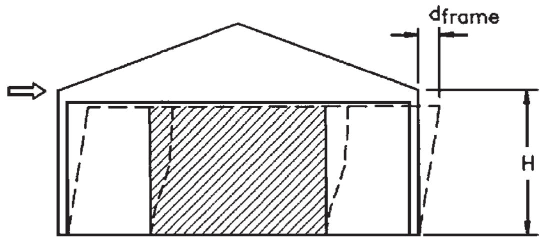


**FIGURE 11.9** Wall racking.

### 11.2.8 Choosing a Lateral Drift Limit

It is clear that lateral drift and deflection criteria depend on many project-specific factors including the type of occupancy; presence of partitions, cranes, and structure-supported equipment; type of exterior wall materials; and expectations of the owner.

For "pure" metal buildings without any partitions, brittle exterior walls, or frame-mounted equipment, story drift limits in the range of *H*/60 to *H*/120 might be adequate.

For masonry or concrete exterior walls attached to metal frame, it is reasonable to use the story drift limits of conventional construction, such as *H*/200 for seismic loading and *H*/400 for wind.

Some cases call for drift and racking limits that are more stringent. Figure 11.10 illustrates one building with an exterior that contains glass block—one of the most brittle construction materials—where a strict drift limit was specified. Note that, in order to minimize racking, the designers specified wall bracing made of steel angles rather than of rods or cables.

Somewhat more liberal limits for wind-induced drift (*H*/200 to *H*/300) may be justified if an excellent cooperation between the architects and engineers allows for a development of custom-engineered details for base, top, and corners of both exterior and interior walls. The prospective contractor's sophistication, experience, and quality of supervision count a lot, too.

A presence of drywall partitions without custom-designed connections—with any type of exterior walls—as in Fig. 11.11, limits the design story drift to *H*/500.

Some custom details of partition-to-purlin connections are shown in Fig. 11.12. These details incorporate a specially made oversized "deflection" track (runner) that receives the partition studs. The studs are inserted in, but are not directly attached to, the deflection track, leaving some expansion space, the size of which is determined by the vertical deflection criteria of the purlins, at the top.

To prevent the studs from rotation within the deflection track, they are laterally braced by solid bridging. The bridging is installed at close intervals, such as 5 ft on centers, in the areas where the studs are not braced by sheathing on both sides (e.g., above the ceiling). When the partition runs parallel to the purlins, the deflection track is attached to closely spaced light-gage steel studs or similar members spanning between the purlins (Fig. 11.12*a*). Note that in this case the corners of the custom deflection track are not square, to allow for the roof slope.

When the partition runs perpendicular to the purlins, a deflection track with square corners can be used. The track can be designed to span the distance between the purlins by itself or, where added strength is needed, can be supplemented by a light-gage steel stud (Fig. 11.12*b*).

A sample custom detail for the partition running under a primary frame is shown in Fig. 11.13. Here, too, the special track allows for a frame deflection under vertical load without transferring the load to the partition studs. The detail shows how to treat the attachment of gypsum sheathing at the top: it should not be fastened to the deflection track so as not to bridge the movement gap and compromise its function.

Figures 11.12 and 11.13 largely decouple the partition from the roof movements parallel to its plane and therefore drastically reduce, if not eliminate, the racking forces acting on the gypsum board. Therefore, they could permit using a drift limit that is more lenient than *H*/500.

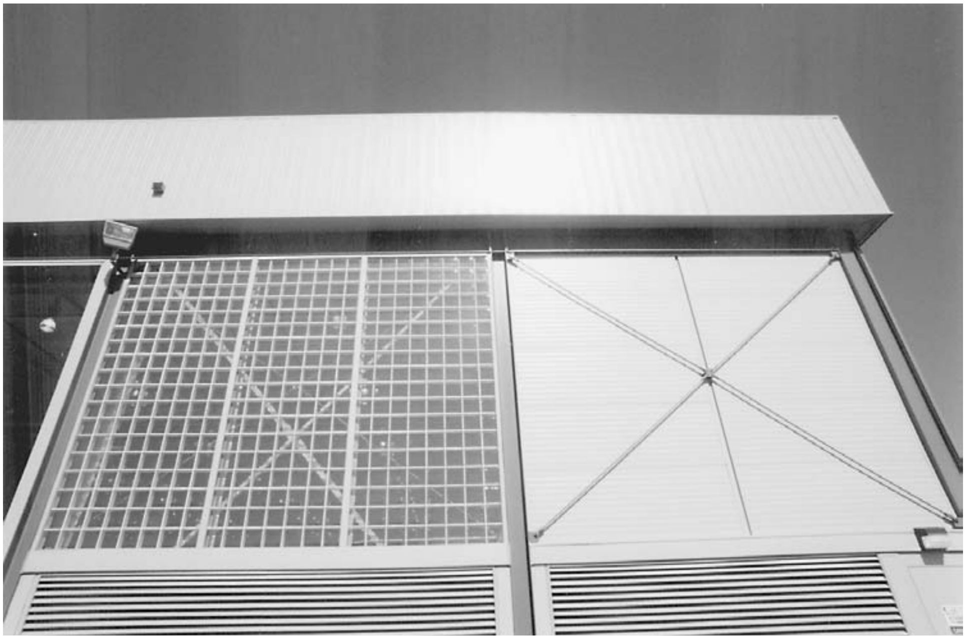

**FIGURE 11.10** Presence of glass block in this metal building system justifies strict limits on building drift and racking. Note the interior wall bracing made of steel angles. (The exposed exterior bracing at right is purely cosmetic.) (*Photo: Maguire Group Inc.*)

Whether to base these drift limits on 50-year, 20-year, or 10-year wind loads is left to the specifying engineer's judgment. While there is merit in recommendations favoring a 10-year wind loading, we hesitate to embrace them for every condition. It may be easier to adjust the drift limit, so that the computations are done only once. Incidentally, the *H*/500 drift limit computed from a 10-year wind is equivalent to the familiar *H*/400 drift limit computed from a 50-year wind.

### 11.2.9 Choosing a Horizontal Deflection Limit

Horizontal deflection limits for some common exterior wall systems are discussed in Chap. 7. Building codes may include requirements for maximum allowable horizontal deflections of walls. For example, the *International Building Code*[1] includes a table of deflection limits. It requires both exterior and interior walls with brittle finishes to be designed for a maximum horizontal deflection of *L*/240, while walls with flexible finishes are allowed twice that—*L*/120. A footnote grants a more lenient treatment to the secondary wall members supporting metal siding: *L*/90.

All the deflections in the IBC table are permitted to be computed using a wind load equal to 70 percent of the loading specified for "components and cladding," sidestepping the debate as to which wind loading to use.

Whenever exterior walls depend on the intermediate girts for lateral support, horizontal deflection criteria are influenced by the wall construction details. As was already demonstrated, a wall that can freely rotate at the base can tolerate larger girt deflections than a fixed-base wall. For the former, the provisions of AISC Guide no. 3, which limit girt deflections to *L*/120 for metal panels and to *L*/240 (but not over 1.5 in) for masonry, seem sensible. For the latter, a stricter limit is justified.