

whereas the steelwork will be erected to a tolerance of approximately ± 10 mm (see Section 8). The design of the beam end connections must allow for the resulting tolerance in the distance between supports. This could be achieved by using bolts in large oversize holes to locate the beams, and then welding to form the final connections. Failure to recognise this problem may result in modifications being necessary on site.

6.2.2 Connections

Several options exist for making connections between steel beams and concrete or masonry walls. Possible details for concrete walls are given in Figures 6.3 to 6.5. Corresponding details for masonry walls can be found in Reference 48.

A void may be left in a concrete wall when it is cast, so that a steel beam can be inserted into the void and then cast-in at a later date (see Figure 6.3). Such a detail creates difficulties for the steelwork erector, since temporary bracing may be needed to locate and support beam ends during erection of the frame. Because the main contractor may not wish to fill the voids on a one-by-one basis, substantial parts of the steel frame may need to be erected before the connections are finalised. The extent of temporary bracing may therefore be considerable.

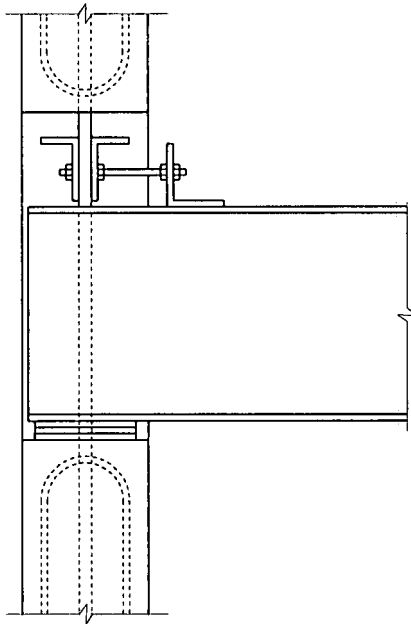


Figure 6.3 *Beam cast into wall*

For a lightly loaded beam, proprietary anchors may be a suitable form of attachment. A seating cleat fixed to the concrete by these anchors may be used to locate the beam. Additional anchors then provide the final connection, using for example an end plate detail. Unfortunately, the beam end reaction which can be carried using such anchors is limited, and the whole operation is time consuming. The heaviest duty expanding bolts have a maximum capacity in shear of around 55 kN, and the number of anchors which can be used is dictated by a minimum centre-to-centre spacing. Minimum edge distance requirements must also be respected.

Chemically bonded anchors may also be considered. Reference should be made to manufacturers' information for capacity and detailing requirements for all types of anchor. To provide greater bolt spacing, the anchors may be used with an attachment plate detail, as shown in Figure 6.4.

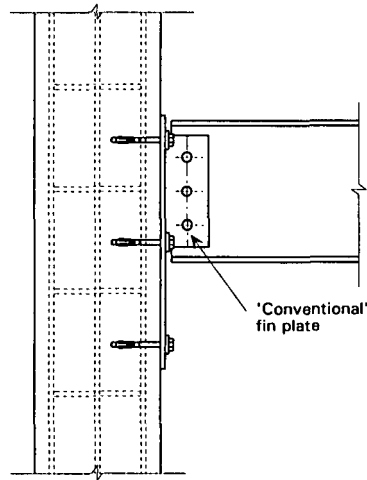


Figure 6.4 Attachment plate fixed to wall using proprietary anchors

A heavily loaded beam may be supported by an attachment plate cast into the wall. A seating angle welded or bolted to the plate is used to locate the beam during erection. Final connection is then made using a detail similar to a standard beam-to-column connection (with a fin plate, cleats or an end plate welded to the embedment). Shear studs welded to the back of the plate transfer loads into the concrete, as shown in Figure 6.5.

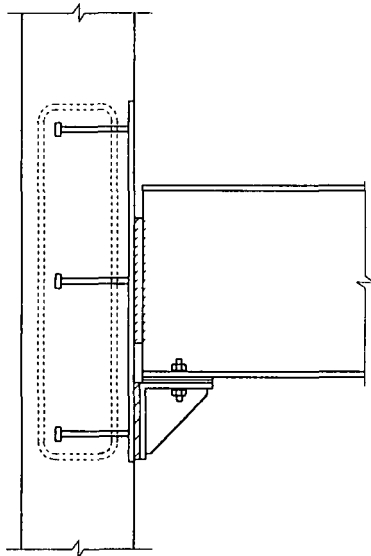


Figure 6.5 Attachment plate cast into wall

The steel frame can be attached to masonry infill walls using a range of proprietary fixings. These are basically the same as those used to retain brickwork panels, as discussed in Section 7.6. Typical examples are shown in Figure 7.6. To resist lateral loads on the frame the masonry panel must be butted-up to the columns, so that lateral movement of the steel frame is resisted by compressive forces in the masonry, rather than tensile forces in the ties. Consideration may need to be given