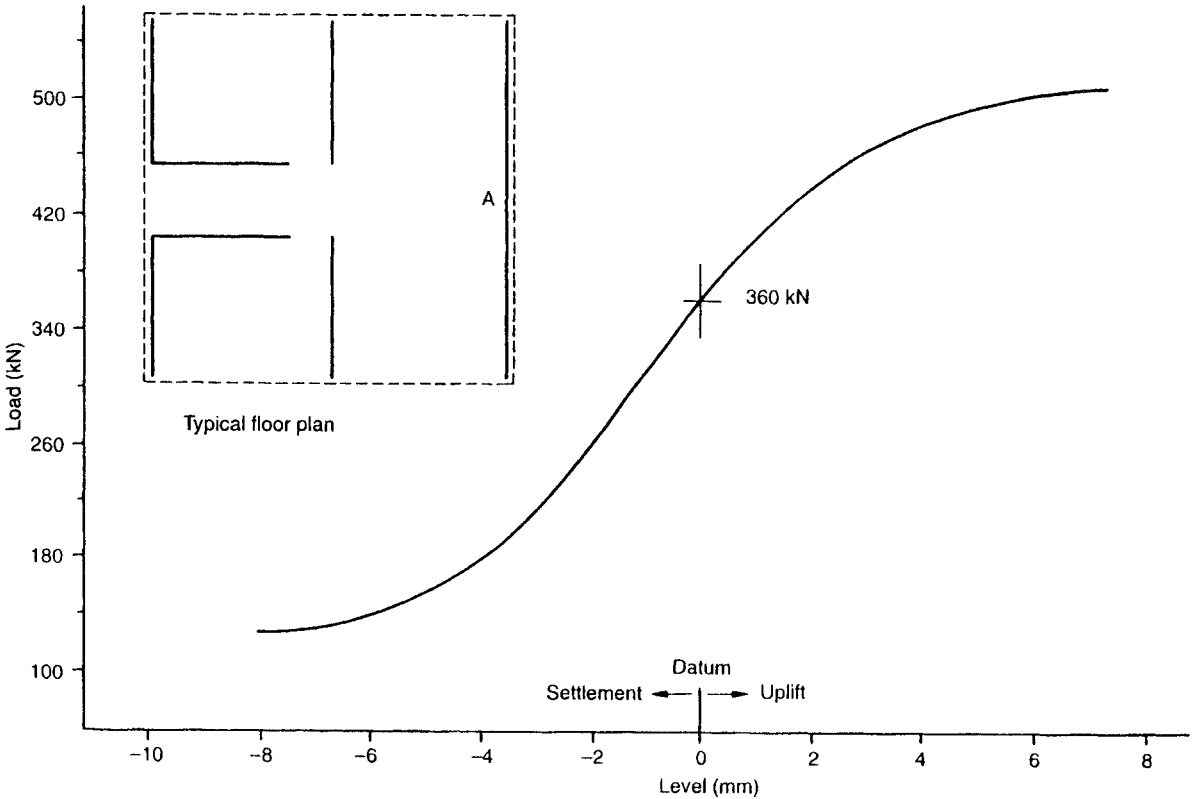

Fig. 7.2 Relationship between load and level of the building. The wall A at the ground floor of a five-storey test structure carries a load of 360 kN shown as the datum level above. When this wall is being pushed the lateral load increases owing to uplift, depending on the magnitude of uplift. In case of settlement at this end, the load carried by wall A will be reduced, depending on the magnitude of the settlement.

7.2.3 Stiffness of a building

Just before collapse a wall under lateral loading tends to lift the structure above it by a certain distance, as shown in Fig. 7.3. The uplift depends on the thickness of the wall. This is the opposite effect to that described in relation to settlement and results in an additional precompression on the wall, the value depending on the stiffness of the building against upward thrust. As shown in Fig. 7.2 the stiffness of a building, however, is highly indeterminate and nonlinear and in practical design this additional precompression may be ignored. This will add to the safety of such walls against failure under lateral pressure.

7.2.4 Boundary conditions

In practice, the walls in loadbearing masonry structures will be supported at top and bottom and may, in addition, be supported at the sides by return walls. Returns can give extra strength depending on the ratio of the length to the height of the wall attached to the return, the tensile strength of the brick or block and the number of headers tying the wall to the return. In a normal English bond alternate courses of headers are used to tie the wall to its return. In the approximate theory described

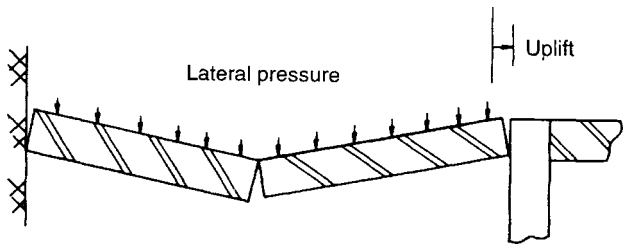

Fig. 7.3 Uplift of the slab at the time of collapse of wall beneath it.

in the next paragraph, it has been assumed that the return does not fail. However, the designer should check whether the return can safely carry the load imposed on it.