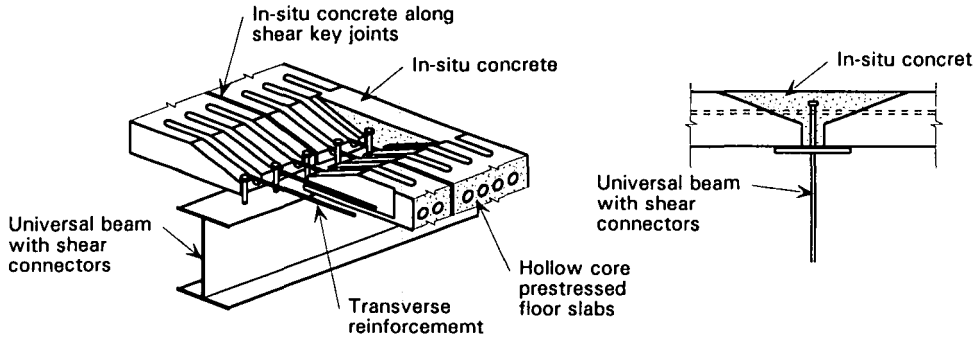

Figure 6.13 *Reinforcement detailing with precast slabs*

Precast planks can be supported on shelf angles bolted or welded to the beam web. To provide the necessary seating, and ensure that the planks can be dropped into position below the beam flanges, a minimum angle outstand of 150 mm is needed (Figure 6.12b). Angles should project 25 mm beyond the top flange of the beam if this is more than 250 mm wide. Care should be taken to ensure that the contact faces of the web and angles are protected against corrosion in situations where this may cause a problem (for example outdoors).

Figure 6.12c shows the cross-section of a composite slim floor beam. In-situ concrete cast around the precast units is used to transfer longitudinal shear between the beam and slab via shear connectors. Similar non-composite sections employ either a grout or in-situ concrete infill around the steel beam, and do not require an in-situ topping. Deep steel decking can be used instead of the precast units in a section which is otherwise similar. Particular advantages of slim floor construction include a high span to depth ratio, a smooth soffit (when precast planks are used), and good inherent fire resistance.

One of the advantages of any floor system using precast concrete units is that they can span 8 m or more. This allows a considerably greater secondary beam spacing than when steel decking is used to form a composite slab.

Disadvantages include the fact that the units require a crane for individual positioning on site, due to their self weight of 250 kg to 500 kg per metre span. When erecting precast units, a sequence of placing them alternately either side of internal beams should be specified to avoid the need to design the beams for torsion.

Unlike steel decking, precast concrete units are not positively fixed to the steel beams. However, prior to the placing of in-situ concrete between the units, restraint is provided by the restoring moment which develops if the steel section starts to buckle. The designer may assume that beams up to 8 m in length are fully restrained by this mechanism (see Figure 6.14). For edge beams, there may not be a restoring moment, and special provision may be needed to give lateral restraint. Frictional forces alone should not be relied upon to laterally restrain the beams during construction when significant loads are applied (although wide precast planks do provide some frictional restraint)([51]).

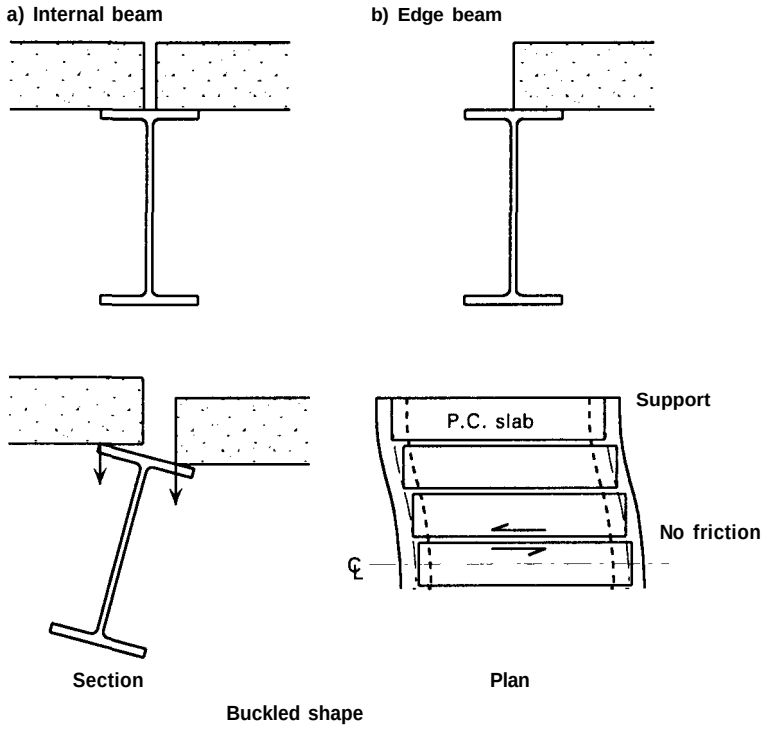

Figure 6.14 *Beam restraint provided by precast concrete slabs*

ACTIONS - Precast concrete floors

When specifying the use of precast concrete floor units, the designer must:

- consider how the units will be manoeuvred into position, and leave appropriate clearances
- consider how lateral restraint will be provided to the beam top flanges during construction
- ensure that the erector understands the need to place the units in a sequence which prevents torsional loads, in excess of those considered in the design, being introduced into the beams.

6.6 Crane girders and rails

A typical crane detail is shown in Figure 6.15. In this example, the girders are supported on brackets attached to the main columns. An alternative would be to support the girders on dual columns. Although design of the girders is normally the responsibility of the structural designer, specialist suppliers are often used to provide a complete design and on-site installation service for the rails and fixings.