

ing capacity reduced in accordance with the column formula applicable. Miscellaneous Requirements.

(c) Wooden piles shall be cut off at least 2 inches below the average low water line. Concrete shall be placed completely around the top 10 inches of each pile and rammed between the piles of a cluster to a depth of 10 inches.

Concrete piles cast in place shall be cast in forms sufficiently rigid to prevent collapse before the concrete has attained strength to resist any pressure applied to it. Every pile broken in drying shall be replaced.

Foundation Walls.

8.303 Foundation walls shall conform to the following requirements.

Materials.

(a) Foundation exterior bearing walls shall be constructed of concrete, brick, concrete block or other suitable material not subject to deterioration under normal conditions, and such walls shall extend from the top of the footings to the level of the bottom of the first floor construction. Hollow clay tile shall not be used for foundation walls, unless they are vitrified or salt-glazed, except for surfaces in contact with mortar.

Thickness Required.

(b) Foundation walls shall be not less in thickness than the walls they support, shall be not less in thickness than required in Section 8.403 and in no case shall be less than 12 inches in thickness, except that frame buildings, without veneer, may have foundation walls 8 inches thick. Such 8-inch walls shall be supported at intervals of not to exceed 12 feet with pilasters not less than 8 inches by 12 inches or other equivalent support. Frame buildings with a veneering of masonry may have foundation walls not less than 10 inches thick, if of monolithic concrete of a quality at least equal to that specified in Section 7.101, provided that that portion of the wall between grade and the 1st floor construction is not less than 6 inches in thickness and is reinforced with steel in both vertical and horizontal directions in an amount not less than 2/10 of 1 per cent. of the cross sectional area of such wall, such vertical reinforcement being imbedded in the 10-inch portion of the wall not less than 40 diameters of the bar.

Water Proofing.

(c) Foundation walls serving as basement or cellar walls shall be so constructed as to provide basements or cellars free from dampness. Except for reinforced concrete walls, all such walls below the grade shall be coated on the outside with not less than 1/2 inch of Portland cement plaster and with hot tar or asphalt or other effective water proofing which will permanently exclude water or dampness from the basement or cellar. Reinforced concrete walls shall also be waterproofed, but such waterproofing may be applied to the inside of the wall or may be incorporated in the concrete.

Drainage.

(d) Drainage systems shall be provided for all basements or cellars, except where the nature of the surrounding soil is of such character as to provide natural drainage, or the walls and basement or cellar floor is of reinforced concrete and designed to resist the maximum possible hydrostatic pressure. Such drainage systems shall consist of a line of porous tile, not less than 3 inches in diameter, laid outside of all foundation walls and with the top of such tile at a level not higher than the lowest part of the surface of the basement floor, except where the wall extends to an adjoining property line, in which case the drain tile may be placed on the interior side of the footing. All tile drains shall be laid so as to drain properly and all joints shall be covered with tarred paper or other suitable material. Where possible tile drains shall be covered with at least 1 foot of cinders or other porous material.

Basement Floors.

8.304 Basement or cellar floors shall be of concrete at least 3 inches thick or the equivalent thereof. Concrete for basement floors shall be of a quality at least equal to that required in Section 7.101 (e).

Section 8.4 MASONRY

Materials.

8.401 The materials used in all masonry construction shall be as specified in Section 7.101.

Working Stresses.

8.402 The maximum allowable working stresses in masonry, shall not, for the different types of masonry specified, exceed the limits given in the following table.

ALLOWABLE WORKING STRESSES IN MASONRY CONSTRUCTION

Table with columns for TYPE OF MASONRY, Allowable compressive stresses in Lbs. per Sq. in. using various mortars (Portland Cement Mortar, Lime Mortar), and Quality equal to that required in Sec. 7.101.

* Where proper provisions satisfactory to the Building Inspector are made for control of the quality of concrete, the allowable stress in compression may be increased to 0.2 of the ultimate strength of the concrete.

† Lime mortar not permitted.

NOTE: Natural cement mortars, approved by the Building Inspector, may be substituted for cement-lime mortar and shall be permitted the same working stresses.

Where the effects of eccentric loading and lateral forces are fully analyzed and allowance made for them in the design, or under local concentrated loads applied to a limited area of the wall, the working stresses in the above table may be increased 50 per cent.

Veneering applied to walls shall not be permitted to carry loads other than its own weight and such load only for such heights as permitted under Section 8.409.

Facing applied to walls and properly bonded thereto shall be permitted the working stresses as given in the above table for the material used in the facing, but the stresses shall not exceed those permitted for the backing of such wall except that facing less than 3 3/4 inches in thickness shall not be considered as part of the required wall thickness nor shall be considered as adding to the wall strength.

8.403 The thickness of masonry walls shall be sufficient at all points to keep the combined stresses due to live and dead loads for which the building is designed, within the limits prescribed by Section 8.402 and not less than the minimum given below.

Solid Brick Walls. (a) Solid brick walls shall have not less than following thicknesses: The minimum thickness for solid brick exterior, bearing or party walls shall be 12 inches for the uppermost 35 feet of their height, except as modified in the table below, and shall be increased in thickness 4 inches for each successive 35 feet measured downward from the top, provided that the thickness shall not be less than that given in the following table:

Table: MINIMUM THICKNESS OF SOLID MASONRY BEARING WALLS. Columns: STORES, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1. Rows: 10th, 9th, 8th, 7th, 6th, 5th, 4th, 3d, 2nd, 1st, Basement.

NOTE: For exceptions to the above requirements for residential buildings see Section 8.403 (g).

Non-bearing walls of solid masonry shall be not less in thickness than specified in the following table, provided, that the uppermost 18 feet of such wall shall be not less than 8 inches thick and that each successive 50 feet or fraction thereof measured downward shall be increased not less than 4 inches and further provided that the thickness shall not be less than that given in the following:

Table: MINIMUM THICKNESS OF SOLID MASONRY NON-BEARING WALLS. Columns: STORES, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1. Rows: 10th, 9th, 8th, 7th, 6th, 5th, 4th, 3rd, 2nd, 1st, Basement.

NOTE: For exceptions to the above requirements for residential buildings see Section 8.403 (g).

Hollow Masonry Walls.

(b) Bearing or non-bearing walls of hollow tile, concrete block, hollow walls of brick or other hollow masonry walls shall have a minimum thickness of 12 inches for the uppermost 35 feet of their height, and not less than 16 inches for the remaining lower portion, except that the top story wall of a building not exceeding 3 stories or 40 feet in height may be 8 inches thick; provided, that the thickness shall be not less than that given in the following table:

Table: MINIMUM THICKNESS OF HOLLOW MASONRY WALLS. Columns: STORES, 4, 3, 2, 1. Rows: 4th Story, 3rd Story, 2nd Story, 1st Story, Basement.

NOTE: Hollow masonry walls may be used in all buildings not exceeding 4 stories or 45 feet in height above grade, provided that not to exceed the uppermost 40 feet of any such wall shall be of hollow masonry wall construction and that any change from solid to hollow wall construction shall be at the intersection with floor construction.

For exceptions to the above requirements for residential buildings see Section 8.403 (g).

Plain Concrete Walls.

(c) The minimum thickness of plain concrete bearing walls shall be not less than 10 inches for the uppermost 35 feet of their height and shall be increased 4 inches for each successive 35 feet or fraction thereof measured downward from the top of the wall.

The minimum thickness of plain concrete non-bearing walls shall be not less than 10 inches for the uppermost 50 feet of their height, and shall be increased 4 inches for each successive 50 feet or fraction thereof, measured downward from the top of the wall, except that the uppermost 18 feet of such wall may be 8 inches thick.

Stone Walls.

(d) The minimum thickness of all stone Ashlar walls shall be as required for solid brick walls and of all rubble stone walls as required for hollow walls.

Veneered Walls.

(e) The materials used in the backing shall govern the thickness of the walls in accordance with the provisions of this section and the veneering shall not be considered as a part of such required thickness.

Faced Walls.

(f) Faced walls shall be at least the thickness required for walls of the type formed by the backing of such faced walls and the facing may be considered as part of such required thickness if properly bonded as provided in Section 8.404. Facing the thickness of which is less than 3 3/4 inches, shall not be considered as adding to the wall strength and shall not be considered as part of the required wall thickness.

Exceptions.

(g) Eight inch walls may be used for Class 3 buildings, when such walls are not over 30 feet in height for solid walls and 20 feet in height for hollow walls. When gable construction is used an additional 5 feet is permitted to the peak of the gable.

Foundation walls for one and two story frame buildings may be eight inches thick, provided such 8-inch walls are supported at intervals of not to exceed 12 feet with pilasters not less than 8 inches by 12 inches, or other equivalent support.

Miscellaneous Requirements for Wall Thicknesses.

(h) No wall less than 10 inches in thickness shall be subjected to lateral thrust of rafters.

Every wall over 100 feet long shall have the normal required minimum thickness increased by 4 inches. In determining the length of a wall, for the purpose of this provision, the length shall be terminated by any solid masonry pier not less than twice the wall thickness in width and three times the wall thickness in length or by any break or cross-wall supported at both ends by masonry walls, which break or cross-wall shall be as high as the supported wall and shall have a length of at least 1/4 of its height.

Masonry veneer shall be not less than 3 inches thick, except that masonry veneer 2 1/4 inches thick may be used for a height not exceeding 12 feet with an additional 5 feet for average height of gable. Such materials shall have a reasonably uniform thickness, but all material need not necessarily be the same thickness.

Bond.

8.404 All masonry work composed of brick, tile or other masonry units shall be bonded in accordance with the following provisions:

Solid Brick Walls.

(a) All stretcher courses shall be bonded by breaking vertical joints by 1/2 the length of the brick in each course. In common brick every seventh course shall be a full header course. Face brick shall be bonded with a full header course every seventh course unless the face brick are other than standard thickness (2 1/4 inches) in which case the distance from center to center of header courses shall not exceed 21 inches. All brick may be bonded with other than full header courses if the same number of bond brick are used as would be required for full header courses every seventh course and are uniformly spaced. Blind, split or diagonal headers or metal ties shall not be accepted as fulfilling the requirements for bonding.

Hollow Walls.

(b) Running bond shall be provided by projecting the units of each course not less than 4 inches beyond the unit below, but in all cases the units shall be so placed as to produce vertical alignment of vertical webs when cells are vertical. When two or more units are used in the thickness of the wall, cross bond shall be provided by off-setting

each alternate course by at least 4 inches, and in all cases vertical webs shall be in vertical alignment both in end and side construction. Hollow walls of brick or concrete may be constructed when provided with such ties of brick or plain or reinforced concrete, as are required to cause the wall to resist pressure as a whole. Cross ties of brick and cross ties of plain concrete shall be equal to at least 18 per cent of the area of the wall. Metal cross ties not imbedded in concrete shall not be accepted.

Stone Walls.

(c) Ashlar stone walls shall be provided with bond stones to the extent of not less than 15 per cent of the wall area and such bond stones shall be uniformly distributed.

Rubble stone walls shall be bonded so as to develop bond strength equivalent to that specified for ashlar stone walls.

Veneered Walls.

(d) When masonry walls are veneered, the veneering shall be tied in the backing either by a header every 5 square feet of wall surface, or by substantial non-corroding metal wall ties spaced not further apart than 1 foot vertically and 2 feet horizontally. Headers shall project at least 3/4 inches into the backing. Wall ties shall be firmly anchored in the backing.

Masonry veneer on frame construction shall be tied to the wall with non-corroding metal ties spaced 1 ft for every 2 square feet of wall surface. Ties shall be not thinner than 24 gauge metal and not less than 3/4 inch wide.

(e) Brick facing shall be bonded into the backing as required by solid brick work.

Stone ashlar facing for walls shall be bonded by making at least 20 per cent of the wall area of stones at least 4 inches thicker than the remainder. These bond stones shall be uniformly distributed throughout the wall and in addition non-corroding metal anchors at least 1 inch by 3/16 inch and eight inches long shall be provided to bond all stones, not bond stones, over 4 square feet in area with at least one such anchor for each 4 square feet of area or fraction thereof.

Miscellaneous Bond Requirements.

(f) All walls, except non-bearing partitions, shall be securely bonded at points where they intersect, and all buttresses, piers, and pilasters shall be securely bonded to all walls they support. Such bond shall be not less than the projection of each second stretcher course across the plane of intersection at least 4 inches. Where walls are not built at the same time, or when a portion of the wall is carried higher than the remaining portion, suitable provision shall be made for continuing or bonding the walls by racking back and providing the proper overlap for each course of masonry.

Lateral Support.

8.405 Masonry walls shall be laterally supported at right angles to the wall, by supports spaced either horizontally or vertically at the intervals specified in the following table for the different types of walls. Such lateral support may be obtained by cross walls, piers, pilasters or buttresses, or by limiting distance to all walls their support. The limiting distance is vertical. Sufficient bonding or anchorage shall be provided between the wall and the supports to resist the assumed wind load, acting in any direction. Piers, pilasters or buttresses relied upon for lateral support shall have a sufficient strength and stability to transfer the wind force, acting in either direction, to the ground. When walls are dependent upon floors for their lateral support, provisions shall be made in the building to transfer the lateral forces resisted by the floors to the ground.

MINIMUM SPACING OF LATERAL SUPPORTS FOR MASONRY WALLS

Table: Type of Wall, Maximum Distance Between Lateral Supports Measured in Terms of Wall Thickness. Rows: Solid Brick, Plain Concrete or Ashlar Stone, Hollow Masonry or Rubble Stone, Veneered, Faced, Chases, Recesses and Openings.

8.406 There shall be no chases within the required area of any pier, and no chase in any bearing or fire wall shall reduce the thickness to less than 2/3 of the normal required thickness nor to less than 8 inches. No chase shall be cut into any hollow wall as to materially impair its strength unless the broken units are removed and the wall properly rebuilt with solid units or concrete.

Every wall, except a spandrel or apron wall, having its normal area in any horizontal section decreased more than 50 per cent by openings, recesses and/or other reductions of area, shall have the thickness increased 4 inches.

All horizontal openings shall be bridged at the top by steel, reinforced concrete, structural clay tile lintels, masonry arches or other approved support. Such supports shall be designed to carry the weight of the wall included in an equilateral triangle, the base of which is the top of the opening, and all loads applied to the wall within this triangle. All arch action shall be resisted by adequate abutments or tie rods. The rise of structural arches shall be not less than 1 inch per foot of span. Provisions shall be made for the proper distribution of any concentrated load applied to any arch.

Fire and Fire Division Walls.

8.407 Fire and fire division walls shall be constructed so as to afford a 4-hour fire resistance rating.

Solid Fire Walls.

(a) Solid brick and plain concrete fire walls shall be not less in thickness than that required for bearing walls of corresponding height. No 8-inch fire wall shall be broken into, subsequent to erection, for the insertion of structural members, except when adequate assurance is provided that the required 6 inches of solid masonry separation is maintained at all points.

Party walls which function also as fire walls shall conform to the requirements of fire walls.

A separation of at least 6 inches of solid masonry shall be provided in all fire and party walls between combustible members which may enter from opposite sides.

Hollow Fire Walls.

(b) Hollow fire walls shall be not less in thickness than that required for exterior bearing walls of corresponding construction and height.

No fire walls of the above type shall be broken into, subsequent to erection, for the insertion of structural members, unless all broken units are removed and replaced with solid units.

Where combustible or unprotected steel building members frame into hollow party or fire walls of thickness not greater than 12 inches, they shall not project more than 4 inches into the wall and shall be so spaced that the distance between the embedded ends is not less than 6 inches. The space within 4 inches of such members shall be filled with solid masonry.

Open cells in tile or block, occurring at wall ends, shall be filled solid with concrete for at least a depth of 6 inches, or closure tie set in opposite direction shall be used.

Party walls which function also as fire walls shall conform to requirements for fire walls.

Fire Division Walls.

(c) Fire division walls of solid brick or plain concrete shall be not less than 8 inches thick. Fire division walls of hollow construction shall be not less than 12 inches thick in any part. Fire division walls shall be considered the equal of fire walls when supported at every story, on fire resistive construction having all sup-

(Continued on page nine)