The design ultimate load should be obtained as follows:

(a) dead load + imposed load

1.4 × characteristic dead load + 1.6 × characteristic imposed load

(b) dead load + wind load

1.0 × characteristic dead load + 1.4 × characteristic wind load or

1.4 × characteristic dead load + 1.4 × characteristic wind load

(c) dead load + imposed load + wind load

1.2 × all characteristic loads

3.3 Material properties

For normal construction in the UK, a characteristic concrete strength of 30N/mm^2 should be assumed for the initial design. In areas with poor aggregates this may have to be reduced. In the final design a higher grade concrete may have to be specified to meet durability requirements.

In the UK a characteristic strength of 460N/mm^2 should be used for high-tensile reinforcement and 250N/mm^2 for mild steel. European and American steel may, for some time to come, have different yield strengths, and corresponding values should be used.

3.4 Structural form and framing

The following measures should be adopted:

(i) provide stability against lateral forces and ensure braced construction by arranging suitable shear walls deployed symmetrically wherever possible
(ii) adopt a simple arrangement of slabs, beams and columns so that loads are carried to the foundations by the shortest and most direct routes
(iii) allow for movement joints (see subsection 2.4)
(iv) choose an arrangement that will limit the span of slabs to 5–6m and beam spans to 8–10m on a regular grid; for flat slabs restrict column spacings to 8m
(v) adopt a minimum column size of 300 × 300mm or equivalent area
(vi) ensure robustness of the structure, particularly if precast construction is envisaged.

The arrangement should take account of possible large openings for services and problems with foundations, e.g. columns immediately adjacent to site boundaries may require balanced or other special foundations.

3.5 Fire resistance and durability

The size of structural members may be governed by the requirement of fire resistance and may also be affected by the cover necessary to ensure durability. Table 2 shows the minimum practical member sizes for different periods of fire resistance and the cover to the main reinforcement required for continuous members in mild and moderate environments. For severe exposures, covers should be increased. For simply supported members, sizes and covers should be increased (see Section 4).

Table 2 Minimum member sizes and cover for initial design of continuous members

Member	Minimum dimension, mm	Fire rating 4h	2h	1h
Columns fully exposed to fire	width	450	300	200
Beams	width	240	200	200
	cover	70	50	45
Slabs with plain soffit	thickness	170	125	100
	cover	45	35	35
Slabs with ribbed open soffit and no stirrups	thickness*	150	115	90
	width of ribs	150	110	90
	cover	55	35	35

*thickness of structural topping plus any non-combustible screed

3.6 Stiffness

3.6.1 Slabs

To ensure adequate stiffness, the depths of slabs and the waist of stairs should not be less than those derived from Table 3.

Table 3 Span/effective depth ratios for initial design of slabs

Characteristic imposed loading (including finishes) kN/m^2	One-way spanning			Two-way spanning		Flat slab without drops
	simply supported	continuous	cantilever	simply supported	continuous	
5.0	27	31	11	30	40	36
10.0	24	28	10	28	39	33

The ratios for two-way slabs have been calculated for a square panel. For a 2 × 1 panel, the ratio for a one-way panel should be used and ratios interpolated for intermediate proportions. The depth should be based on the shorter span.

Flat slab design should be based on the longer span dimension. For exterior panels, 85% of the ratios quoted in Table 3 should be used.

Ribbed slabs should be proportioned so that:

the rib spacing does not exceed 900mm
the rib width is not less than 125mm
the rib depth does not exceed four times its width.

The minimum structural topping thickness should preferably be 75mm, but never less than 50mm or one-tenth of the clear distance between ribs, whichever is the greater.

For ribbed slabs, 85% of the ratios quoted in Table 3 should be used.