

Thinking Outside the Frame

Benefiting from a masonry cavity wall on a structural steel framing system BY CHARLES OSTRANDER, PE

In designing a two to three story industrial or school building for a client, the structure may be predetermined to be a structural steel frame system rather than a loadbearing masonry system.

MEETING THE CHALLENGE

Given the selection of the building to be structural steel and the interior and exterior steel columns and beams with a poured concrete topping on the metal deck, how do you express a masonry exterior with the following requirements?

- cost effectiveness
- energy efficiency
- speed of construction
- simplicity of design

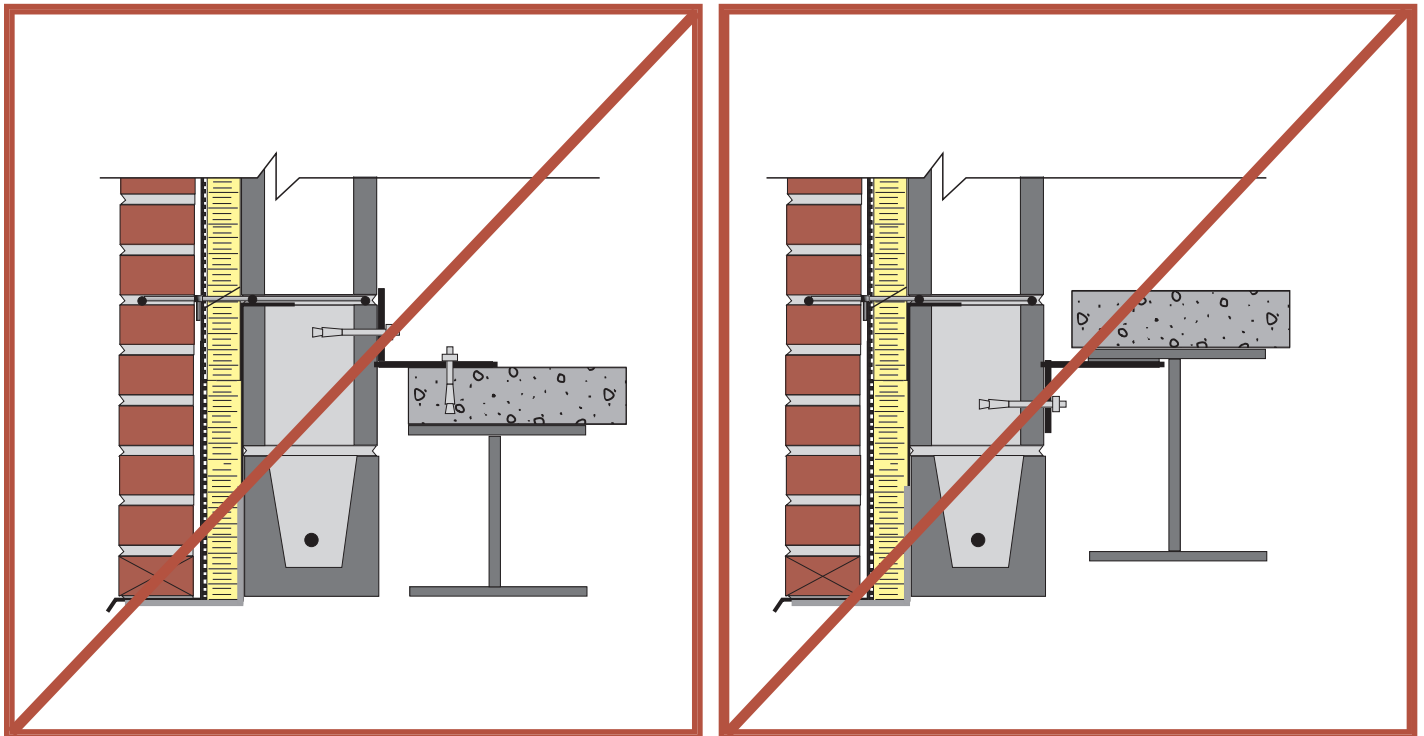
Properly integrated and planned, a brick and block cavity wall can be built on the exterior of the erected steel columns and beams. This

masonry system bypasses all beams and columns and doesn't bear on the poured concrete metal deck edge. Sitting the masonry on a metal deck would slow down the construction considerably because the masonry could not start until the metal decks were poured (Figure 1).

PLANNING FOR COST SAVINGS AND SIMPLICITY

The masonry wall must be laterally tied back through the steel frame at the bottom of the edge of the beam for lateral support at each floor level (Figure 2). The next important consideration in designing the masonry of the exterior to this building is the size and location of the masonry openings. The windows must fit the masonry modular design dimensions (length and height must be divisible by 8"). The masonry between the windows must also be design modularly and be divisible by 8". The inside face of the block back up unit should be detailed to bypass the edge of the slab and the bottom edge of the beam with at least 1½" clearance. Figure 2 is an isometric drawing of the theoretical 42' high wall, attached to a steel frame of the building.

Figure 1. Details to avoid



1. Bad because you have to wait for the deck to be poured, slowing the job down.
2. Can or may interfere with the interior finish.

1. Bad because you have to be a leprechaun to install this angle between the wall and the beam.

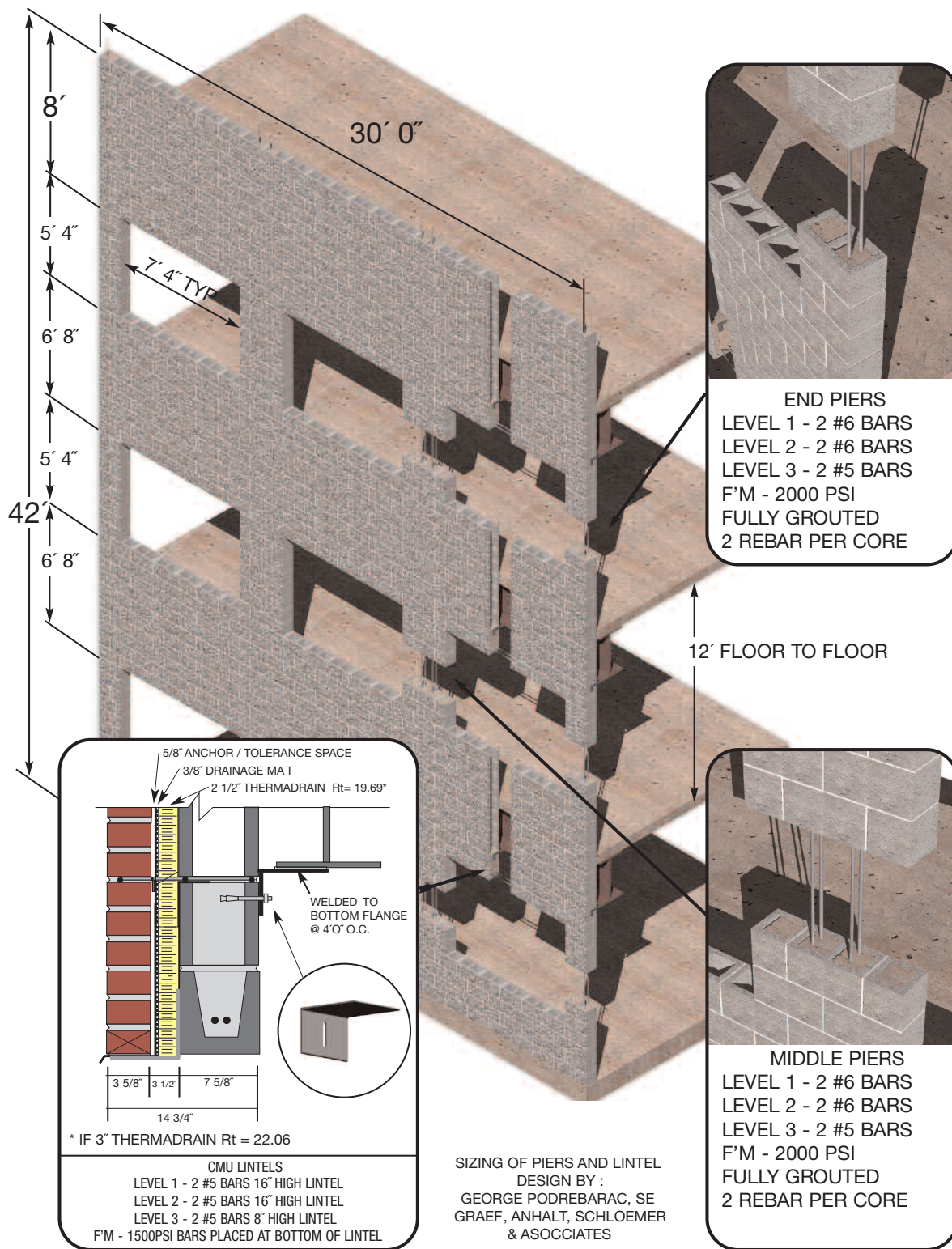


Figure 2. Isometric drawing of the theoretical 42' high wall, attached to a steel frame of the building. The masonry wall must be laterally tied back through the steel frame at the bottom of the edge of the beam for lateral support at each floor level. The wall cross-section and R-value of the proposed walls is laid out for designers' information and design consideration.

For simplicity, the brick exterior and the horizontal joint reinforcing is not shown in the drawing, but it would be placed 16" oc vertically.

Another cost saving is the elimination of structural steel lintels to span the masonry openings. Grouted bond beams are already present in the CMU. No cutting is required around the structural steel with associated lower masonry productivity. CMU bond beams, with depth (8", 16", 24" +) grouted as required, are clean and simple — and just one trade is involved!

A WORD OF CAUTION

With this design and construction method under consideration, an important item to remember is that the lateral support at each floor must be installed onto the wall of the structural steel when the wall is just above the slab to maintain lateral support. You cannot install three stories of this masonry wall and then install the bracket supports on the wall to the structural steel for the full height. It has to be done on every floor, the next day after that floor height is achieved. **ME**