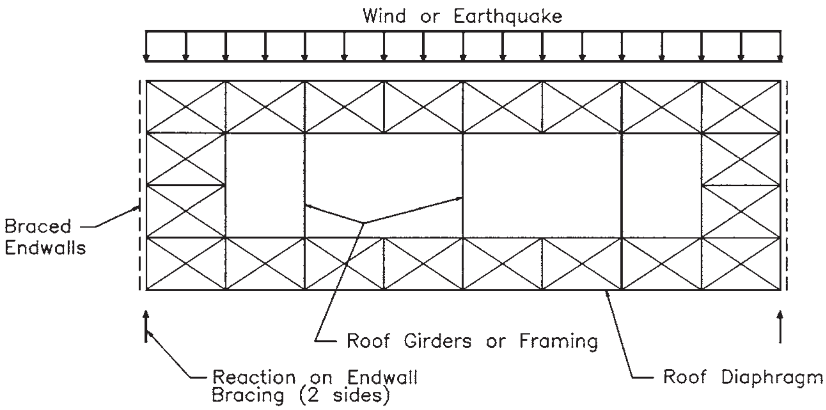

FIGURE 3.6 Roof diaphragm distributes lateral loads to braced endwalls.

typical cold-formed purlin has a very limited compressive capacity. The lateral purlin bracing shown in Fig. 3.8 is made of special Z shapes attached by screws to both the strut and the adjacent roof purlin; other types of purlin bracing are discussed in Chap. 5. The purlin struts should be provided with antiroll clips at supports, also discussed in Chap. 5. The roof struts are typically designed only for axial forces, and they should not be carrying any other load. It means that neither roof clips nor hangers of any sort be attached to the struts, and that roof sheets not be terminated at the strut locations.

Purlin struts are usually made of thicker steel than the regular purlins, but when the compressive capacity of even the heaviest-gage purlin is insufficient (or the span exceeds, say, 35 ft), pipe struts may be used. Unlike cold-formed shapes, pipes require little, if any, lateral bracing for full effectiveness.

There are two methods of attaching a pipe strut to the primary frame. In the first one, a web connection is made (Fig. 3.9); in the second, the pipe is bolted to the top flange of the frame (Fig. 3.10). In either case, at least two high-strength bolts are needed. The layout of compression struts is normally shown on the manufacturer's roof erection plan. The details of attachment should be carefully coordinated with the location and details of purlin bracing. For example, if purlin bracing consists of two rows of angles at the top and bottom of purlins, it might be possible to locate the pipe strut between them, and Fig. 3.9 would get the nod. The attachment of Fig. 3.10 may present more difficulty in this regard, unless the pipe size is small enough not to interfere with the top line of purlin bracing.

3.3.4 Wall Bracing

Rigid frames offer little or no lateral resistance normal to their plane, unless fixed at the base—an infrequent and often undesirable solution. Instead, stability in that direction is typically provided by sidewall bracing, spaced as shown in Fig 3.11. A typical sidewall bracing bay consists of steel rod or cable diagonals, eave strut and columns on each side.

Some manufacturers place the braces in the end bays of the side walls, others avoid the end bays and start in the first interior bays, as in Fig. 3.11. The former approach helps stabilize the corner areas that are most susceptible to hurricane damage; the latter engages only the frames with the largest dead load, which reduces the uplift forces on the frame anchors bolts. Naturally, in small buildings consisting of only two bays, wall bracing may be placed in either bay. The manufacturers tend to avoid using standard wall bracing in the adjacent bays in order not to complicate detailing and erection. The lateral loads are transmitted along the wall from brace to brace by eave struts. The eave struts are designed for axial compression or for combined axial compression and biaxial bending.

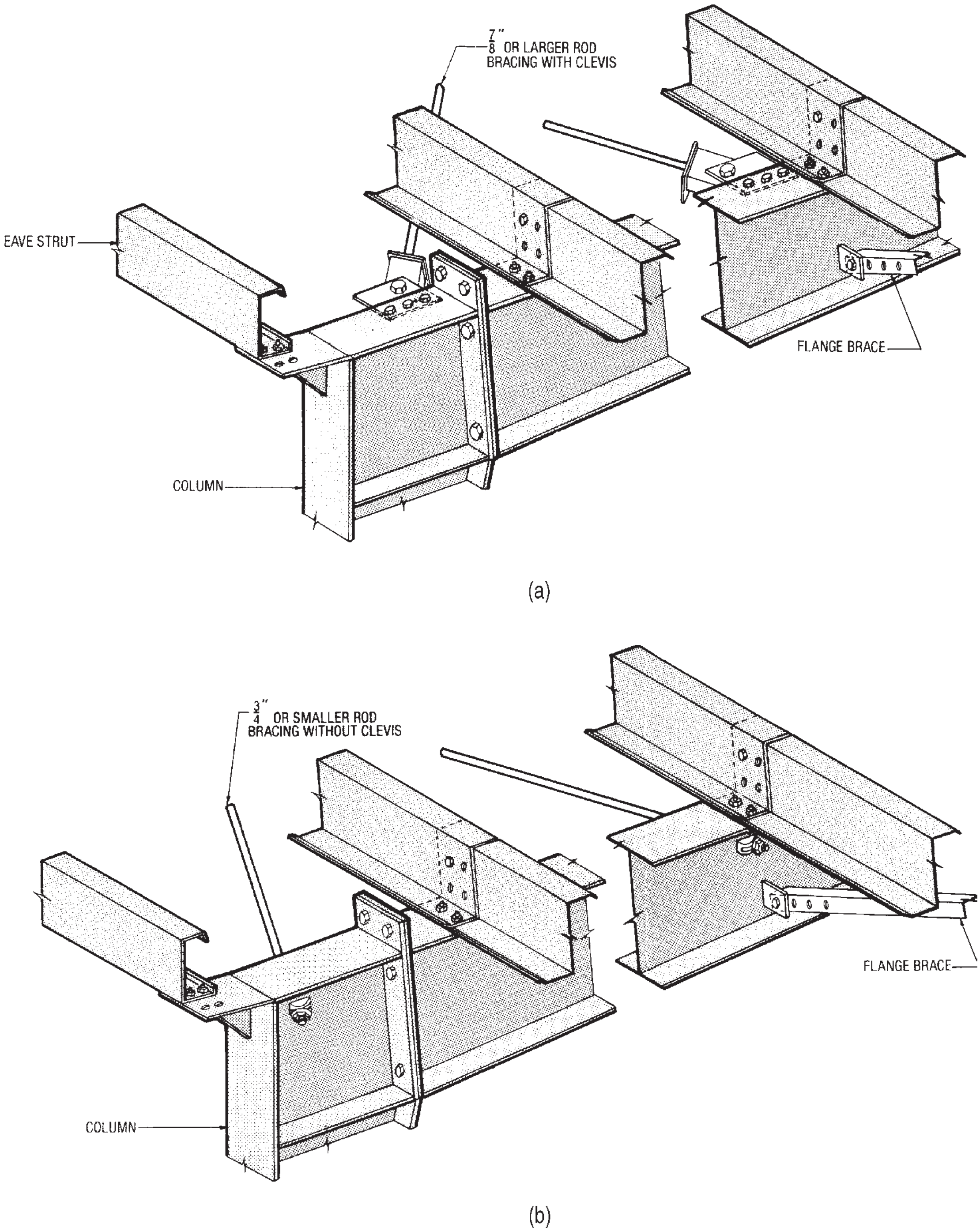

FIGURE 3.7 Typical roof diaphragm details. (*a*) With clevis, used with ⅞-in or larger rods; (*b*) without clevis, with ¾-in or smaller rods. (*Star Building Systems.*)