KELLER


# Bored piles and pile walls

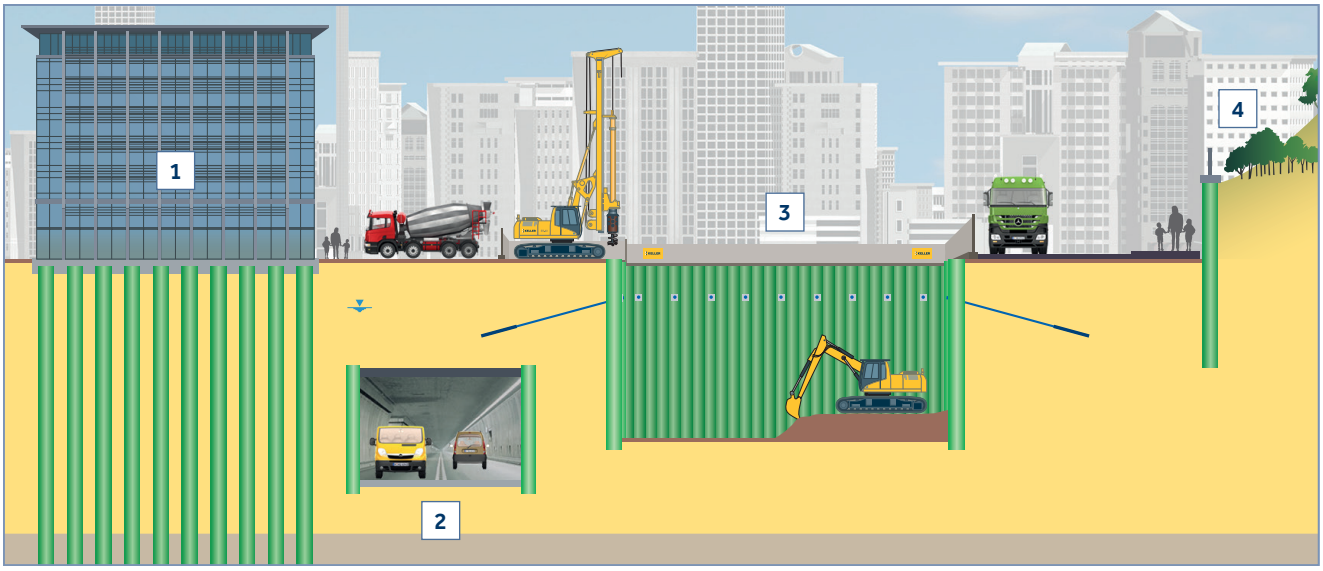
A very economical foundation element to support high structural loads with minimal settlement. Can also be used to build retaining structures.

Casing installation and concreting

## Applications

Bored piles are a very effective, state-of-the-art construction element with many applications in foundation and civil engineering. They can be used to support high loads, securing deep excavations especially close to existing buildings as well as stabilising and retaining slopes.

Thanks to the variety of construction methods and the large range of diameters and tools, bored piles can transfer foundation loads through a variety of overburden soil to stronger underlying bedrock strata.




**1. Foundations**
Large diameter bored piles are extremely effective in transferring and withstanding high loads.

**2. Infrastructure**
Large bored piles can be used in a variety of infrastructure projects such as tunnelling, road or bridge construction as well as flood protection.

**3. Excavation pits**
Bored piles are an approved method to retain ground alongside an excavation pit or close to adjacent buildings and are often combined with other techniques such as ground anchors or soil nails.

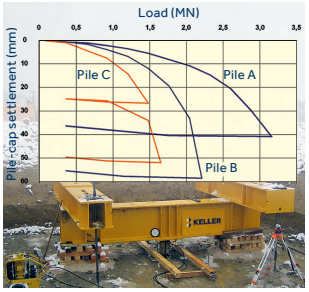
**4. Slope stabilisation**
Large diameter bored piles are used to prevent landslides or protect existing buildings.

# Technical highlights

- Can support high loads
- Piles with various diameters of 450 mm to 1,800 mm
- Can ensure minimal settlement and deformation
- Minimum amount of vibration
- Quality assurance according to European Standard EN 1536

## Quality assurance

Large diameter bored piles usually have to withstand high loads, and we therefore use a variety of quality-assurance methods for our products.



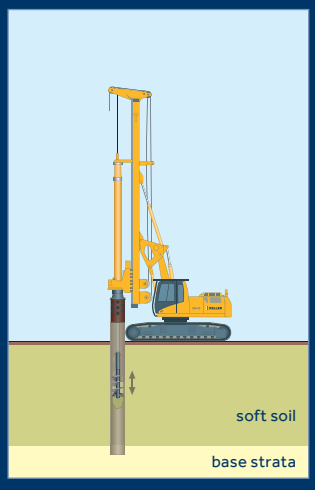

Common bi-directional pile load tests


Digital recording and logging of the execution parameters

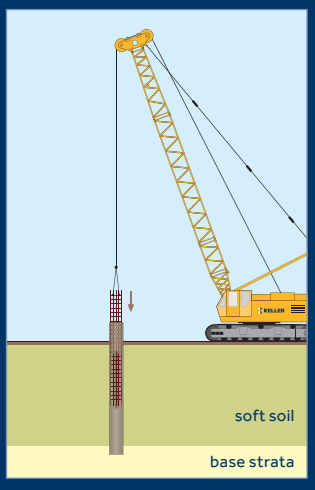
Integrity testing

## Bored piles – process description

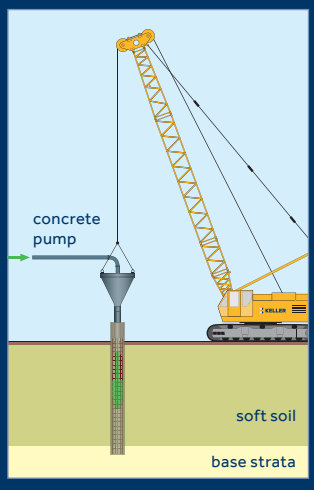
1. Installation of casing and drilling out soil using specialised tools
2. Installation of reinforcement cages
3. Pouring concrete
4. Withdrawal of casing by drilling rig or alternatively using vibrator



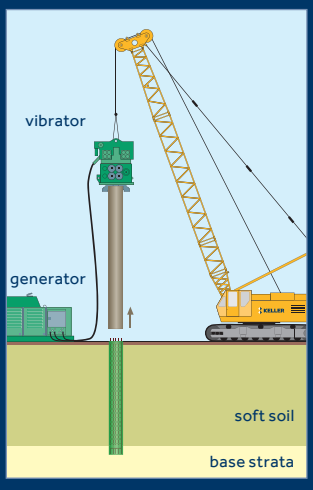

Installation of casing and drilling




Installation of reinforcement




Concreting




Withdrawal of casing

# Pile walls

**Several bored piles arranged in a line can form a pile wall**

Purpose of bored pile walls:

- retaining system for excavation pits, tunnels and large diameter shafts,
- abutment walls for bridges or
- slope protection systems

Pile walls used as retaining structures are often supported by rows of anchors or steel strutting systems.

**Types of pile walls**

Pile walls are classified into three different types:

- Secant pile wall
- Contiguous pile wall
- Contiguous/Secant pile wall retained by anchors

## Secant pile walls

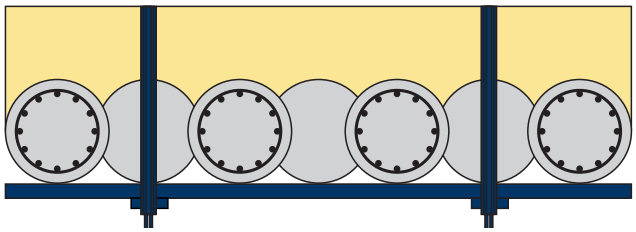
Advantages:

- Very little deformation and settlement on the outside
- Can carry high loads from surrounding structures
- Less vibration during construction
- Can be used as part of a permanent structure
- Water tightness

Secant pile walls require a reinforced concrete guide wall to ensure the correct location and alignment of the pile (x and y direction) and temporary casing to ensure required verticality (z direction).

A secant pile wall consists of several piles over-cutting each other to ensure a connection and the required water tightness.

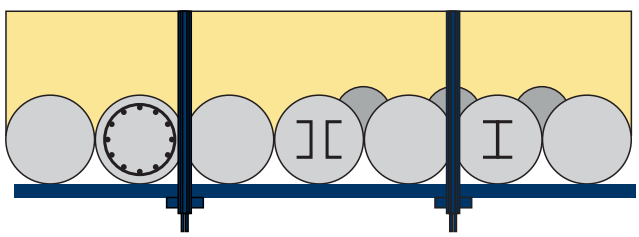
The piles are classified into male piles and female piles. At the beginning several primary piles are constructed by using lower strength concrete only (without reinforcement). When secondary piles are constructed they overcut into the adjacent primary piles. Secondary piles are constructed with shaft reinforcement and higher strength concrete.



**Contiguous/Secant pile walls retained by anchors**

Advantages:

- Little deformation and settlements on the outside
- Can carry load from surrounding structures
- Less vibration during construction

Secant pile walls consist of reinforced and non-reinforced piles. The reinforcement can be provided by installing reinforcement cages, steel channel sections, I-beams or H-beams.

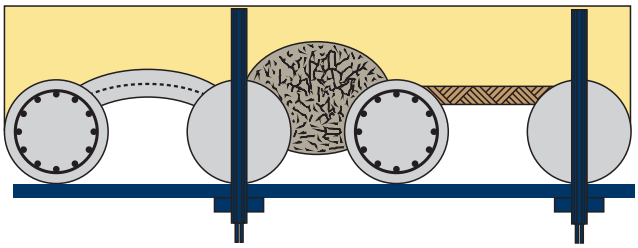
Walls retained by anchors or strutting systems are often supported by a waler beam to distribute the loads (prevent punching of anchor/strut through the pile) and as a mitigation measure for the unlikely event of an anchor/strut not carrying the load. Such a waler beam can be constructed as a reinforced concrete beam cast towards the pile wall or by using steel profiles to be fixed to the piles and anchors/strutting systems.

To ensure water tightness injection grouting can also be performed along the outside of the joint of two adjacent piles.

**Contiguous pile walls**

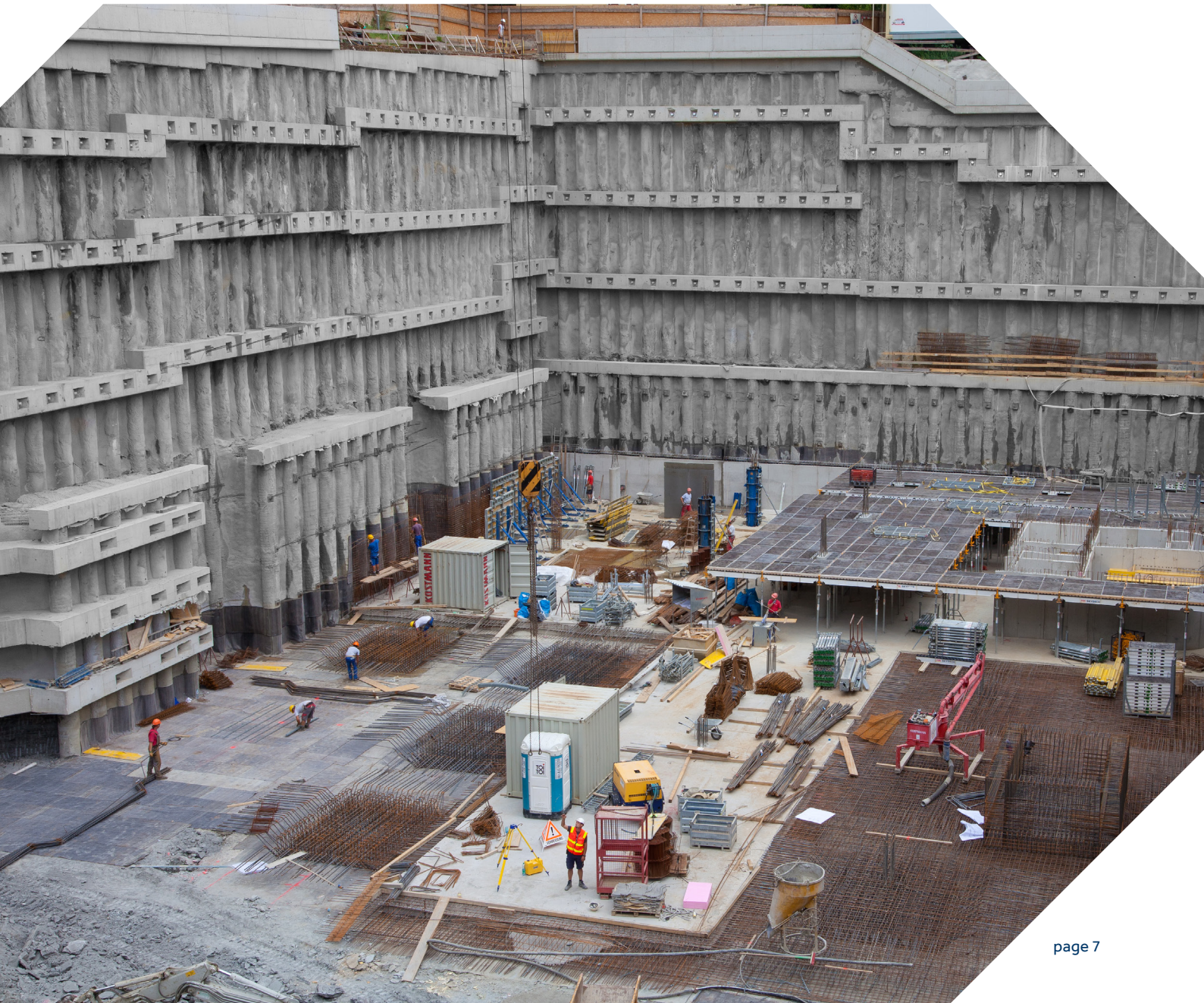
Advantages:

- Can take limited load from surrounding structures
- Less vibration during construction



Contiguous pile walls consist of piles arranged in a way that a gap remains between them. The soil between the piles can be stabilised during excavation by either installing timber formwork in front of the excavated soil or by building a reinforced shotcrete wall towards the excavated soil surface. Alternatively injection grouting can be carried out in advance of the excavation to solidify the soil between the piles.

Contiguous pile walls retained by anchors or strutting systems are often supported by a waler beam to distribute the loads (prevent punching of anchor/strut through the infill) and as a mitigation measure for the unlikely event of the failure of an anchor. Such a waler beam can be constructed as a reinforced concrete beam cast on the pile wall or by using steel profiles to be fixed to the piles and anchors/strutting systems.




# A380 by-pass, Kingskerswell, Devon

Keller provided a complete design and build solution to some of the geotechnical works on the Kingskerswell Bypass.

The A380 had been a bottleneck for many years or holiday traffic heading to Torbay. The existing road lay between properties and a railway line at the northern, Newton Abbot end and passed through cuttings around the village of Kingskerswell itself.

The work involved conventional CFA piling, vibro stone columns, soil nails and bored piles.

A bridge crossing was undertaken by Keller using conventional rotary techniques with with piles bored into the mudstone.

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