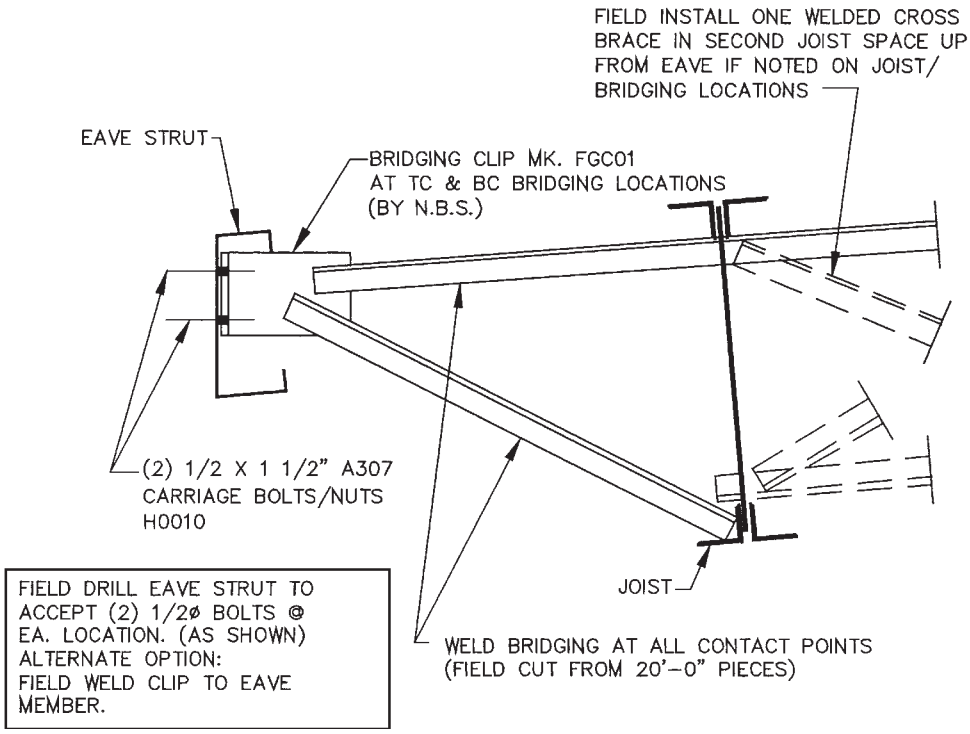

FIGURE 5.42 Attachment of open-web joist bridging to eave strut. (*Nucor Building Systems.*)

5.7 COLD-FORMED STEEL GIRTS

Cold-formed C and Z girts are similar in most respects to cold-formed purlins, except that, of course, the girts are used in walls, not roofs. The discussion of the available sections, basic design principles, continuity effects, and bracing needs for purlins largely applies to cold-formed girts as well. These and some other differences worthy of note are summarized below.

5.7.1 Girt Inset

Unlike cold-formed purlins that pass over the building frames to take advantage of the continuity effects, light-gage girts can be positioned relative to columns in three different ways called insets. In *bypass* inset, the girts are located wholly outside the columns (Fig. 5.43*a*). Bypass girts can be simply bolted to the outside column flange, if web crippling is not a problem, or be connected by bearing clips otherwise.

Semiflush inset requires girt coping and allows some of the girt section to continue past the column (Fig. 5.43*b*). Bearing clips bolted to the outside column flange are typically required for attachment. (This design is not available from some manufacturers.)

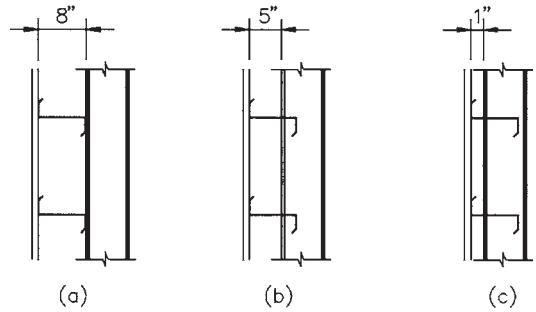

FIGURE 5.43 Girt insets: (*a*) bypass; (*b*) semiflush; (*c*) flush. (*After Ref. 26.*)

Girts can also be positioned *flush* with the exterior of columns (Fig. 5.43*c*), being bolted to the column web with clip angles. Actually, the girts normally extend about 1 in past the column to allow for erection tolerances.

A close-up of the bypass girt assembly is shown in Fig. 5.44, and of the flush assembly in Fig. 5.45. Note the position of the eave strut in each illustration: It is simply bolted to the top of the column in the flush assembly but requires a special support bracket in the bypass configuration.

At endwalls, incorporating any type of girt inset is easy, since there are no eave struts there; purlins simply cantilever over the end posts (Fig. 4.23*a*), and the rake angle spanning between the purlins picks up the top of the siding. At the corners, the connection details may get somewhat complicated. These details depend on whether the corner column is an endwall post or a part of expandable frame and whether the sidewall and endwall girt inset is the same. A sample set of the details for an expandable-frame corner column and bypass endwall girts is shown in Fig. 5.46. Some other details are given in Chap. 4, Figs. 4.23 and 4.24.

While the bypass inset allows for continuity, there may be a compelling reason to prefer the flush-type design whenever straight exterior columns are involved. Wall panels are supported by fasteners at the exterior face of the girts and of the closure angle, or similar structure, attached to the foundation wall (Fig. 5.47). With bypass girts, the foundation must extend all the way to the inside face of the wall panel, and the resulting space between the inside surfaces of the girts and the columns is frequently unusable. A cost of this space could easily outweigh any savings derived from the girt continuity. From this standpoint, flush girts in combination with straight columns may provide for a uniform and reasonable overall wall thickness.

On the other hand, there could be important structural reasons for using bypass or semiflush girts in combination with tapered or even straight columns. As discussed in Chap. 12, column anchor bolts require a certain minimum distance from the edge of the foundation for full effectiveness. This means that the anchor bolts cannot be placed too close to the exterior edge of the foundation. Taking into consideration that the minimum number of the column anchor bolts is four, per OSHA regulations, a system with flush girts may require an excessively deep column section to contain the bolts. The anchor bolts are easier to place properly if the column is located away from the foundation edge—as can be accomplished by using bypass girts.

5.7.2 Horizontal versus Vertical Girts

The main function of girts is to transfer wind loads from wall materials to primary framing. Most commonly, girts are positioned horizontally, to span between the frame columns. Under this arrangement, metal siding is oriented vertically, being attached to each girt, the base angle or similar element, and the eave girt. Girt spacing is governed by the load-resisting properties of the wall panels; it is often between 6 and 8 ft for typical single-leaf siding. Figure 5.48 shows standard girt spacing for one manufacturer. The first girt is positioned to provide a clearance for doors.