

The size of the timber bearers would be determined in a similar manner and suitable plywood decking would be chosen to resist bending and deflection. Proprietary steel props would be used to support the bearers, selected by reference to a manufacturer's safe load tables.

2.16.2 Support work for excavations

The general term 'timbering' is often used to describe any form of temporary support work for excavations. It may however be composed of either timber or steel, or a combination of the two. The choice from the different methods and combinations available will be dependent on a number of factors, such as soil conditions and the plant to be used.

Methods of excavating trenches, pits and shafts in various types of ground and methods of providing temporary support to the sides are described in BS 6031.

The fundamental requirements of any support work may be summarized as follows:

- (a) It should provide safe working conditions.
- (b) It should allow both the excavation and the construction of the permanent work to be carried out efficiently.
- (c) It should be capable of being easily and safely removed after completion of the permanent work.

Typical examples of timbering for shallow trench excavations are illustrated in Figures 2.11 and 2.12. For deep excavations where standard timber sizes are impractical, steel trench sheeting or driven interlocking steel sheet piles are normally used.

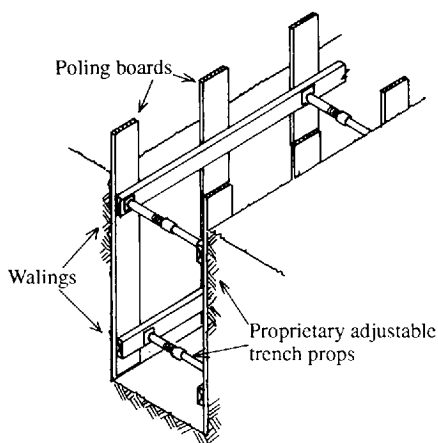


Figure 2.11 Trench support for excavation in firm ground

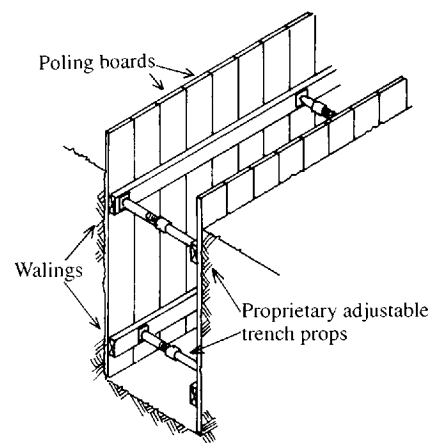


Figure 2.12 Trench support for excavation in loose ground

Practical considerations rather than pure structural design requirements often dictate the size of the timber sections that are adopted. Health and safety regulations and other codes require that an adequate supply of timber or other support material be kept available for use in excavations. Therefore the sizes that the designer has to work with may already be decided. In such cases he will advise on the spacing of the supports based on the structural capacity of the sections.

Since the actual design of the timber elements used to support excavations follows the BS 5268 procedures already described, only an appreciation of how the loads acting on trench supports are derived will be given here.

Consider the section through the typical trench support system shown in Figure 2.13. Forces exerted by the retained earth are transmitted from one side of the excavation to the other by walings and horizontal props. The vertical poling boards and horizontal walings are subject to bending for the distance they span between the trench props. Provided that the supporting members are adequately designed, a state of equilibrium will be maintained between the two sides.

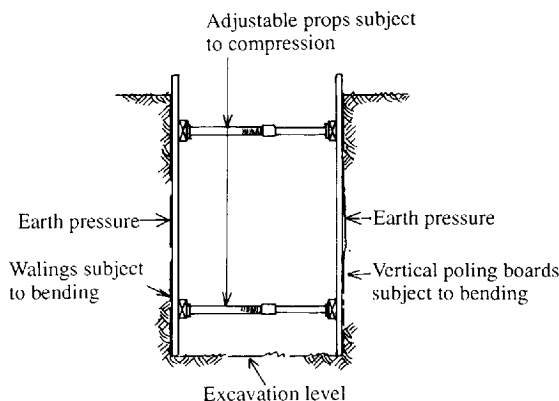


Figure 2.13 Section through typical trench support system

The loads acting on the timbering result from earth pressure, and for non-cohesive soils they may be calculated using Rankine's theory. In addition a pressure due to surcharge from any imposed loading adjacent to the trench may have to be allowed for. The pressure diagram for such loading is shown in Figure 2.14, and the relevant formulae for calculating the resultant forces acting on the timbering are as follows:

Maximum retained earth pressure at excavation level:

$$q = Wh \left[\frac{1 - \sin \theta}{1 + \sin \theta} \right]$$