Design vertical load resistance
In this section the value of Φ_i=0.58 must replace the value of β=0.91 used in section (a) resulting in a value of 19.82 f_k for the design vertical load resistance.

Determination of f_k
As for section (a)

$$19.82 f_k = 63.57$$

$$f_k = 3.20 \text{ N/mm}^2$$

Modification factors for f_k
There are no modification factors since the cross-sectional area of the wall is greater than 0.1m^2 and the Eurocode does not include a modification factor for narrow walls.

Required value of f_k

f_k=3.20N/mm^2 (compared with 2.16 in section (a))

Note that in ENV 1996–1–1 an additional assumption is required for the calculation in that the modular ratio is used. This ratio is not used in BS 5628. It can be shown that for the present example taking E_{slab}/E_{wall}=1 would result in f_k=4.7N/mm^2 whilst taking E_{slab}/E_{wall}=4 would result in f_k=2.44N/mm^2. To obtain the same result from BS 5628 and ENV 1996–1–1 would require a modular ratio of 6 approximately.

Selection of brick/mortar combination
This selection can be achieved using the formula given in section 4.4.3(b) Using the previously calculated value of f_k and an appropriate value for f_m, the compressive strength of the mortar, the formula can be used to find f_b the normalized unit compressive strength. This value can then be corrected using δ, from Table 4.6, to allow for the height/width ratio of the unit used.

6

Design for wind loading

6.1 INTRODUCTION

Conventionally, in wind loading analysis, wind pressure is assumed to act statically on a structure. Such forces depend at a particular site on the mean hourly wind speed, the estimation of an appropriate gust factor, shape and pressure coefficients and the effect of local topography. The wind force calculated from these factors is assumed to act as an equivalent uniformly distributed load on the building for its full height. Sometimes the wind velocity or the gust factor is assumed variable with the height of the building, so that the intensity of the equivalent uniformly distributed load varies accordingly. In the United Kingdom, wind loads on buildings are calculated from the provisions of the Code of Practice CP 3, Chapter V, Part 2, 1970.

Whilst masonry is strong in compression, it is very weak in tension; thus engineering design for wind loading may be needed, not only for multi-storey structures, but also for some single-storey structures. Figure 6.1 shows how a typical masonry building resists lateral forces. It can be seen that two problems in wind loading design need to be considered: (1) overall stability of the building and (2) the strength of individual wall panels. In this chapter overall stability of the building will be considered.

6.2 OVERALL STABILITY

To provide stability or to stop 'card-house' type of collapse, shear walls are provided parallel to the direction of lateral loading. This is similar to diagonal bracing in a steel-framed building. In masonry structures, adequate length of walls must be provided in two directions to resist wind loads. In addition, floors must be stiff and strong enough to transfer the loads to the walls by diaphragm action. The successful action of a horizontal diaphragm requires that it should be well tied into the supporting shear walls. Section 1.2 explained in detail how lateral