FIGURE 10.1 Despite having a metal roof, this small but complex building with masonry walls would not be an ideal application for metal building systems.

up into three rectangular "units" by the manufacturer, who could assign the framing design of each to a different engineer or technician. Not surprisingly, each unit might end up with its own set of columns, with a double line of columns at the unit interface.[1] Unless the owner's design team has anticipated this turn of events by providing expansion joints at the interface—with a double set of columns and foundations—it is in for a shock when the shop drawings come in.

The unexpected double set of columns could wreak havoc with the assumed column sizes and could require new expansion joints in the exterior walls and roof, complicating the appearance of the building. It will also require much larger foundations than those shown in the contract drawings. At this stage of construction, the foundation contract might already have been awarded, or, in a most nightmarish scenario, the concrete has already been placed. In either case, the change won't be easy—or cheap.

We recommend that the owner's designers either divide L-, C-, and Z-shaped buildings into rectangles from the beginning or carry a warning on the contract drawings against an introduction of any columns not shown there. The manufacturer can avoid extra columns by using transfer girders, a solution that slightly complicates framing design but is certainly well within the capabilities of most metal building engineers.

Metal roofs with hips and valleys are best avoided in metal building systems, especially when structural standing-seam roofing is used. As discussed in Chap. 6, these roof configurations present conceptual difficulties and impede expansion and contraction of metal roofing. We will add here that the details of purlin support on sloped hip and valley beams are rather convoluted (Fig. 10.2), and purlin stability at supports may be difficult to ensure. The complexity of construction increases the chances of leakage and structural problems in these critical areas.

10.1.3 Hard Wall Materials

As Chap. 7 demonstrated, metal building systems are increasingly designed with masonry, concrete, and other hard wall materials. These applications expand the limits of the systems' acceptance and

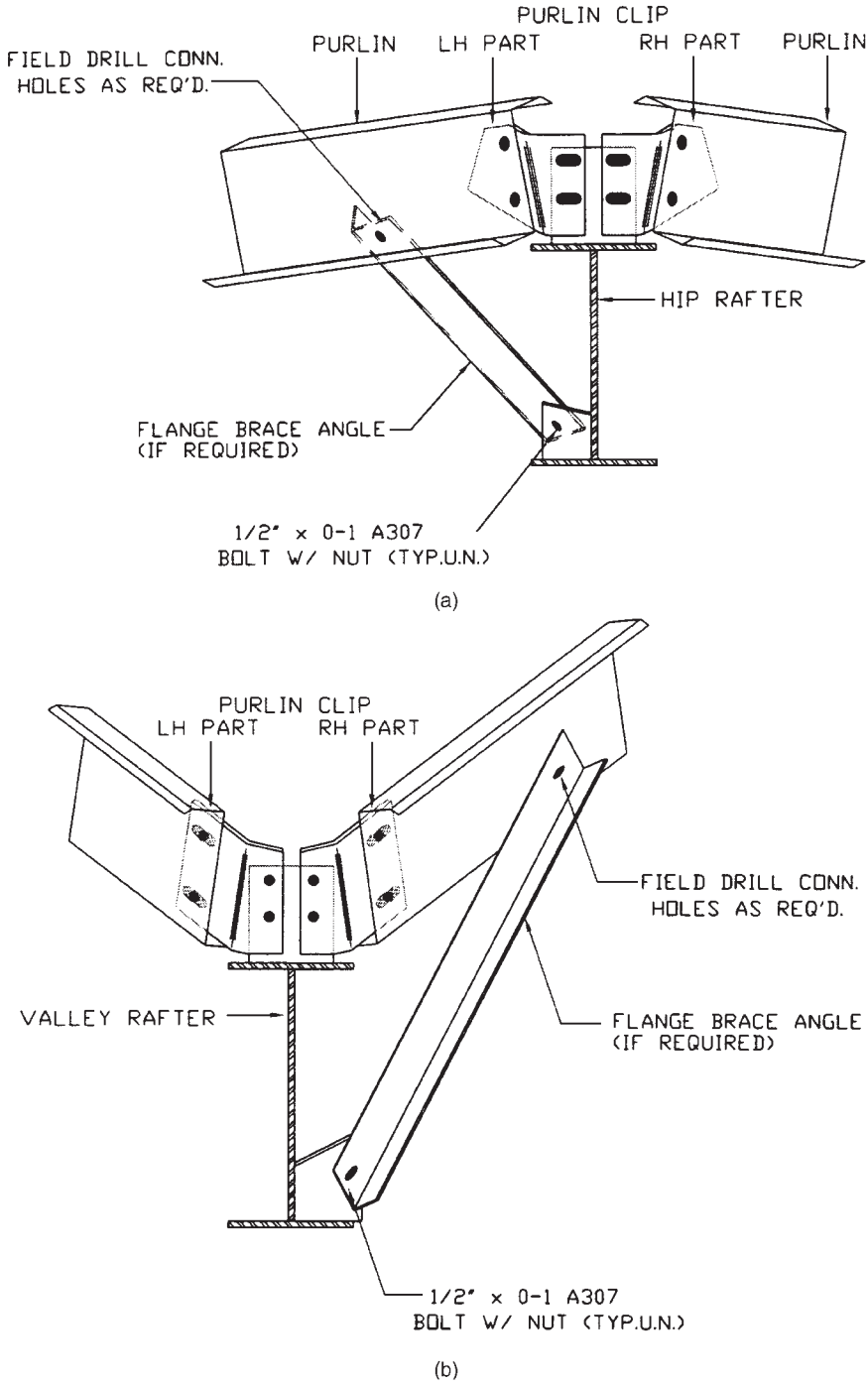

FIGURE 10.2 Purlin bearing details at hips and valleys: (*a*) section at hip looking upslope; (*b*) section at valley looking downslope. (*A&S Building Systems.*)