per foot of length of tread. Winders of any type shall not be used as a required means of egress from any place of public assemblage, the capacity of which as determined by Section 6.105 is more than 200 persons.

Doors.

(e) Doors opening upon the head of a flight of stairs shall not open immediately on such flight but on a landing the length of which is not less than the width of the door. Doors giving access to stairs at an intermediate point in the flight shall open upon a landing and shall not in any point of the swing decrease the width of such landing to less than 36 inches. All doors giving access to stairs shall swing with the exit travel and when open shall not interfere with the full use of the stairs.

Railings and Stair Widths.

(f) All stairs shall have walls or well secured balustrades or guards on both sides and shall have handrails on both sides. Any stairway 88 inches or more in width shall be provided with one or more intermediate handrails, substantially supported, the number and position of such intermediate handrails where used to be such that there will be not less than 44 inches nor more than 66 inches between adjacent handrails.

Landings.

(g) Stairways exceeding 12 feet vertical rise shall have an intermediate landing of at least 4 feet in length.

Miscellaneous Provisions.

(h) The space beneath any stairway, except stairways constructed entirely of fire resistive construction, shall be left entirely open or be completely enclosed without door or other opening.

Stairway Enclosures.

6.302 (a) All required stairways leading to floors above the first shall be enclosed as provided in this Section. (See also requirements of Section 10.3.)

General Provisions.

(b) When a stairway is required to be enclosed, such enclosure shall include all landings or parts of floor between stairways which lie in the path of egress travel, so that once inside the enclosure, persons may go from any part of the stairway to the outside exit without leaving the enclosure, except that not to exceed ½ of the required stairways may discharge on the ground floor.

Not less than ½ of the required stairways from every sub-basement to the first floor or grade shall be enclosed in type 2 or better enclosures, except that horizontal exits may be substituted for the enclosed stairways.

In basements, the number of occupants of which, as determined by Section 6.105, is 20 or more, not less than half of the required stairways shall be enclosed in type 2 or better enclosures, except that horizontal exits may be substituted for all except one of such stairways.

Type 1 Enclosure (Smoke proof tower).

(c) Stairways conforming to the requirements of smoke-proof towers, or type 1 enclosures, shall be completely enclosed by solid masonry walls not less than 8 inches thick or by walls of other materials and construction affording 4 hour fire resistance rating. The enclosure shall extend from the sidewalk, court, or yard level to a roof bulkhead or penthouse and shall be capped by fire resistive materials not less than four inches thick. There shall be no openings in walls separating the enclosure from the interior of the building. Fixed or automatic fire windows are permitted in an exterior wall not subject to severe fire exposure hazard from the same or nearby buildings. The stairs, landings, platforms and balconies of smoke-proof towers shall be solid and made of incombustible materials throughout, except that the handrails may be made of combustible material. Stairways of smokeproof towers shall provide continuous uniform width of egress from the roof to grade. Access to the stairway shall be provided from every story through vestibules open to the outside on an exterior wall or from balconies overhanging an exterior wall, but not subject to severe fire exposure. Every such vestibule or balcony shall have an unobstructed length and width not less than the required width of exit doors serving same, and shall be directly open to a street, alley, yard, or an enclosed court open at the top, not less than 18 feet in width and 1000 square feet in area. Balustrades on the vestibules and balconies shall be constructed of incombustible materials not less than 4 feet high and solid, except for small openings for drainage. All windows or other wall openings within 10 feet of such balconies shall be protected by wired glass in stationary metal sash and frames or fire doors and shutters. Access from the building to the vestibules or balconies and from the balconies or vestibules to the stairway shall be through doorways not less than 40 inches wide, provided with standard class B self-closing fire doors swinging with the exit travel. Where locks or latches are provided they shall be of a pressure release type. Clear wired glass not less than ¼ inch in thickness and not exceeding 720 square inches in area shall be provided in all doors giving access to the stairway enclosure. The floor level of the vestibule or balcony shall be placed approximately 7½ inches below the floor level of each story and there shall be no step from the vestibule or balcony into the stair enclosure.

Where Required

One type 1 enclosure shall be required in all buildings over 6 stories in height, unless there is a horizontal exit provided, in which case no type one enclosure need be provided but all required stairways shall be enclosed in a type 2 enclosure. Each unit of width in a type 1 enclosure shall be rated as 1½ stairway units.

Type 2 Enclosure

(d) Type 2 enclosures shall be required in all buildings 4 or more stories in height for all required stairways and shall be constructed of 4 inch masonry walls or other types of fire resistive construction affording at least 2 hours fire resistance rating. No openings from the building into the enclosure shall be allowed other than those required for exit openings and all such openings shall be protected by standard Class B fire doors. Openings in such enclosures in exterior walls shall be protected by fire windows or fire shutters.

Type 3 Enclosures

(e) Type 3 enclosures shall be required in all buildings 3 stories in height for all required stairways and shall be constructed of 2"x4" wood studs, firestopped with incombustible material and protected on both sides with construction affording at least 1 hour fire resistance rating. No openings from the building into the enclosure shall be allowed other than those required for exit openings and all such openings shall be protected by standard Class C. fire doors. Openings in such enclosures in exterior walls shall be protected by fire windows or fire shutters.

Exceptions

(f) In buildings of Type I or II construction, the enclosure may be omitted from the first floor on those stairways not required to lead directly to an outside exit by the provisions of Section 6.205 (d) provided, however the stair shaft shall be completely enclosed at the second floor level. In buildings in which such enclosure is omitted there shall be at least one enclosed stairway completely enclosed to the grade exit.

Fire Escapes

6.303 (a) Fire escapes shall in addition to the following requirements conform to the requirements of the Fire Marshal Division of the Department of Insurance of the State of Michigan.

Where doors or casements lead to outside balconies the level of the balcony floor shall be approximately 7½ inches below the sill.

The surface of treads and balconies shall be such as not to involve danger from slipping.

Maintenance

(b) Steel members shall be painted before and after erection. Fire escapes shall be inspected at least annually, and shall be scraped and painted as often as necessary to maintain them in proper condition and prevent deterioration. They shall be kept clear of all encumbrances and promptly cleaned after snow or ice has accumulated upon them. No obstructions or wires shall be permitted on or near outside stairs or fire escapes. Electric light or power wires shall not be directly over or within 3 feet of fire escapes, unless such wires are enclosed in rigid conduit. Any obstructions found which in any way hinder the proper use of the fire escape shall be promptly removed.

Ramps

6.304 (a) Wherever stairs are required in this Code ramps may be substituted.

Ramps used for pedestrian travel shall not have a slope greater than 1 foot vertical in 8 feet horizontal and shall be surfaced with a suitable non-slip material to avoid danger from slipping.

Handrails shall be required on all ramps used for pedestrian travel having a greater slope than 1 foot vertical in 12 feet horizontal. All other requirements for stairways shall apply in as far as they are applicable, such as strength, width, enclosure, landings, lighting, etc. provided, however, ramps with a slope of not more than 1 foot vertical in 10 feet horizontal or less need not be provided with landings.

Doors

6.305 (a) All doors used in connection with exits shall be substantially constructed and installed in a workmanlike manner, and be fitted with reliable hardware. All exit doors shall swing with the exit travel, except in the following cases:

Exit doors at street level from stairways serving an occupancy of 30 persons or less or ground floor exits serving 120 persons or less, number of persons served to be as determined by section 6.105.

Sliding doors may be used only where permitted elsewhere in this Code.

Shall Not Project

(b) Doors when open shall not project beyond the right of way line.

Locks

(c) All doors used in connection with exits shall be so arranged as to be readily opened from the side from which egress is made. Locks, if provided, shall not require a key to open from the inside.

Panic Bolts

The exterior exit doors of schools and all exit doors of school auditoriums, theatres, motion picture theatres and all places of assembly having capacities of 200 persons or more shall be equipped with panic bolts. Exit doors, at grade, or main exit doors, from stairways serving an occupancy of 200 or more and from street or first floor serving an occupancy of 300 or more shall also be equipped with panic bolts. Panic, or fire exit, bolts shall release when pressure of not to exceed 15 pounds is applied to the releasing devices in the direction of exit travel. Such releasing devices may be bars or panels on the latch side of the door and placed at heights suitable for the service required.

Access to Exit Doors

(d) All exit doors shall be so arranged as to be readily visible and no obstructions interfering with access or visibility shall be permitted. No draperies shall be permitted over or in front of exit doors and no mirrors shall be placed in any exit door.

Fire Doors

(e) Where fire doors are required in this chapter, they shall conform to the requirements of Section 10.402 of this Code.

Type Of Doors Prohibited As Exits

(f) Doors used as required exits shall not be of the steel rolling or other vertically operated types. Swinging doors shall be not more than 4 feet wide.

Revolving Doors

(g) Revolving doors shall not be used as a required means of exit, except that approved collapsible revolving doors may be used between the street floor and street, but not at the foot of stairs. All revolving doors shall be so constructed as to collapse in the direction of exit travel when pressure is applied on two opposite wings. When used as required exits, the diameter of the door shall be not less than 6 feet and such door shall be rated as one unit of doorway width.

Horizontal Exits

6.306 (a) Horizontal exits shall consist of protected openings through or around fire walls, fire division walls, absolute or Special fire separations, or they may be bridges constructed entirely of incombustible material connecting two buildings or two sections of the same building separated by one of the above fire separations.

Egress Thru Horizontal Exits

(b) Every fire section serving as an area of refuge thru a horizontal exit shall have in addition to the horizontal exit or exits at least one stairway or other standard exit and shall be so arranged that such stairway or other standard exit cannot be affected by the same fire which may involve the area from which refuge is taken. Egress thru a horizontal exit shall be by means of a continuous path of travel leading from each side of the exit to a stairway or other standard exit leading to outside the building. The floor area of the area of refuge shall be ample to accommodate the people to be served on the basis of 1 person per 4 square feet of floor area, the number of persons to be accommodated to be determined as in Sec. 6.105.

Doors

(c) The unit of width for horizontal exits shall be rated the same as door units as given in section 6.103.

Each opening serving as a horizontal exit shall be protected by at least one self-closing or automatic class B fire door of swinging or horizontal sliding type with direction of opening indicated.

Bridges or Balconies

(d) Bridges and balconies serving as horizontal exits shall have the same width as the doors serving them. They shall be constructed of incombustible materials and shall have a railing not less than 4 feet high. The level of the balcony or bridge floor shall be approximately 7½ inches below the sills of the doors leading to them.

Elevators & Escalators

6.307 Elevators and escalators shall conform to the "American Standard Safety Code for Elevators, Dumbwaiters, and Escalators," A17-1931 of the American Standards Association, 1931 Edition. All elevators and escalators shall be encased in fire resistive enclosures as required for stairways in the same location. Escalators serving as a required means of egress shall normally operate in the direction of exit travel and shall be of the horizontal tread type.

Lighting Of Exits

6.308 All stairways and exits and the passageways appurtenant thereto shall be properly illuminated to facilitate egress. Such illumination shall be continuous during the time the conditions of occupancy require that the exits be open or available. Artificial lighting shall be employed at such places and for such periods of time required to maintain the illumination to the full intensities herein specified.

The floors of exitways of buildings shall be illuminated at all principle points such as angles, intersections, stairways, landings and exit doorways to intensities of not less than 0.5 foot candles and at all other points to intensities of not less than 0.2 foot candles. In auditoriums and places where pictures, motion pictures or other projections are made by means of directed light the illumination of the floors of exitways may be reduced during the performance or period of projection to intensities of not less than ½ those specified above. The lighting source shall be arranged so as to assure continued illumination of all exitways in case of emergencies.

Exit Signs

6.309 Exit doors and passageways shall have signs visible from the interior exit approach indicating the way of egress. For auditoriums and other places of public assembly accommodating 100 persons or more there shall be placed at each exit door a sign with the word exit in plainly legible letters not less than 6 inches high and with principle strokes of such letters not less than ¾ inch in width, or by internally illuminated signs with letters not less than 4½ inches high and plainly legible.

Signs in corridors and other passageways shall have the words "To Exit" with a suitable pointer or arrow indicating the direction to such exit. The lettering shall be not smaller than that required for exit signs.

Exit signs shall be suitably illuminated by a reliable light and such light shall be contiauous as required for exitways. Externally illuminated exit signs shall have letters on a contrasting field and internally illuminated signs shall have translucent letters in an opaque field.

CHAPTER VII

Materials, Loads and Stresses

Section 7.1 QUALITY OF MATERIALS

Masonry

7.101 Masonry of the different types listed shall conform to the requirements as defined in this section for the quality of materials.

Brick

(a) Brick as used in this Code shall mean a structural unit of burned clay or shale, sand and lime or concrete.

Brick shall be divided into three grades; namely, Grade A, Grade B and Grade C, and the grade of any lot of Brick shall be not higher than that grade, as listed below, to the requirements of which they comply in every respect. Tests shall be made in accordance with the "Tentative Methods of Testing Brick" (A. S. T. M. Designation: C67-30T) of the American Society for Testing Materials. Brick shall be of a quality at least equal to one of the three grades listed below.

CLASSIFICATION OF BRICK

Classification	Compressive Strength Lbs. per Square Inch		Modulus of Rupture Lbs. per Square Inch	
	Mean of 5 tests	Individual Minimum	Mean of 5 tests	Individual Minimum
Grade A ----	4500	3500	600	400
Grade B ----2500-4500		2000	450	300
Grade C ----1250-2500		1000	300	200

Brick shall not be allowed the working stresses permitted for Grade A and B bricks, unless sufficient tests are made at the expense of those persons desiring to use such stresses to assure the Building Inspector that such brick are of the quality necessary to be properly classed as Grade A or B bricks.

Hollow Tile

(b) Hollow clay tile used for exterior or bearing walls or piers or for party walls shall be of a quality at least equal to the "Medium Class" as prescribed by the "Specifications for Hollow Burned Clay load Bearing Wall Tile" of the American Society for Testing Materials, Serial Designation C 34-30. When used for non-bearing purposes and not exposed to the weather, hollow tile may be of a quality not inferior in any respect to the "Soft Class" described in the same specifications.

Concrete Block & Tile

(c) Concrete block and tile shall be of a quality at least equal to Grade A and Grade B blocks as specified in this section.

The average ultimate compressive strength of Grade A or Grade B concrete block or tile shall be not less than 750 pounds per square inch, or for any one specimen a minimum of 650 pounds per square inch, of the gross cross-sectional area when tested in the position used in the wall. The absorption of concrete block or tile shall not exceed 14 pounds per cubic foot of concrete in the block (net), except that where they are not exposed to dampness the requirements as to absorption may be waived. The tests to determine the strength and absorption shall be conducted in accordance with the "Standard Specifications, Serial Designation P-1A—29 of the American Concrete Institute."

Grade A concrete blocks or tile shall conform to all of the above requirements as to strength and absorption and shall in addition conform to the Underwriter's Laboratories Standards for Hollow Concrete Building Units, adopted September 26, 1930.

Concrete blocks or tile bearing the approval of the Underwriter's Laboratories shall be accepted as Grade A blocks.

Stone

(d) Stones to be used in walls shall be hard, sound, free from shale, clay, or loose formation and shall have a compressive strength of at least 6,000 pounds per square inch and shall be laid in their natural bed. Stones used for bearing blocks under concentrated loads shall be hard selected stones.

Plain Concrete

(e) Monolithic concrete containing not more than 0.2 of 1 percent of steel reinforcement shall be classed as plain concrete. Such concrete shall be mixed in proportions of 1 part of portland cement to not more than 6 parts aggregate, but shall be of such quality as to produce concrete of not less than 2000 pounds per square inch average compressive strength.

Mortars

(f) Mortar shall be mixed in the following proportions for different types called for in this Code:

PORTLAND CEMENT MORTAR shall consist of 1 part portland cement to not more than 3 parts sand, with an allowable addition of lime not to exceed 15 percent of the cement by volume.

CEMENT LIME MORTAR shall consist of 1 part portland cement, 1 part hydrated lime and not more than 6 parts sand.

CEMENT-LIME MORTAR FOR USE WITH HOLLOW UNITS IN BEARING WALLS shall consist of 1 part portland cement, 1 part lime and not more than 4 parts sand.

LIME MORTAR shall consist of 1 part, by volume, of hydrated or slacked lime and not more than 3 parts sand. Lime mortar shall be used only in masonry made up of solid units, and shall be used only where more than 2 feet above grade and in buildings not exceeding 2½ stories in height.

Sand And Coarse Aggregate

(g) Sand and coarse aggregates for mortar or plain concrete shall be clean, uncoated grains of strong and durable materials and properly graded in size.

7.102 REINFORCED CONCRETE MATERIALS.

Portland Cement

(a) Portland cement shall conform to the "Standard Specification and tests for Portland Cement," of the American Society for Testing Materials, serial designation C 9-30.

Aggregates

(b) Concrete Aggregates shall consist of natural sands and gravels, crushed rock, crushed air-cooled blast furnace slag, or other materials having clean, uncoated grains of strong and durable materials. (See also Section 8.5)

Water

(c) Water used in mixing concrete shall be clean and free from strong acids, alkalis, or organic matter.

Metal Reinforcement

(d) Metal reinforcement shall conform to the requirements of the "Standard Specifications for Billet-Steel Concrete Reinforcement Bars" of intermediate grade, serial designation A 15-30, or for "Rail Steel Concrete Reinforcement Bars," serial designation A 16-14, of the American Society for Testing Materials. The provisions in these specifications for machining deformed bars before testing shall be eliminated.

Wire for concrete reinforcement shall conform to the requirements of the "Standard Specifications for Cold-drawn Steel Wire for Concrete Reinforcement," serial designation A 82-27, of the American Society for Testing Materials.

Structural steel and cast iron used in reinforced concrete shall conform to the requirements of section 7.103.