FIGURE 3.29   Portal frame in a sidewall. (*Star Building Systems.*)

eave strut into the portal frame without introducing weak-axis bending into the primary frame columns. To maintain reasonable bracing proportions, the distance from the bottom of the portal frame to the top of the eave strut (the distance X in Fig. 3.32) should be at least 6.5 to 7 ft. Otherwise, a full-height portal frame is normally provided.[7]

The most certain way to determine the dimensions and clearances of a portal frame is to contact the manufacturer that will be providing the frames. When the dimensions must be known before the manufacturer is selected, as in public bidding work, the following approach is suggested (after Ref. 7). First, determine the horizontal frame loads by independent analysis or by following the procedures in some manufacturers' catalogues (such as Ref. 7). The independent calculations are rather straightforward; they involve computing the design wind pressure on the wall and multiplying it by the tributary area of the end wall. The resulting force is divided by the number of portal frames in the wall to arrive at the horizontal frame load V. Then, the approximate clearances—the maximum clear height or the minimum clear width—provided by standard portal frames can be determined as a function of the bay dimensions and the load V.

When a certain clear height H must be provided, enter Table 3.2 with the bay size and the load V to determine the minimum clear width W available with standard frames. The maximum frame clear height H for a given eave height is listed in Table 3.3. The numbers in these tables—and most other reference data in this book for that matter—should be used only as rough guides, because each manufacturer may have its own standards. Also, nonstandard designs can always be provided, with or without a cost premium.

3.3.10   Load Path

In a properly functioning building, structural loading is transferred between various building elements, like a ball in a football game, until it is absorbed by the soil or otherwise extinguished. This system of load transfer is known as the *load path*. To illustrate its function, let's trace the path of a wind loading acting on a pre-engineered building's roof.
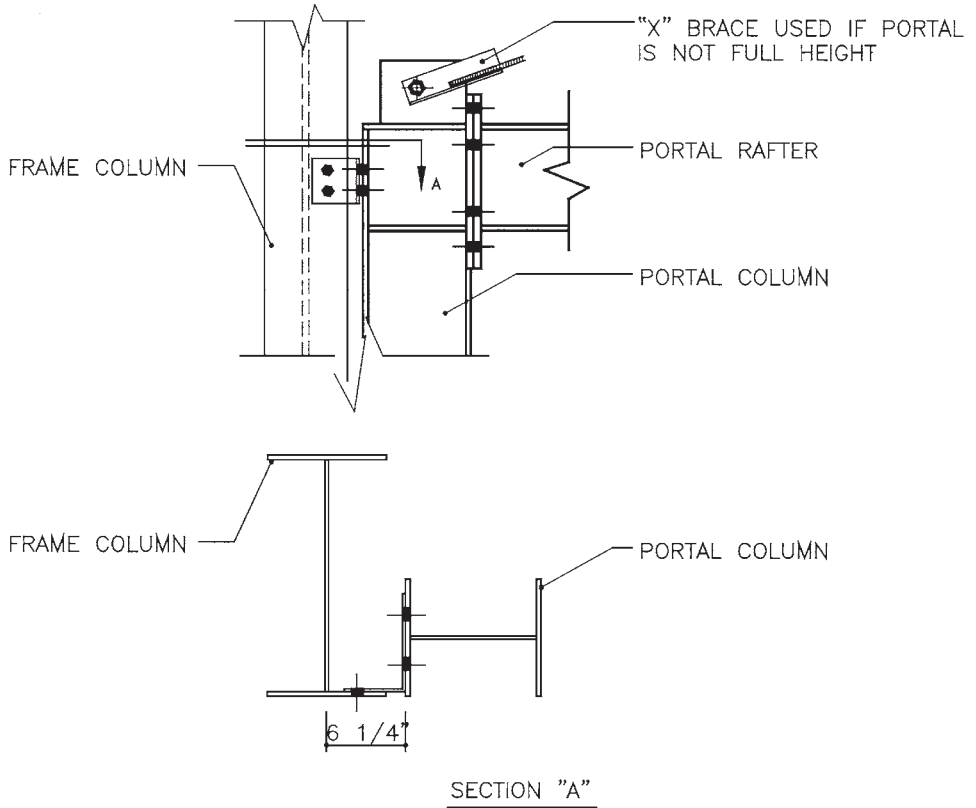
FRAME COLUMN

"X" BRACE USED IF PORTAL IS NOT FULL HEIGHT

PORTAL RAFTER

PORTAL COLUMN

FRAME COLUMN

PORTAL COLUMN

6 1/4"

SECTION "A"

FIGURE 3.30 Details of portal frame connection to building frame. (*Nucor Building Systems.*)

FLANGE BRACE
FBC

(1) 1/2" ø X 2" A325
BOLT H0603/NUT H0300
@ EACH END

HORIZONTAL
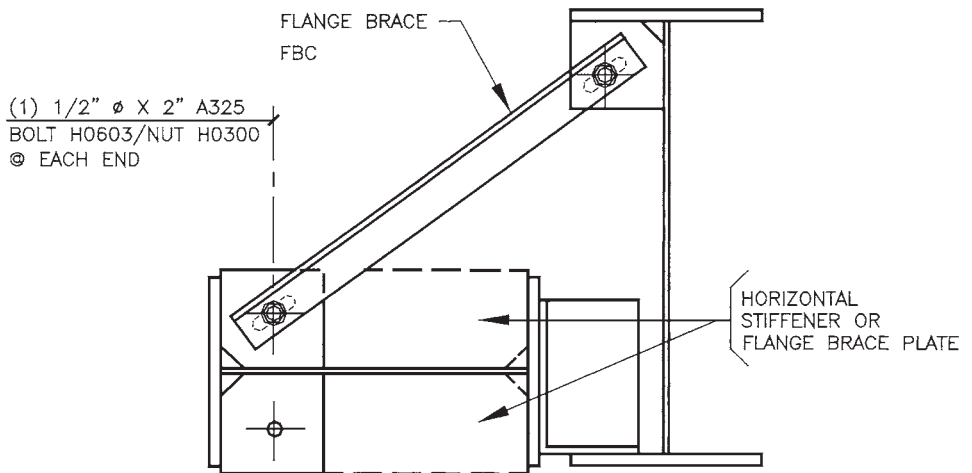STIFFENER OR
FLANGE BRACE PLATE

FIGURE 3.31 Both flanges of the portal frame column are laterally braced to the building frame. (*Nucor Building Systems.*)