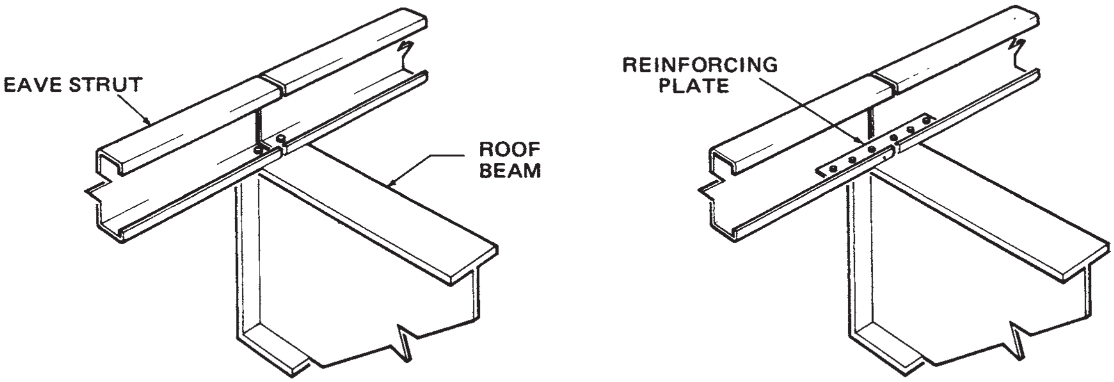

FIGURE 5.56 Eave strut connection to primary frame: (*a*) direct bolting; (*b*) direct bolting with reinforcing plate. (*Butler Manufacturing Co.*)

Note another difference between the two figures: in Fig. 5.56 the eave strut bears on top of the frame rafter, a common design in buildings with flush girts, while in Fig. 5.54 the eave strut is supported on a frame extension bracket, for use with bypass girts. Whenever the eave strut is bolted directly to the rafter, its top and bottom flanges usually have the same slope as the roof—the so-called double-slope design (Fig. 5.1). An extension bracket, however, can be made with its top horizontal, so that the eave strut bearing on it can have its top flange sloped and the bottom horizontal—the single-slope design (see Fig. 5.44). Some systems have the eave member bearing on the horizontal top of the column, and use single-slope sections too, as in Fig. 5.45.

The eave strut is a versatile framing element, but sometimes it is expected to perform more than it can deliver. The channel-like section works well with metal roofing and siding, but as demonstrated in Chap. 7, it may lack the rigidity to laterally support walls made with nonmetal materials—masonry and concrete. Also, its torsional capacity may prove insufficient to laterally support overhead doors, as discussed in Chaps. 4 and 10. In both of those situations, a wide-flange or tubular structural steel member would be more appropriate than a cold-formed eave strut, despite the manufacturers' preference for using cold-formed sections.

Even when metal cladding is involved, the eave strut is sometimes assumed to play a role it cannot realistically furnish. For instance, as discussed in Sec. 5.4.5, some manufacturers seem to believe that simply tying purlin bracing to an eave strut ensures lateral support for the purlins, even though the lateral rigidity of the eave strut section is comparable to the purlin's (and the siding cantilevered for a distance of several feet does not provide sturdy enough bracing either).

The tables in Appendix B show the dimensions, section properties, simple-span flexural capacities, axial capacities, and combined axial and bending capacities of the typical eave strut sections produced by the LGSI.

Example 5.3: Preliminary Selection of an Eave Strut. Select a preliminary size of the double-slope eave strut to carry a compressive load of 15 kip. Assume there are adjacent purlins and girts to resist wind loading, so that the eave strut carries axial loading only. Use LGSI Z sections. The spacing of primary rigid frames is 25 ft.

Solution. Distance between the frame supports KL_x is 25 ft. Assume that the eave strut is laterally braced at 6.25 ft. (the one-quarter points of the span) by crisscrossed or channel-type purlin bracing. Using Table B.13 in Appendix B, select section 8 × 4 × 4 × 1 DSE 12G, capable of resisting 18.3 kip in compression (found by interpolation between the lateral support distances of 6 and 7 ft).

Note that the axial capacity of the eave strut can be increased if the spacing of the lateral bracing is decreased.

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