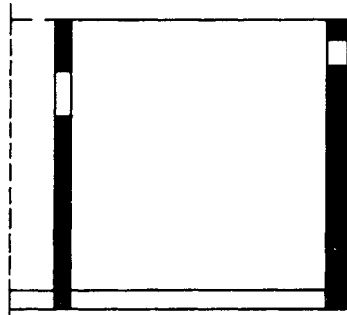


Plan: Outside wall with small return



Plan: Outside wall without return

Fig. 9.1 Case A.

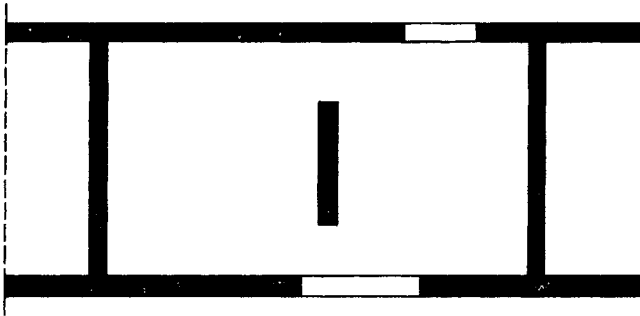


Fig. 9.2 Case B.

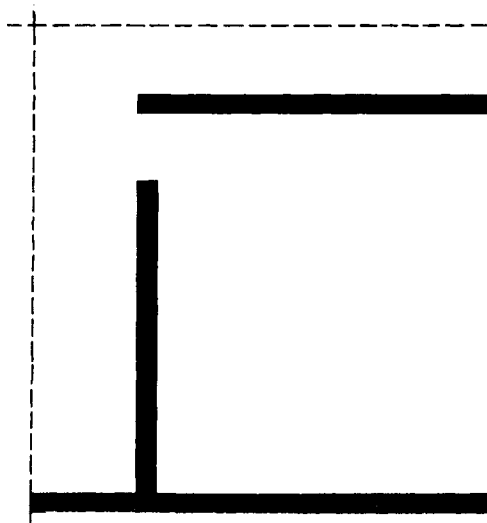


Fig. 9.3 Case C.

In summary it would appear that the risk of progressive collapse in buildings of loadbearing masonry is very small. However, against this the limited nature of the additional design precautions required to avoid such collapse are such that they add very little to the overall cost. In addition the social implications of failures of this type are great, and the collapse at Ronan Point will long be remembered. It added to the general public reaction against living in high-rise buildings.

9.4 POSSIBLE METHODS OF DESIGN

Design against progressive collapse could be introduced in two ways:

- Design against the occurrence of accidental damage.
- Allow accidental damage to occur and design against progressive collapse.

The first method would clearly be uneconomic in the general case, but it can be used to reduce the probability of local failure in certain cases. The risk of explosion, for example, could be reduced by restricting the use of gas in a building, and impact loads avoided by the design of suitable guards. However, reducing the probability does not eradicate the possibility, and progressive collapse could still occur, so that most designers favour the second approach.

The second method implies that there should be a reasonable probability that progressive collapse will not occur in the event of a local failure. Obviously, all types of failure could not be catered for, and a decision has to be made as to the extent of allowable local failure to be considered. The extent of allowable local failure in an external wall may be greater than that for an internal wall and may be related to the number of storeys. Different countries tend to follow different rules with respect to this decision.

Eurocode 6 Part 1–1 recommends a similar approach to the above but does not give a detailed example of the method of application. It refers to a requirement that there is a ‘reasonable probability’ that the building will not collapse catastrophically and states that this can be achieved by considering the removal of essential loadbearing members. This is essentially the same as the requirements of the British code.

Having decided that local failure may occur it is now necessary to analyse the building to determine if there is a likelihood of progressive collapse. Three methods are available:

- A three-dimensional analysis of the structure.
- Two-dimensional analyses of sections taken through the building.
- A ‘storey-by-storey’ approach.