There will be occasions when this sequence cannot be adhered to, e.g. when the foundation drawings are required before the rest of the structural drawings are completed. In such instances extra care is required in assessing the loads and other requirements of the superstructure design.

4.2 Slabs

4.2.1 Introduction

The first step in preparing the final design is to complete the design of the slabs. This is necessary in order that the final loading is determined for the design of the frame.

The initial design should be checked, using the methods described in this subsection, to obtain the final sizes of the slabs and to calculate the amount and size of reinforcement.

This subsection gives fire resistance and durability requirements, and bending and shear force coefficients for one-way spanning slabs, two-way spanning slabs on linear supports, flat slabs, and ribbed and coffered slabs. The treatment of shear around columns for flat slabs and the check for deflection for all types of slab are given, together with some notes on the use of precast slabs. The coefficients apply to slabs complying with certain limitations which are stated for each type.

For those cases where no coefficients are provided the bending moments and shear forces for one-way spanning slabs may be obtained from a moment distribution analysis. These moments may then be redistributed up to a maximum of 30%, although normally 15% is considered a reasonable limit. The following criteria should be observed:

(a) Equilibrium must be maintained
(b) The redistributed design moment at any section should not be less than 70% of the elastic moment.

The general procedure to be adopted is as follows:

1. Check that the section complies with requirements for fire resistance
2. Check that cover and concrete grade comply with requirements for durability
3. Calculate bending moments and shear forces
4. Make final check on span/depth ratios
5. Calculate reinforcement
6. For flat slabs check shear around columns and calculate shear reinforcement if found to be necessary.

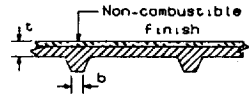
4.2.2 Fire resistance and durability

4.2.2.1 Fire resistance

The member sizes and reinforcement covers required to provide fire resistance are given in Table 7. The covers in the Table may need to be increased to ensure durability (see clause 4.2.2.2).

Where the cover to the outermost reinforcement exceeds 40mm special precautions against spalling may be required, e.g. partial replacement by plaster, lightweight aggregate or the use of fabric as supplementary reinforcement (see BS 8110, Part 2[1]).

Table 7 Fire resistance requirements for slabs

Fire resistance h	Plain soffit solid slab (including hollow pot, joist + block) Minimum overall depth, mm		Ribbed soffit (including T-section + channel section) Minimum thickness/width, mm/mm 	
	Simply supported	Continuous	Simply supported	Continuous
			t/b	*t/b*
1	95	95	90/90	90/80
1½	110	110	105/110	105/90
2	125	125	115/125	115/110
3	150	150	135/150	135/125
4	170	170	150/175	150/150
	Cover to *main* reinforcement, mm			
1	20	20	25	20
1½	25	20	35	25
2	35	25	45	35
3	45	35	55	45
4	55	45	65	55

If the width of the rib is more than the minimum in Table 7 the cover may be decreased as below:

Increase in width, mm	Decrease in cover, mm
25	5
50	10
100	15
150	15

4.2.2.2 Durability

The requirements for durability in any given environment are:

(a) an upper limit to the water/cement ratio
(b) a lower limit to the cement content
(c) a lower limit to the thickness of cover to the reinforcement
(d) good compaction and
(e) adequate curing.

Values for *(a)*, *(b)* and *(c)* which, in combination, will be adequate to ensure durability are given in Table 8 for various environments.

As *(a)* and *(b)* at present cannot be checked by methods that are practical for use during construction, Table 8 gives, in addition, the characteristic strengths that have to be specified in the UK to ensure that requirements *(a)* and *(b)* are satisfied.