Equivalent pier thickness $t_p = 3t = 3 \times 215 = 645\,\text{mm}$

$$\frac{\text{Equivalent pier thickness}}{\text{Wall thickness}} = \frac{t_p}{t} = \frac{645}{215} = 3$$

Therefore, by interpolation from Table 4.7, the stiffness coefficient K is 1.38. The effective thickness $t_{ef} = tK = 215 \times 1.38 = 296.7\,\text{mm}$. Thus the slenderness ratio is given by

$$\text{SR} = \frac{\text{effective length}}{\text{effective thickness}} = \frac{l_{ef}}{t_{ef}} = \frac{2035}{296.7} = 6.86 < 27$$

This is satisfactory. From Table 4.7, the capacity reduction factor β is 1.0 without eccentricity.

From Table 4.5a, the masonry characteristic strength $f_k = 8.5\,\text{N/mm}^2$. The material partial safety factor $\gamma_m = 3.5$. Thus the ultimate vertical design strength is

$$\frac{\beta t f_k}{\gamma_m} = \frac{1.0 \times 215 \times 8.5}{3.5} = 522.14\,\text{N/mm} = 522.14\,\text{kN per metre run}$$

4.11 Concentrated loads

Concentrated loads can occur at beam, truss or lintel bearings. Whilst these produce relatively high stress concentrations over a small plan area, they are usually rapidly dispersed through the wall construction below. It is accepted that bearing stresses produced by concentrated loads of a purely local nature may safely exceed the allowable design stress for a uniformly distributed load.

Reference should be made to BS 5628 Part 1 for guidance on the three types of bearing condition which permit the normal design stresses to be exceeded by 1.25, 1.5 and 2 times respectively.

4.12 References

BS 187 1978 Specification for calcium silicate (sand lime and flint lime) bricks.

BS 1243 1978 Specification for metal ties for cavity wall construction.

BS 3921 1985 Specification for clay bricks.

BS 4721 1981 (1986) Specification for ready mixed building mortars.

BS 5390 1976 (1984) Code of practice for stone masonry.

BS 5628 Code of practice for use of masonry.
Part 1 1978 (1985) Structural use of unreinforced masonry.
Part 3 1985 Materials and components, design and workmanship.

BS 6073 1981 Precast concrete masonry units.
Part 1 Specification for precast masonry units.
Part 2 Method for specifying precast concrete masonry units.

Structural Masonry Designers' Manual. W.G. Curtin, G. Shaw, J.K. Beck and W.A. Bray. 2nd edn. BSP Professional Books, 1987.

Structural Masonry Detailing. W.G. Curtin, G. Shaw, J.K. Beck and G.I. Parkinson. BSP Professional Books, 1984.

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5 Steel elements

5.1 Structural design of steelwork

At present there are two British Standards devoted to the design of structural steel elements:

BS 449 The use of structural steel in building.

BS 5950 Structural use of steelwork in building.

The former employs permissible stress analysis whilst the latter is based upon limit state philosophy. Since it is intended that BS 5950 will eventually replace BS 449, the designs contained in this manual will be based upon BS 5950.

There are to be nine parts to BS 5950:

Part 1 Code of practice for design in simple and continuous construction: hot rolled sections.

Part 2 Specification for materials, fabrication and erection: hot rolled sections.

Part 3 Code of practice for design in composite construction.

Part 4 Code of practice for design of floors with profiled steel sheeting.

Part 5 Code of practice for design of cold formed sections.

Part 6 Code of practice for design in light gauge sheeting, decking and cladding.

Part 7 Specification for materials and workmanship: cold formed sections.

Part 8 Code of practice for design of fire protection for structural steelwork.

Part 9 Code of practice for stressed skin design.

Calculations for the majority of steel members contained in building and allied structures are usually based upon the guidance given in Part 1 of the standard. This manual will therefore be related to that part.

Requirements for the fabrication and erection of structural steelwork are given in Part 2 of the standard. The designer should also be familiar with these, so that he can take into account any which could influence his design.

For information on all aspects of bridge design, reference should be made to BS 5400, 'Steel, concrete and composite bridges'.