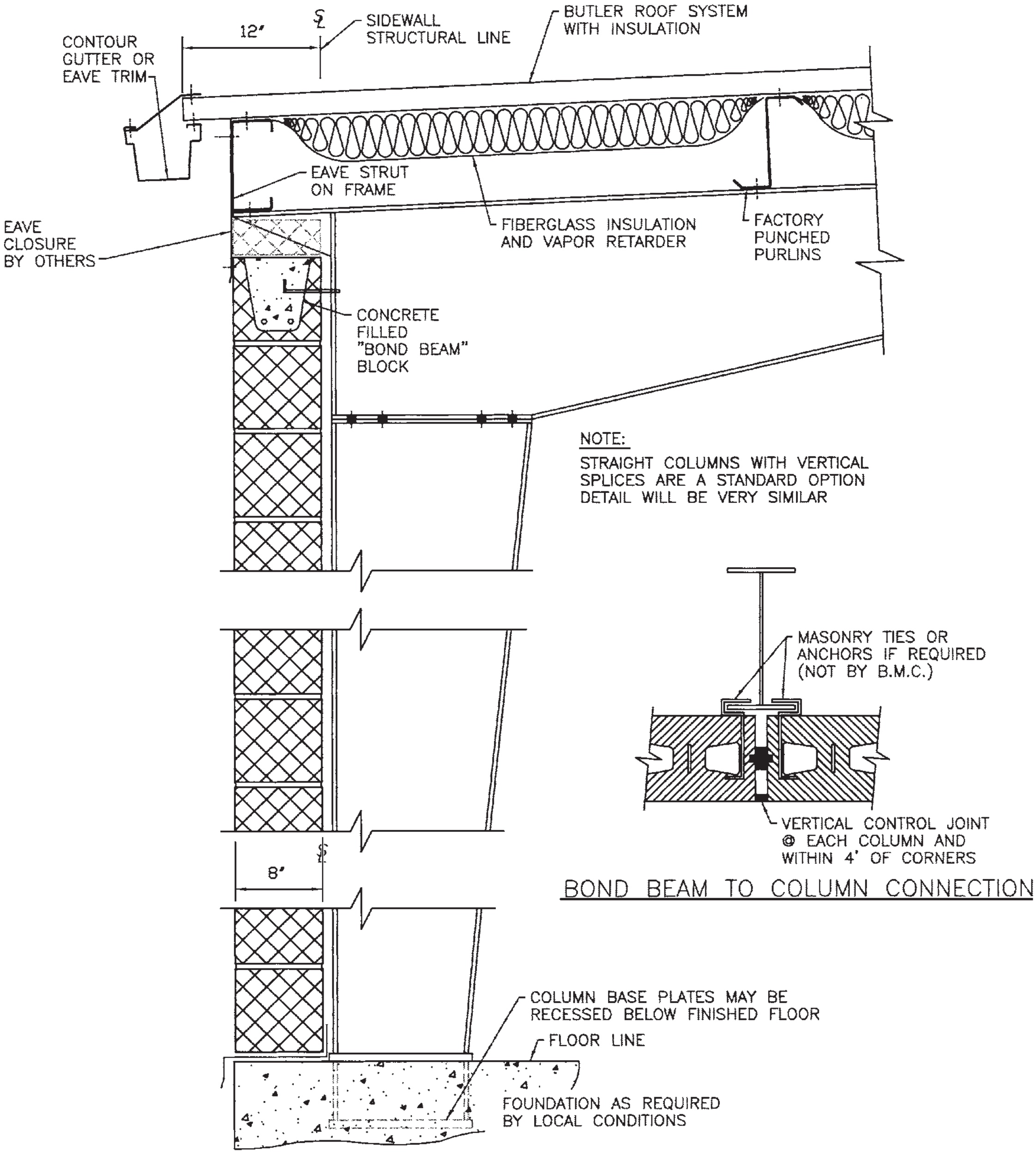

FIGURE 7.27 Horizontally spanning single-leaf CMU wall. (*Butler Manufacturing Co.*)

$$\frac{1.57}{(40)(7.625)} = 0.0051 > 0.0007 \qquad \text{OK}$$

Also

$$0.0051 > 0.00133$$

Since the horizontal bars provide more than two-thirds of the total, the vertical reinforcement need not be spaced closer than 48 in o.c. and its area needs to be only

$$A_v = 0.0007(48)(7.625) = 0.256 \text{ in}^2$$

Use #5 vertical bars at 48 in o.c. ($A_v = 0.31$ in^2).

Find the reaction on the anchors attaching CMU to steel column (the anchors are spaced 40 in o.c., at each bond beam):

$$R_{max} = 25(40/12)(25)/2 = 1042 \text{ lb}$$

This is a substantial force, and the connectors must be selected with care.

Therefore, select #5 vertical bars spaced 48 in o.c. and two #8 bars placed in horizontal bond beams spaced 40 in o.c. (Compare the overall amount of reinforcement in this example to that of Example 7.1 for a vertically spanning wall.)

7.5 BRICK VENEER WALLS

7.5.1 Brick Veneer over CMU

This system combines the advantages of CMU walls such as durability and fire resistance with elements of a rain screen cavity wall. Figure 7.28 depicts a version of this wall as conceived by some major manufacturers, with CMU spanning horizontally between the columns. As stated in the previous section, we would prefer a wall that spans vertically with a tubular member on top or a wide-flange girt placed behind the wall. A cold-formed girt will likely not be rigid enough for this application; a hot-rolled channel would tend to sag under its own weight in the absence of any sag rods.

In this system, brick veneer and block are connected by adjustable ties, which transfer the design lateral loads even at the outer limits of their movement. Brick's function is nonstructural, and all lateral loads are resisted by CMU; one can use 4-in split-face block or stone instead of brick without changing the CMU design. All structural considerations discussed above for a single-leaf masonry wall apply to the CMU of this assembly as well.

To improve insulating properties of masonry cavity walls, rigid insulation can be added into the cavity; it can also go on the inside surface of the CMU between furring channels and gypsum board. The wall cavity should be at least 2 in wide, but the width can be reduced to 1 in if rigid insulation or drainage board is placed there. The base flashing should be turned up behind the brick and firmly embedded into a block joint.

Masonry cavity walls are rarely considered "systems" by either specifiers or code officials, in the sense that other curtain-wall systems such as EIFS (see Sec. 7.7.2) are conceived and tested. Instead, masonry is still thought of as an assembly of block and mortar; both components are specified and tested separately. As Kudder[11] points out, many masonry tests are available, but most predate cavity walls. For example, there is no standard watertightness test of the whole cavity-wall assembly with flashing and control joints. And yet, as architects well know, problems traced to improper flashing details and installation cause more harm than masonry materials that do not quite conform to the specifications. Other common occurrences that may compromise watertightness include mortar bridging the cavity and poorly filled mortar joints.

Brick and CMU are not identical in nature and performance, though both are masonry materials.