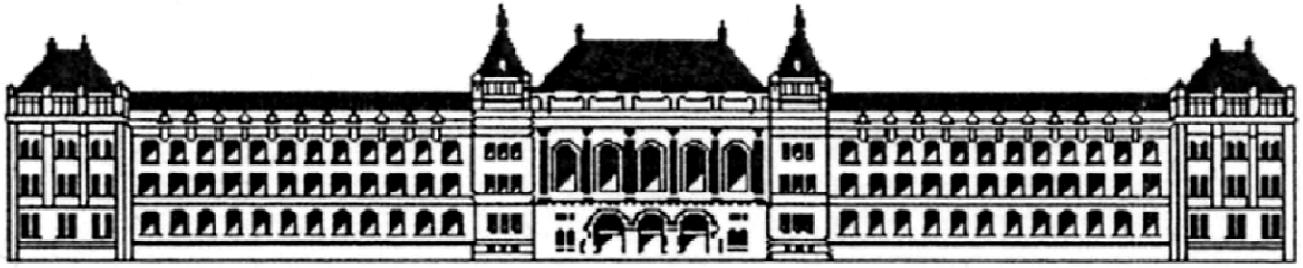
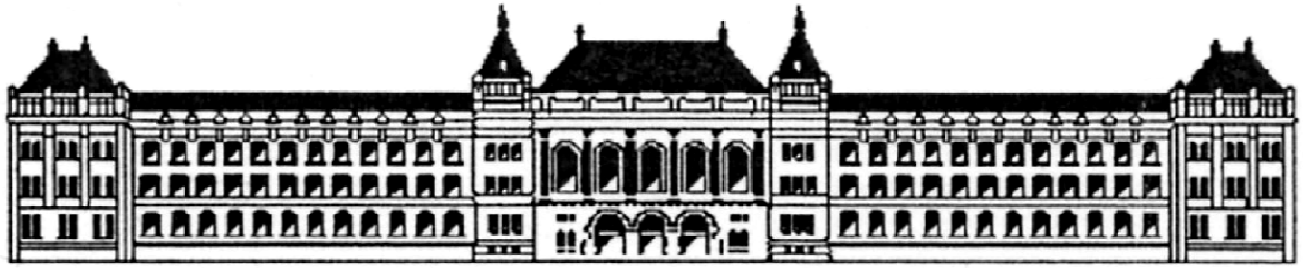


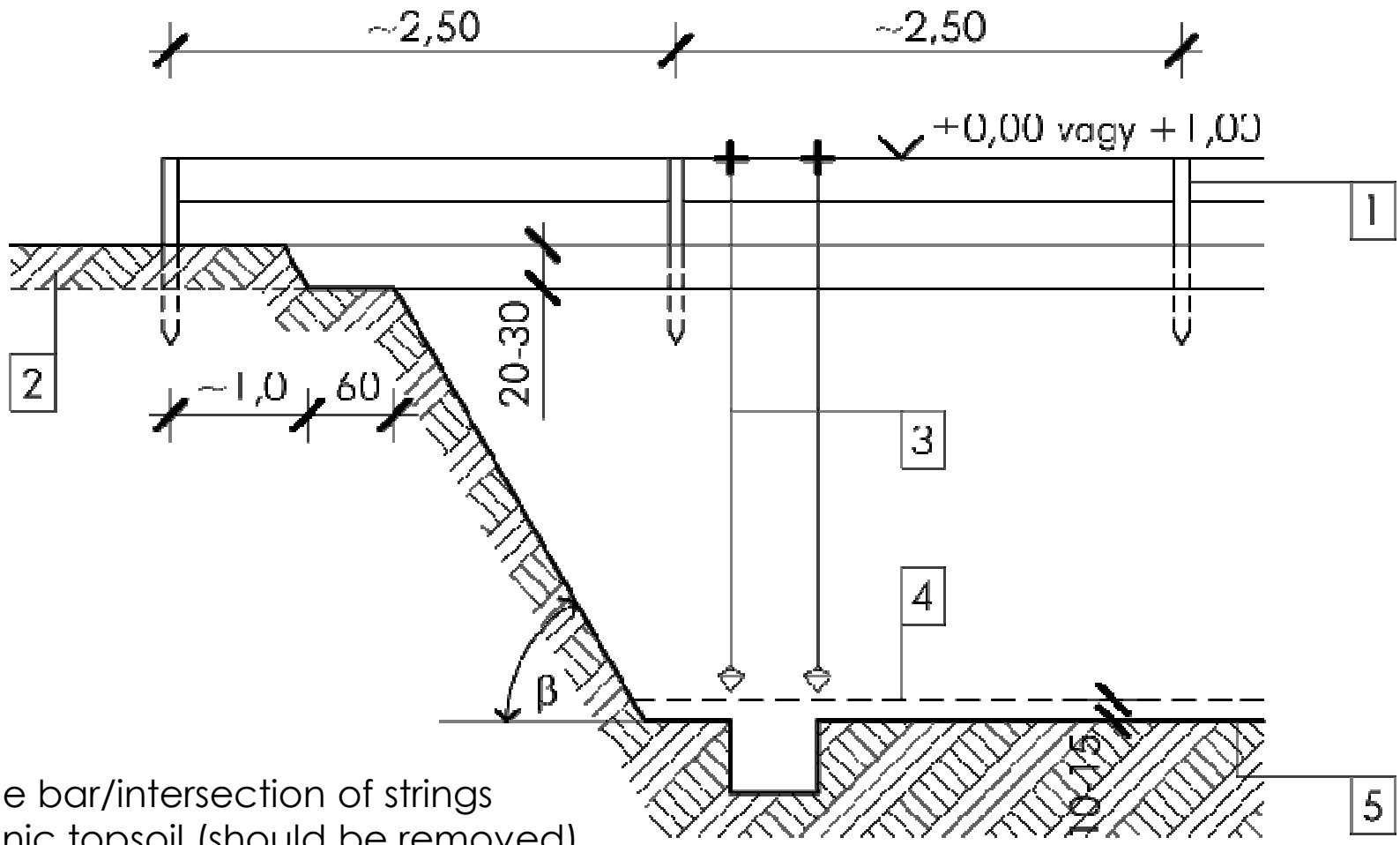
FOUNDATIONS III.
EXCAVATION WORKS, RETAINING WALLS, DEEP FOUNDATION

Dr. TAKÁCS Lajos Gábor
BUTE Department of Building Constructions



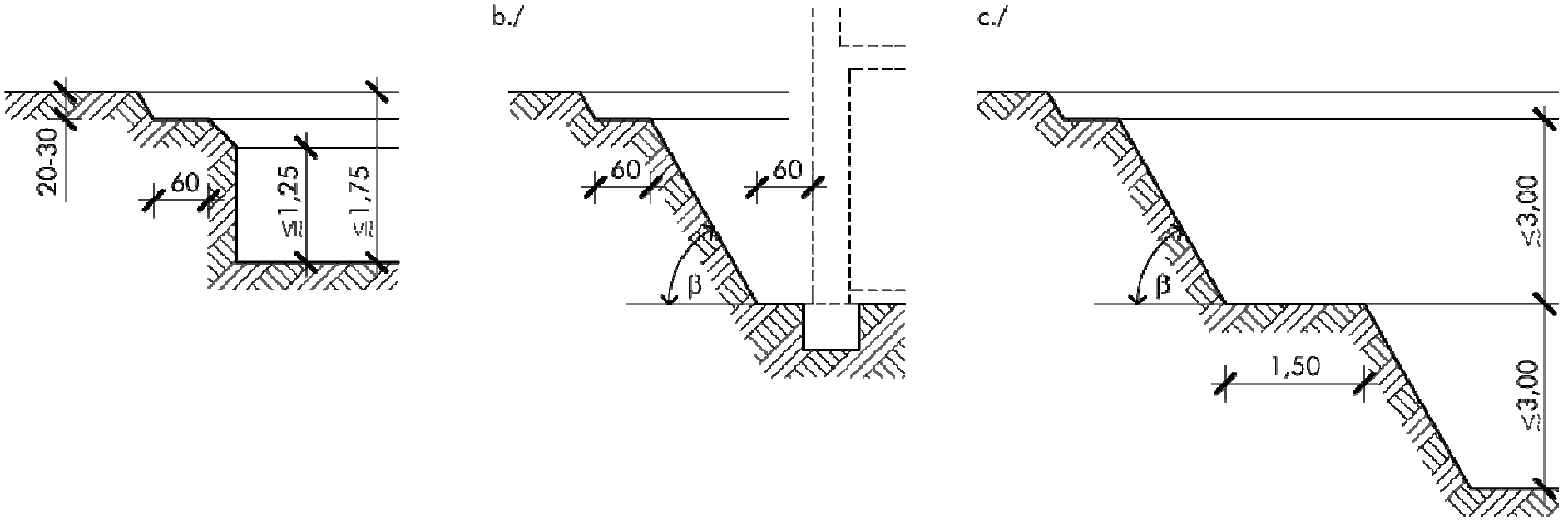
EARTHWORKS, RETAINING WALLS

EARTHWORKS, EARTHMOVINGS



1. Grade bar/intersection of strings
2. Organic topsoil (should be removed)
3. Vertical adjustment
4. Gravel bed
5. Bottom level of cut (excavation works)

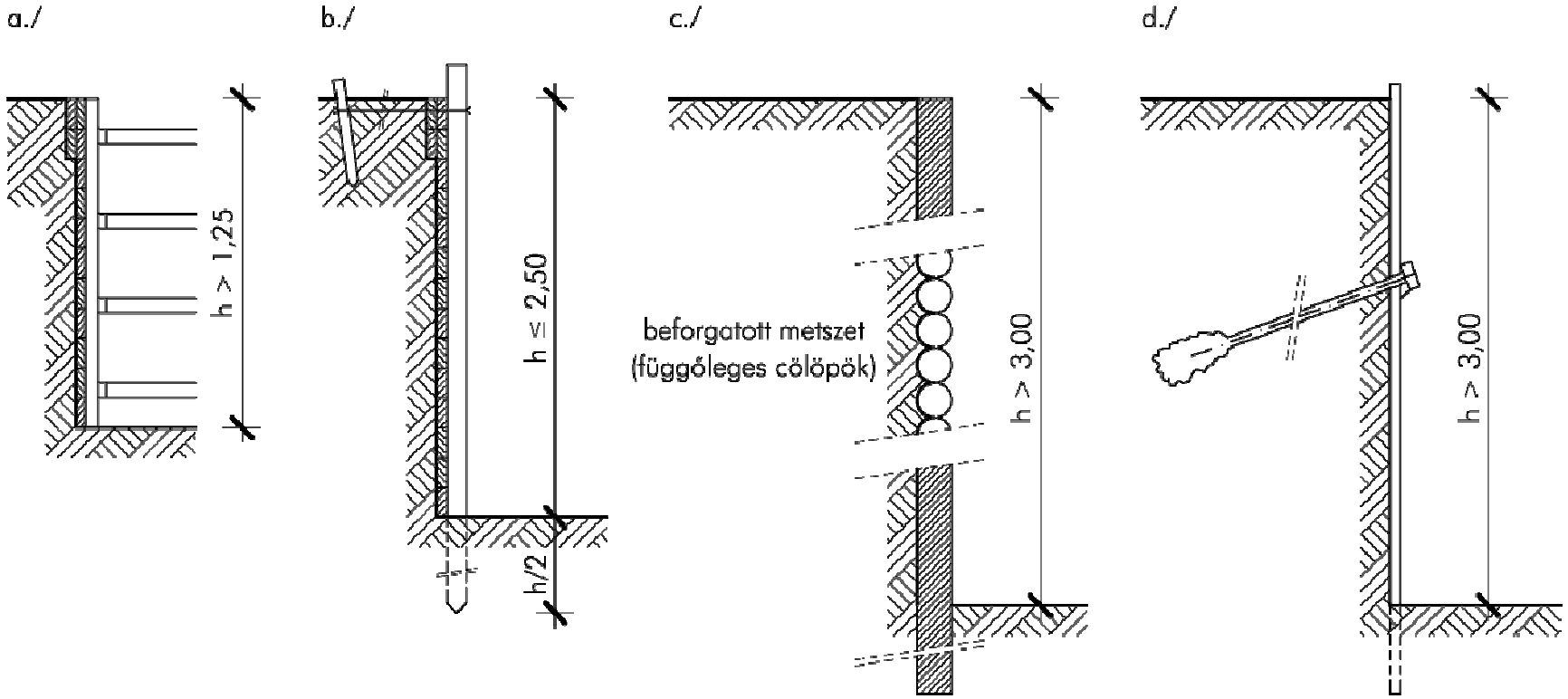
EARTHWORKS, EARTHMOVINGS



1. Adherent soil, small depth
2. Loose soil, small depth
3. Loose soil, large depth

EARTHWORKS

RETAINING WALLS AT EARTHWORKS



a, b., horizontal lagging
c., vertical set of piles
d., anchored bulkhead

RETAINING PIERS FOR SAFE EARTHWORKS

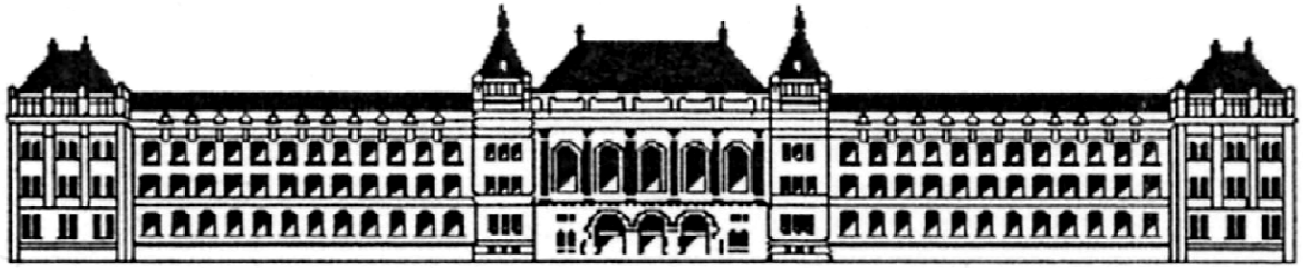
TORKRET (SHOT CONCRETE) USED AS RETAINING CONSTRUCTION

SOLDIER PILES/BERLIN WALLS

Soldier piles, also known as king piles or Berlin walls, are constructed of wide flange steel H sections spaced about 2 - 3 m apart and are driven prior to excavation. As the excavation proceeds, horizontal timber sheeting (lagging) is inserted behind the H pile flanges.

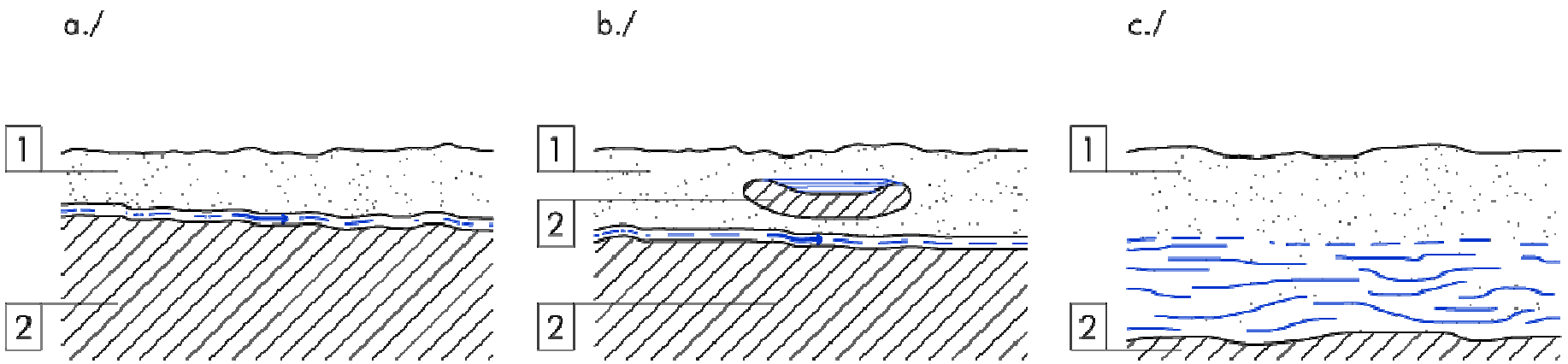
STEEL PILES

Retaining wall supported by driven steel piles



DEWATERING

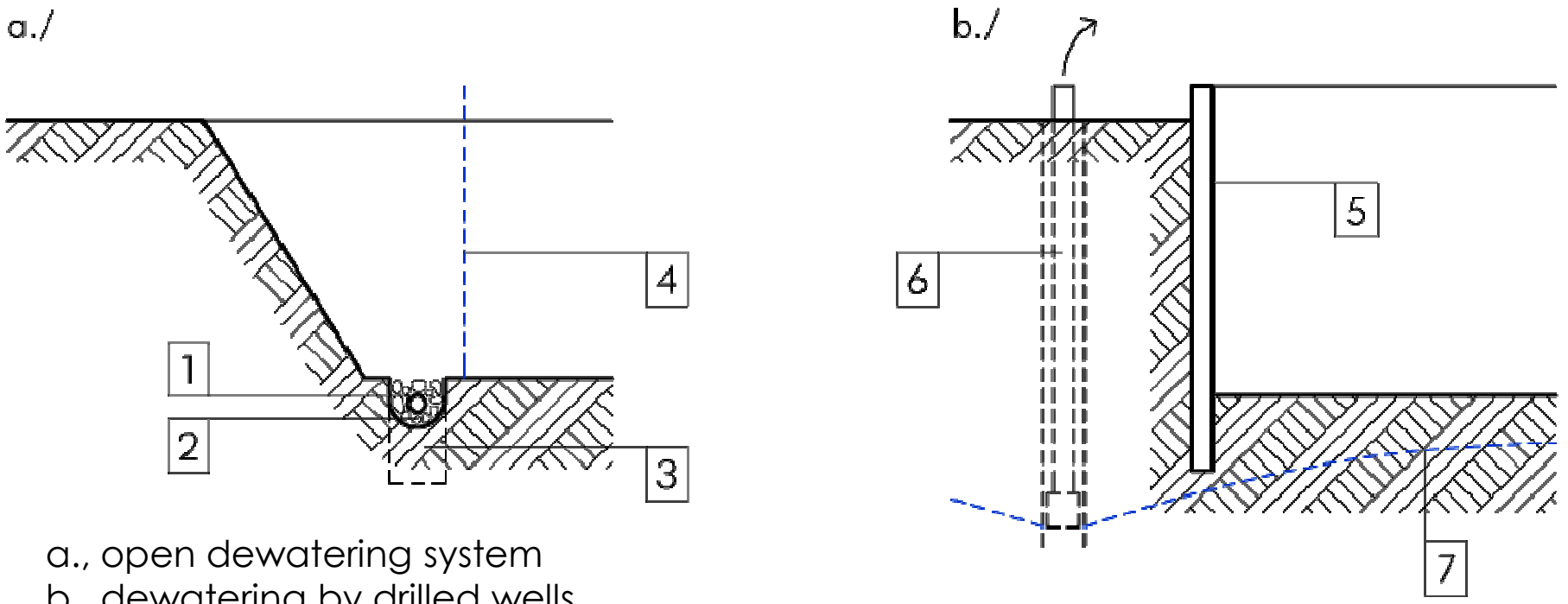
TYPE OF SUBSOIL WATER



a., seepage flow
b., entrapped water
c., subsoil

1: loose soil
2: adherent soil

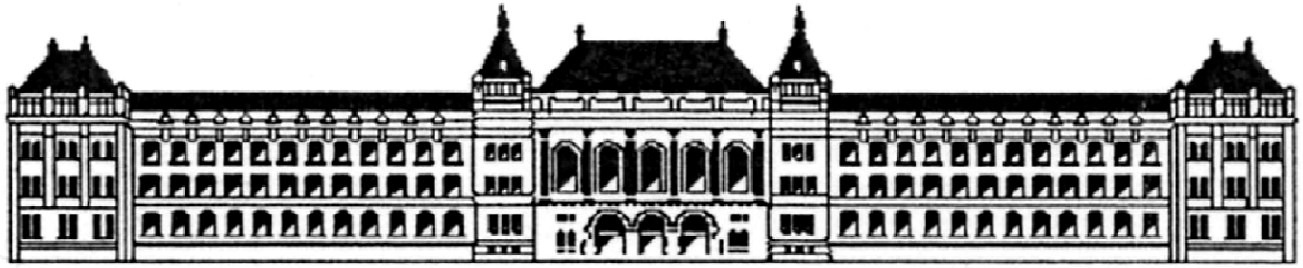
DEWATERING OF THE CUT



a., open dewatering system
b., dewatering by drilled wells

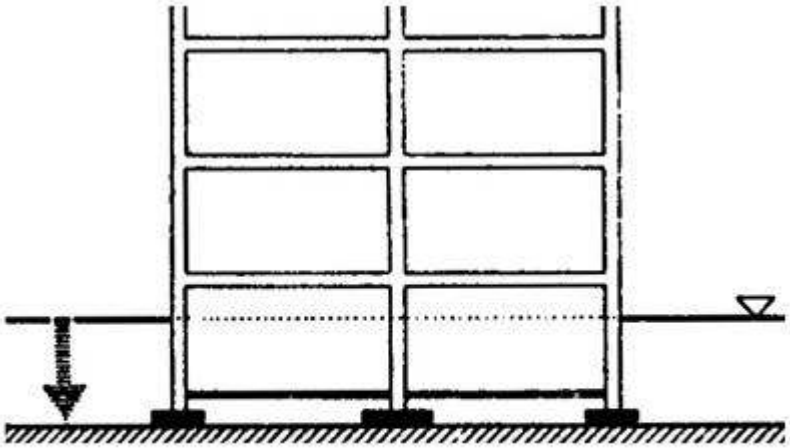
1. Drain
2. Gravel bed
3. Water collecting
4. Basement wall (proposed)
5. Retaining wall
6. Pump
7. Sunk water table

DEWATERING OF THE CUT WITH DRILLED WELLS

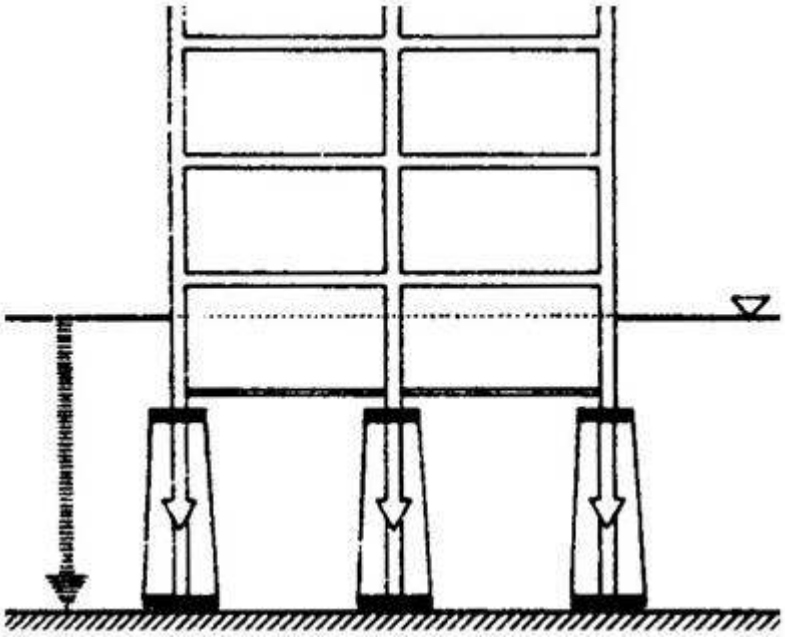


DEEP FOUNDATIONS

REVISION: CLASSIFICATION ON THE DEPTH OF THE FOUNDATION



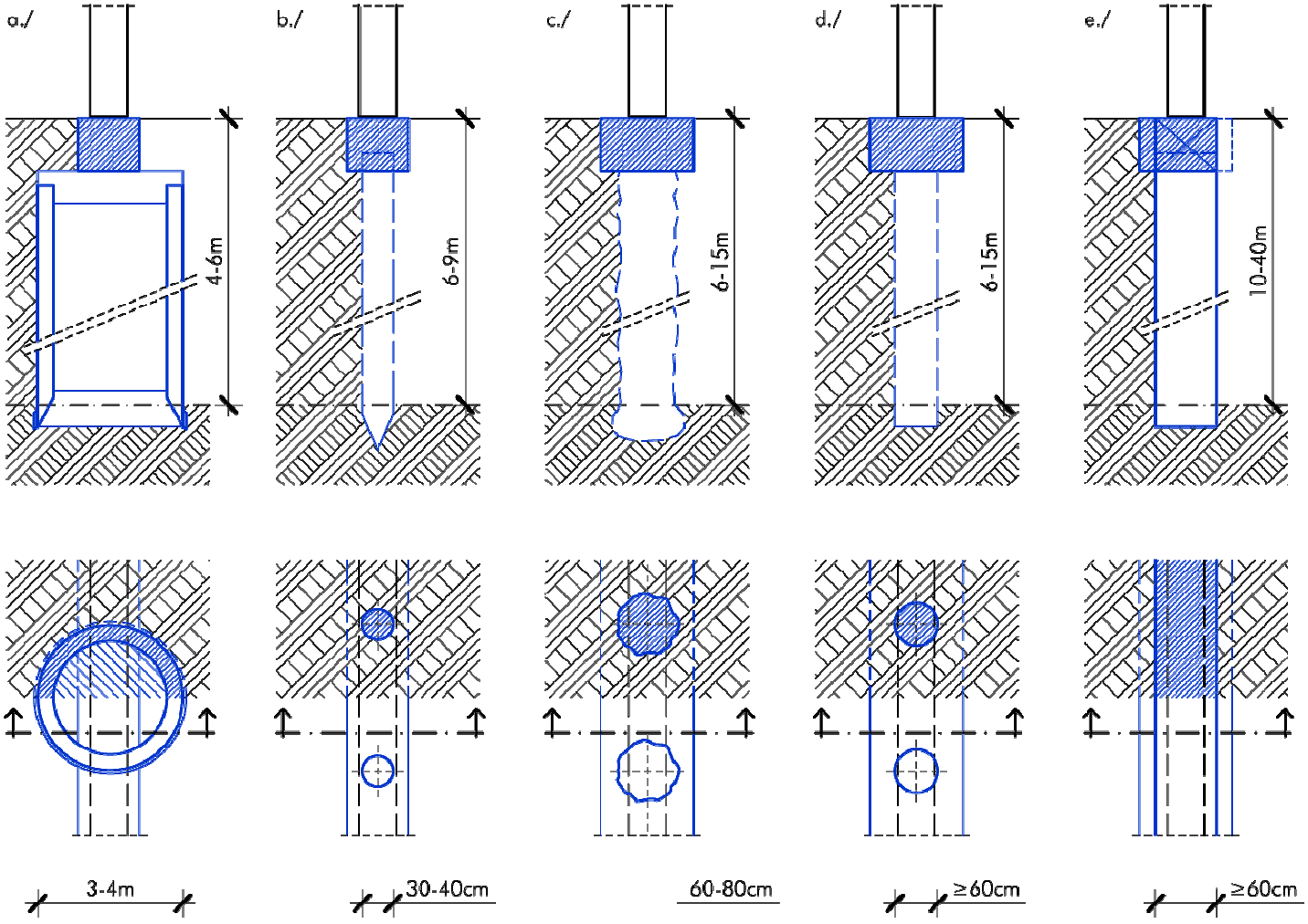
Shallow foundation scheme



Deep foundation scheme

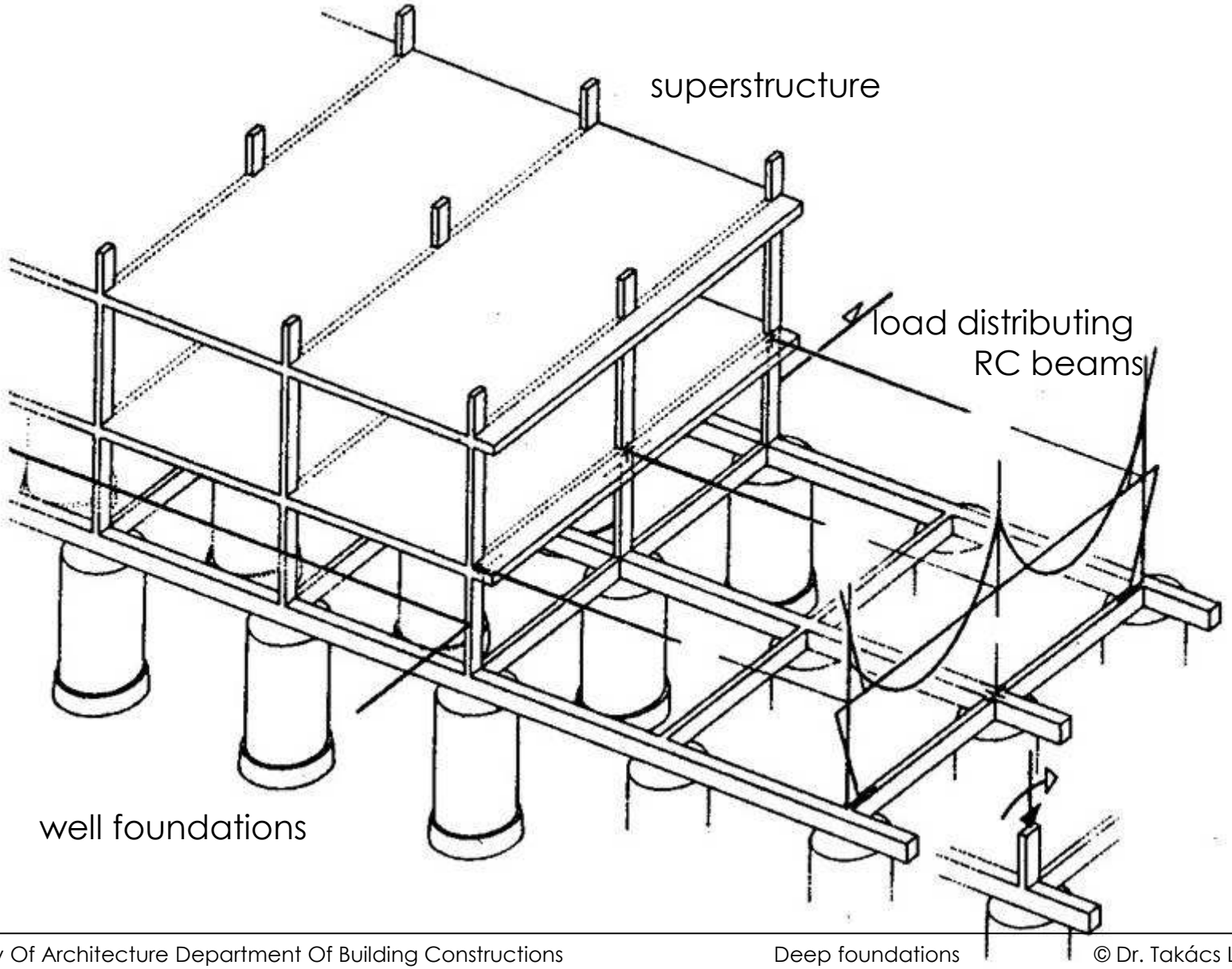
Deep foundations transfer the dead load of the building onto the loadbearing soil layers deep below the building.

REVIEW OF DEEP FOUNDATIONS

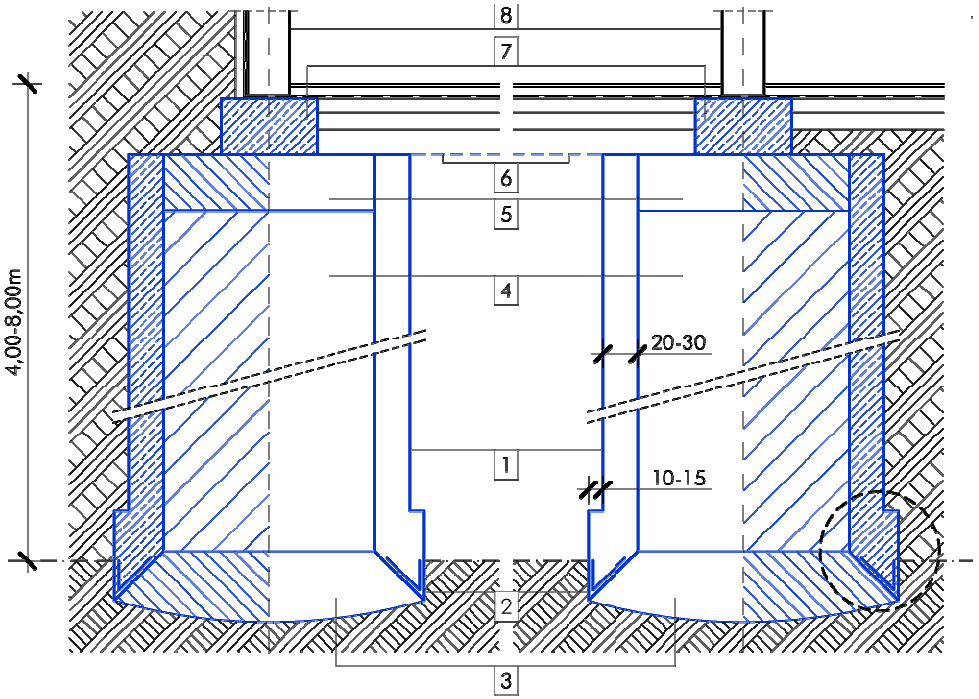


a., well foundation
b., prefabricated concrete pile foundation
c., augercast pile
c., slurry trench wall
d., drilled piles

WELL FOUNDATION SYSTEM



WELL FOUNDATION



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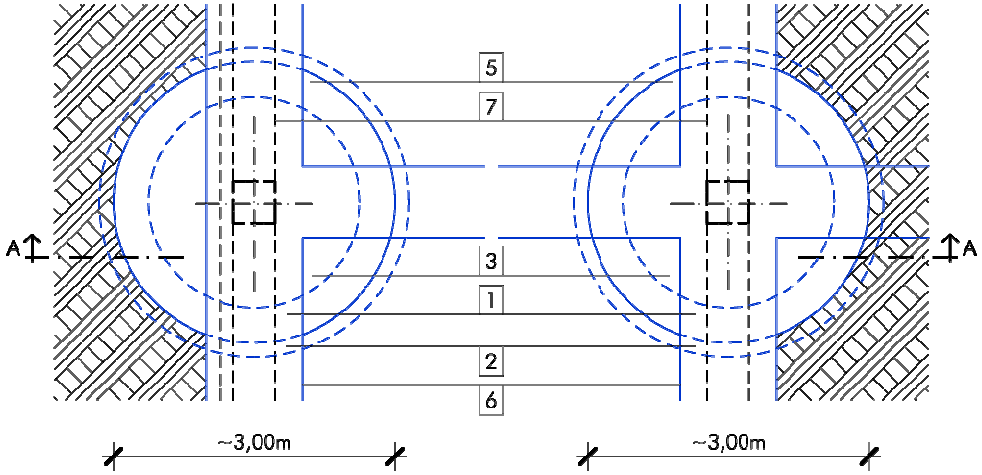
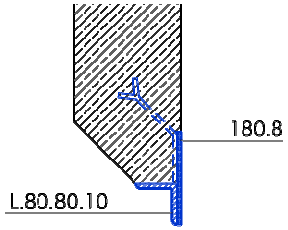


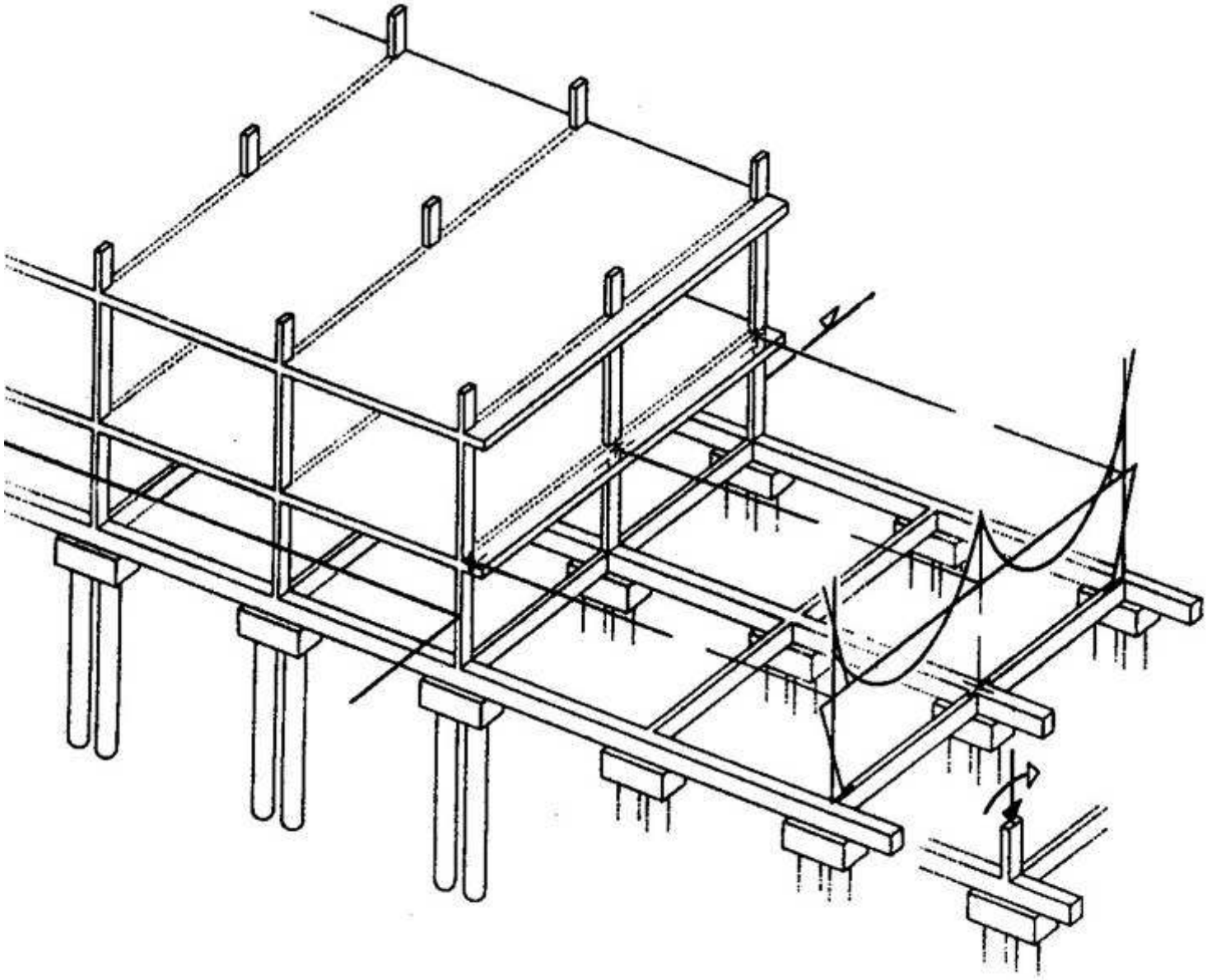
Well foundation of a building with skeleton frame/loadbearing wall superstructure

a., foundation of an external wall/pier
b., foundation of an intermediate pier
c., cutting edge

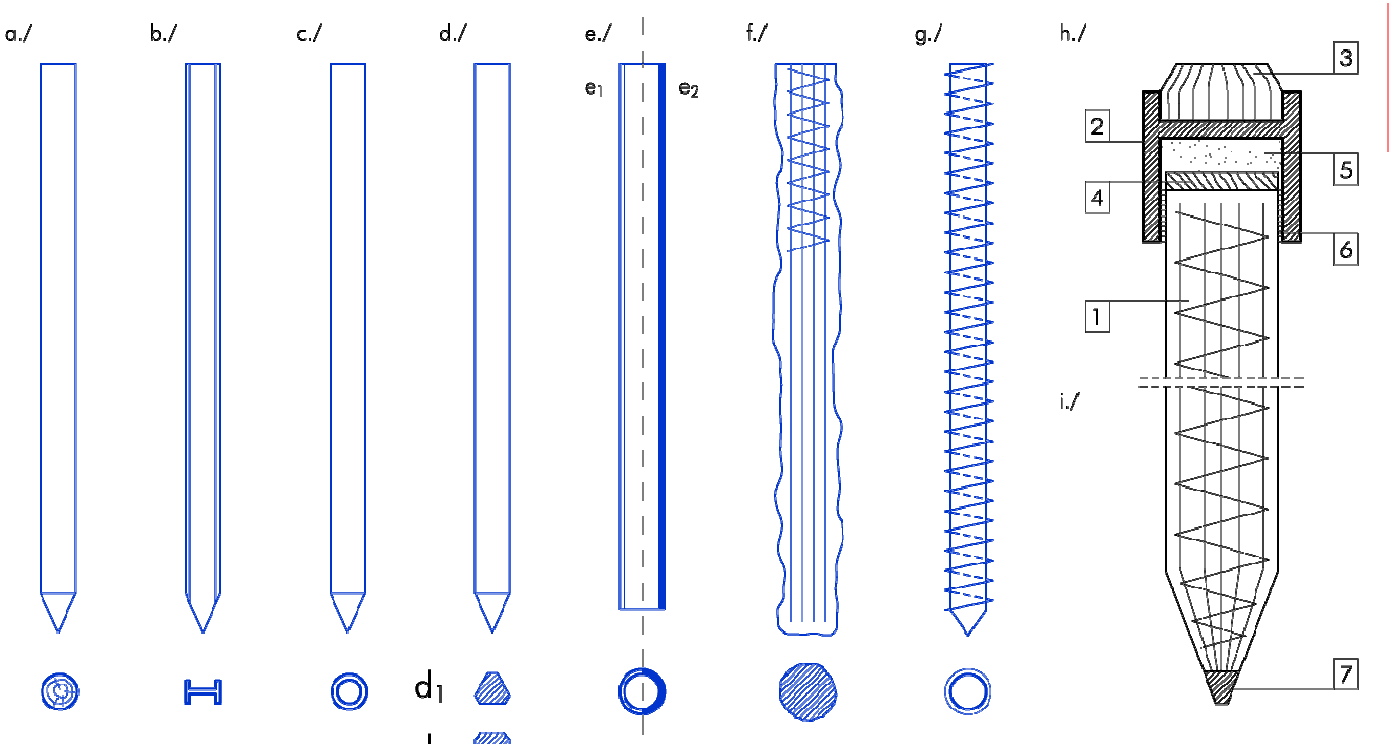
1. Foundation well
2. Cutting edge
3. Concrete base plate
4. Concrete
5. Concrete cover plate
6. RC grade beams
7. RC grade beams
8. Superstructure



PILE FOUNDATION SYSTEM



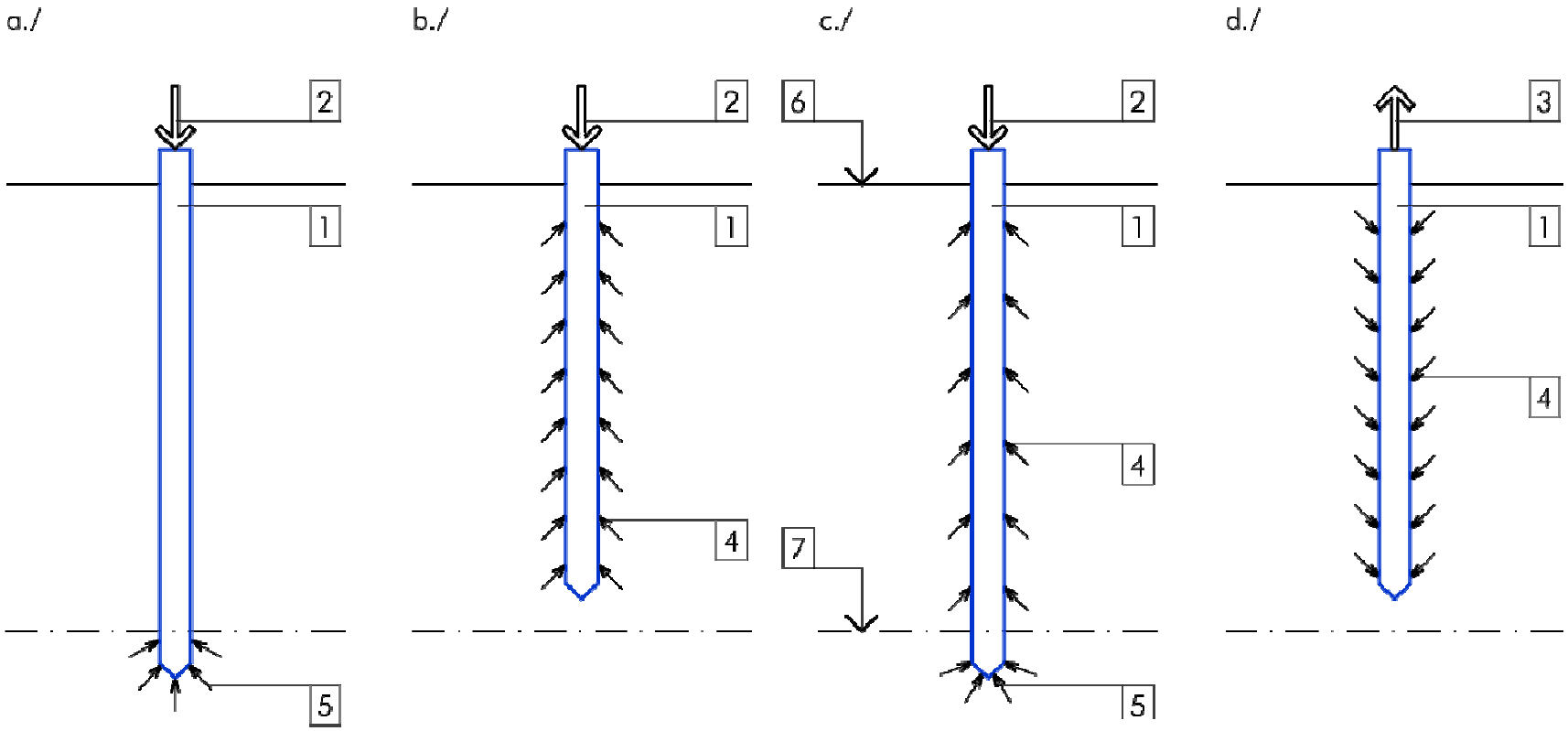
CLASSIFICATION OF FOUNDATION PILES BY MATERIALS



a., timber pile
b., steel „T" profile
c., steel pipe
d., precast/prestressed reinforced concrete pile
e., drilled pile
f., augercast pile
g., RC pier wit clevis
h - i., block and the head of a precast RC pile

1. RC pile
2. Steel block
3. Hardwood bond plug
4. Softwood backing
5. Sawdust
6. Textile rag backing
7. Steel pile head

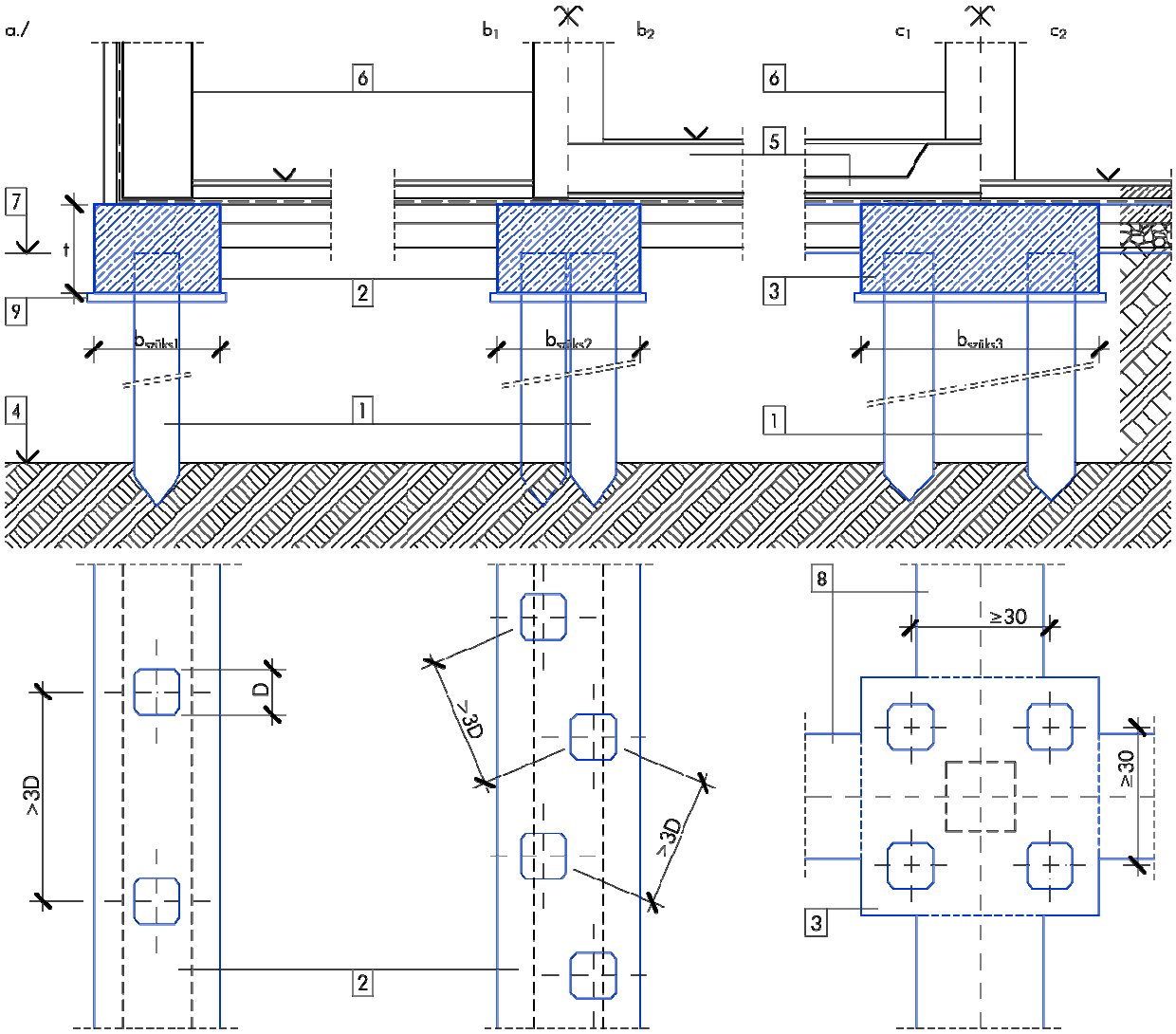
CLASSIFICATION OF FOUNDATION PILES



a., bearing pile
b., friction pile
d., bearing and friction pile
d., tensile friction pile

1. Pile
2. Load
3. Pulling force
4. Lateral friction
5. Point resistance
6. Surface of the ground
7. Level of the loadbearing soil

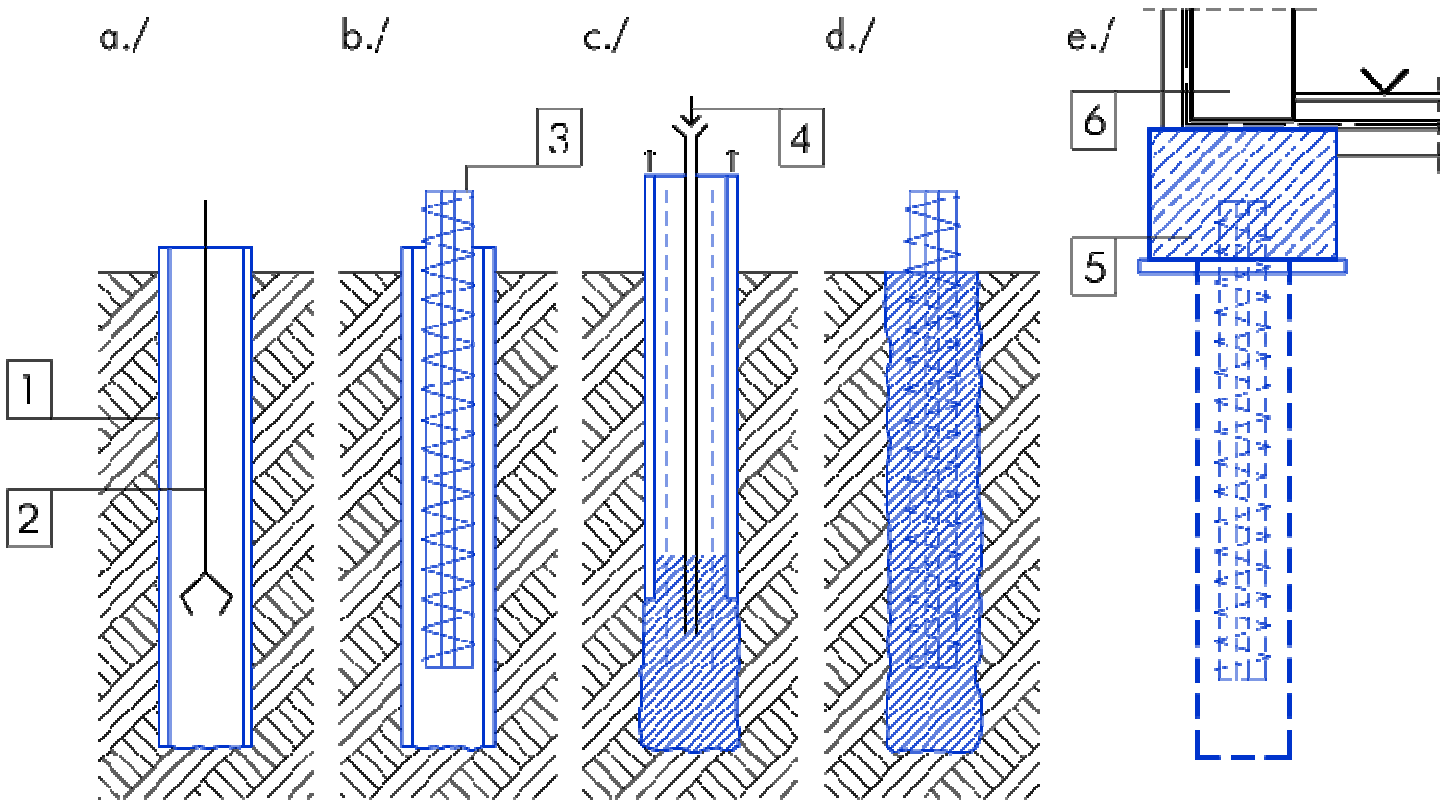
CONNECTION OF PILES AND SUPERSTRUCTURE



a., external loadbearing wall
b., intermediate loadbearing wall
b1., subsoil
b2., subsoil water
c., skeleton frame
c1., subsoil water
c2., subsoil

1. Pile (drilled or friction type)
2. Grade beams
3. Pile cap
4. Loadbearing soil
5. RC slab against the pressure of subsoil water
6. Surface of the ground
7. Pile head
8. RC beam
9. Blinding

CONSTRUCTION OF A DRILLED PILE



a., earthwork
b., reinforcement
c., high slump concrete mix pumping and augercast withdrawn
d., foundation pile is ready
e., connection to the superstructure

1. Augercast
2. Excavation/pile machine
3. Reinforcement
4. Concrete fill and augercast withdrawn
5. Grade beam
6. superstructure

HISTORIC TIMBER PILE FOUNDATION SYSTEM

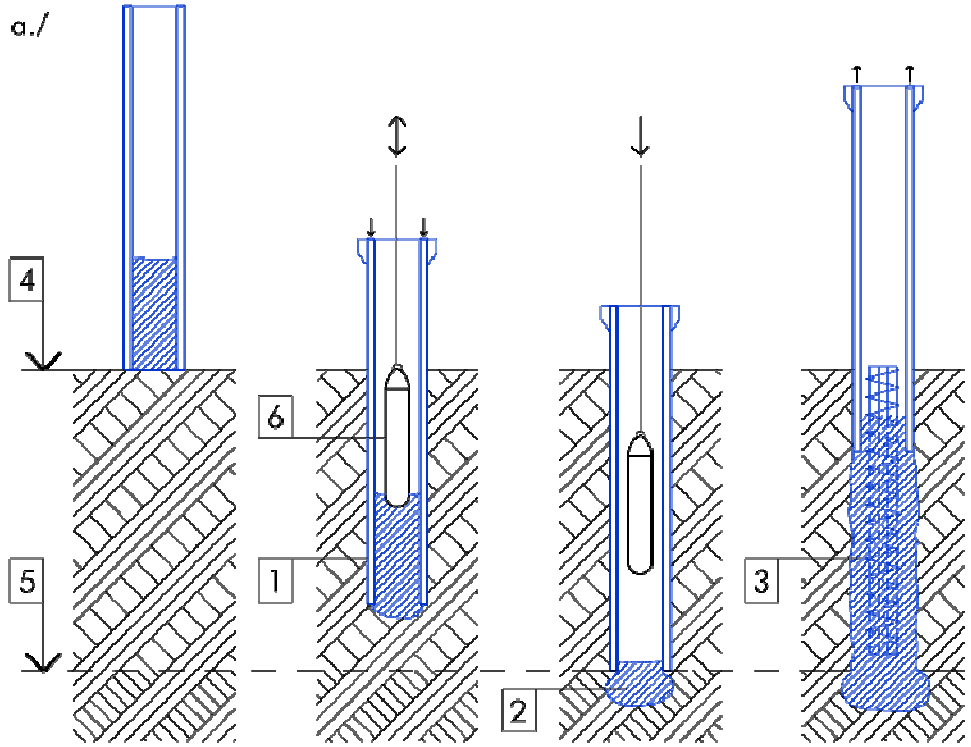
PILE FOUNDATION SYSTEM - DRILLING

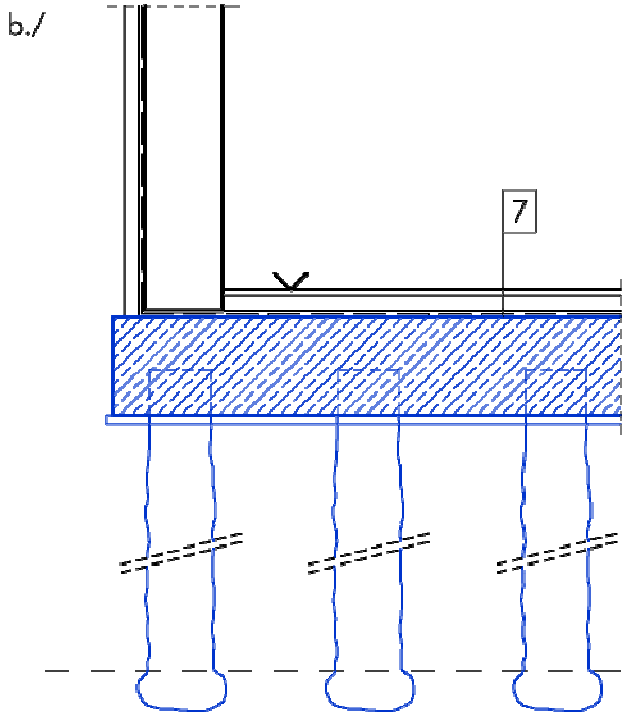
CONSTRUCTION OF IN-SITU RC PILE FOUNDATION

Monolithic RC piles drilled without the aid of auxiliary tubes

Reinforcement of the pile cap

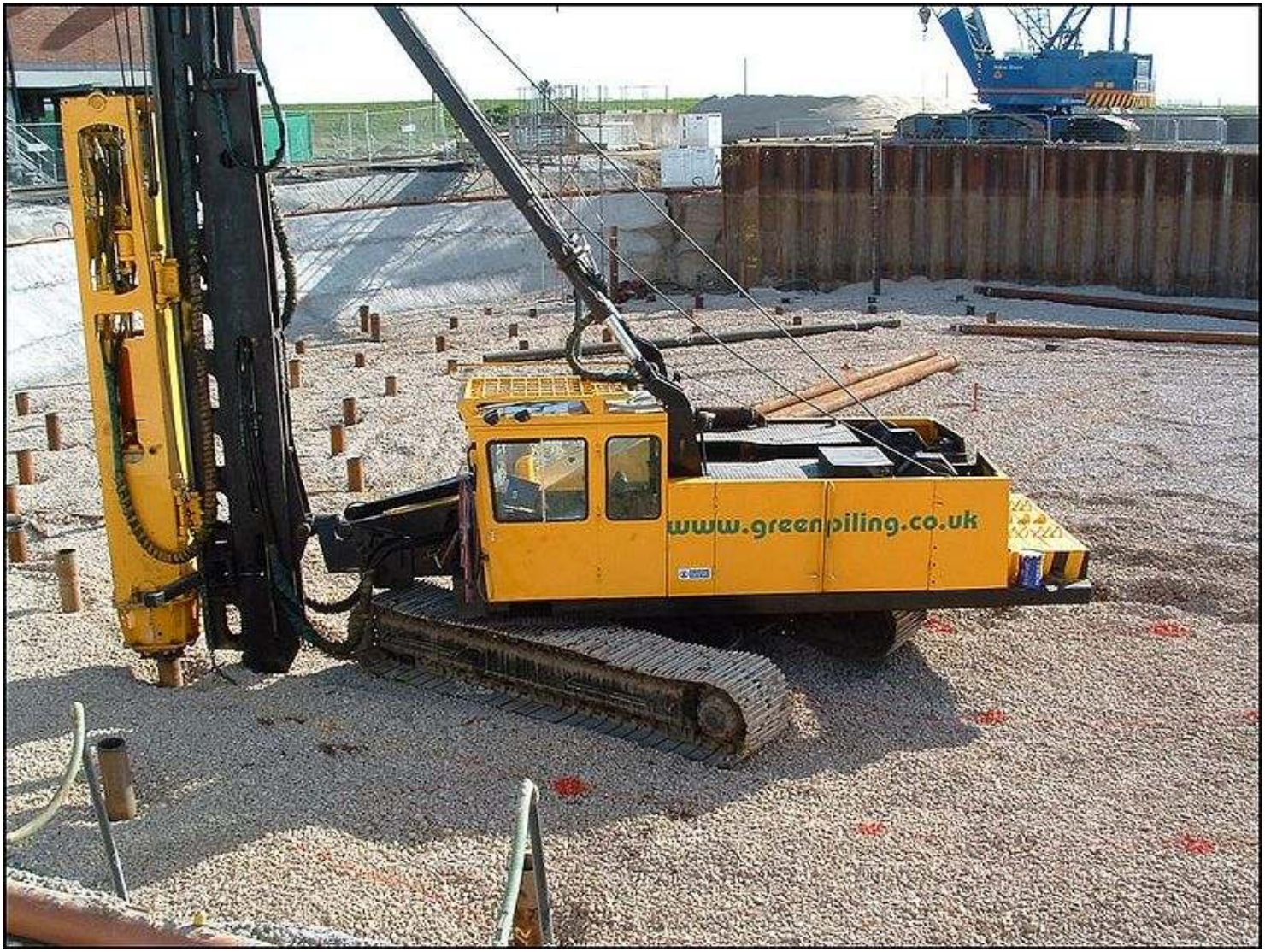
CONSTRUCTION OF A DRIVEN PILE





1. Augercast driving with concrete plug
2. Head of the pile
3. Augercast withdrawn
4. Ground surface
5. Level of loadbearing soil
6. Pile driver
7. Superstructure

DRIVEN PILE CONSTRUCTION



DRIVEN PILE CONSTRUCTION

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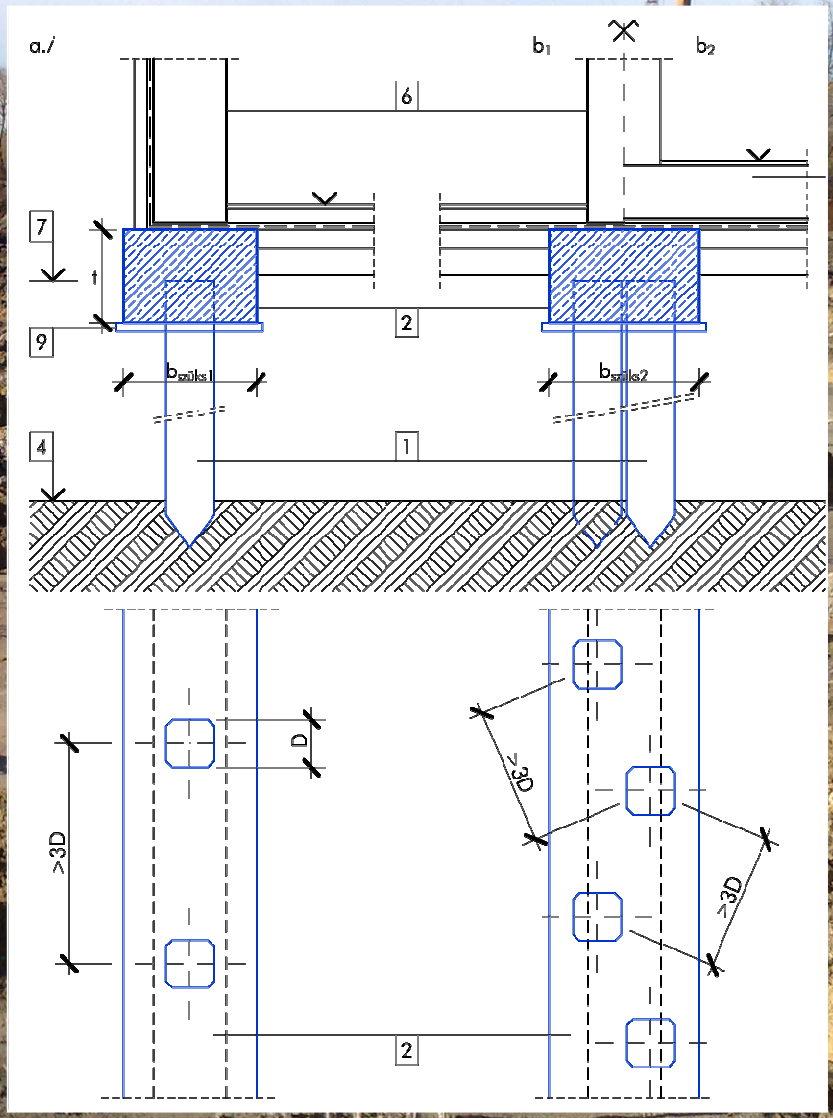
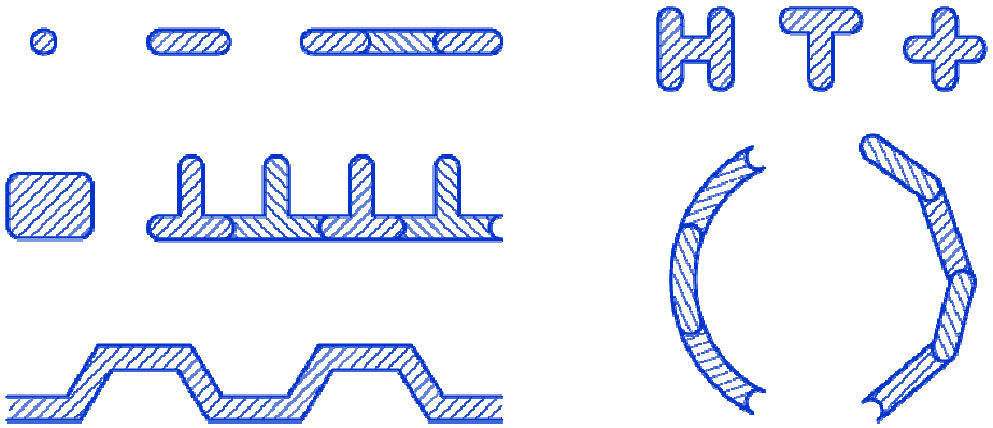
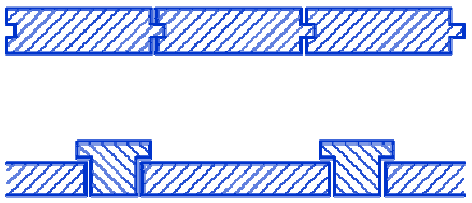


SLURRY TRENCH WALLS

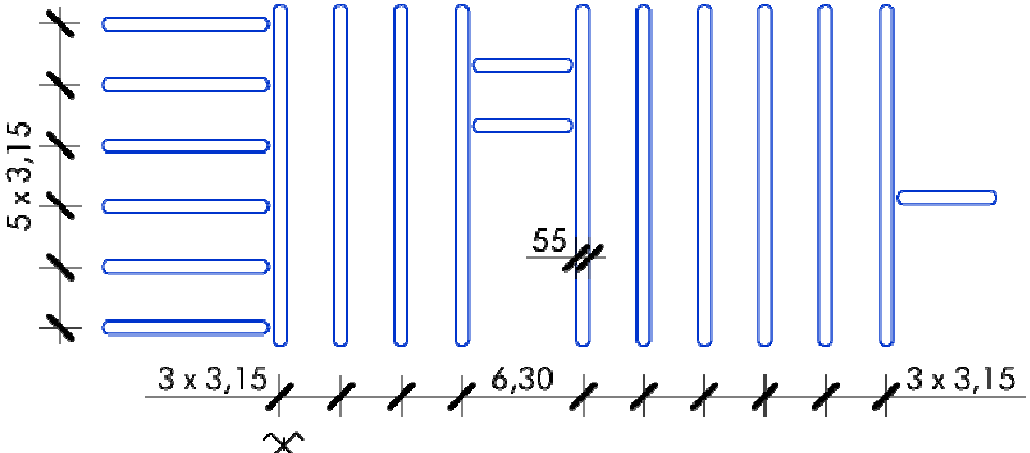
a./



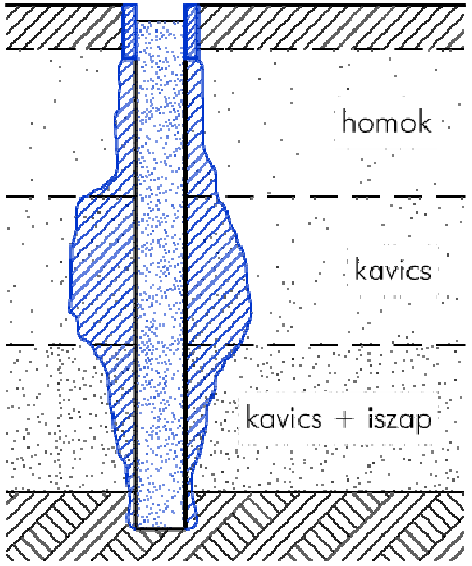
b./



c./

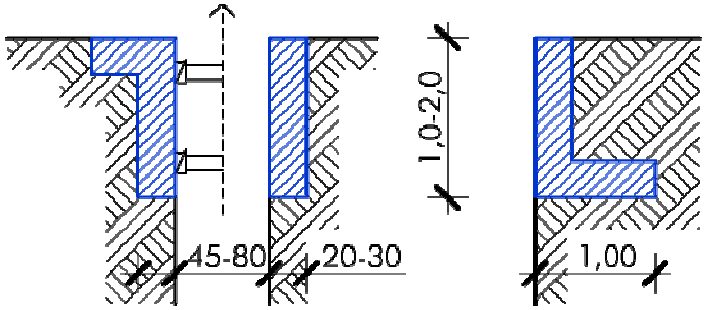


d./



a., form alternatives of slurry trench walls
b., prefabricated trench wall elements
c., slurry trench walls used as foundation
d., diffusion of the slurry in the different soil types (sand, gravel, gravel+sludge

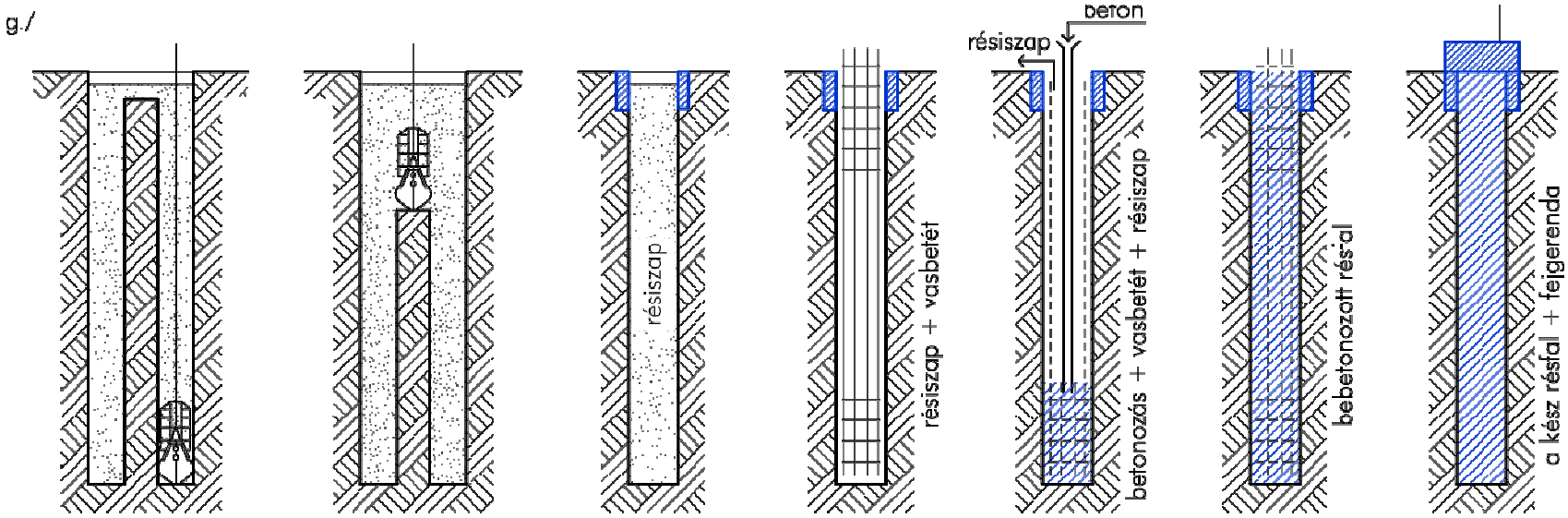
SLURRY WALL GUIDE

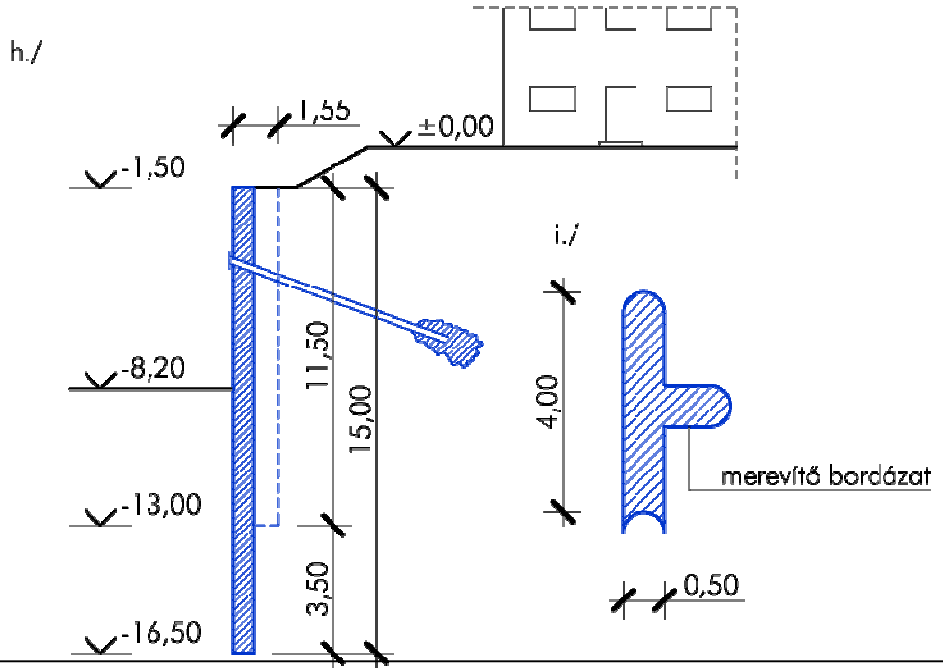


Alternatives for slurry wall guide walls

Guide wall under construction

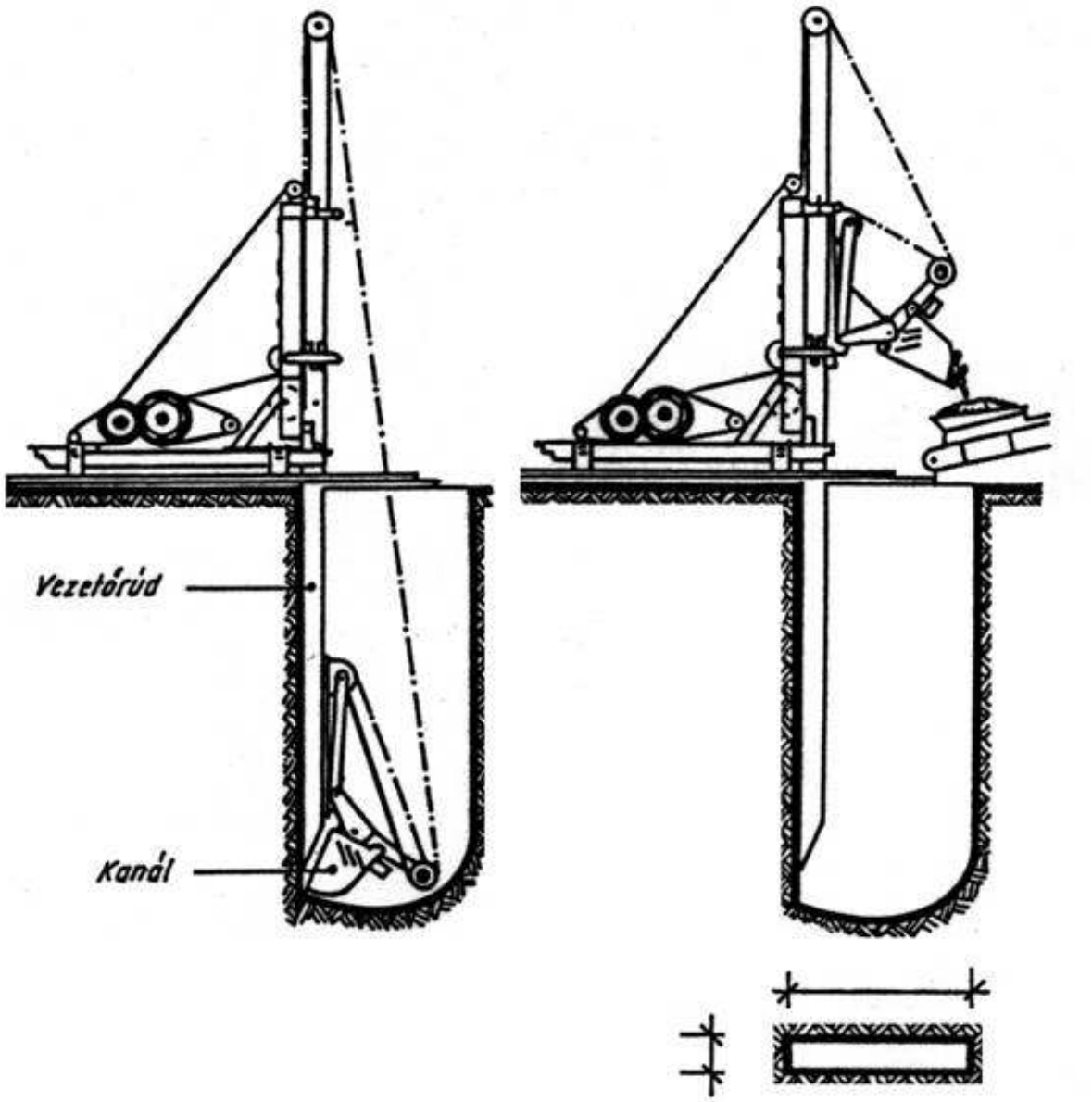
SLURRY WALLS





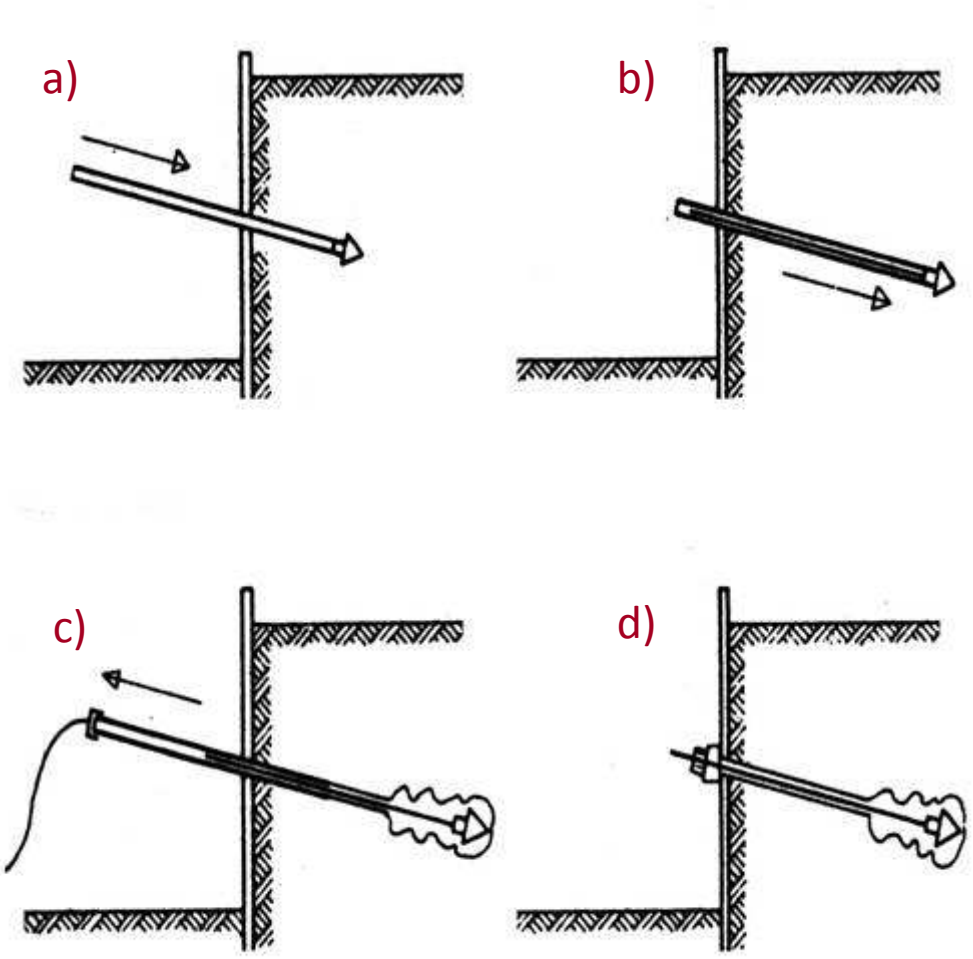
g., construction order of a slurry wall
h., anchoring of the slurry wall
i., slurry wall with rib beam

CONSTRUCTION OF A SLURRY WALL



Series of interlocking vertical walls

ANCHORING OF SLURRY WALL

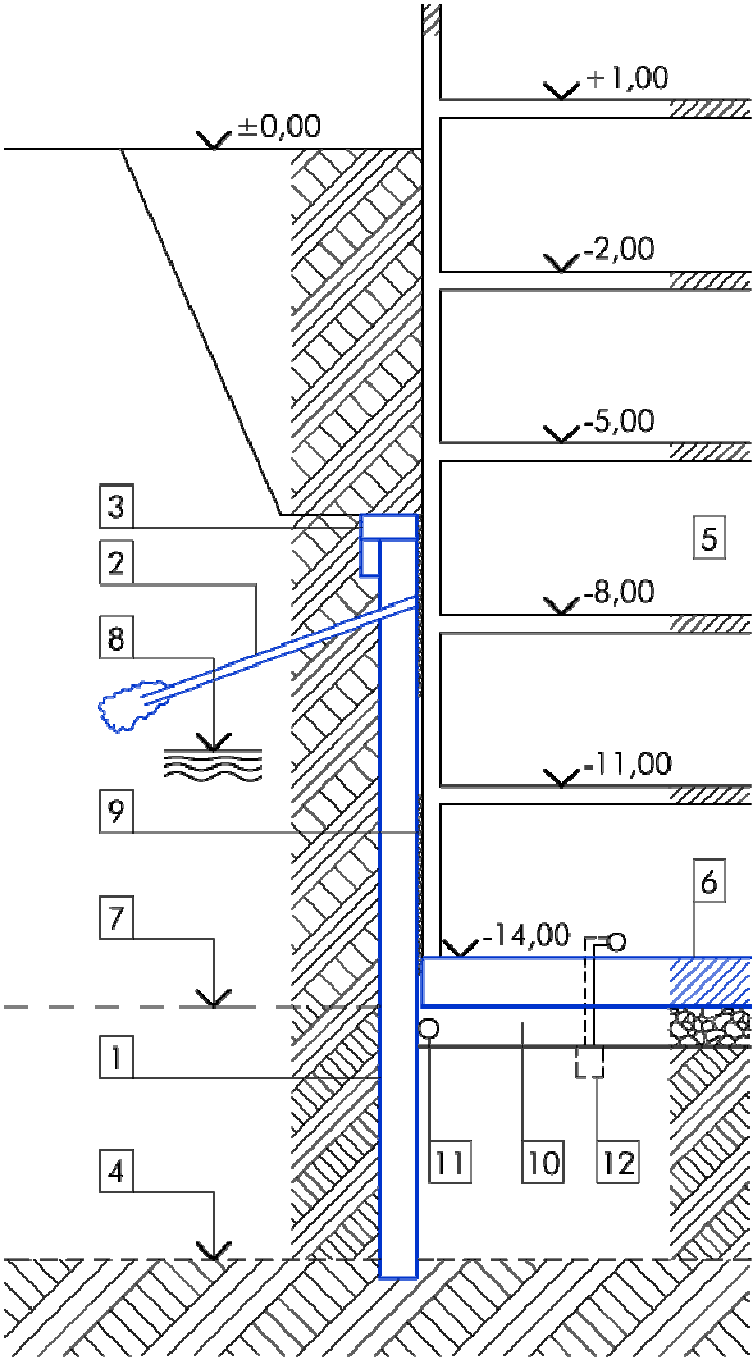


Temporary anchor
process of construction:

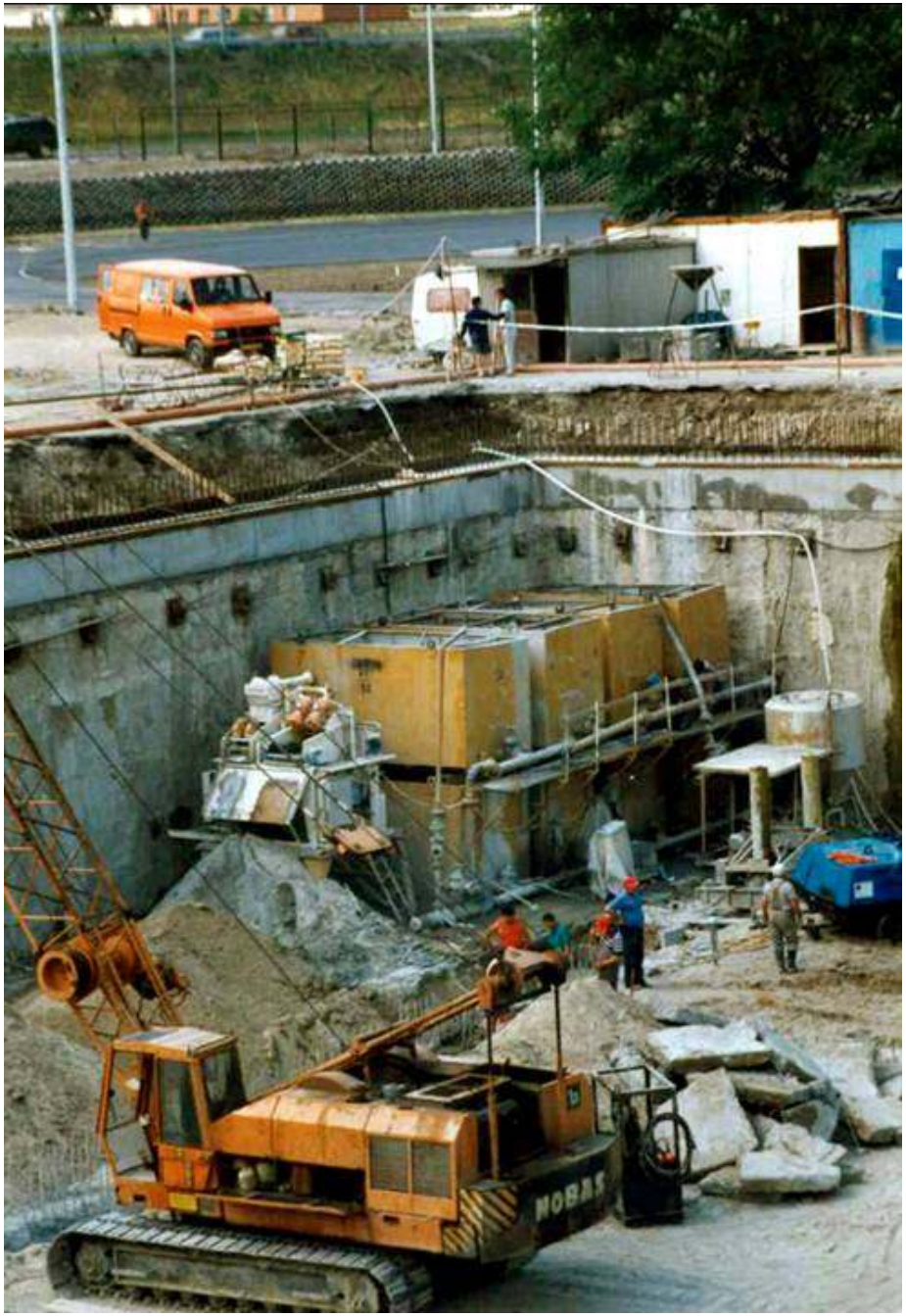
a) Drilling using auxiliary pipe;
b) Placing the tensile rod;
c) Concrete injection while simultaneously retracting the pipe;
d) Tensioning then fixing the tensile rod.

SLURRY TRENCH WALL SYSTEM (PRINCIPAL SECTION)

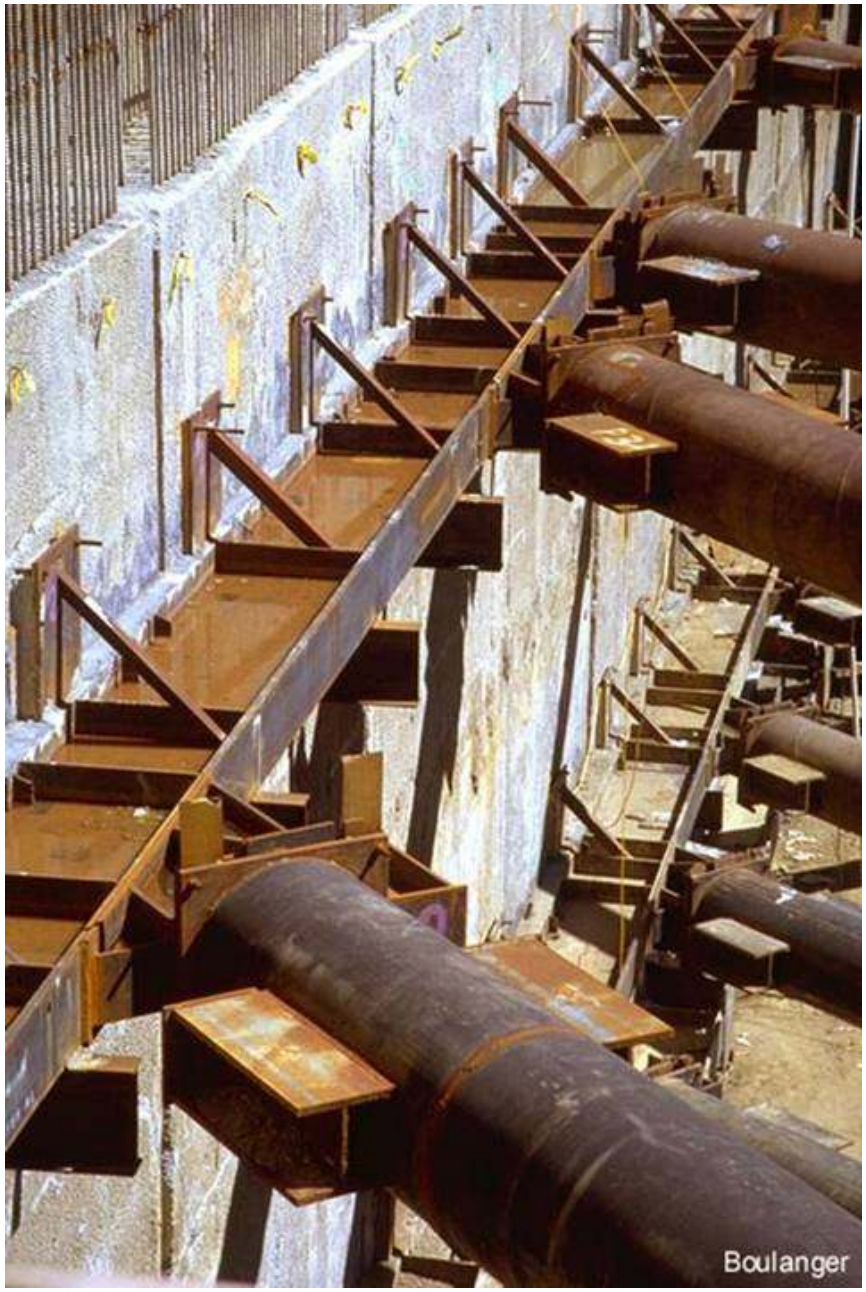
1. Slurry trench wall
2. Anchoring
3. Head beam
4. Level of loadbearing soil
5. New building
6. Base slab
7. Bottom level of the foundation
8. Water table
9. Drainage system
10. Gravel bed (horizontal drainage)
11. Drainage pipe
12. Water collecting well with pump



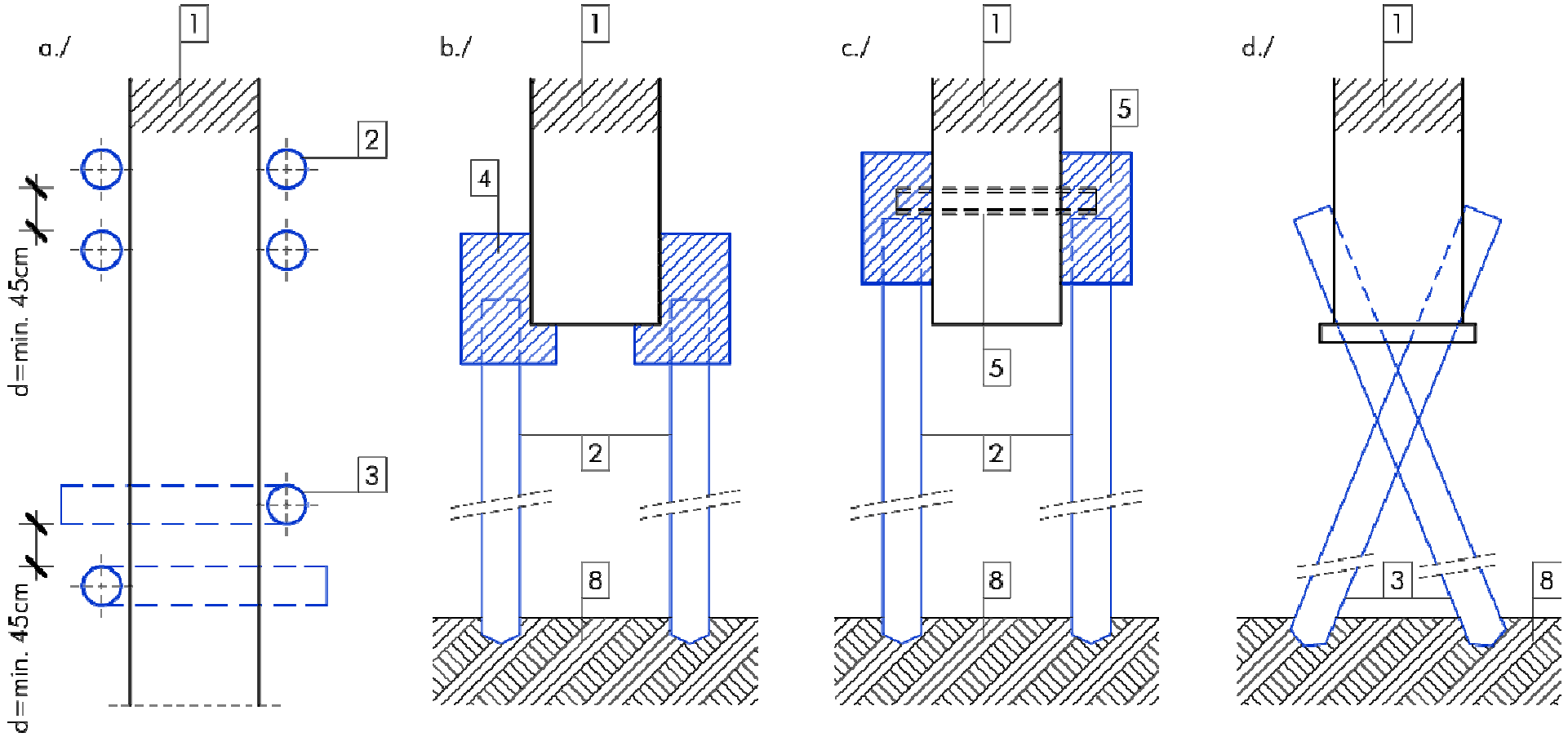
SLURRY WALL CONSTRUCTION



SLURRY WALL CONSTRUCTION

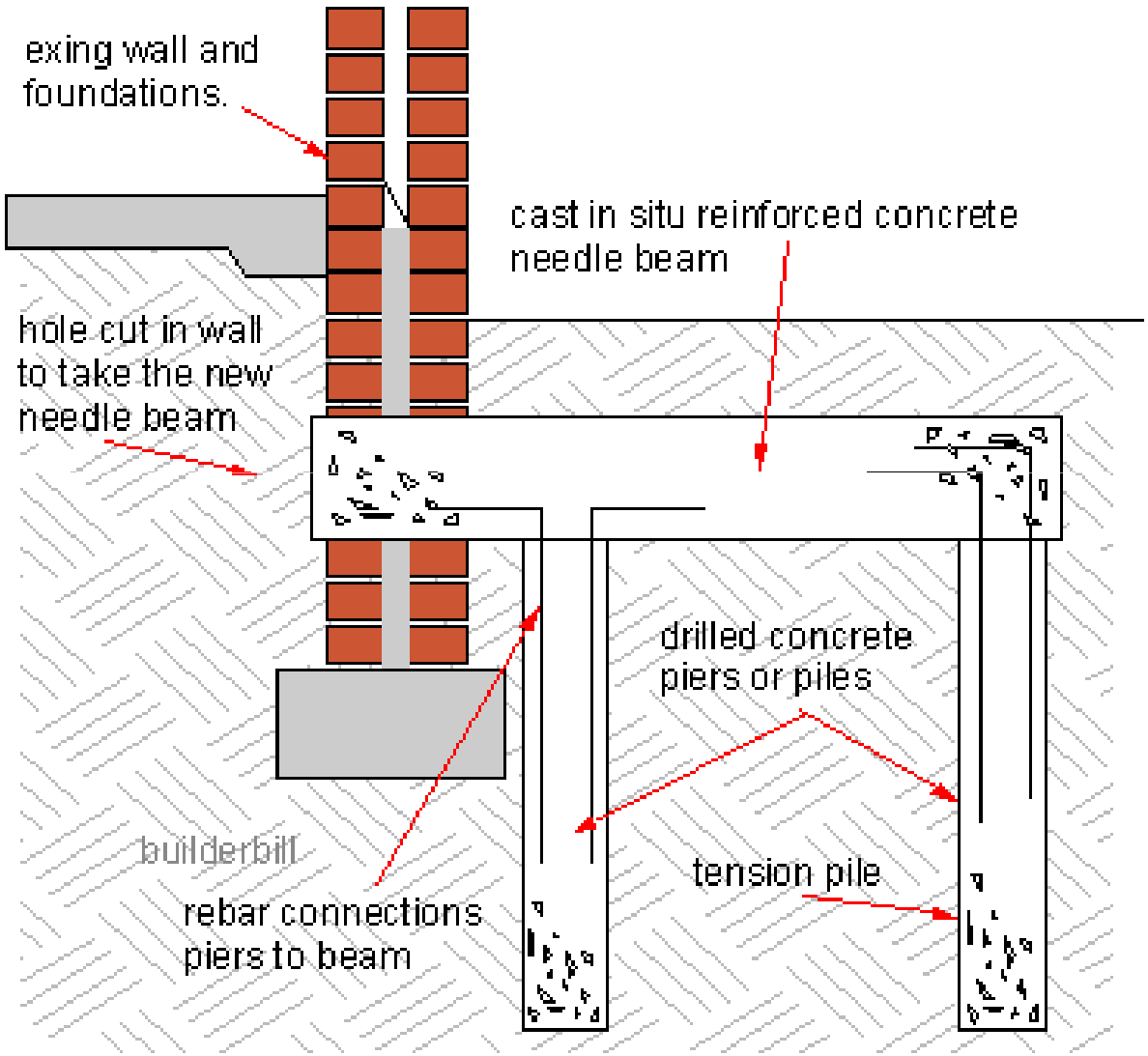


UNDERPINNING WITH MICRO PILES

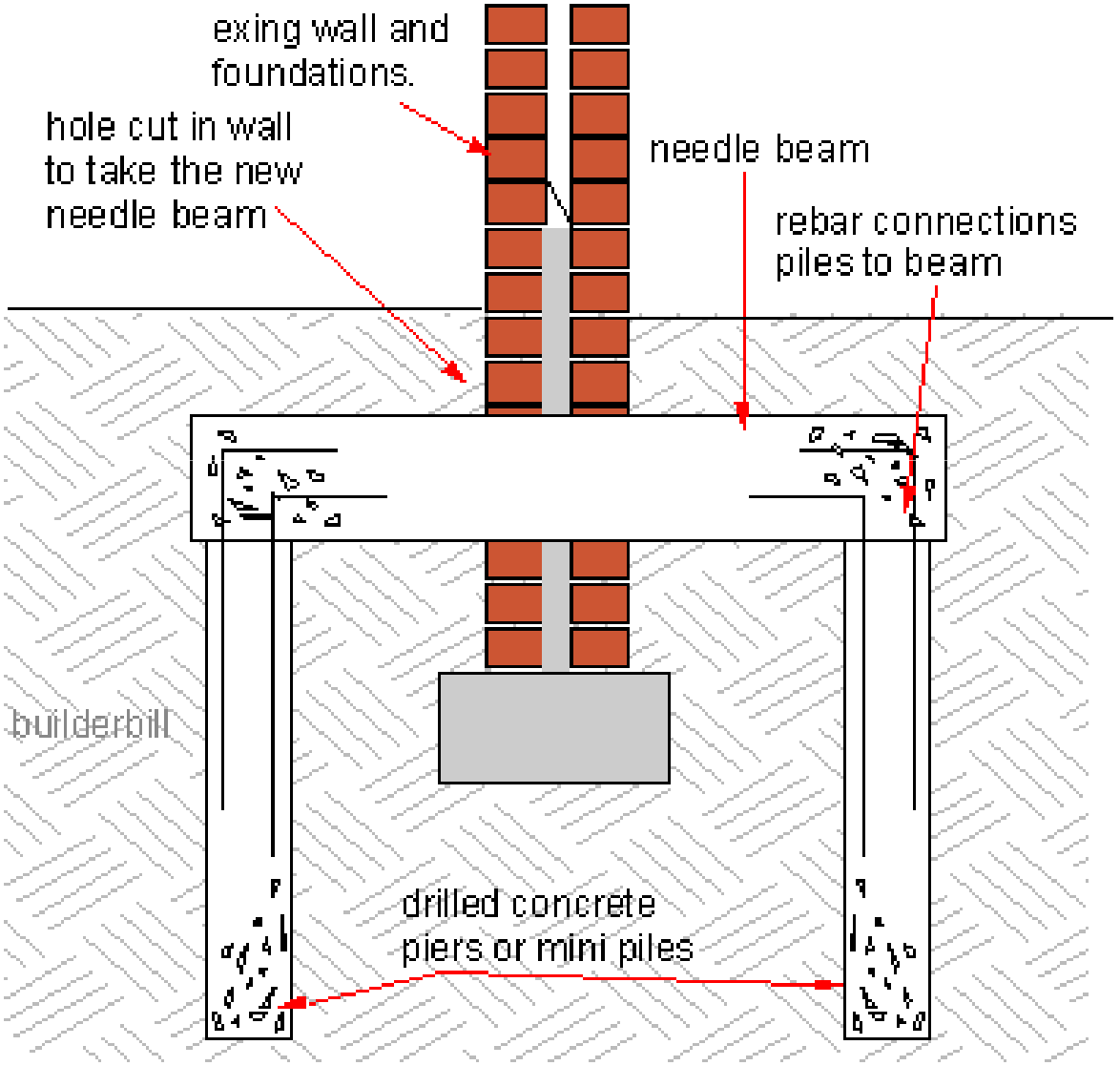


a., vertical or inclined micro piles
b., relieving with RC beam
c., relieving with steel beam and RC beams
d., relieving with micro piles

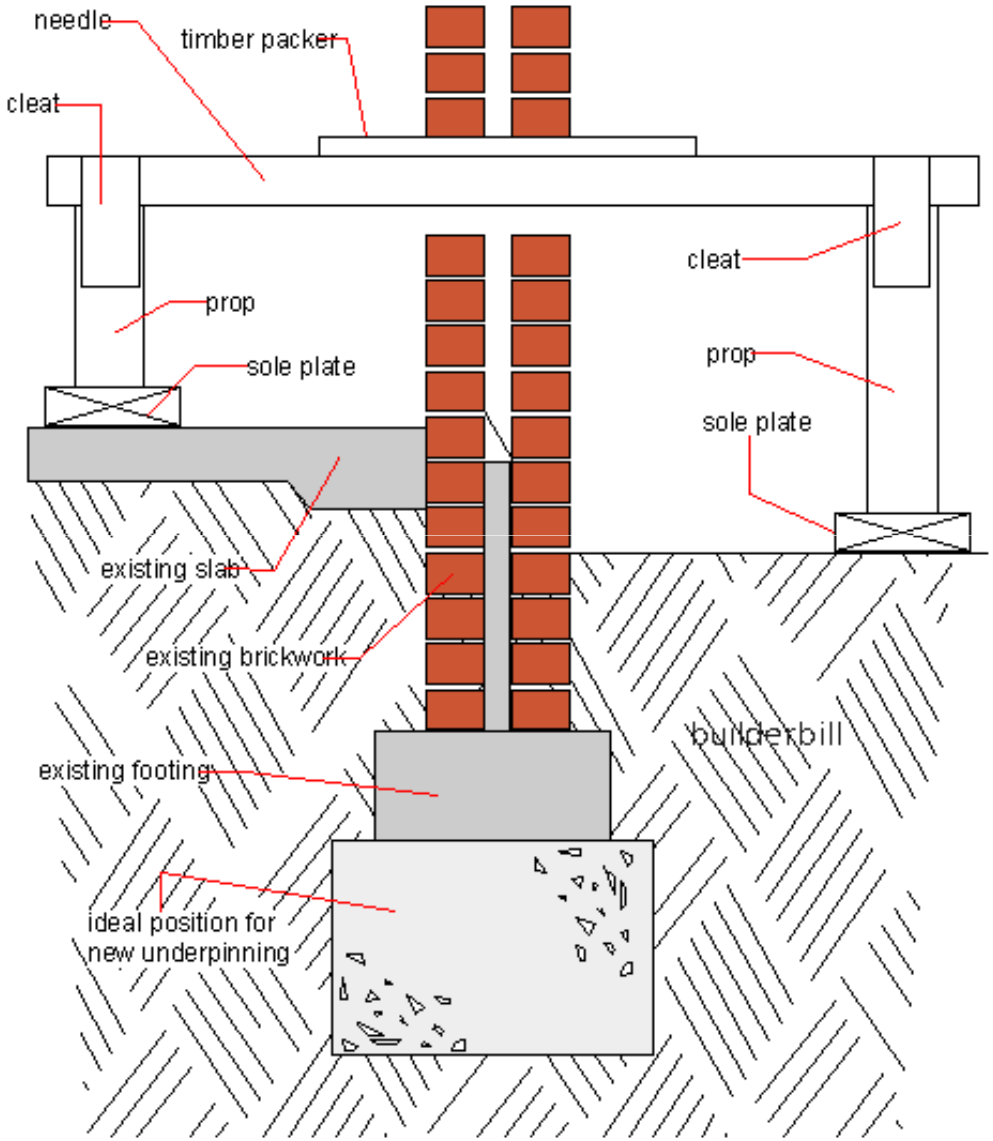
UNDERPINNING WITH CANTILEVERED NEEDLE BEAM



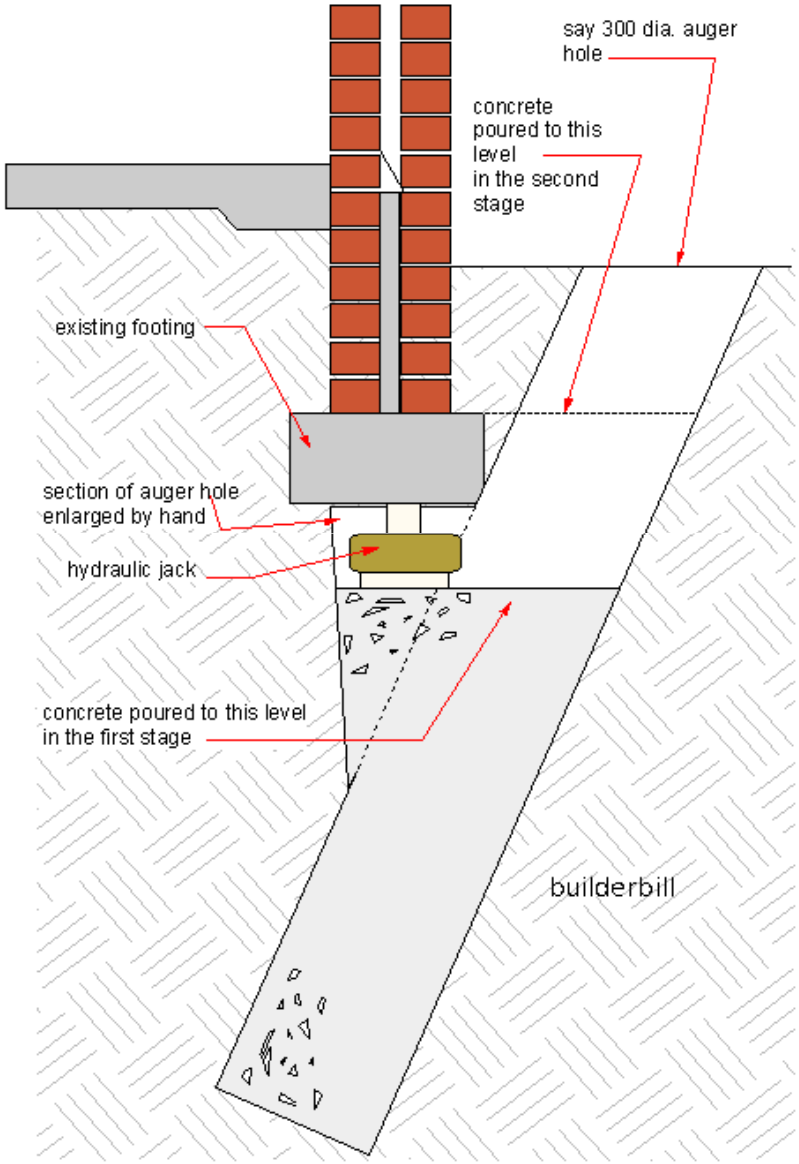
UNDERPINNING WITH CAST IN-SITU NEEDLE BEAM



UNDERPINNING WITH NEEDLE WALL



UNDERPINNING WITH CONCRETE PIER



FOUNDATION SPECIALITIES OF CHAIN BRIDGE, BUDAPEST