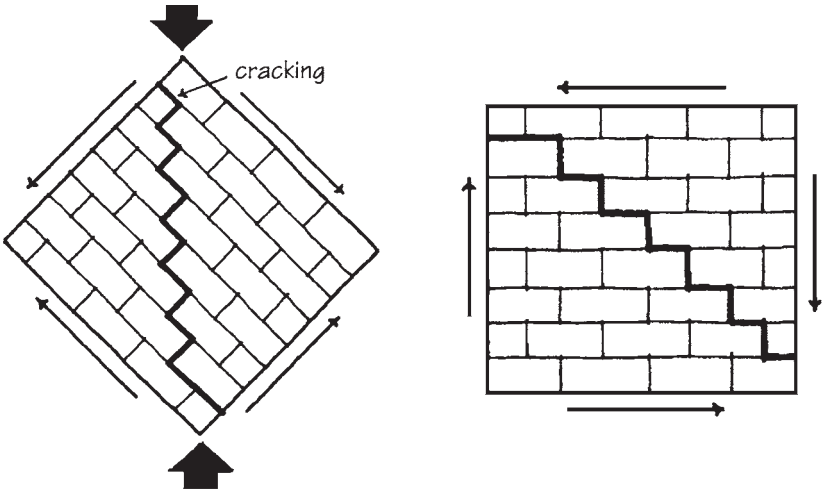

Figure 12-10 Diagonal tension.

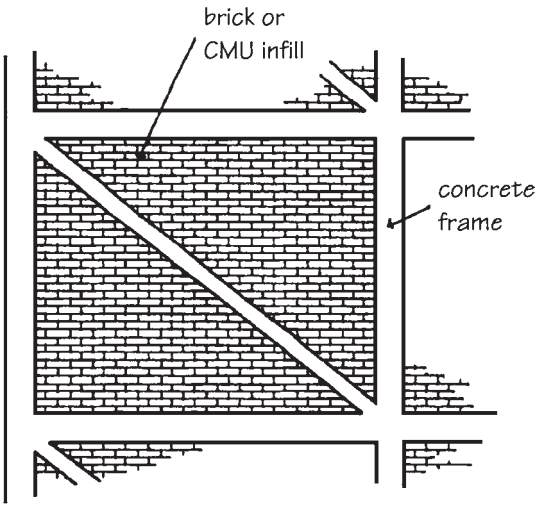

Figure 12-11 Masonry infill panels.

impact of heavy debris as well as the concussive force of the large air mass produced as the towers fell.

12.1.5 Beams and Girders

The use of reinforcing steel in masonry construction permits the design of flexural masonry members such as lintels, beams, and girders to span horizontal openings (*see Fig. 12-12*). This gives a continuity of materials, finishes, and fire ratings by eliminating the introduction of other materials solely for flexural spans.

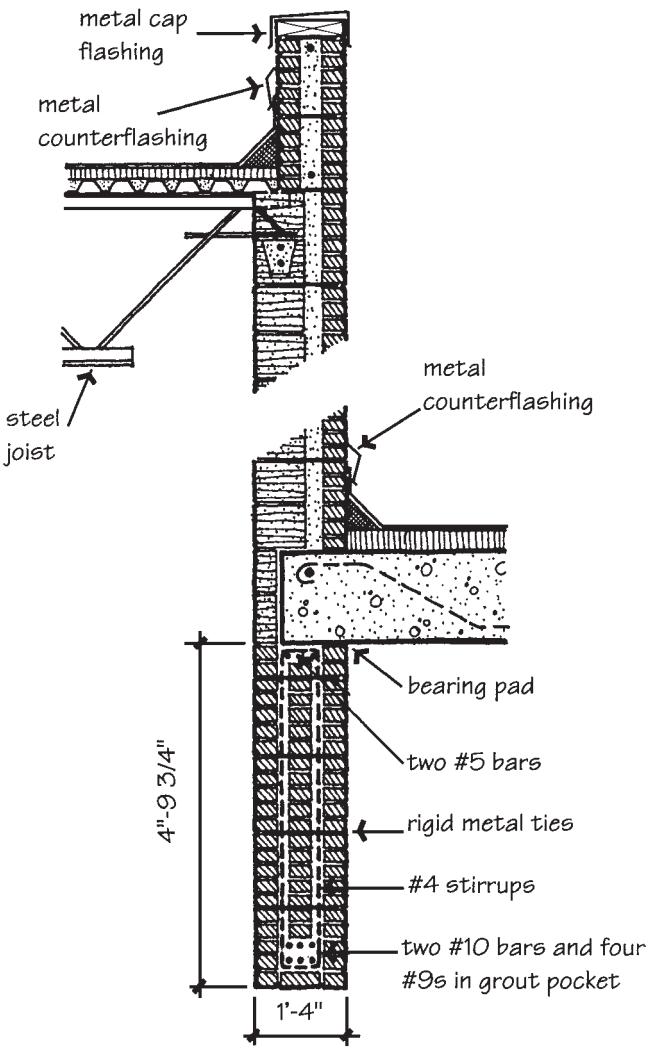

Figure 12-12 Example of reinforced masonry beam.

The design of reinforced masonry beams and girders is based on the straight-line theory of stress distribution. The required steel is determined by actual calculated stress on the member. The reinforcement needed to resist this stress is then provided in the necessary amounts and locations. The member must be designed to resist at all sections the maximum bending moment and shears produced by dead load, live load, and other forces determined by the principles of continuity and relative rigidity. Building codes place deflection limits on all flexural members which support unreinforced masonry.

The concept of deep masonry wall beams is based on a wall spanning between columns or footings instead of having continuous line support at the bottom as in conventional loadbearing construction (*see Fig. 12-13*). If soil-bearing capacities permit this type of concentrated load, the wall may be designed as a flexural member and must resist forces in bending rather than in direct compression.

Deep wall beams may also be used to open up the ground floor of a load-bearing structure. The bearing wall on the floor above can be supported on