

4. Driving Methods

4.1 General

Whilst it is recognised that, in common with most civil engineering projects, a measure of flexibility is desirable to meet site conditions, every precaution must be taken to maintain the necessary standards of safety whilst giving the required alignment and verticality of the installed piles.

The first sheet pile must be installed with great care and attention to ensure it is vertical in both planes of the wall.

It is essential that the following piles are interlocked sufficiently to the preceding pile before being released and the hammer applied. This can be achieved by a preliminary dug-out trench in the wall line which automatically reduces the driving length.

4.2 Pitch and drive

This method, where each sheet pile is driven to full depth before pitching the next one, is the simplest way of driving but can be practised only for loose soils and short piles. The free leading interlock is constantly in danger of deviation. For dense sands and stiff cohesive soils or in the case of possible obstructions, panel driving is recommended.

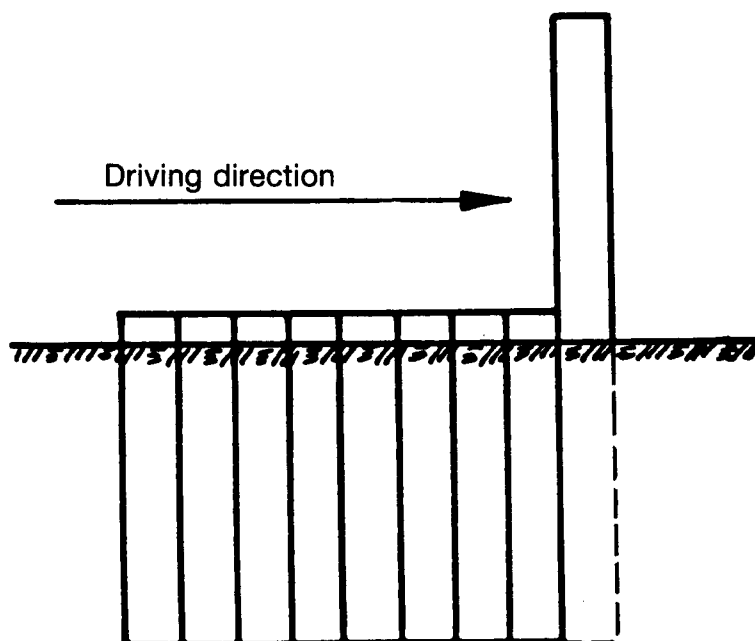


Figure 4.2: PITCH AND DRIVE

4.3 Panel driving

Sheet piles should be installed using the panel-driving technique in order to ensure that good verticality and alignment is achieved and to minimize the risk of driving difficulties or de-clutching problems.

This technique also enables greater control to be maintained on the nominal wall length.

Because a whole panel of piles has been pitched there is no need to drive all piles fully to maintain piling operations; if obstructions are encountered, individual piles can be left high without fear of disruption to the overall efficiency.

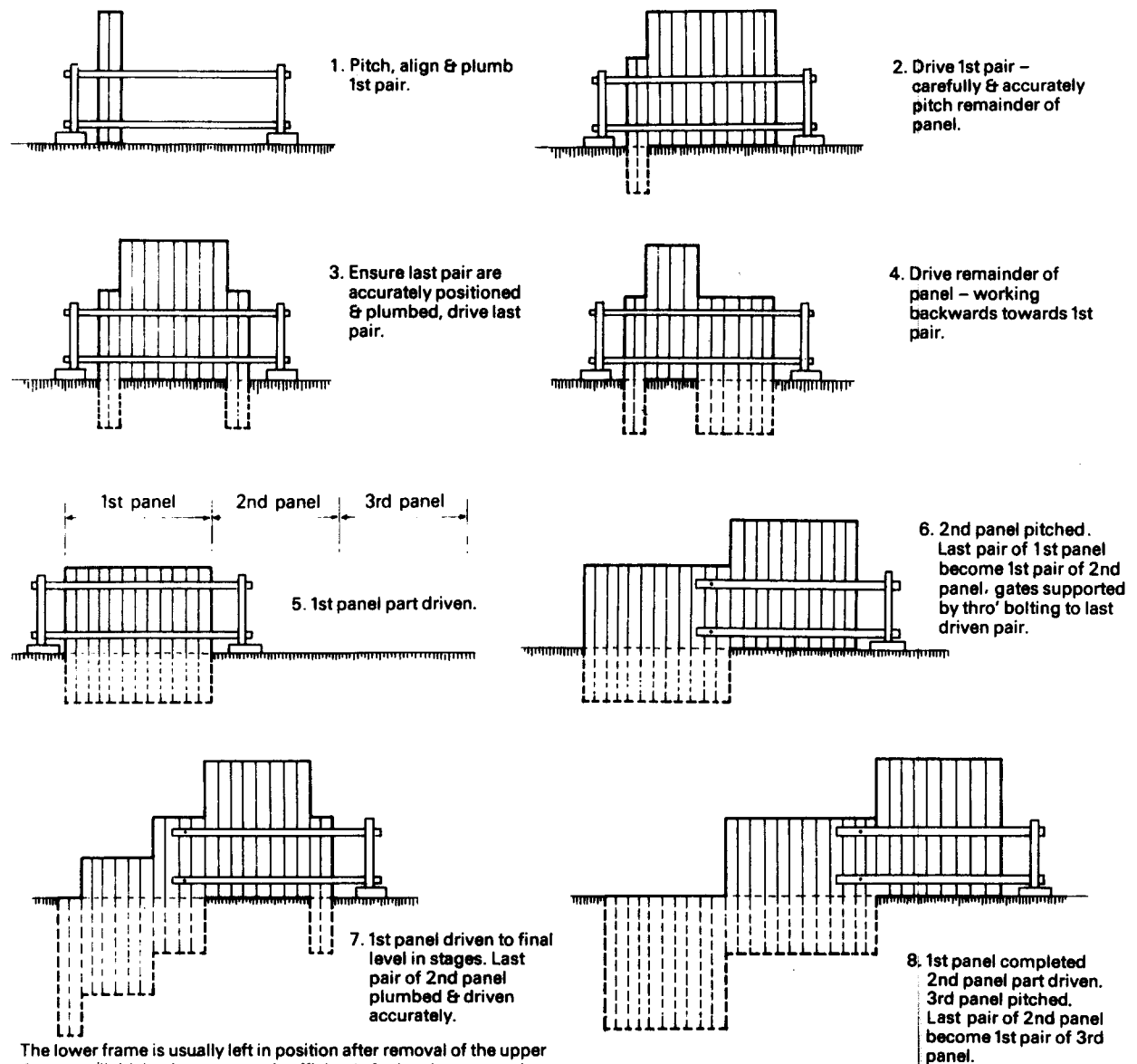


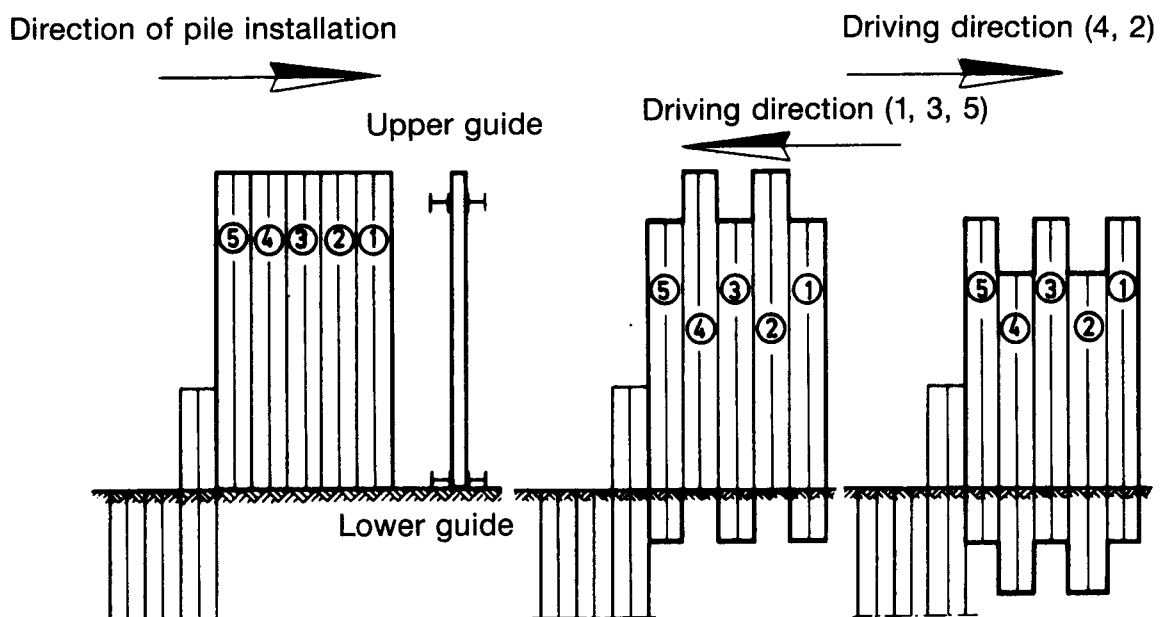
Figure 4.3: PANEL DRIVING

4.4 Staggered driving

In difficult soil conditions panel installation combined with staggered driving is recommended.

The piles are installed between guide frames and then driven in short steps as follows: piles 1, 3 and 5 first; then piles 2 and 4.

If the soil is very dense sand, gravel or rock, piles 1, 3 and 5 can be reinforced at the toe. In this case, these piles are always driven first and piles 2 and 4 in the second stage.



Only the reinforced elements 1, 3, 5 are pre-driven; the other 2, 4 . . . follow.

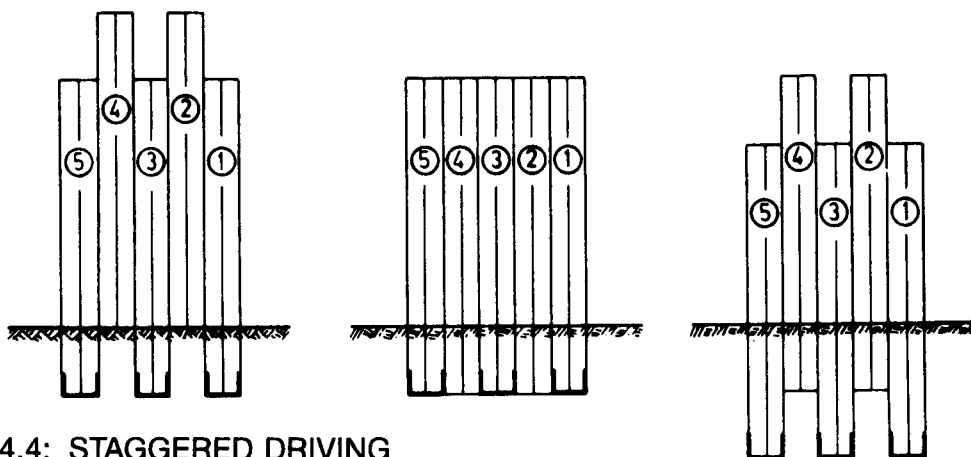


Figure 4.4: STAGGERED DRIVING

4.5 Driving of combined walls

Combined walls are piled walls which comprise high modulus components interspaced by much lighter sheet piles. The high modulus components known as king piles can be tubular, box, bearing or other types of fabricated piles.

It is essential that a stable, heavy, adequately rigid and straight pile driving frame adapted to suit the length and weight of the piles is provided.

The king piles are located in position in the frame by welded bracket guides which take into account width tolerances.

Driving of the king piles must be carried out with extreme care in order that they are embedded straight and vertical, or at a prescribed batter, ensuring that they are parallel to each other and at the required spacing.

The driving sequence of the king piles must ensure that the pile toe encounters compacted soil uniformly on its total circumference and never on one side only.

This is achieved by driving in the following sequence:

1 - 5 - 3 - 6 - 4 - 7 - 2 (large driving step).

At least however, the following sequence should be observed:

1 - 3 - 2 - 5 - 4 - 7 - 6 (small driving step).

In general all of the king piles should be driven in sequence to full penetration without interruption. Following successful completion of this the intermediate light pile sections can be pitched and driven. During the pitching and driving operations of the king piles a constant check should be made, using theodolites, of their alignment along and normal to the wall.

When the guide frames have been removed a final survey must be made to ensure the deviations in the distance between the king piles are within the acceptable tolerances, so as to allow the installation of the sheet piles. However, if the deviations are outside the specified or practical tolerances then either the intermediate piles have to be adjusted or the king piles extracted and re-driven.

To overcome difficult driving conditions it may be possible to use jetting, excavating inside the king piles or any of the ground pre-treatment methods normally adopted for sheet piling.

