Pile Materials

Piles may be made of timber, steel, concrete, and various combinations of these materials (Figure 2.47). Timber piles have been used since Roman times, when they were driven by large mechanical hammers hoisted by muscle power. Their main advantage is that they are economical for lightly loaded foundations. On the minus side, they cannot be spliced during driving and are, therefore, limited to the length of available tree trunks, approximately 65 feet (20 m). Unless pressure treated with a wood preservative or completely submerged below the water table, they will decay (the lack of free oxygen in the water prohibits organic growth). Relatively small hammers must be used in driving timber piles to avoid splitting them. Capacities of individual timber cations. H-piles displace relatively little soil during driving. This minimizes the upward displacement of adjacent soil, called *heaving*, that sometimes occurs when many piles are driven close together. Heaving can be a particular problem on urban sites, where it can lift adjacent buildings.

H-piles can be brought to the site in any convenient lengths, welded together as driving progresses to form any necessary length of pile, and cut off with an oxyacetylene torch when the required depth is reached. The cutoff ends can then be welded onto other piles to avoid waste. Corrosion can be a problem in some soils, however, and unlike closed pipe piles and hollow precast concrete piles, H-piles cannot be inspected after driving to be sure they are straight and undamaged. Allowable loads on H-piles run from 30 to 225 tons (27,000 to 204,000 kg).

and concreted immediately after driving. Pipe piles are stiff and can carry loads from 40 to 300 tons (36,000 to 270,000 kg). They displace relatively large amounts of soil during driving, which can lead to upward heaving of nearby soil and buildings. The larger sizes of pipe piles require a very heavy hammer for driving.

Minipiles, also called *pin piles* or *micropiles*, are a lightweight form of steel piles made from steel bar or pipe 2 to 12 inches (50 to 300 mm) in diameter. Minipiles are inserted into holes drilled in the soil and grouted in place. When installed within existing buildings, they may also be forced into the soil by hydraulic jacks pushing downward on the pile and upward on the building structure. Since no hammering is required, they are a good choice for repair or improvement of existing foundations where vibrations