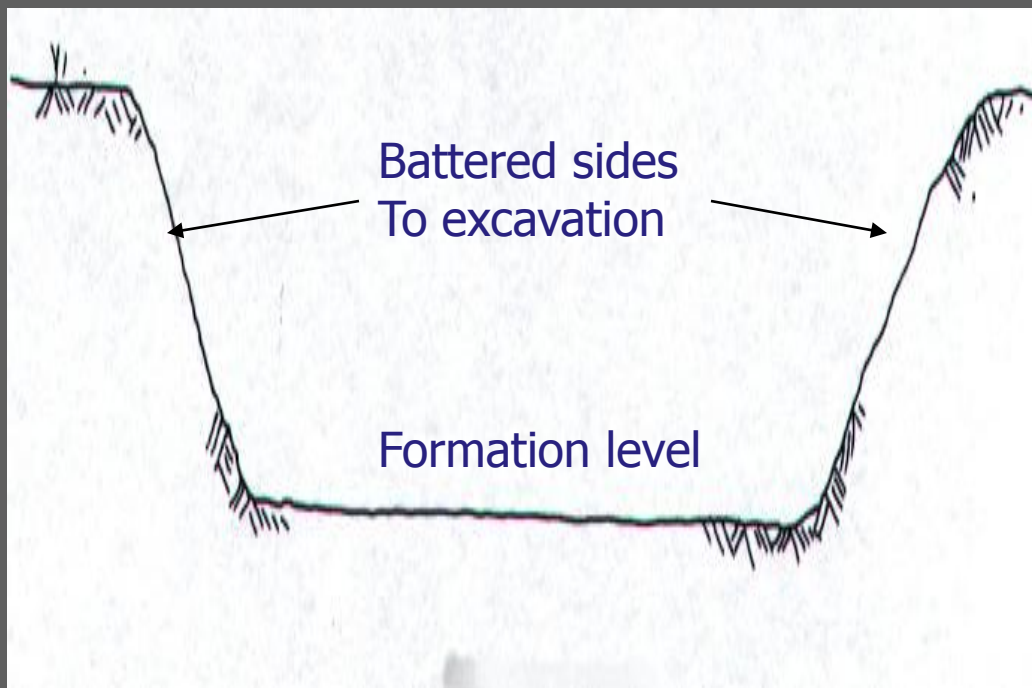
Earthwork support

⇒ Information on...

- Bearing capacity
- Slip angle
- Ratio of water to pores
- Particle size
- Presence of different soil types



Earthwork support



Earthwork support derives from the need to excavate.

Earthwork support



Support by battering the sides of the excavation

- Needs space
- Limited depth
- Economical if available

Excavation

Purpose of excavation

To reach some stratum
suitable to support the
building



Excavation



- ➡ Before main excavation there is a need to remove vegetable soil (top soil)
 - Topsoil contains material which decomposes – easily compressible!
 - Topsoil depths range from some 150 – 400mm and is a valuable commodity
 - Topsoil will be needed for landscaping purposes

Excavation

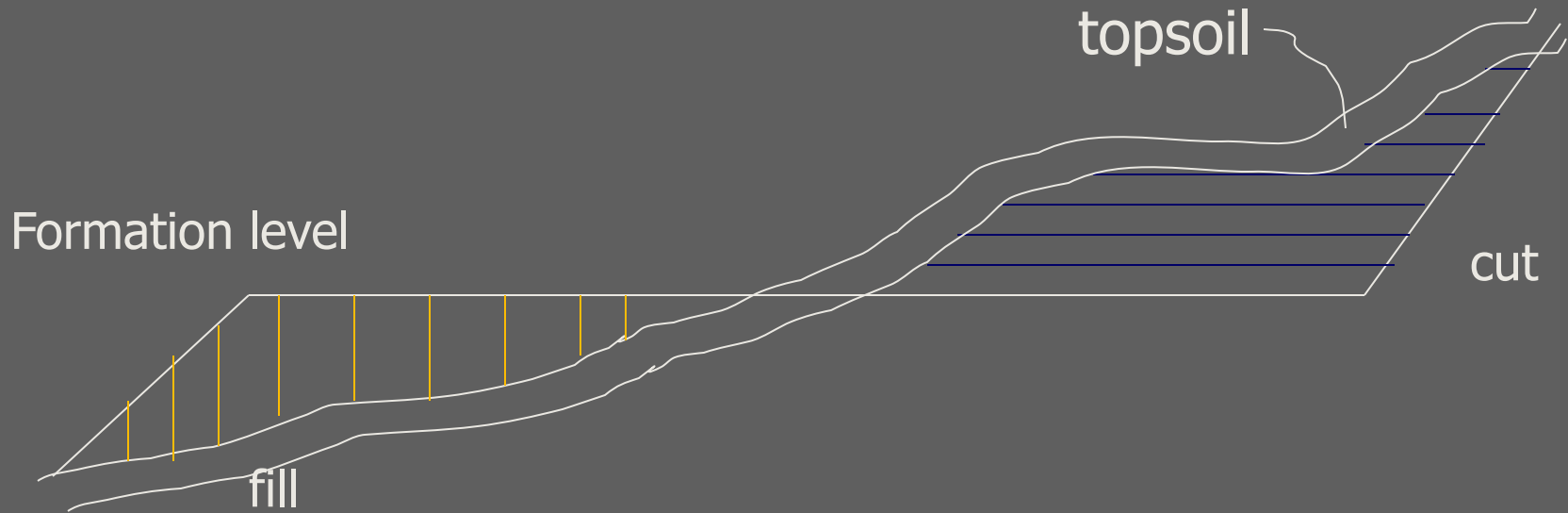


⇒ Methods

- Soil strip
- Reduced level
- Cut and fill
- Trench excavation
- Pit excavation
- Bulk excavation

Sloping sites

Cut and fill technique



Excavations

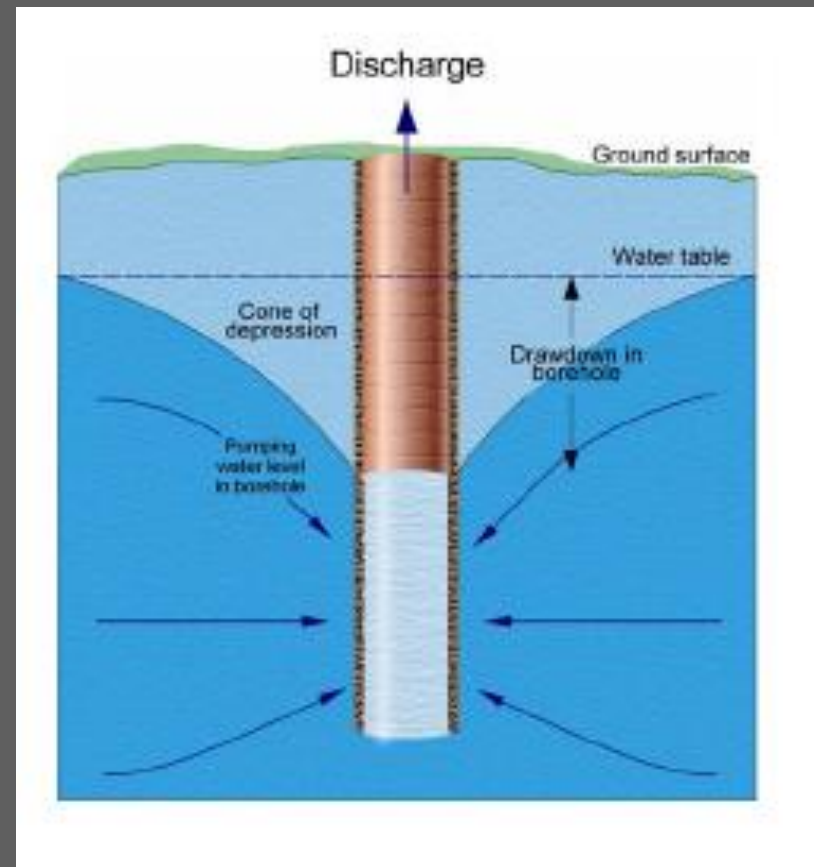
⇒ Main challenges...

- Soil make-up

- Water

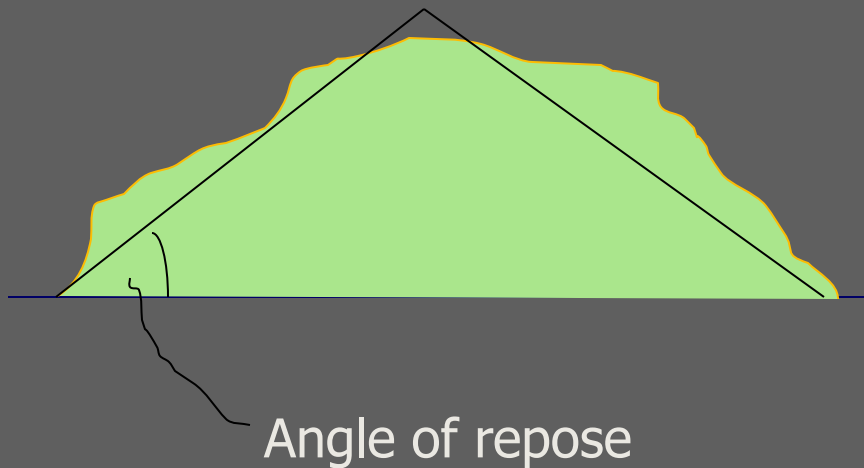
 - Water table

 - ♦ Its position relative to the excavation



Excavations

Ground water can have an adverse effect on subsoil's natural angle of repose

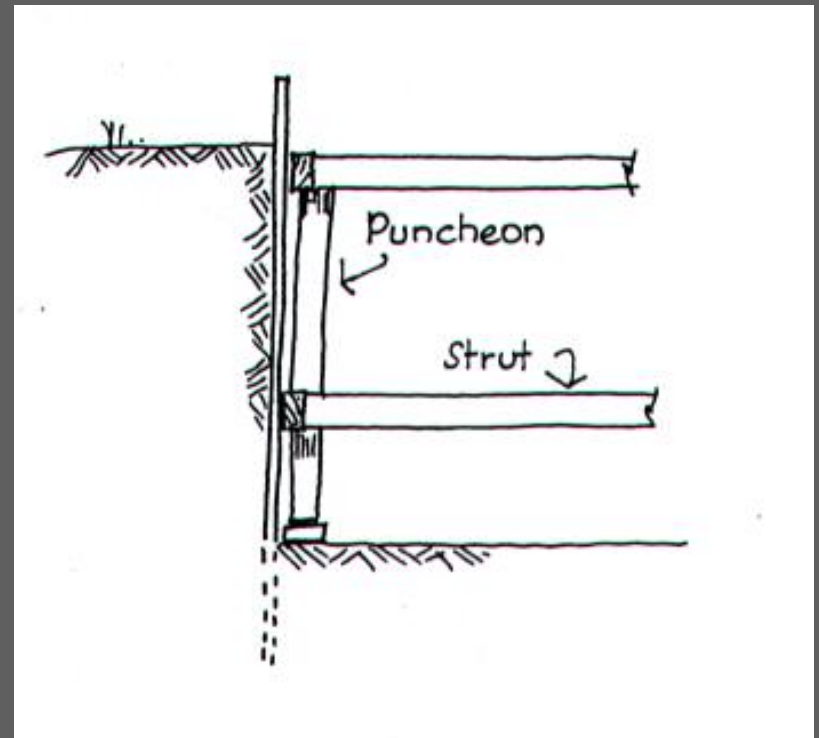


- Drained clay - 45°
- Wet clay - 16°
- Wet sand - 22°
- Gravel and dry sand - 40°

Excavations

⇒ Soil types classified as:

- Loose – close boarded
- Medium
- Firm – open boarded



Earthwork support

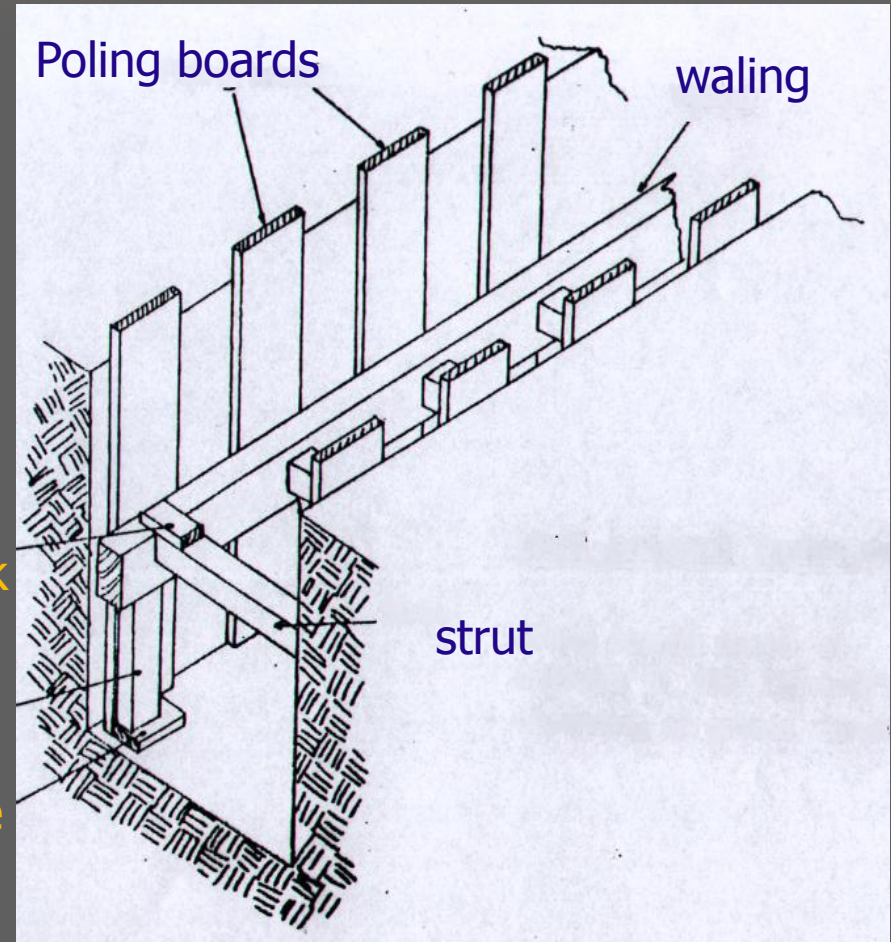
Open boarded timbering

Poling boards placed at intervals of 150mm to 225mm depending on ground conditions

Lipping block

Ground prop

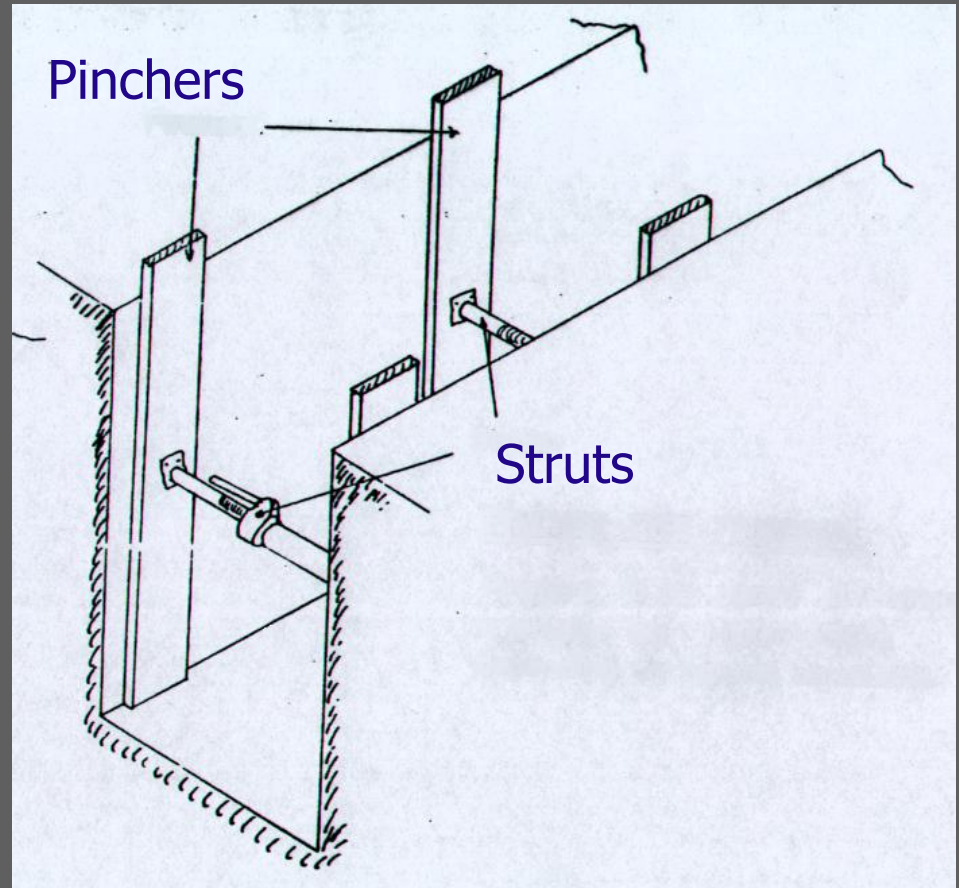
Sole plate

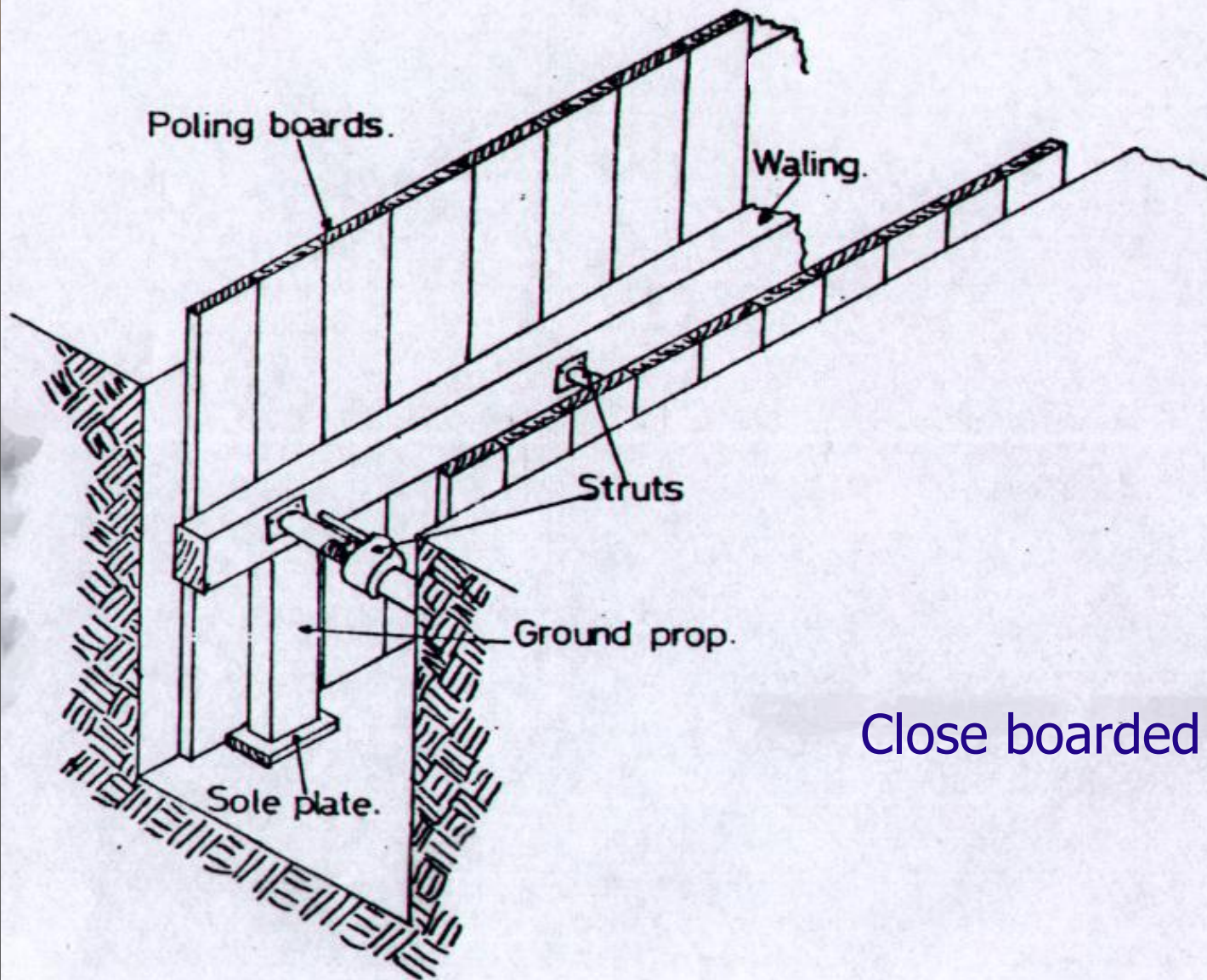


Earthwork support

Pincher type timbering

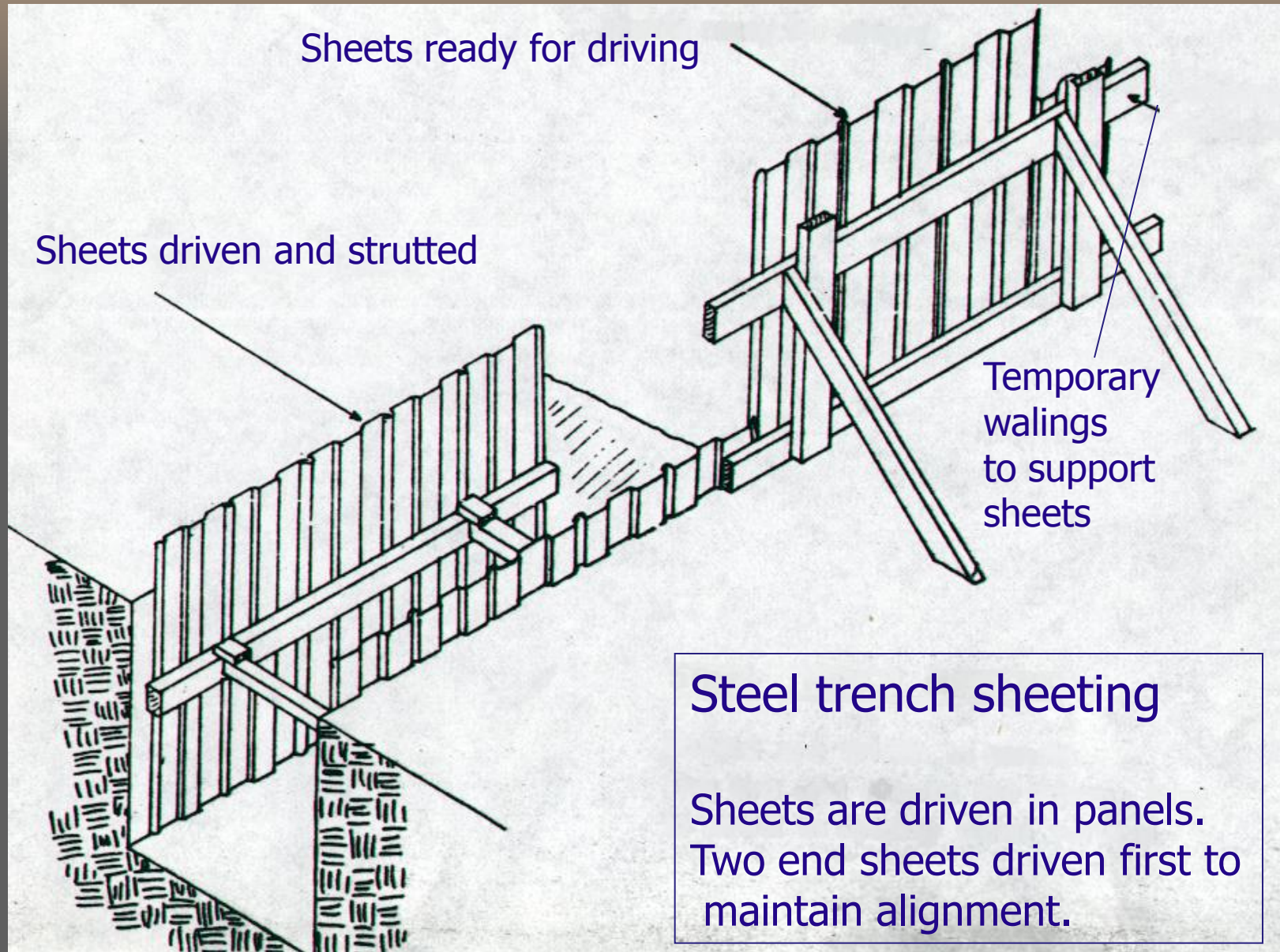
Pinchers placed at appropriate intervals (1 – 1.5m) depending on ground conditions





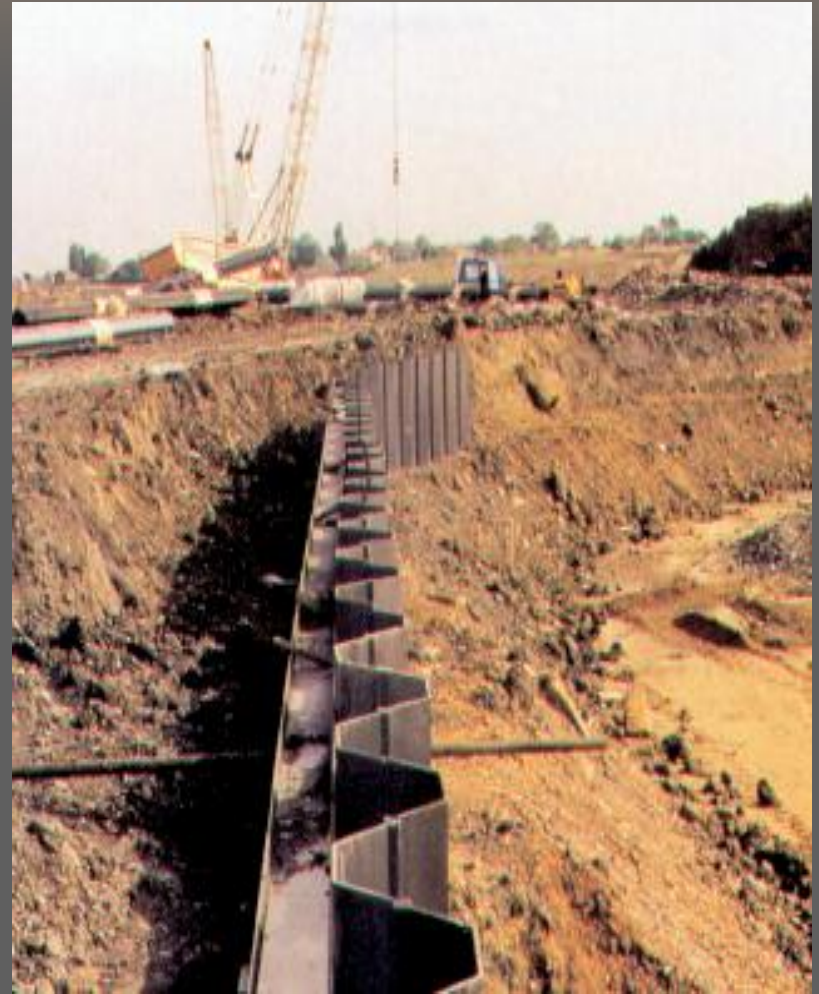
Close boarded timbering





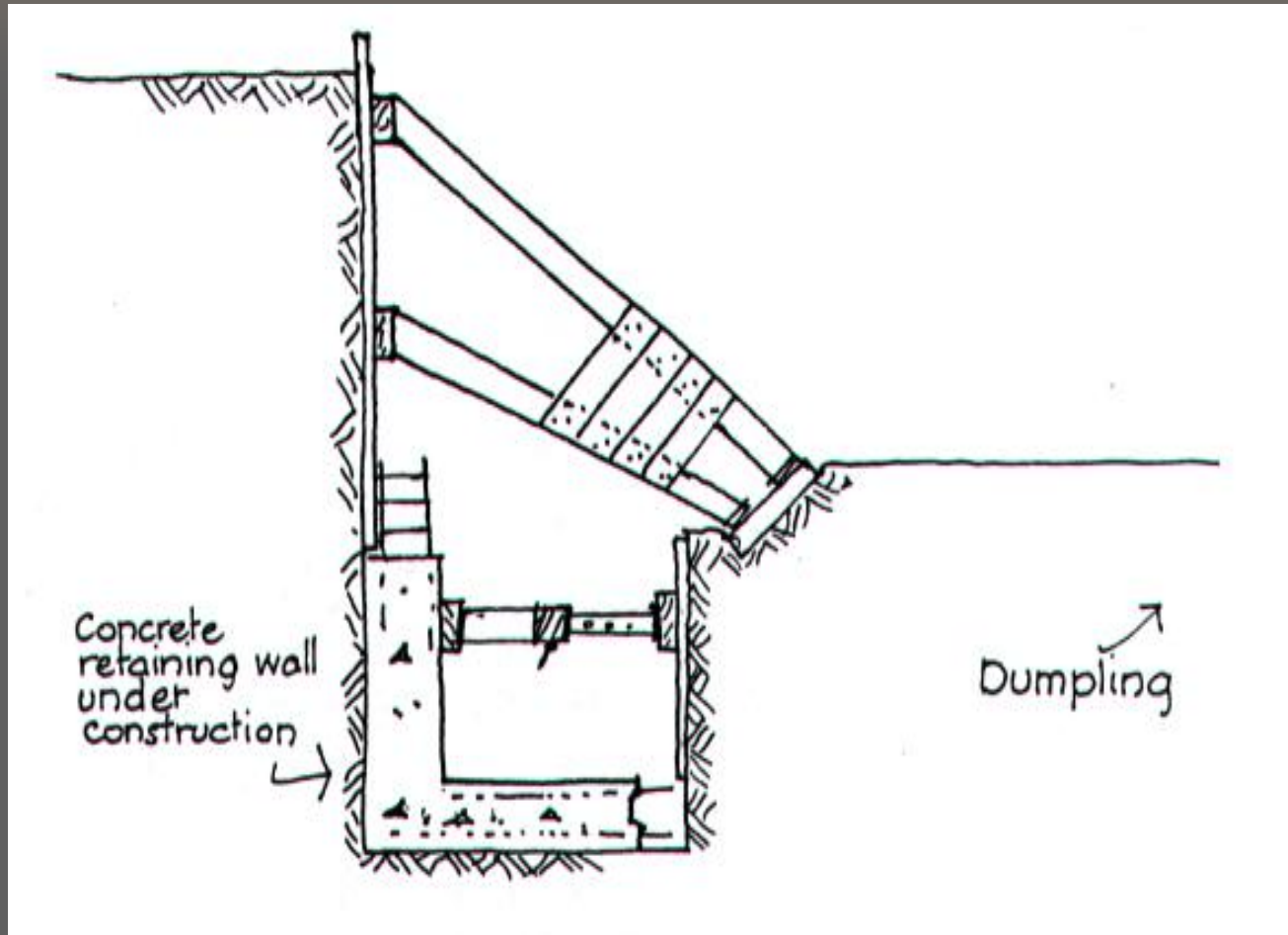
Earthwork support

Sheet piling





Earthwork support



Using the soil
as temporary
support

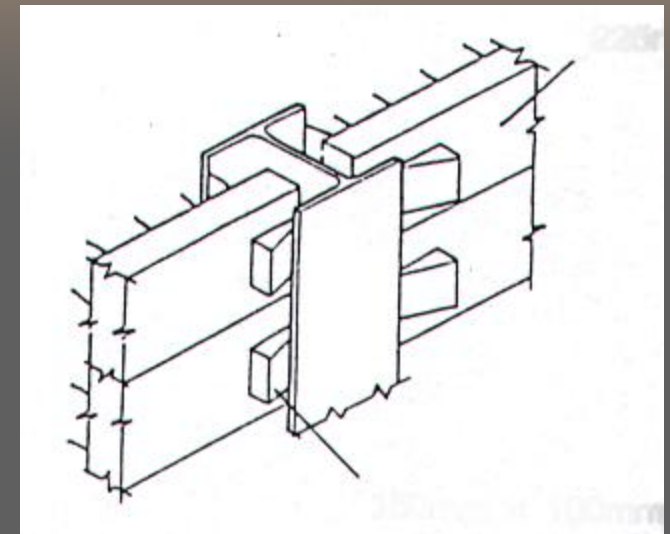
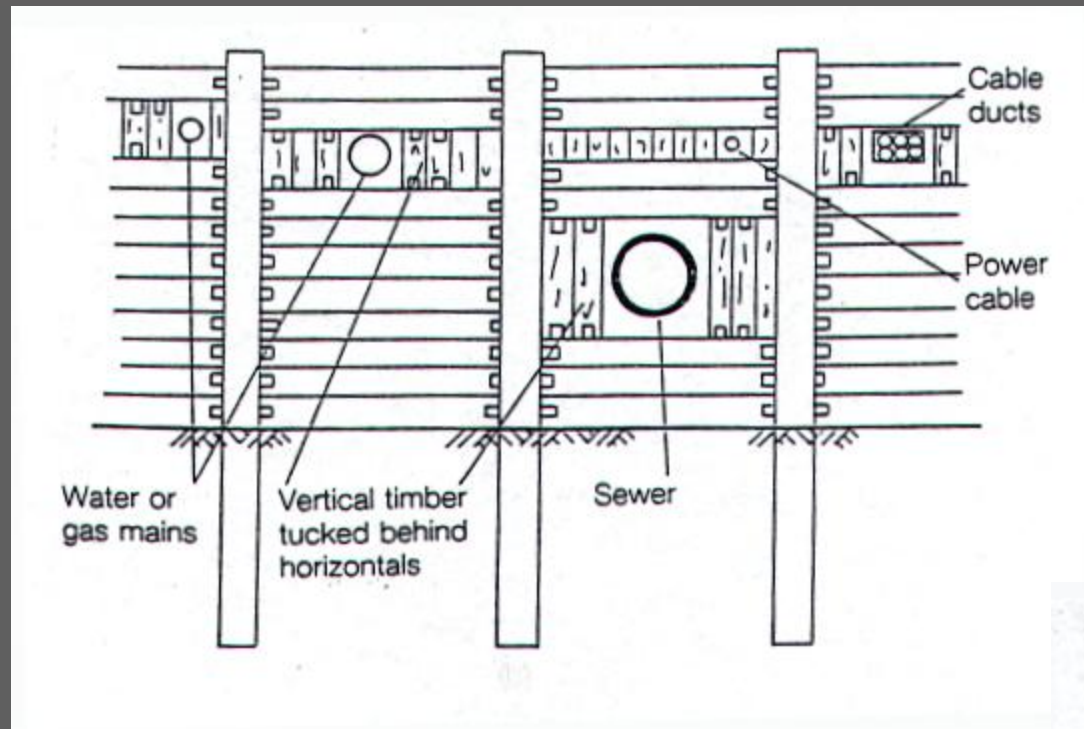
The dumping method

Earthwork support

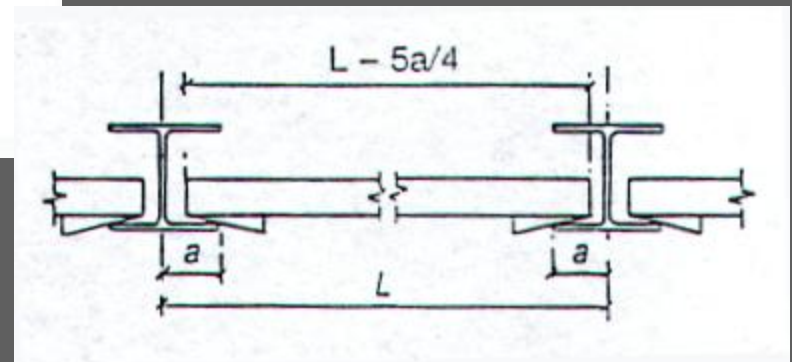


Using raking shores

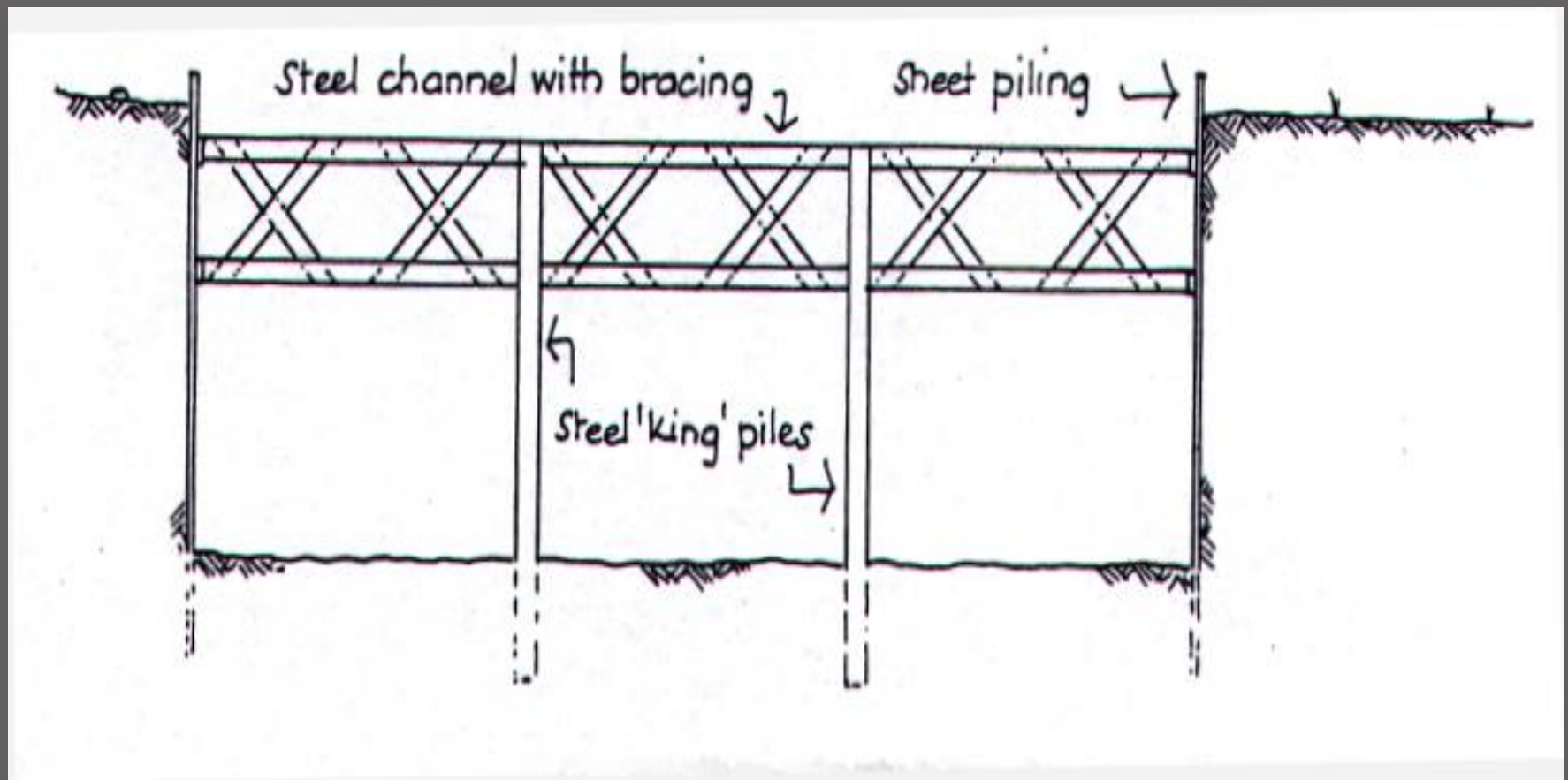
Earthwork support



Soldier piles



Earthwork support



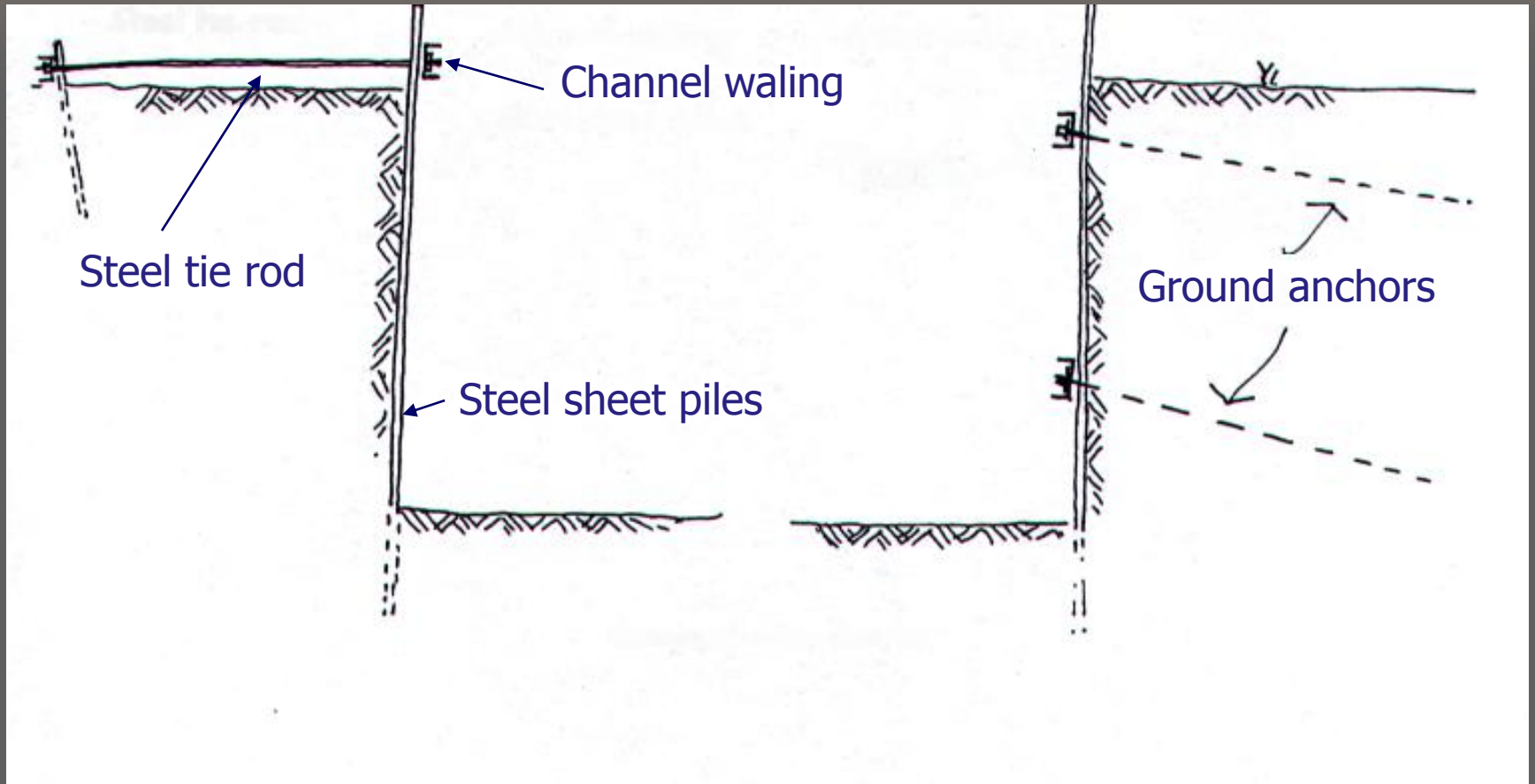
Support to excavation using 'H' piles



Earthwork support

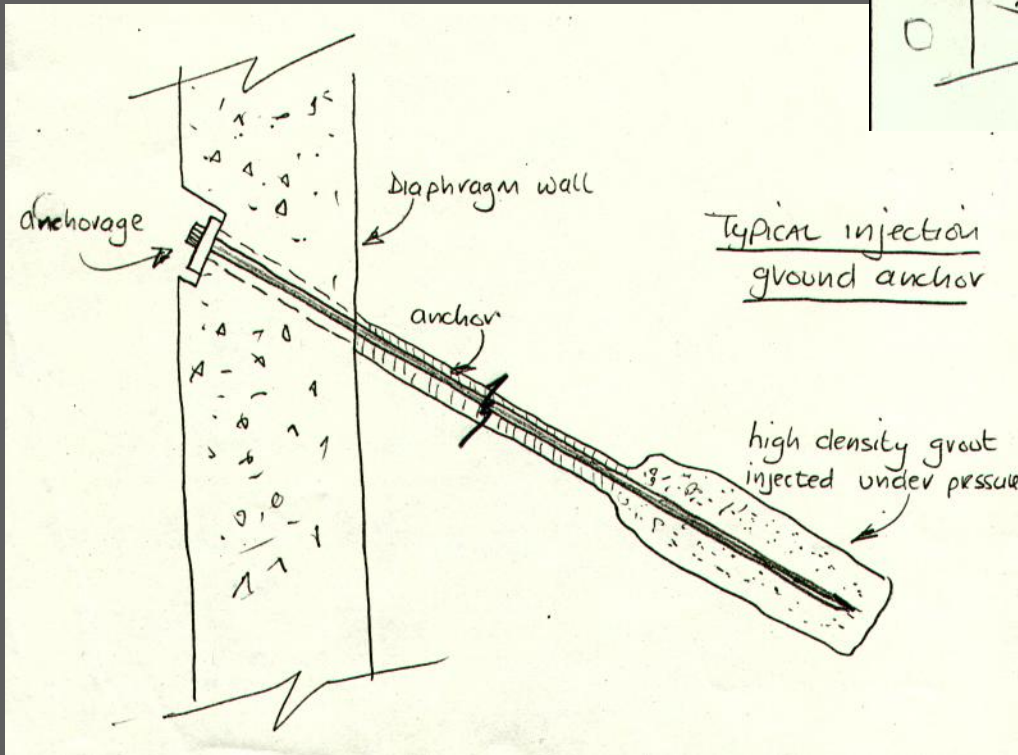
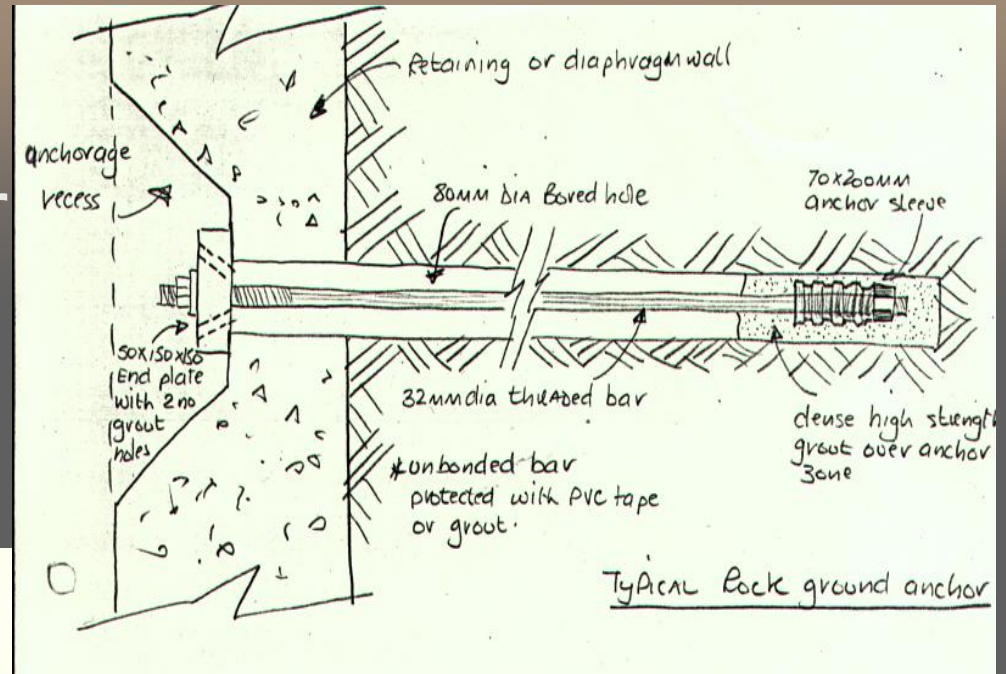


Earthwork support



External support to excavations

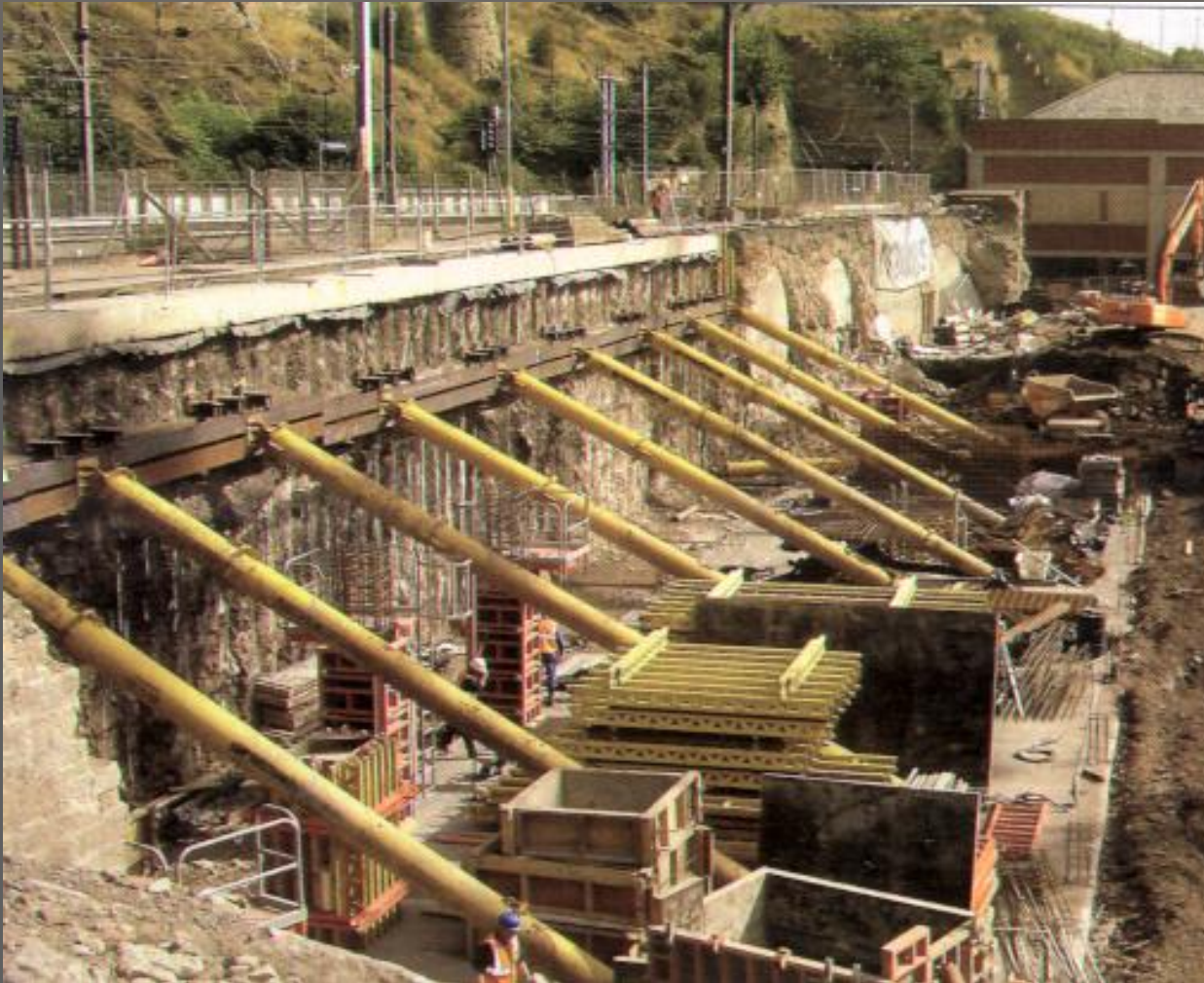
Typical ground anchor applications



Earthwork support



Earthwork support



Contiguous pile wall with steel waling and raking struts



Earthwork support



Earthwork support

Earthwork support



Workshop: earthwork support systems

Comment on the main factors that will determine the degree of support to excavations.

Consider the component parts of each of the systems illustrated. What role do each part play in the support of the ground?

Identify the performance requirements of the systems shown.

