LATERAL FORCE DESIGN ELEMENTS

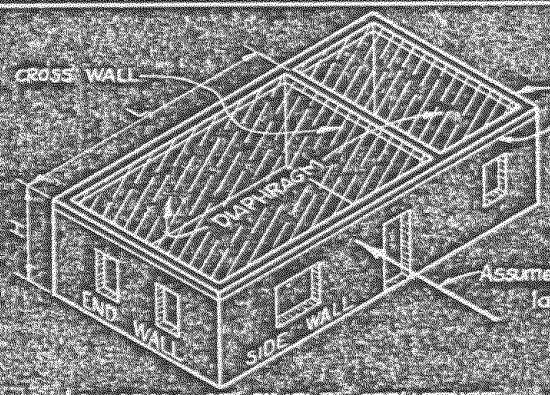

DIAGRAM OF SIMPLE STRUCTURE

ELEMENT OF STRUCTURE	PRINCIPAL FUNCTIONS UNDER LATERAL FORCES	REMARKS ABOUT DESIGNING AND CONSTRUCTING
DIAPHRAGM	To act as a horizontal girder or plate in distributing forces from roof, ceiling and side walls to the end and cross walls; to do this, and to relieve the side walls of carrying the horizontal roof and ceiling forces as vertical cantilevers, the diaphragm must have rigidity, adequate strength, and must be securely fastened to all the walls through the plate and bond beams.	If the roof is of 1:2.5 slope or flatter, rafters may be diagonally sheathed to function as the diaphragm. Square-laid sheathing is generally too flexible to be effective. If the roof is steeper than 1:2.5, according construction of wall-nailed plywood may be used. A steep roof with no ceiling necessitates a special analysis to make the bond beams and the walls self-sufficient.
BOND BEAM	To act as a tie along the top of the walls, thus giving them considerable extra strength as vertical beams or resisting foundation settlements and other irregular or concentrated loadings. To give the walls additional lateral strength along their tops to resist overhead forces and concentrated reactions from plate and rafters, ceiling joists	The concrete bond beam must have considerable tensile strength continuously around the top of all walls and corners, and it should be well bonded to the top course of masonry. A minimum area of reinforcement equal to 0.0007 times the entire area of the cross-section, wall section is recommended.
SIDE WALLS	To carry the normal forces down to the foundation, up to the bond beam and diaphragm, or sideways to the end and cross walls, depending upon the ratio of L/H, the area and arrangement of openings, and the rigidity of the diaphragm. To resist torsional forces caused by the rotation of the building.	Design the structure as a whole for lateral forces in any direction equal to 10% of the dead weight. Design walls for 20% of their own weight as a load-ing normal to the face. Minimum thickness exterior walls 11 1/2". Reinforcement is recommended. Concrete lintels are recommended. Wall openings should have a total width in any wall of less than 40% of wall length. Avoid corner win-dows. Ratio of height to width of piers between open-ings to be about equal.
END WALLS	To receive the forces from the diaphragm, the bond beam, and the side walls and to transmit them down to the foundations. To resist torsional forces caused by the rotation of the building.	
CROSS WALLS	Same as the end walls except that the values resist-ing torsional forces is usually small.	All mortar to be 1:2 1/2 cement and well-graded sand mortar, waterproofed.
PARAPET WALLS & CHIMNEYS	To carry themselves as vertical cantilevers.	Design and reinforce for horizontal force equal to their own weight.
FOUNDATION	To receive forces from the walls and to transmit them to the ground. To support the walls uniformly at all times so that no cracks develop with consequent loss of wall strength.	Extend to firm, uniform bearing of proper intensity for soil. Provide key for wall mortar. Top and bot-tom horizontal reinforcement is recommended.

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