

Construction Technology



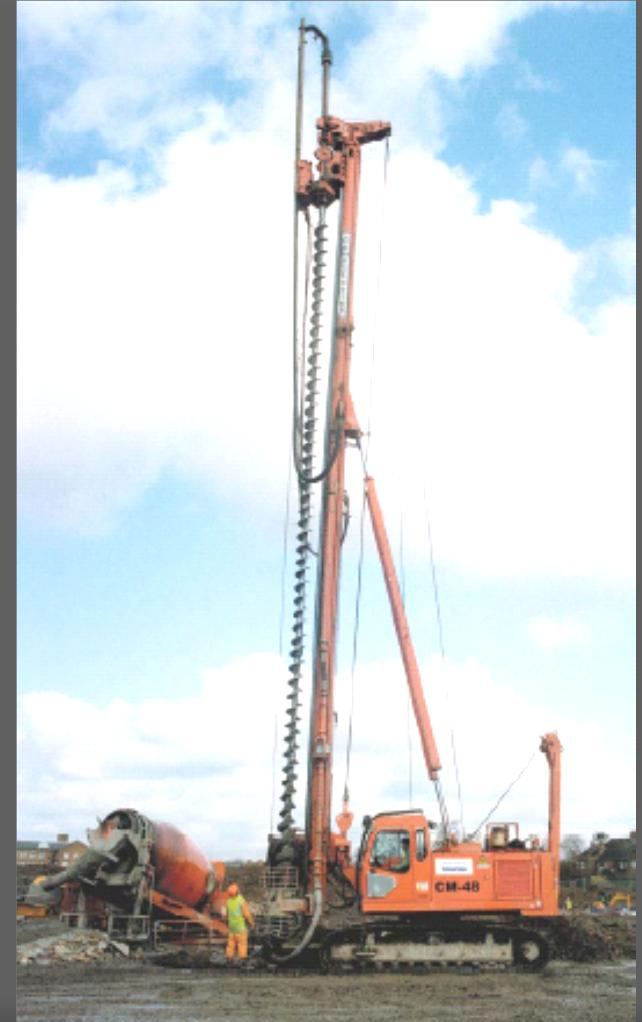
Deep foundations

Construction Technology

Piled foundations

What are they?

Foundations in which the loads are transferred well below ground level via a series of columns on which the building rests



Construction Technology



Typical applications

- Where firm bearing strata is at depths considered unreasonable
- Where firm strata is at a depth considered uneconomic for conventional foundations
- Where applied loads are uneven

Construction Technology



⇒ Piled foundations

- Depths range from around 3.5m (short bored) to 50m plus
- Diameters from 0.30m to 3.0m or more
- Useful to offset seasonal moisture movements in clay soils

Construction Technology

➡ Materials for piles

- Timber
- Concrete



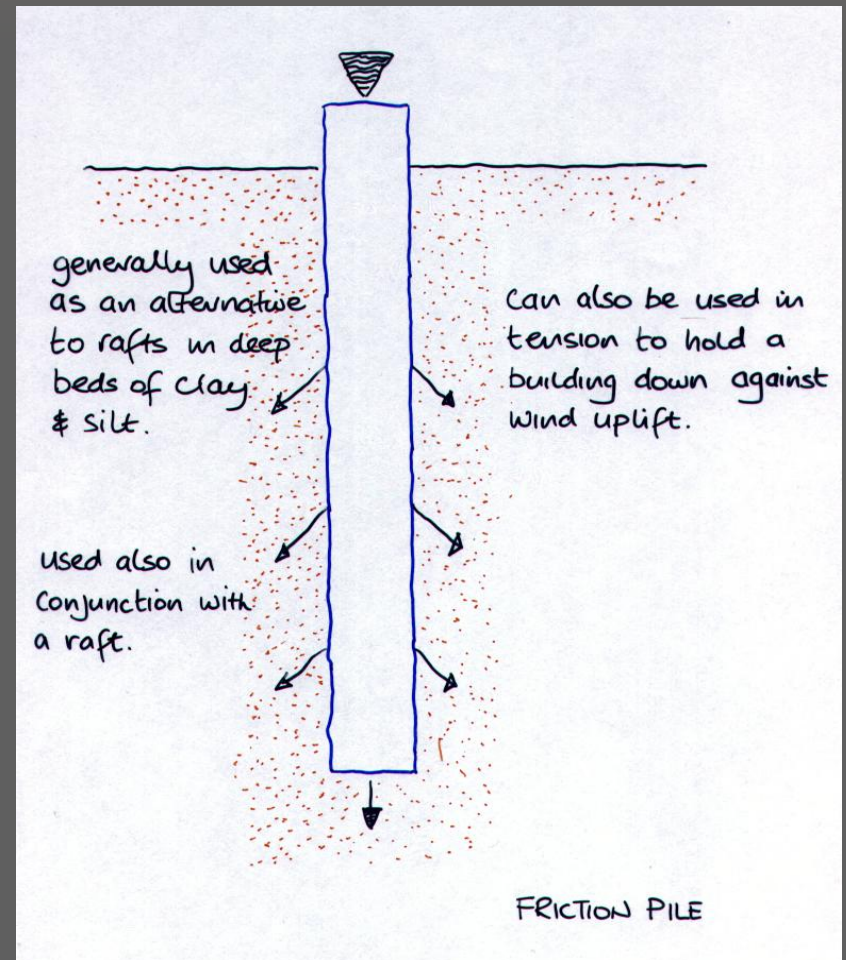
- Steel
- Composite



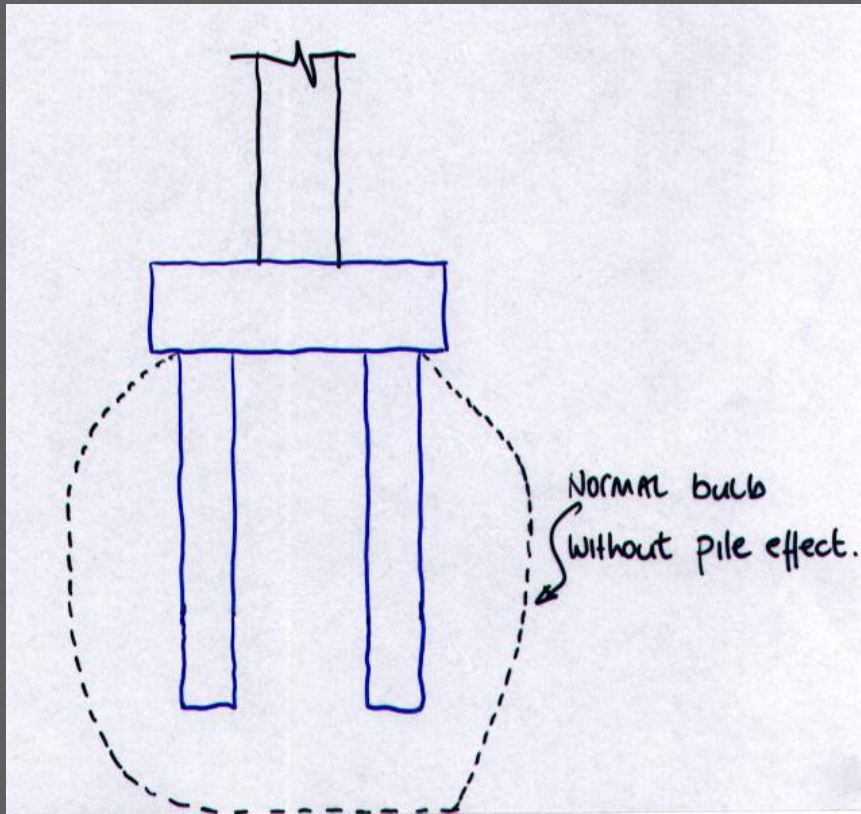
Construction Technology

Friction pile

Loads from piles are transferred to the surrounding soil by means of the friction between their surfaces and the soil, with some end bearing



Construction Technology



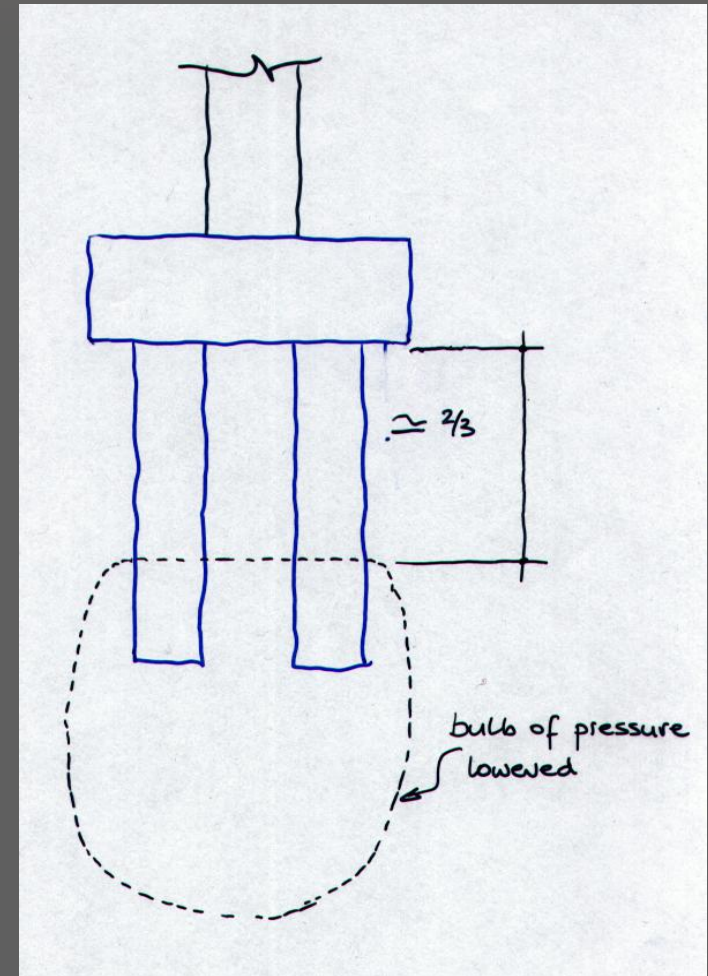
Bulb of pressure

Relates to the stresses imposed on the soil from the loadings.

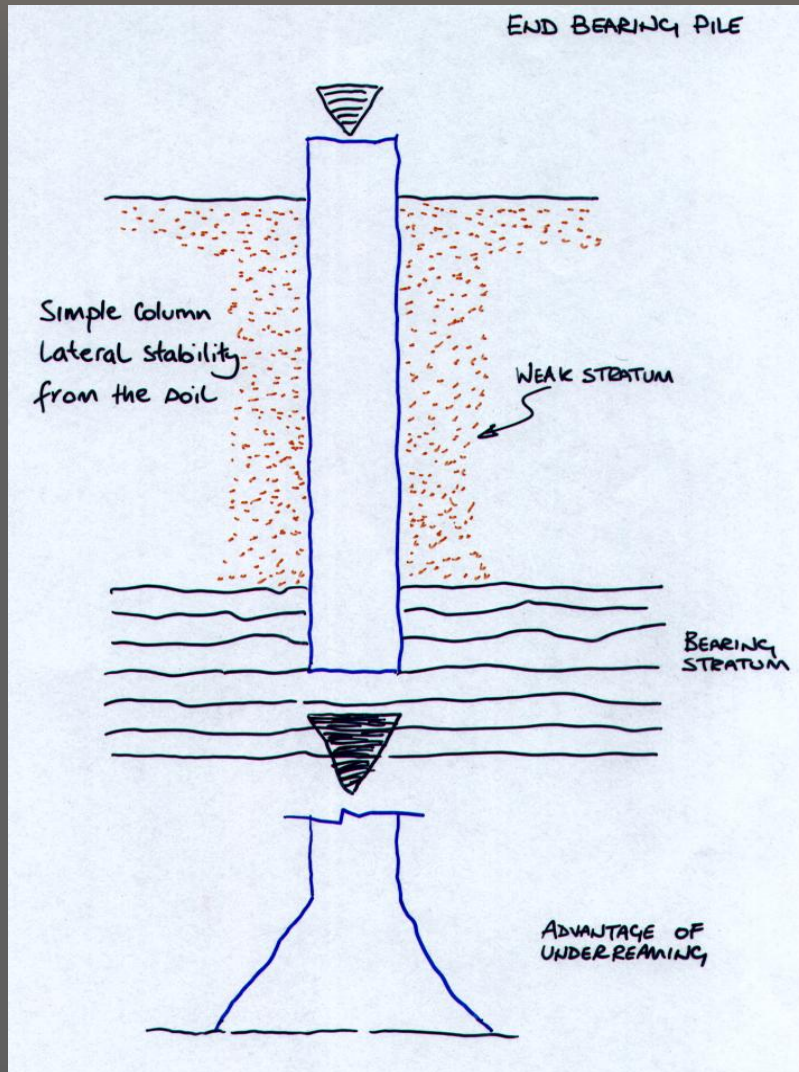
Larger the loaded area, the deeper its effect on the soil.

Construction Technology

The friction pile has the effect of transferring the stresses deeper into the soil



Construction Technology



End bearing pile

Carry loads through weak strata and transfer them to a firm stratum on which the pile end rests.

Construction Technology



Pile classification

Displacement piles...

preformed and driven
into the ground thus
displacing the soil

Construction Technology

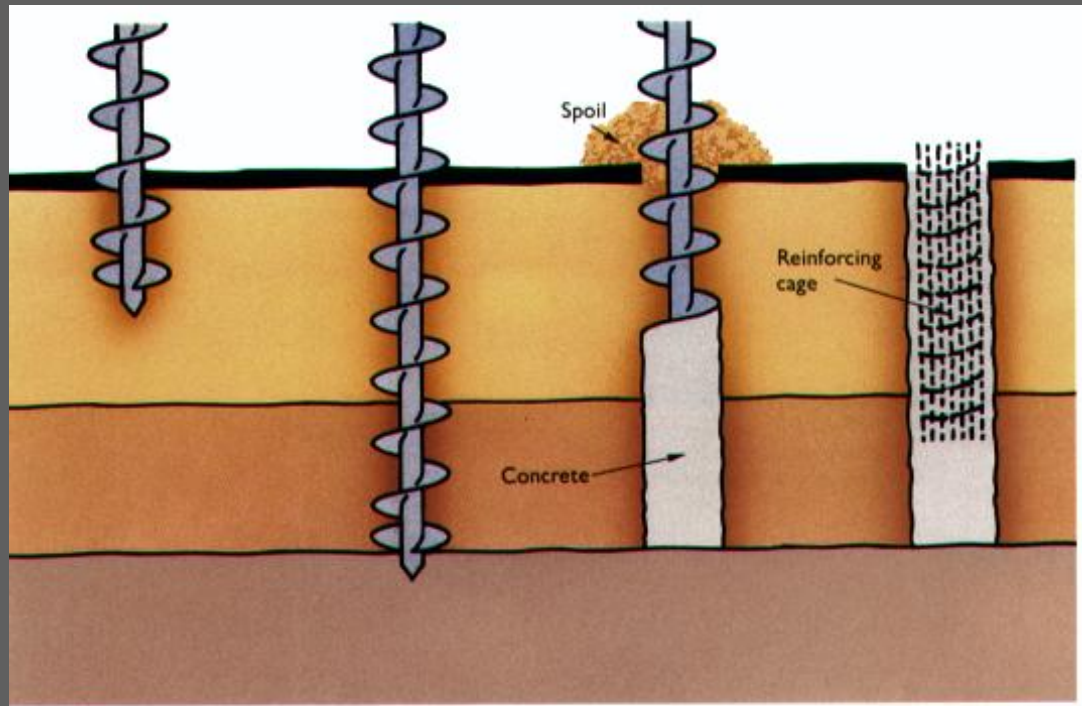
Pile classification

Replacement piles...

involves soil removal
which is replaced by the
pile



Construction Technology



CFA technology

Continuous flight
auger bored piles
(CFA)

Construction Technology



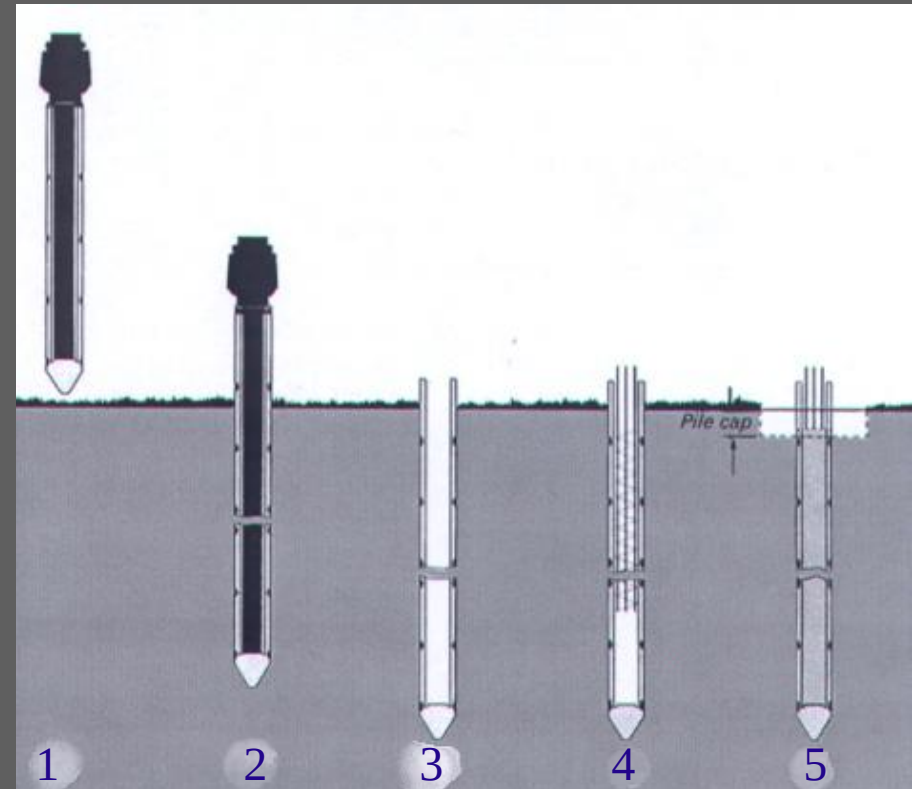
- ⇒ Pile Performance requirements
 - Strength and stability
 - Durability

- ⇒ Other requirements of piles in order to perform satisfactorily:
 - Verticality
 - Good friction
 - Uniform cross section
 - Continuous

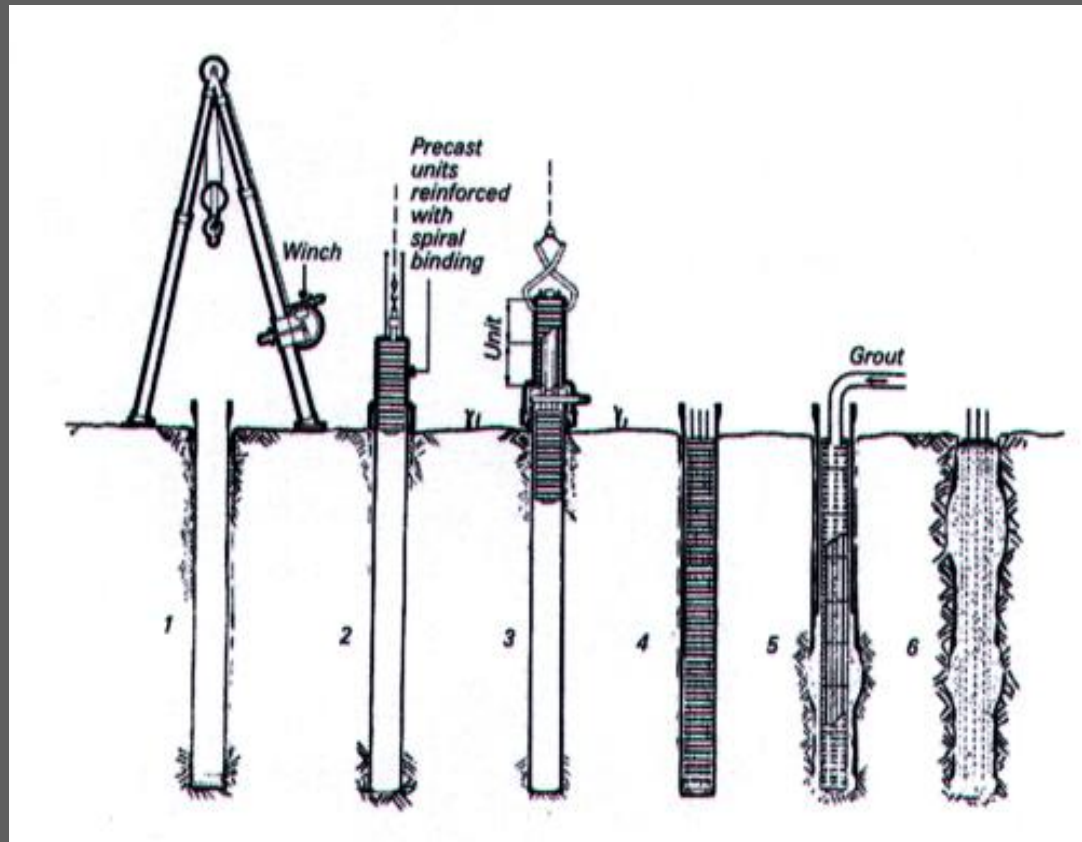
Construction Technology

Insitu displacement end-bearing system

1. Pile shells are threaded on to a steel mandrel
2. Whole assembly driven into the ground
3. Mandrel withdrawn
4. Steel reinforcement
5. Complete pile



Construction Technology



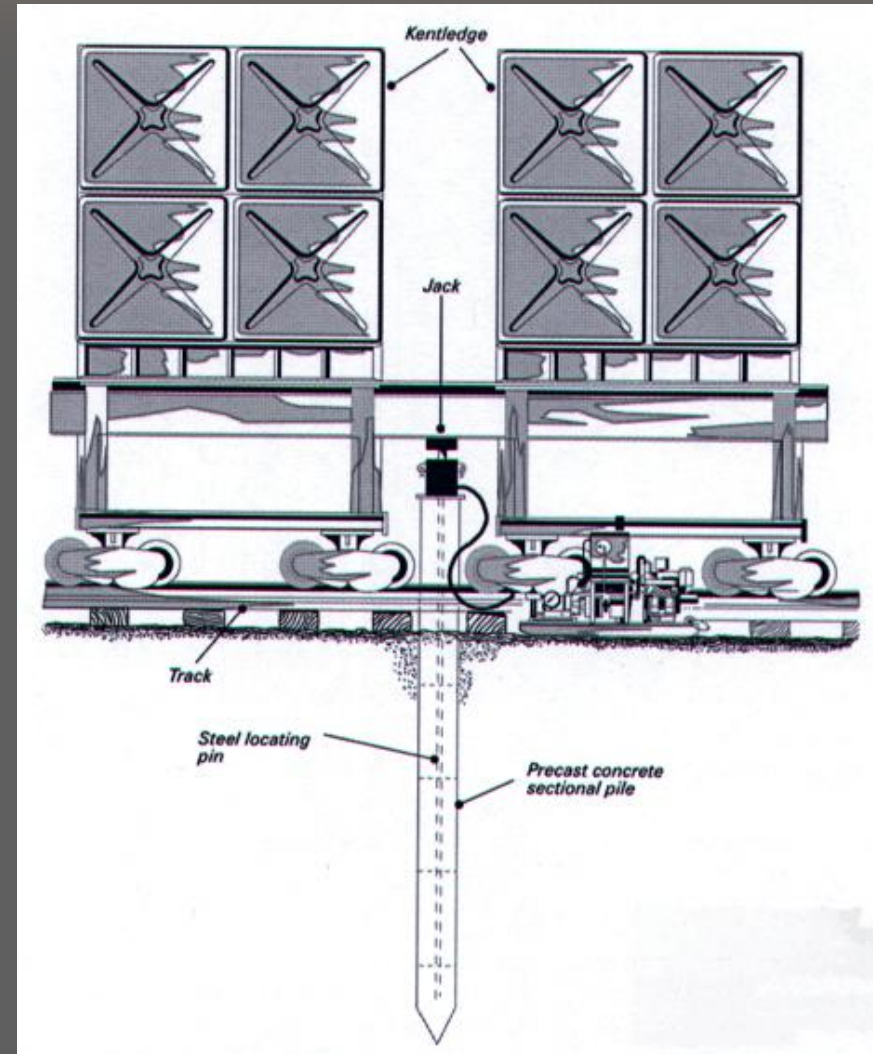
1. Hole bored and lined with steel casing
2. Assembly of short cylindrical precast units
3. Building up length of core pile
4. Precast core and rebar in position
5. Steel casing freed and withdrawn during grouting
6. Finished pile

Construction Technology

Jacked-down piling

Sectional concrete piles are jacked down from a kentledge

Can also be used to test the loadbearing capacity of piles



Construction Technology



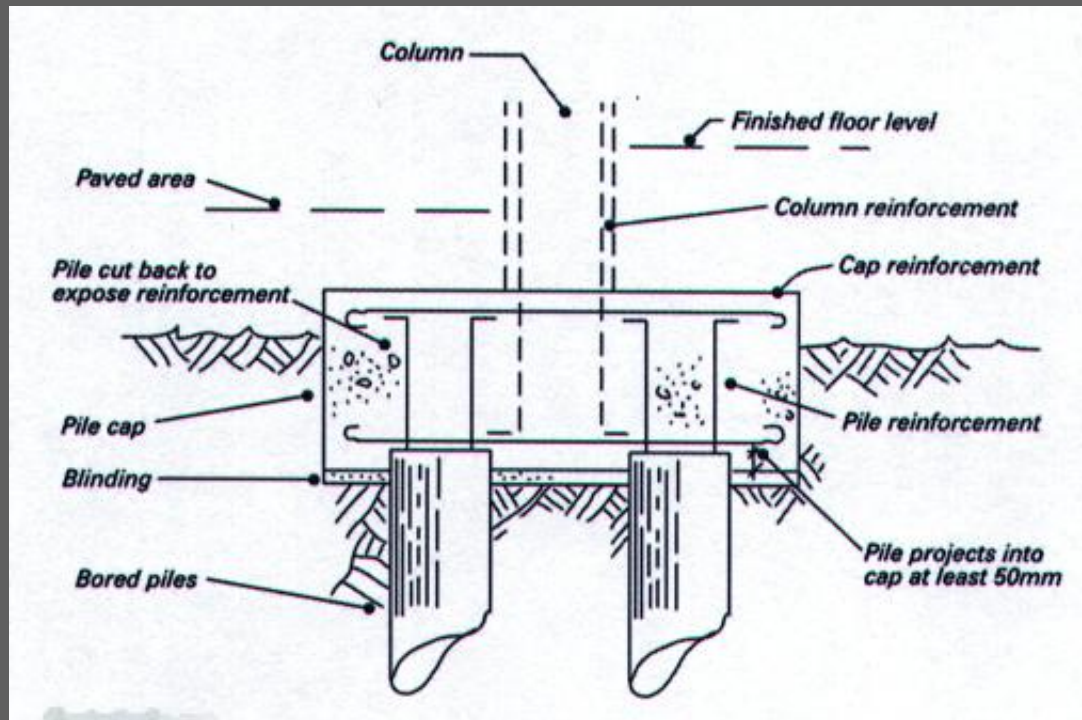
Kentledge method
for testing piles

Construction Technology

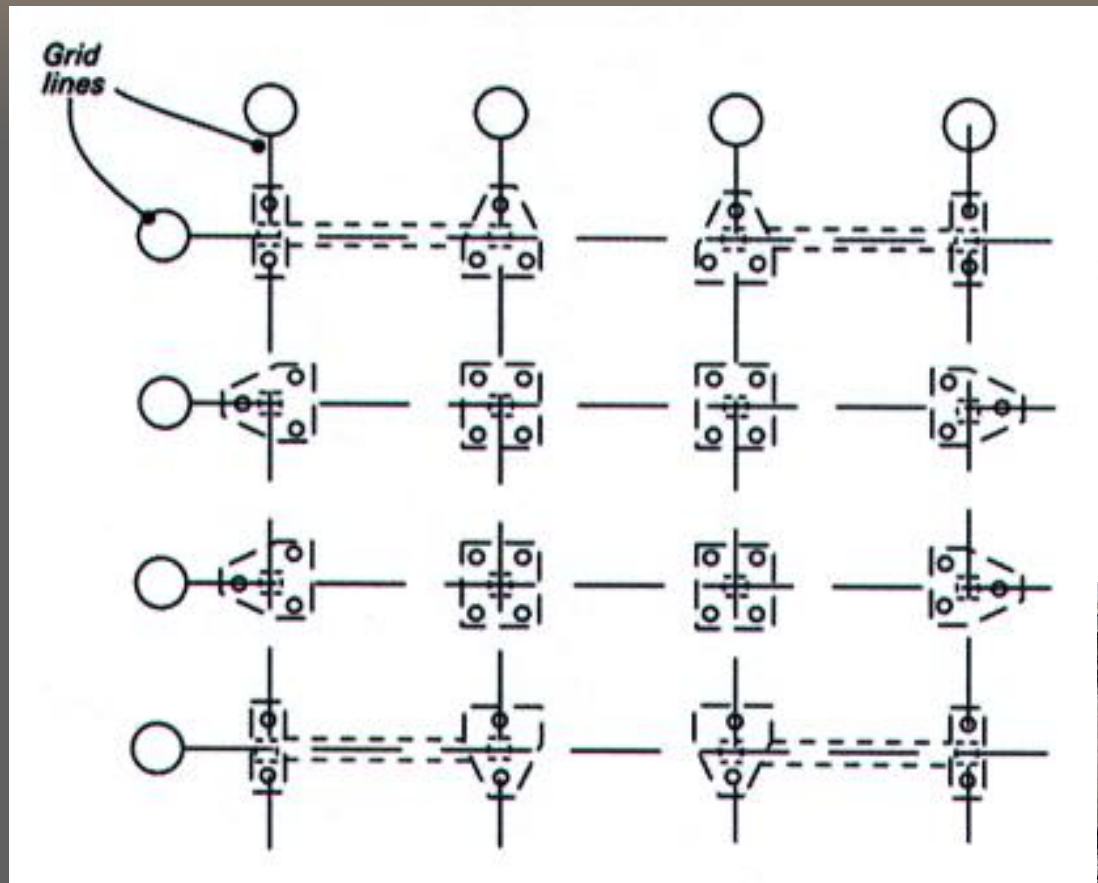
Pile caps

Allows adequate bearing capacity of pile groups to be achieved

- Ensures stability
- Provides margin of safety
- Transmits the column load to pile heads



Construction Technology

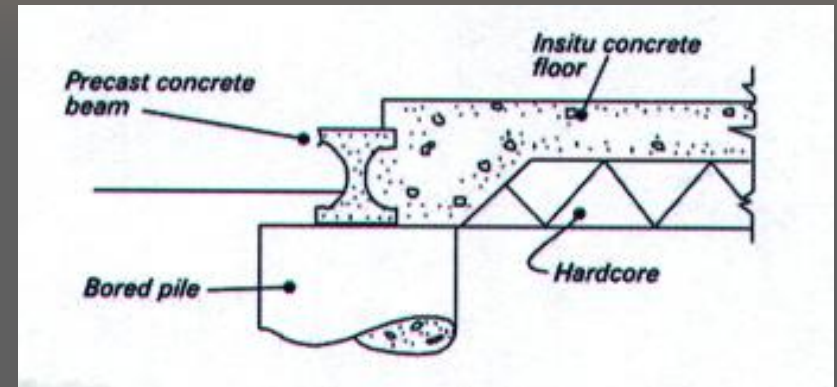
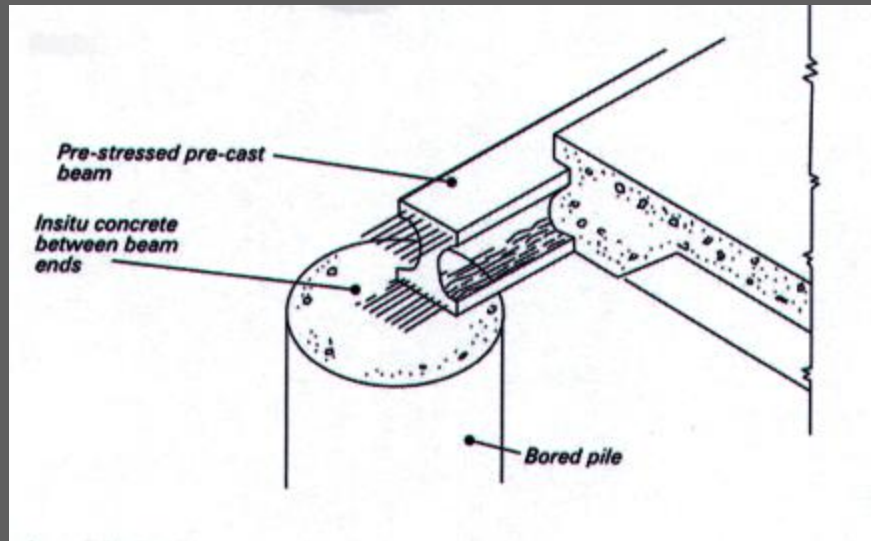


Note the different pile capping arrangements for groups of piles

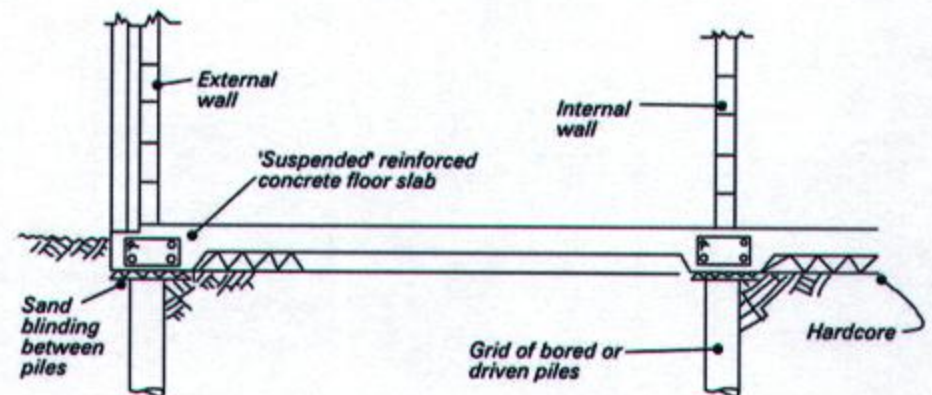


Setting out of pile and pile cap arrangements

Construction Technology



Pile caps for lightly loaded applications



Construction Technology

⇒ Factors that affect the choice of pile

- The site
- The soil
- Materials
- The structure
- Environmental



Construction Technology

⇒ Selection of piles

■ Timber

- Light loads
- Temporary works
- Decay
- Splitting



Construction Technology

⇒ Selection of piles

■ Precast concrete

- Ideal for above ground continuation
- High resistance to lateral forces
- Advantageous in soils unfriendly to cast-in-place piles

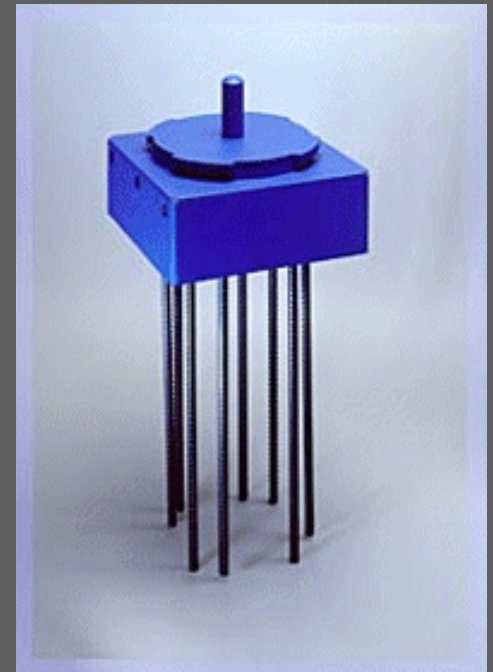


Construction Technology



Precast piling

Pile extension technology



Construction Technology

➔ Selection of piles

■ Precast concrete

- Lifting and handling
- Driving
- Rebar
- Cover to steel
- Concrete design
- Casting
- Shoes



Construction Technology



Precast piles showing the lifting links

Mini piles used in restricted areas



Construction Technology



Piling in restricted spaces

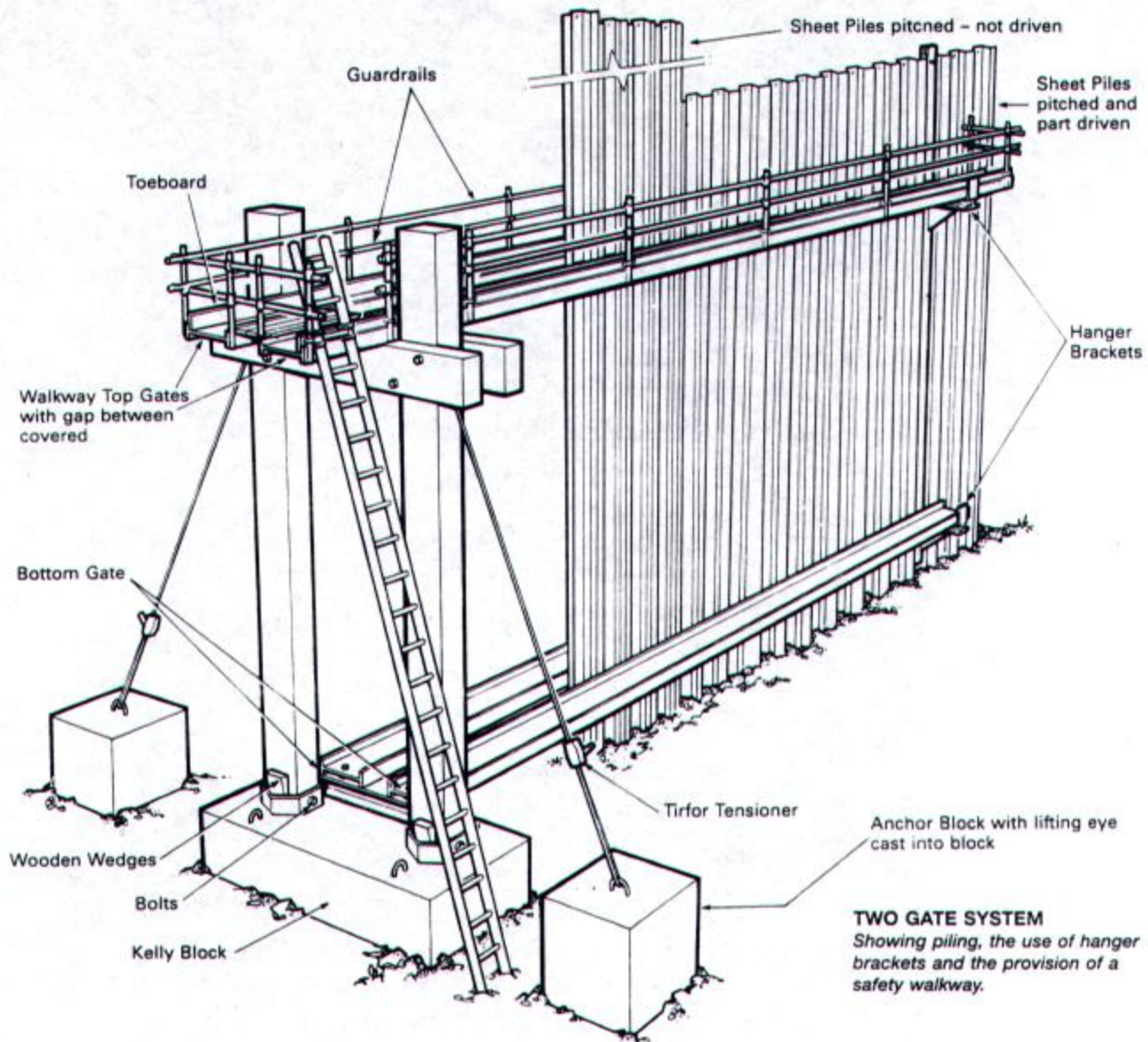
Construction Technology



⇒ Selection of piles

■ Steel piles

- Mainly sheet piling
- High bearing capacity
- Resistant to buckling
- Readily cut / extended
- Small displacements
- Damage limited
- Corrosion challenges
- Verticality problems
- Resilience / strength





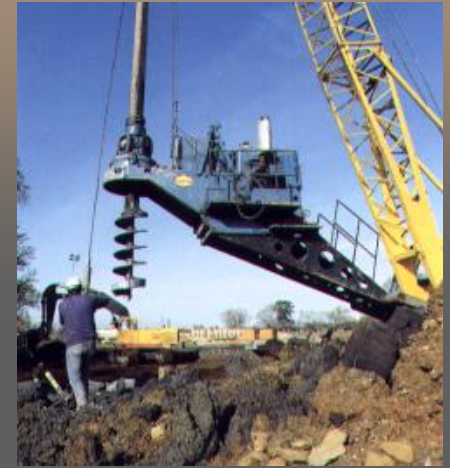






Deep foundations

Workshop



Consider a method by which the stability of a group of piles is ensured.

What methods are available to overcome the problem of groundwater when boring piles to their required depth?

How might the safe bearing capacity of a pile be established?

