

# Piles

## Steel

### *Advantages:*

- Easy to handle
- High driving stress resistance
- Penetrate hard layers

### *Disadvantages:*

- Expensive
- Noisy to install
- Corrosion

## Concrete (Precast/driven)

### *Advantages*

- Resistance to chemical and biological attacks
- Hard driving force resistance
- No corrosion

### *Disadvantages*

- Design stress limited to  $0.4 \cdot F'_c$
- Difficult to transport
- Expensive equipment to install
- 10-15m in length

## Concrete (In Situ)

Large pile cross sectional area. Can be rock socketed. Suitable for large loads. 30 – 50m in length

### *Advantages*

- Economical
- Easy to extend
- Inspection can be done before pouring concrete
- Can place steel reinforcement past 30m depth

### *Disadvantages*

- Thin casings can be damaged
- Confined design stress  $0.33 \cdot F'_c$ , unconfined is  $0.27 \cdot F'_c$

## Timber

### *Advantages*

- Economical
- Easy to handle
- Easy extraction

Disadvantages

- Decay
- Low load bearing capacity
- Treatment may be required

Efficiency of hammer

weight of the ram

height of fall of the ram

Coefficient of restitution

weight of pile

weight of the ram

penetration of pile per hammer blow (average value obtained from the last few driving blows)

recommended  $C = 0.254$  cm if  $S$  and  $h$  in cm.

$$Q_u = \frac{E W_R h}{S + C} \cdot \frac{W_R + n^2 W_p}{W_R + W_p}$$

Ultimate pile load  $Q_u$

**Capacity calculated here must be reduced using AS 2159**

$W_p$  = weight of pile + weight of pile cap

$Q_{all} = Q_u / FOS$

$$\text{Driving stress } \sigma_u = Q_u / A_p$$

- The driving stress on wooden pile

$$\sigma_u < 0.9 f_u \quad f_u = \text{timber compressive strength parallel to grain}$$

- The driving stress on concrete pile

$$\sigma_u < 0.8 f_{cm}' \quad f_{cm}' = \text{concrete compressive strength at time of driving}$$

- The driving stress on steel pile

$$\sigma_u < 0.9 f_{sy} \quad f_{sy} = \text{steel yield stress}$$

ultimate load-bearing capacity of pile group

$$\eta = \frac{Q_{g(u)}}{\sum Q_u}$$

group efficiency

ultimate load-bearing capacity of each pile without group effect

$$Q_{g(u)} = f_{av} \times p_g \times L$$

average unit frictional resistance

perimeter of the cross section of block =  $2(L_g + B_g)$