Provided that their centres do not exceed 610 mm they are considered to be load sharing, and hence the K_8 factor of 1.1 will apply.

The individual studs are usually taken to be laterally restrained about the y–y axis either by the sheathing/cladding material or by internal noggings or diagonal bracing. Hence their strength is calculated about the plane parallel to the wall, that is the x–x axis of the studs.

Since such walls are normally provided with a top and bottom rail, it is usual to consider that the loading is applied axially and that the ends are restrained in position but not in direction.

The following example will be used to illustrate stud wall design in relation to the previous procedure for posts.

Example 2.8

A stud wall panel is to be constructed within a maximum overall thickness of 100 mm, lined on both faces with 12.5 mm plasterboard. The panel is to be 2.4 m high overall including top and bottom rails with vertical studs placed at 600 mm centres, and is to be provided with intermediate horizontal noggings. Design suitable SCl studs if the panel is to sustain a 7.5 kN per metre run long term load which includes the self-weight.

Panel load = 7.5 kN per metre run

Axial load per stud = $7.5 \times 0.6 = 4.5$ kN

The depth of timber is governed by the overall panel thickness less the plasterboard linings (see Figure 2.9). Thus the maximum stud depth = $100 - (2 \times 12.5) =$ 75 mm. In addition, the minimum practical breadth for fixing plasterboard is 38 mm.

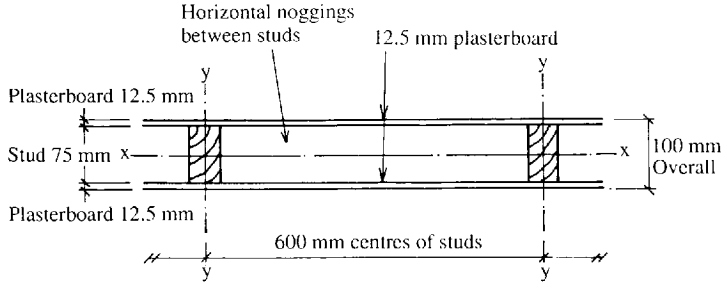

Figure 2.9 *Cross-sectional plan on stud wall*

It would be usual to specify regularized timber for wall studs. However, since only properties for sawn timber are given in this manual, a section from Table 2.4 will be selected for checking. Try the nearest practical size, that is 38 mm × 75 mm sawn timber studs.

As the studs are braced laterally by the horizontal noggings they can only buckle about their x–x axis. Therefore the i_x value or depth is used to calculate the slenderness ratio. Use either of the following expressions:

$$\lambda = \frac{L_e}{i_x} = \frac{2400 \times 1}{21.7} = 110.6 < 180$$

$$\lambda = \frac{L_e}{d} = \frac{2400 \times 1}{75} = 32 < 52$$

Both values are satisfactory.

The grade compression stress $\sigma_{c,g,par} = 3.5$ N/mm^2, and

$$\frac{E_{min}}{\sigma_{c,g,par} K_3} = \frac{4500}{3.5 \times 1} = 1285.71$$

Thus from Table 2.9, $K_{12} = 0.420$. Finally, compare stresses:

Permissible compression stress:

$$\sigma_{c,adm,par} = \sigma_{c,g,par} K_3 K_8 K_{12} = 3.5 \times 1 \times 1.1 \times 0.420 = 1.62 \text{ N/mm}^2$$

Applied compression stress:

$$\sigma_{c,a,par} = \frac{F}{A} = \frac{4.5 \times 10^3}{2.85 \times 10^3} = 1.58 \text{ N/mm}^2 < 1.62 \text{ N/mm}^2$$

Use 38 mm × 75 mm SC1 sawn timber studs.

2.16 Timber temporary works

Under this general heading may be included formwork for concrete, timber support work for excavations, or any other form of falsework giving temporary support to a permanent structure.

With respect to the actual structural elements comprising temporary works, these are basically either flexural or compression members whose design follows the procedures already explained. It should be appreciated, however, that the timber in temporary works will usually be in a wet exposure situation, and this must be taken into consideration in the design by applying the wet exposure modification factors where necessary.

The only other significant differences in approach relate to loading and matters of a practical nature. Reference should be made to the following British Standards for detailed guidance on particular aspects for the design of falsework and support to excavations:

BS 5975 1982 Code of practice for falsework.

BS 6031 1981 Code of practice for earthworks.

The implications of these codes will now be discussed in relation to two types of temporary works: formwork, and support work for excavations.

2.16.1 Formwork

Formwork is used to mould concrete into the desired shape and to provide temporary support to freshly poured concrete. Practical considerations play an important part in the conceptual design of formwork, particularly