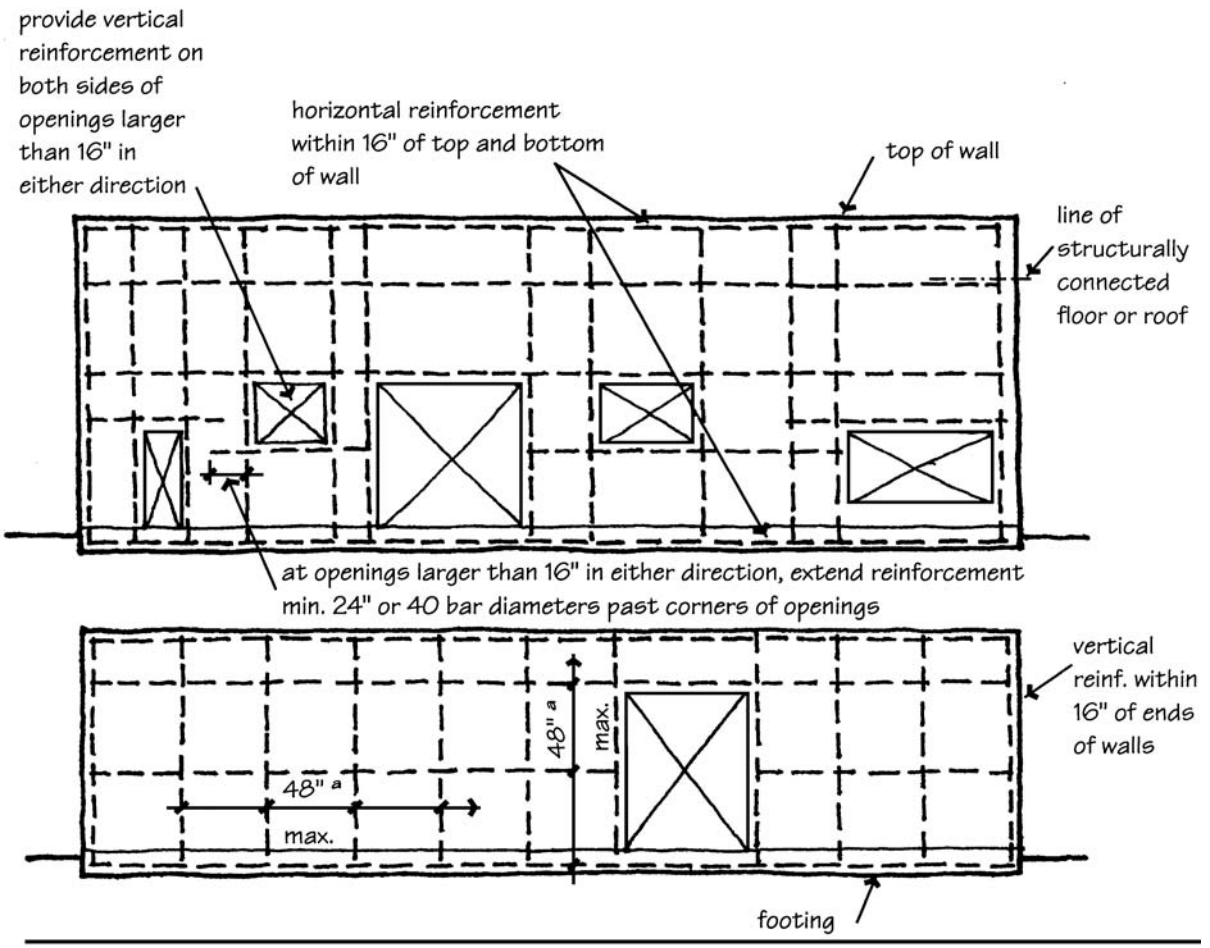

[a] Masonry elements that are part of the lateral-force-resisting system must have reinforcement in *both* the vertical and horizontal direction. The sum of the cross-sectional area of horizontal and vertical reinforcement must be 0.002 times the gross cross-sectional area of the wall, with 0.0007 minimum in each direction. Reinforcement must be evenly distributed and have a maximum spacing of the smaller of 1/3 the wall height, 1/3 the wall length, or 4'-0" on center. *Requirements for stack bond masonry are more restrictive.*

Figure 12-36 Minimum reinforcement required in Seismic Design Categories D, E, and F. (*Based on MSJC,* Building Code Requirements for Masonry Structures, *ACI 530/ASCE 5/TMS 402-02.*)

Type of Shear Wall	Design Method	Minimum Required Reinforcement	Permitted in Seismic Design Category
Empirical	Empirical Design	None	A
Ordinary Plain (unreinforced)	Allowable Stress Design, Strength Design, or Prestressed Masonry	None	A, B
Detailed Plain (unreinforced)	Allowable Stress Design or Strength Design	*Vertical* reinforcement of minimum one No. 4 or two No. 3 deformed steel bars area at corners, within 16" of each side of openings, within 8" of each side of movement joints, within 8" of the ends of walls, and at a maximum spacing of 10 ft. *Horizontal* reinforcement of either 2-wire, 9 gauge prefabricated joint reinforcement or minimum one No. 4 or two No. 3 deformed steel bond beam bars continuously at structurally connected roof and floor levels, within 16" of the top of walls, at the bottom and top of wall openings extending at least 24" or 40 bar diameters past the opening*, as well as 2-wire, 9 gauge prefabricated joint reinforcement spaced not more than 16" on center or minimum one No. 4 or two No. 3 deformed steel bond beam bars spaced 10 ft. on center.	A, B
Ordinary Reinforced	Allowable Stress Design or Strength Design	*Vertical* reinforcement of minimum one No. 4 or two No. 3 deformed steel bars at corners, within 16" of each side of openings, within 8" of each side of movement joints, within 8" of the ends of walls, and at a maximum spacing of 10 ft. *Horizontal* reinforcement of either 2-wire, 9 gauge prefabricated joint reinforcement or minimum one No. 4 or two No. 3 deformed steel bond beam bars continuously at structurally connected roof and floor levels, within 16" of the top of walls, at the bottom and top of wall openings extending at least 24" or 40 bar diameters past the opening*, as well as 2-wire 9 gauge prefabricated joint reinforcement spaced not more than 16" on center or minimum one No. 4 or two No. 3 deformed steel bond beam bars spaced 10 ft. on center.	A, B, C
Intermediate Reinforced	Allowable Stress Design or Strength Design	*Vertical* reinforcement of minimum one No. 4 or two No. 3 deformed steel bars at corners, within 16" of each side of openings, within 8" of each side of movement joints, within 8" of the ends of walls, and at a maximum spacing of 4 ft. *Horizontal* reinforcement of either 2-wire, 9 gauge prefabricated joint reinforcement or minimum one No. 4 or two No. 3 deformed steel bond beam bars continuously at structurally connected roof and floor levels, within 16" of the top of walls, at the bottom and top of wall openings extending at least 24" or 40 bar diameters past the opening*, as well as 2-wire 9 gauge prefabricated joint reinforcement spaced not more than 16" on center or minimum one No. 4 or two No. 3 deformed steel bond beam bars spaced 10 ft. on center.	A, B, C
Special Reinforced	Allowable Stress Design or Strength Design	Combined vertical and horizontal reinforcement at least 0.002 times gross cross-sectional area of wall, with a minimum of 0.0007 times gross cross-sectional area of wall in each direction, uniformly distributed and spaced at the smaller of 1/3 the length of the shear wall, 1/3 the height of the shear wall, or 4 ft. on center for masonry laid in other than stack bond. Shear reinforcement must be anchored around vertical reinforcing bars with a standard hook.	A, B, C, D, E, F

* Reinforcement adjacent to openings need not be provided for openings smaller than 16 in. in either the horizontal or vertical direction, unless the spacing of distributed reinforcement is interrupted by such reinforcement.

Figure 12-37 Masonry shear wall types. (*Based on requirements of MSJC,* Building Code Requirements for Masonry Structures, *ACI 530/ASCE 5/TMS 402-02.*)