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ENGINEERING EXPERIMENT STATION

North Carolina Building Code

PREPARED BY

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NORTH CAROLINA STATE COLLEGE

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OF

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INTRODUCTJON

On November 28, 1931, a meeting was held at North Carolina State College at the instigation of W. G. Geile, Chairman of the Building Code Committee of the North Carolina Society of Engineers. Invited to this meeting were all officials of state organizations interested in the construction industry and all fire chiefs in the State. A short paper was presented by Professor Geile outlining the purposes of the meeting and explaining the necessity for a State Building Code. He was followed by Mr. Sherwood Brockwell, State Fire Marshal, who pointed out the possibilities of securing a State Code and giving a short history of previous experiences in formulating a Code. At this meeting a constitution was adopted and the following officers elected: Mr. Sherwood Brockwell, Chairman; Mr. Harry Barton, Vice Chairman; Mr. W. G. Geile, Secretary-Treasurer.

A number of meetings were held in the next two years, during which time a proposed Code for North Carolina was adopted. The total membership of the Council reached one hundred and twenty-four, and the proposed Code was endorsed by the following organizations: North Carolina Society of Engineers; North Carolina Chapter of the American Institute of Architects; North Carolina Branch of the American General Contractors of America; State Board of Health; North Carolina Chapter of the Society of Civil Engineers; and the North Carolina Association of Plumbing and Heating Contractors.

Before the General Assembly of 1933 a bill was introduced entitled: "An Act to Create a Building Code Council for North Carolina." This bill was passed without any opposition. It will be found on pages vii and viii of this bulletin. In substance, it created a State Building Code Council and authorized the Council, in cooperation with the Insurance Commissioner of the State, to prepare and adopt a Building Code.

The appointment by the Governor of the official Building Code Council provided for by the bill introduced by Senator Griffin did not take place until July 24, 1934. The appointed members were as follows:

George W. Kane, Durham; W. W. Hook, Charlotte; W. R. Dosher, Wilmington; R. R. Lawrence, Winston-Salem; Harry Tucker, Raleigh.

The Building Code Council held its first meeting in the office of the State Insurance Commissioner, Raleigh. At this meeting Mr. George W. Kane was elected chairman and Mr. W. W. Hook, acting secretary. At a meeting held at State College on August 9, 1934, W. W. Hook was elected permanent chairman and Harry Tucker, secretary and treasurer. Mr. W. R. Dosher, sometime after his appointment to the Building Code Council, was named Postmaster for the city of Wilmington. He thereupon resigned as a member of the Building Code Council, and the Governor appointed W. H. Sullivan of Greensboro in his place.

The Building Code Council, as soon as it had been officially appointed, proceeded to a thorough study of the Building Code as adopted by the unofficial Building Code Council of North Carolina. The Code was finally assembled in a satisfactory shape during the early part of 1935, and received the full approval of the Building *Code* Council. It was thereupon submitted to the Insurance Commissioner of the State and likewise was given his formal approval. There remained the task of having the Code printed and distributed to those individuals, companies, and public officials who were interested in seeing its provisions put into effect.

The printing of the code has been a real task. The Legislature in 1933 made no appropriation for financing the expenses of the Building Code Council, nor did it provide funds for printing the code. It was hoped that the Legislature of 1935 would not only provide a sufficient sum for printing and distributing the code, but would likewise make an appropriation to the Insurance Department for thorough enforcement of the provisions of the code. Neither was done. The publication of the code has, therefore, been delayed for over a year due to lack of the necessary funds. The printing has finally been made possible by securing a limited number of advertisers and through the cooperation of the Engineering Experiment Station of the North Carolina State College.

The code is presented with the hope that .its adoption and use will protect the public from dangerous and unsanitary buildings, and will provide architects and engineers a set of minimum standards to follow in designing buildings. It should be pointed out that the code is, in its present form, necessarily far from perfect. The Building Code Council has authority, with the cooperation of the Insurance Department, to make such changes in the code as are warranted by the wider use of new materials and methods. From time to time, therefore, it will be necessary to modify or to change certain requirements in the code.

The Building Code Council acknowledges the very fine assistance it has received from W. G. Geile, Professor of Construction at State College, and Sherwood Brockwell, State Fire Marshal. These two men have been largely responsible for the inception and preparation of the Building Code. The Council, since its formation, has had the full cooperation of Mr. Dan Boney, State Insurance Commissioner. His advice and assistance have been most valuable.

LAW CREATING BUILDING CODE COUNCIL

From the 1933 Supplement to the North Carolina Code of 1931
Containing all the General Laws of 1933
Chapter 126; Art. 2A. Building Code

#7494 (1). N. C. building code. This law shall be known and may be cited as the North Carolina building code. (1933, c. 392, s. 1.)

#7494 (2). Purpose of article. It is the purpose of this article to protect life, health, and property and all its provisions shall be construed liberally to that end. (1933, c. 392, s. 2.)

#7494 (3). Administration by Insurance Commissioner. The administration of such reasonable rules and regulations which may be hereafter adopted by the Building Code Council which is herein provided for shall be enforced by the Insurance Commissioner or his deputy or deputies in cooperation with local officials in accordance with the consolidated statutes of North Carolina, Sections 2738 to 2745, inclusive.

City ordinances may go more into detail, if desired, or may contain more stringent requirements, provided the same do not conflict with the rules and regulations hereafter adopted by the said Building Code Council. (1933, c. 392, s. 3.)

#7494 (4). Building Code Council created, There is hereby created a Building Code Council which shall consist of the following members registered in accordance "1th the laws of North Carolina where registration laws apply: One architect, one general contractor, one structural engineer, one plumbing and heating contractor, and one representative of organized labor. Members of the Building Code Council shall be appointed or removed by the Governor, The terms of office shall be as follows: One architect five years, one general contractor four years, one structural engineer three years, one plumbing and heating engineer two years, and one representative of organized labor one year. Vacancies caused by expiration of term of office shall be filled by the Governor and appointments made for a period of five years. Vacancies caused by resignation or otherwise shall be filled by the Governor for the unexpired term of the person leaving office.

Within thirty days after the passage and publication of this article, the Building Code Council shall meet and organize and shall have power to elect its own officers, to fix the times and places for its meetings, to adopt necessary rules of procedure, and to adopt all other rules and regulations not in- consistent herewith which may be necessary for the proper discharge of its duties and it shall keep an accurate record of all its proceedings. (1933, c. 392, s. 4.)

#7494 (5). Appeals to council. An appeal from the decision of the Insurance Commis3ioner upon any matter affecting the building code may be taken to the Building Code Council as hereinafter provided. (1933, c. 392, s. 5.)

#7494 (0). Pay of members. The members of the Building Code Council may each receive five dollars per day as compensation for the time given in the performance of his duty and may be reimbursed for compensation and actual traveling expenses from funds of the organization which he represents.

"When the Insurance Commissioner shall reject or refuse to approve the mode or manner of construction proposed to be followed, or materials to be used in the erection or alteration of any building or structure, or when it is claimed that the provisions of this code do not apply, or that an equally good or more desirable form of construction can be employed in any specific case, the owner of such building or structure, or his duly authorized agent, may demand that the decision of the Insurance Commissioner be reviewed by the chairman and two or more members of the Building Code Council who are qualified to render a fair and impartial decision where the amount in question shall exceed the sum of $1,000.00. The members best qualified in the opinion of the chairman shall be selected to review the decision of the Insurance Commissioner.

After a review of the decision of the Insurance Commissioner the chairman shall forward the findings and recommendations to the Insurance Commissioner immediately. It is understood that the Building Code Council shall serve in an advisory capacity only and that the final decision and responsibility for such decision shall rest upon the Insurance Commissioner: Provided nothing in this article shall prohibit the owner his right of appeal to the superior courts.

It shall be the duty of the council not only to make recommendations to the Insurance Commissioner relative to the proper construction of the pertinent provisions of the building code but it shall also recommend that he shall allow materials and methods of construction other than those required by the building code to be used, when in its opinion such other material and methods of construction are as good as those required by the code, and for this purpose the requirements of the building code as to such matters shall be considered simply as a standard to which construction should conform. (1933, c. 392, s. 6.)

#7494 (7). Violation of act subjects offender to fine. If any employer, owner, or other person shall violate any of the provisions of this article, or shall do any act prohibited herein, or shall fail to perform any duty lawfully enjoined within the time prescribed by the Insurance Commissioner or his deputy, or shall fail, neglect, or refuse to obey any lawful order given or made by the Insurance Commissioner, for each such violation, failure or refusal, such employer, owner or other person upon conviction thereof shall be fined in any sum not less than ten dollars ($10.00), nor more than fifty dollars ($50.00' for each offense. Each seven days neglect shall constitute a separate and distinct offense. (1933, c. 392, s. *1.)*

NORTH CAROLINA BUILDING CODE

Adopted by the North Carolina Building Code Council and approved by the Insurance Commissioner in accordance with Act of the General Assembly of 1933, *Chapter* 392

PUBLISHED BY

THE NORTH CAROLINA BUILDING CODE COUNCIL

In* Co-operation *with the

ENGINEERING EXPERIMENT STATION

of the

NORTH CAROLINA STATE COLLEGE

North Carolina Building Code Council:

W. W. HOOK, *Chairman*
Charlotte

GEORGE W. KANE
Durham

R. R. LAWRENCE
Winston-Salem

W. H. SULLIVAN
Greensboro

HARRY TUCKER, *Secretary*
State College Station
Raleigh

CHAPTER I.

Administration

Section 1.1. TITLE. These rules and regulations shall be known as the 1935 Edition of the North Carolina State Building Code, may be cited as such and will be referred to hereafter as "this code."

Section 1.11. Purpose. The purpose of the code is to provide certain minimum standards, provisions and requirements for safe and stable design, methods of construction and uses of materials in buildings and/or structures hereafter erected, constructed, enlarged, altered, repaired, moved, converted to other uses or demolished and to regulate the equipment, maintenance, use and occupancy of all buildings and/or structures.

Section 1.2. SCOPE.

Section 1.21. New Buildings and Additions - Exemptions. This code shall apply to all new buildings, structures and additions thereto except:

(a) Dwellings and outbuildings in connection therewith, such as barns and private garages.
(b) Apartment buildings used exclusively as the residence of not more than two families.
(e) Buildings used for agricultural purposes other than schools or assembly halls which are not within the limits of a city or an incorporated village.
(d) Temporary buildings or sheds used exclusively for construction purposes, not exceeding twenty feet in any direction, and not used for living quarters.

Section 1.22. Alterations. This code shall apply to all alterations which affect the structural strength, fire hazard, exits, lighting or sanitary conditions of any building except those exempted in Section 1.21. Within the fire limits of cities and towns where this article applies, as established and defined, no frame or wooden building shall be hereafter erected, altered, repaired, or removed except upon the permit of the building inspector, approved by the Insurance Commissioner.

Section 1.23. Change of Use. This code shall apply to all buildings which are to be devoted to a new use for which the requirements of this code are in any way more stringent than the requirements covering the previous use of the building.

Section 1.24. Local Regulations. This code shall not be understood to limit the powers of cities, villages and towns to make or enforce additional or more stringent requirements and regulations, provided the same do not conflict with this code or any revision of this code.

Note: Every municipality is authorized to adopt, for its own benefit:
(a) Regulations covering the construction of private residences.
(b) Other fire-preventive and sanitary regulations which cannot be reasonably included in this code.

Section 1.3. GENERAL PROVISIONS.

Section 1.31. Design and Supervision of Buildings. For every building costing $10,000 or more and/or designed to accommodate one hundred or more persons, except those exempted in Section 1.21, plans shall be prepared and copies thereof furnished the Insurance Commissioner. The plans and specifications so prepared shall be complete in every detail so that the work will comply with the provisions as set forth in this code and shall be constructed under the supervision of a competent superintendent or inspector, in accordance with the plans and specifications.

Section 1.32. Plans To Be Kept at Building. When permit has been issued for the construction of any building, the owner or contractor shall keep at the building a set of plans and specifications that have been approved, in order that any building inspector, whether state or city, may ascertain when he visits a building under construction, whether the construction is in accordance with the plans.

Section 1.33. Plans Approved by Building Department. Section 1.31 of this code shall not be construed to repeal any existing provisions of law requiring plans and specifications for building construction and work connected therewith to be filed with any state or local board or department, and to be previously approved by said state or local board or department.

Section 1.34. Building Permits. Before a building is begun the owner of the property shall apply to the inspector for a permit to build. This permit shall be given in writing and shall contain a provision that the building shall be constructed according to the requirements of this code and any other local ordinance pertaining to the construction. As the building progresses the inspector shall make as many inspections as may be necessary to satisfy him that the building is being constructed according to the provisions of this law. As soon as the building is completed the owner shall notify the inspector, who shall proceed at once to inspect the said building and determine whether or not the flues and the building are properly constructed in accordance with the building law. If the building meets the requirements of the building law the inspector shall then issue to the owner of the building a certificate which shall state that he has complied with the requirements of the building law as to that particular building, giving description and locality and street number if numbered. The inspector shall keep his record so that it will show readily by reference all such buildings as are approved. The inspector shall report to the Insurance Commissioner every person neglecting to secure such permit and certificate, and so bring the matter before the mayor, recorder, or municipal court for their attention and action.

Section 1.35. Unsafe Buildings Condemned. Every building which shall appear to the inspector to be especially dangerous because of its liability to fire or in case of fire by reason of bad condition of walls, overloaded floors, defective construction, decay or other causes shall be held to be unsafe, and the inspector shall affix a notice of the dangerous character of the structure to a conspicuous place on the exterior wall of said building. No building now or hereafter built shall be altered, repaired or moved, until it has been examined and approved by the inspector as being in a good and safe condition to be altered as proposed, and the alteration, repair or change so made shall conform to the provisions of the law.

Section 1.36. Punishment for Allowing Unsafe Building to Stand.

(a) If the owner of any building which has been condemned as unsafe and dangerous by any local inspector, after being notified by the inspector in writing of the unsafe and dangerous character of such building, shall permit the same to stand or continue in that condition, he shall forfeit and pay a fine of not less than ten nor more than fifty dollars for each day such building continues after such notice.

(b) If after ninety days from legal notice from the inspector, the owner or owners of a building which has been condemned fails to answer such notice of condemnation, the Chief of the Fire Department or the local Building Inspector may, with and by a two-thirds vote of the City Council, order such building removed, with reasonable expense incurred by such removal charged against the property.

CHAPTER II.

Definitions

Section 2.1. DEFINITIONS. For the purpose of this code, certain terms, phrases and words and their derivatives shall be construed as set out in this section. Words used in the singular include the plural and the plural the singular. Words used in the masculine gender include the feminine, and the feminine the masculine. Wherever a chapter, section or part is referred to in this code by number it shall be understood to refer to a chapter, section or part of this code.

"Alteration." Alter or alteration means any change, addition or modification in construction or occupancy.

"Apartment" means a room, or a suite of two or more rooms, in a residence-building occupied as the home or residence of an individual, family, or household.

"Approved." The term "approved" refers to a device, material or construction which has been approved by the Building Code Council as a result of tests or investigations made under its direction; or approval issued by it upon satisfactory evidence of competent and impartial tests or investigations conducted by others.

"Area," as applied to a form of construction, means an uncovered sub-surface space adjacent to a building.

"Area," as applied to the dimensions of a building, means the maximum horizontal projected area of the building at grade.

"Automatic," as applied to a fire door or other opening protective, means normally held in an open position and automatically closed by a releasing device that is actuated by abnormal high temperature or by a predetermined rate of rise in temperature.

"Basement" means a story the floor of which is not less than two feet below and the ceiling of which is not less than four feet six inches above grade.

"Bearing-wall" means a wall which supports any vertical load in addition to its own weight.

"Building" means a combination of materials to form a construction that is safe and stable, and adapted to permanent or continuous occupancy for residence, business, assembly or storage purposes; the term "building" shall be construed as if followed by the words "or part thereof."

"Building-line" means the line, established by law, beyond which a building shall not extend, except as specifically provided by law.

"Building Official" means the officer or other person charged with the administration and enforcement of this code, or his duly authorized representative.

"Buildings-types of"

(a) "Business building."
(b) "Institutional building."
(c) "Public building."
(d) "Residence building."
(e) "Storage building."
(f) "Private building."

(a) "Business building" means a building occupied for the transaction of business, for the rendering of professional services, for the display, sale or storage, if not exclusively storage, of goods, wares or merchandise, for the supplying of food, drink or other bodily needs or comforts, or for the performance of work or labor; including among others, office buildings, stores, markets, restaurants, garages, hotels, factories, workshops, laboratories.

(b) "Institutional building" means a building in which persons are harbored to receive medical, charitable, or other care or treatment, or in which persons are held or detained by reason of public or civic duty, or for correctional purposes; including among others, hospitals, asylums, sanitariums, fire houses, police stations, jails.

(c) "Public building" means a building in which persons congregate for civic, political, educational, religious, social or recreational purposes; including among others, courthouses, schools, colleges, libraries, museums, exhibition buildings, lecture halls, churches, assembly halls, lodge rooms, dance halls, theatres, bath houses, armories, recreation piers.

(d) "Residential building," except when classed as an institutional building, means a building in which sleeping accommodations are provided; including among others, dwellings, tenements, multi-family houses, lodging houses, dormitories, convents, studios, club houses.

(e) "Storage building" means a building for the housing, except for purely display purposes, of airplanes, automobiles, carriages, railway cars or other vehicles of transportation, for the sheltering of horses, livestock or other animals, or exclusively for the storage of goods, wares or merchandise, not excluding in any case offices incidental to such uses; including among others, garages, carriage houses, stables, barns, hangars, storage warehouses, freight depots, grain elevators.

(f) "Private building" means a building not included within the term "public building."

"Bulkhead" means a structure above the roof of any part of a building enclosing a stairway, tank, elevator machinery or ventilating apparatus, or such part of a shaft as extends above the roof.

"Cellar" means a story the ceiling of which is entirely below or less than four feet six inches above grade.

"Court" means an open, uncovered and unoccupied space within the lot-lines of a lot and includes a yard.

"Curb" shall be construed to mean the curb level or established grade at the center of the principal front of the building, fronting on one street; or, in the case of a building fronting on two or more streets, the curb level at the center of the front facing on the highest curb shall be taken, unless the highest curb is more than ten feet higher than the lowest curb, in which case the average level of the two curbs shall be taken.

"Curtain wall" means a non-bearing wall between columns or piers, which is not supported by beams or girders at each story.

"Dead-load" means the weight of walls, partitions, floors, roofs and all other permanent construction of a building.

"Display-sign" means a structure that is arranged, intended, designed or used as an advertisement, announcement or direction; and includes a sign, sign screen, billboard and advertising devices of every kind.

"Dwelling" means a building occupied exclusively for residence purposes and having not more than two apartments.

"Division-wall" means any interior load bearing wall in a building.

"Elevator" means a device within or in connection with a building used for carrying persons or things upward or downward; and includes dumbwaiter, escalator, and similar devices.

(a) "Passenger elevator" means an elevator designed and used for carrying persons.

(b) "Freight elevator" means an elevator designed and used for the carrying of things and such persons only as are necessary for its safe operation or the handling of things carried by it.

"Fireproof construction" as applied to buildings, means that in which walls are of approved masonry, reinforced ,concrete or reinforced brick masonry; and the structural members of which have fire-resistive ratings sufficient to withstand the hazard involved in the occupancy, but not less than a four-hour rating for bearing walls, fire walls, party walls, isolated piers, columns and wall-supporting girders; a three-hour rating for walls and girders other than already specified, and for beams, floors, roofs and floor fillings; and a two-hour rating for fire partitions.

"Fire limits" means that territory or those districts within a municipality in which, with certain specified exceptions, frame- construction and unprotected metal construction are prohibited. The fire limits as used in this code shall be that territory fixed as such by the governing body of any incorporated city or town, and which shall include the principal business portions of such city or town.

"Fire partition" means a wall or partition which subdivides a story of a building to restrict the spread of fire or to provide an area of refuge.

"Fire Resistive Ratings." The following table gives the minimum protection of structural parts based on time periods for various incombustible materials:

STRUCTURAL PARTS TO BE PROTECTED	INSULATING MATERIAL	MINIMUM THICKNESS OF MATERIAL IN INCHES FOR THE FOLLOWING FIRE-RESISTIVE PERIODS			
		4 Hrs.	3Hrs.	2Hrs.	1 Hr.
Steel or Cast Iron Columns: Projecting steel beams and girder flanges: top and bottom chords and all primary truss members.	[1]Grade A Concrete ……	3	2	1½	1
	[2]Grade B Concrete ……	4	3	2	1½
	Gunite ……...	2½	1½	1	¾
	Brick or clay, shale, concrete, or sand-lime ……..	4	4	2½	2½
	Clay tile or clay tile and concrete ….	3	3	1½	1½
	Solid gypsum block ……..	4	3	2	1½
	[3]Metal Lath and gypsum or Portland cement plaster ……	3	2½	2	1
Webs of steel beams and girders.	[1]Grade A Concrete ……	2½	1½	1	1
	[2]Grade B Concrete ……	3½	2½	1½	1
	Gunite ……...	2	1	¾	¾
	Brick or clay, shale, concrete, or sand-lime ……..	4	2½	2½	2½
	Clay tile or clay tile and concrete ….	2	2	1½	1½
	Solid gypsum block ……..	3	2	1½	1
	[3]Metal Lath and gypsum or Portland cement plaster ……	2½	2	1½	¾

1. Grade A concrete shall mean concrete with a course aggregate of limestone, calcareous pebbles or trap rock.
2. Grade B A concrete shall mean concrete with a course aggregate of granite, sandstone, chert pebbles or quartz.
3. Provided there is an air space or one inch between the structural steel and the protective coat of metal lath and plaster.

"Fire walls" means a wal1 which subdivides a building or separates buildings to restrict the spread of fire, and which starts at the foundation and extends continuously through all stories to and above the roof.

"Foundation wall" means a wall or pier below curb level serving as a support for a wall, pier, column, or other structural part of a building.

''Frame Construction" includes frame buildings of metal construction and all those in which exterior or party walls are wholly or partly of wood.

NOTE: Buildings of exterior masonry veneer or stucco or wooden frame, constituting wholly or in part the structural supports of the building or its loads, are frame buildings within the meaning of this definition.

"Garage" means a building, shed or enclosure, or a part thereof, in which a motor vehicle containing volatile inflammable oil in its fuel storage tank is stored, housed or kept.

"Private garage" means a garage, for not more than three motor vehicles, in which no business or industry connected directly or indirectly with motor vehicles is carried on.

"Public garage" means a garage not included within the term private garage.

"Grade," with reference to a building, means, when the curb level has been established, the mean elevation of the curb level opposite those walls that are located on, or parallel with and within fifteen feet of, street lines; or, when the curb level has not been established, or all of the walls of the building are more than fifteen feet from street lines, "grade" means the mean elevation of the ground adjoining the building on all sides.

"Gypsum mortar" means a mixture of one part of retarded gypsum and not more than two parts of sand, proportioned by weight, to which a fibrous binding material is added when necessary.

"Heavy timber or Mill Construction," as applied to buildings, means that in which walls are of brick, concrete, or reinforced concrete; and in which the interior structural elements, including posts, floor, and roof construction, consist of heavy timbers with smooth flat surfaces assembled to avoid thin sections, sharp projections and concealed or inaccessible spaces; and in which wall supporting girders and structural members of steel or of reinforced concrete, if used in lieu of timber construction, have a fire resistance rating of not less than three hours.

"Height," as applied to a building, means the vertical distance from grade to the highest point of such building.

“Height,” as applied to a court, means the vertical distance from the level of the floor of the lowest story served by that court to the level under consideration.

“Height," as applied to a story, means the vertical distance from top to top of two successive tiers of floor beams.

"Height," as applied to a wall, means the vertical distance to the top measured from the foundation wall, or from a girder or other immediate support of such wall.

"Hereafter" means after the time that this code becomes effective.

"Heretofore" means before the time that this code becomes effective.

"Hollow block" means a cellular building unit of burnt clay or concrete, the gross cubic content of which is not less than fifty per cent greater than the standard size of brick and the cellular spaces of which are in excess of twenty-five per cent of the gross cubic content of the unit.

"Lime mortar" means a mixture of one part slaked lime or hydrated lime and not more than four parts of sand, proportioned by volume.

"Cement mortar" means a mixture of one part of cement and not more than three parts of sand, proportioned by volume, with an allowable addition of hydrated lime not to exceed fifteen per cent of the cement by volume.

"Cement lime mortar" means a mixture of one part of cement, one part of slaked lime or dry hydrated lime, and not more than six parts of sand, proportioned by volume.

"Live load" means all loads except dead load.

"Lot corner." A corner lot is a lot situated at the junction of two streets, or of a street and public alley not less than ten feet in width.

"Lot, front of." The front of a lot is that boundary line which borders on the street. In the case of a corner lot the front shall be taken as that property line bordering on a street which is at right angles, or as nearly as possible, to the long dimension of the lot.

"Lot, interior." A lot other than a corner lot is an interior lot.

"Lot, rear of." The rear of a lot is the side opposite to the front. In the case of a triangular lot the rear shall be the boundary line not bordering on a street.

"Multi-family house" means a building occupied as the home or residence of individuals, families or households living independently of each other, of which three or more are doing cooking within their apartments; including tenement house, apartment house, flat, but does not include hotels.

"Occupied," as applied to a building, shall be construed as though followed by the words "or intended, arranged or designed to be occupied."

"Ordinary construction," as applied to buildings, means that in which the exterior walls are of approved masonry or of reinforced concrete; and in which the interior structural elements are, wholly or partly, of wood of smaller dimensions than required for heavy timber construction, or of steel or iron that is not protected as required for fireproof construction or semifireproof construction.

"Owner" includes his duly authorized agent or attorney, a purchaser, devisee, fiduciary, and a person having a vested or contingent interest in the property in question.

"Party wall" means a wall used or adapted for joint use between two buildings.

"Passageway" means an enclosed hallway or corridor connecting a required exit to a street or other open space communicating with a street when such required exit does not lead directly to a street.

"Pent house" means an enclosed structure, other than a bulkhead, extending not more than twelve feet above a roof.

"Person" includes corporation and copartnership as well as individual.

"Reinforced brick masonry" means brick masonry in which steel is embedded in such a manner that the two materials act together in resisting forces.

"Reinforced concrete" means a special Portland cement concrete in which steel is embedded in such a manner that the two materials act together in resisting forces.

"Repair" means the replacement of existing work with the same kind of material used in the existing work not including additional work that would affect the structural safety of the building, or that would affect or change required exit facilities, or that would affect a vital element of an elevator, plumbing, gas piping, wiring or heating installations, or increase the total cubical contents.

"Required" means required by some provision of the code.

"Self closing," as applied to a fire door or other opening protective, means normally closed and equipped with an approved device which will insure closing after having been opened for use.

"Semi-fireproof construction," as applied to buildings, means that in which all walls are of approved masonry or of reinforced concrete; and the structural members of which have fire resistance rating not less than a four-hour rating for fire. walls and party walls; a three-hour rating for other walls, isolated piers, columns, trusses, and wall-supporting girders; and a two-hour rating for fire partitions, girders not otherwise specified, exposed beams, floors, roofs, and floor fillings.

"Shaft" means an enclosed shaftway or space, extending through one or more stories of a building, connecting a series of two or more openings in successive floors, or floors and roof.

"Solid block" means a building unit of burnt clay or of stone, gravel or cinder concrete, the gross cubic content of which is not less than fifty per cent greater than the standard size of brick, and in which there are no cellular spaces exceeding in the aggregate twenty-five per cent of the gross cubic content of the unit.

"Sprinklered" means equipped with an approved automatic sprinkler system.

"Stairway" means one or more flights of stairs and the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one story to another in a building or structure.

"Standard fire test" means the fire test formulated under the procedure of the American Standards Association as "American Standard" or as "Tentative American Standard" as approved by the National Board of Fire Underwriters and/or The United States Bureau of Standards.

"Story" means that part of a building comprised between a floor and the floor or roof next above, and includes basement and cellar.

"Street" means a highway or thoroughfare dedicated or devoted to public use by legal mapping, user or other lawful manner; and includes avenue, road, alley, lane, boulevard, terrace, concourse, driveway, sidewalk.

"Street line" means a lot line dividing a lot from a street.

"Structure" means a combination of materials, other than a building, to form a construction that is safe and stable; including among others, stadiums, gospel and circus tents, reviewing stands, platforms, stagings, observation towers, radio towers, sheds, coal bins, fences and display signs; the term "Structure" shall be construed as if followed by the words "or part thereof."

"Unprotected metal construction," as applied to buildings, is that in which the structural supports are metal and in which the roofing and walls or other enclosures are of sheet metal, or other incombustible materials, or of masonry deficient in thickness or otherwise not conforming to approved masonry.

"Width," as applied to a court, means the minimum average width taken along all sides, including lot lines, of the court, the widths along each side being measured at right angles or normal to and from such side to the opposite side at the point of measurement.

"Yard" means a court that extends along the entire length of a lot line.

CHAPTER III.

Classifications

Section 3.1. CLASSIFICATION OF BUILDINGS BY OCCUPANCY.

Section 3.11. Classes Designated. For the purposes of this code, buildings are classified, with respect to occupancy and use, as public buildings, institutional buildings, residence buildings, business buildings and storage buildings.

Section 3.12. Mixed Occupancy. In case a building is occupied for two or more purposes not included in one class, the provisions of this code applying to each class of occupancy shall apply to such parts of the building as come within that class; and if there should be conflicting provisions, the requirements securing the greater safety shall apply.

Section 3.13. Doubtful Classification. In case a building is not specifically provided for, or where there is any uncertainty as to its classification, its status shall be fixed by a ruling of the Building Code Council.

Section 3.2. CLASSIFICATION OF BUILDINGS BY TYPE OF CONSTRUCTION.

Section 3.21. Types Designated. For the purposes of this code, construction as used in buildings shall be classified as follows:

Class A ----------Fireproof construction
Class A' ----------Semi-fireproof construction
Class B ----------Heavy timber construction
Class C ----------Ordinary construction
Class D ----------Frame construction
Class E ----------Unprotected metal construction

Section 3.22. Partial Compliance. Nothing in this code shall require full compliance with a type of construction, if, under this code, a less restricted form of construction is permitted; but no building shall be deemed of a given type of construction unless it conforms with all specific provisions of this code applying to that type.

CHAPTER IV.

General Building Restrictions

Section 4.1. RESTRICTIONS AS TO LOCATION.

Section 4.11. Limitations. Except as hereinafter provided in this chapter, no building or structure of frame construction, or of unprotected metal construction, shall be erected hereafter within the fire limits.

Section 4.12. Moving Buildings. No building of frame construction or unprotected metal construction shall hereafter be moved from without to within the fire limits.

Section 4.13. Location. A building or structure shall be deemed to be within the fire limits if more than one third of the area of such building or structure is located therein.

Section 4.14. Exceptions. Nothing in this section shall prohibit within the fire limits and subject to the specified limitations, the erection of new buildings or structures, nor the extension or enlargement of existing buildings or structures, of frame construction or unprotected metal construction as follows:

(a) A building of frame construction or of unprotected metal construction occupied exclusively as a private garage or stable, not more than one story in height nor more than seven hundred and fifty square feet in area, located on the same lot with a dwelling.
(b) Outhouses not more than eight feet in height nor more than one hundred square feet in area; provided the roofs are covered with incombustible or fire-retarding material.
(c) Greenhouses not more than fifteen feet in height erected on the same lot with and accessory to a dwelling or a store.
(d) Builders' shanties not more than twenty feet in height, for use only in connection with a duly authorized building operation and located on the same lot with such building operation, or on a lot immediately adjoining, or on an upper floor of the building, or on a sidewalk shed.
(e) Coal tipples, ice houses, material bins, trestles and water tanks when built of planking and timbers of the dimensions specified for heavy timber construction.
(f) Fences not exceeding ten feet in height.
(g) Display signs as elsewhere provided in this code.

Section 4.2. RESTRICTIONS AS TO HEIGHT.

Section 4.21. New Buildings.

(a) Except as may be otherwise provided by this code, no building hereafter erected shall exceed in height the limits fixed in this chapter.

(b) Each part of a building included within fire walls required to conform to the area limitations prescribed for its type of construction, shall be limited in height as though such part were a separate building.

Section 4.22. Alterations. No building shall hereafter be altered so as to exceed the limits of height fixed by this chapter.

Section 4.23. Public Buildings. For public buildings, semi- fireproof construction shall not exceed seventy-five feet; ordinary construction and heavy timber construction shall not exceed forty feet, provided that churches of such construction may be forty-five feet but not more than two stories, and that schools of such construction shall be not more than two stories high; and frame construction shall not exceed thirty feet, provided that churches and schools of such construction shall be not more than one story high.

Section 4.24. Institutional Buildings. For institutional buildings semi-fireproof construction shall not exceed seventy-five feet; ordinary and heavy timber construction shall not exceed two stories nor forty feet; and frame construction shall not exceed one story nor thirty-five feet.

Section 4.25. Residence Buildings. For residence buildings semi-fireproof construction and heavy timber construction shall not exceed seventy-five feet; ordinary construction shall not exceed three stories nor forty-five feet; provided that when the floors immediately over the basement and Over cellars are of a construction having a fire-resistance rating of not less than two hours and in which there are no openings between floors, ordinary construction may exceed these heights but shall not exceed four stories nor fifty-five feet; and when in addition, in multi-family houses which are subdivided by fire partitions into floor areas not exceeding twenty-five hundred square feet, all other floors have a fire resistance rating of not less than one hour, ordinary construction may be, but shall not exceed, five stories nor sixty-five feet.

Section 4.26. Business Buildings. For business buildings semi-fireproof construction and heavy timber construction shall not exceed seventy-five feet; ordinary construction shall not exceed fifty feet; and frame construction shall not exceed twenty-five feet.

Section 4.27. Storage Buildings. For storage buildings semi-fireproof construction shall not exceed fifty feet; ordinary construction and heavy timber construction shall not exceed thirty-five feet, provided that in buildings which are sprinklered heavy timber construction may be, but shall not exceed, seventy-five feet; and frame construction shall not exceed one story nor twenty-five feet.

Section 4.28. Exceptions.

(a) For the purpose of this chapter, the following appurtenances shall not be deemed parts of buildings: church spires, water tanks and their supports, bulkheads, chimneys, and parapets that do not extend more than four feet above the roof surface at their point of contact.

(b) For the purpose of this chapter, neither a basement nor a cellar shall be deemed a story.

(c) Outside the fire limits, public buildings, business buildings, or storage buildings may, in the discretion of the Insurance Commissioner, be erected to greater heights than otherwise fixed by this chapter, on written recommendation of the local building inspector.

Section 4.29. Unprotected Metal Construction. Buildings of unprotected metal construction shall be not more than one story high and limited to a height of twenty-five feet unless otherwise authorized; provided that this shall not prohibit mezzanine stories the aggregate floor area of which does not exceed twenty- five per cent of the area of the building.

Section 4.3. RESTRICTIONS AS TO FLOOR AREAS.

Section 4.31. New Buildings. No building hereafter erected shall exceed in area in any story above grade, the limits fixed in this section.

Section 4.32. Use of Fire Walls. No building shall be limited in area if it is divided by fire walls into sections, none of which exceeds the limits of area fixed in this section for its type of construction. Buildings exceeding 25,000 square feet in undivided area shall be of Class A construction, Class A' construction, or Class E construction; provided that buildings of Class A' whose occupancy comes under the classification of "Business" or "Storage," shall not exceed 25,000 square feet in undivided area.

The maximum area undivided by fire walls in buildings of Class B construction whose occupancy comes under the classification "Public," shall not exceed 15,000 square feet for buildings one story in height, 10,000 square feet for buildings two stories in height, and 7,500 square feet for buildings three stories in height, except that public assembly

occupancies not more than one story in height may have an unlimited area if not subdivided or with only minor subdivision along the walls; for occupancies coming under the classification "Institutional," the area shall not exceed 15,000 square feet for buildings one story in height, and 10,000 square feet for buildings two stories in height; for occupancies coming under the classification "Residential," the area shall not exceed 10,000 square feet; for occupancies coming under the classification "Business," the area shall not exceed 20,000 square feet for bm1dings one story in height, 15,000 square feet for buildings two or three stories in height, and 10,000 square feet for buildings over three stories in height; for occupancies coming under the classification "Storage," the area shall not exceed 20,000 square feet for buildings one story in height, and 10,000 square feet for buildings two stories in height.

The maximum area undivided by fire walls in buildings of Class C whose occupancy comes under the classification "Public," shall not exceed 7,500 square feet for buildings one story in height and 5,000 square feet for buildings two or three stories in height except that "Public Assembly" occupancies in buildings not more than one story in height may have an area not to exceed 20,000 square feet; for occupancies coming under the classification "Institutional," the area shall not exceed 7,500 square feet for buildings one story in height and 5,000 square feet for buildings two stories in height; for occupancies coming under the classification "Residential," the area shall not exceed 7,500 square feet; for occupancies coming under the classification "Business," the area shall not exceed 10,000 square feet for buildings one story in height, 7,500 square feet for buildings two or three stories in height, and 6,000 square feet for buildings four stories in height; for occupancies coming under the classification "Storage," the area shall not exceed 10,000 square feet.

The maximum area undivided by fire walls in buildings of Class D, whose occupancy comes under the classification "Public" or "Institutional," shall not exceed 3,000 square feet; for occupancies coming under the classification "Residential," the area shall not exceed 3,000 square feet; for occupancies coming under the classification "Business," the area shall not exceed 5,000 square feet for buildings one story in height and 3,000 square feet for buildings two stories in height; for occupancies coming under the classification "Storage," the area shall not exceed 3,000 square feet.

The allowable areas appear in the following table:

Allowable Area of Building in Square Feet

CLASS OF OCCUPANCY	CLASS A	CLASS A'	CLASS B	CLASS C	CLASSES D AND E
Public	No restriction	No restriction	1 story [1] / 15,000; 2 stories / 10,000; 3 stories / 7,500	1 story[2] / 7,500; 2 or 3 stories / 5,000	3,000
Institutional	No restriction	No restriction	1 story / 15,000; 2 stories / 10,000	1 story / 7,500; 2 stories / 5,000	3,000
Business	No restriction	25,000	1 story / 20,000; 2 or 3 stories / 15,000; Over 3 stories / 10,000	1 story2 /10,000; 2 or 3 stories / 7,5000; 4 stories / 6,000	1 story / 5,000 2 stories / 3,000
Residential	No restriction	No restriction	10,000	7,500	3,000
Storage	No restriction	25,000	1 story / 20,000; 2 stories / 10,000	10,000	3,000

1. Public assembly occupancies in buildings not more than1 story in height may be of unlimited area if not subdivided or with only minor subdivisions along walls.
2. Public assembly occupancies in buildings not more than 1 story in height may have an area not to exceed 20,000 square feet, if not subdivided or with only minor subdivisions along the walls.

No building shall hereafter be extended on any side so as to exceed the limits of undivided area fixed in this section, but this shall not prohibit such extension of a building heretofore lawfully erected which already exceeds the limiting area, provided such extension does not exceed the area limitations fixed by this section and such extension is separated from the existing building by a fire wall.

The limiting areas of this section for "Business" occupancies and for "Storage" occupancies may be increased by 50 per cent when the building has a frontage on two streets, and by 100 per cent when it has a frontage on three or more streets. The same allowances may be made when the building is not located on a street line, but is directly accessible to fire apparatus on two or more sides.

The limiting areas fixed in this section, as modified on account of street frontage, for "Business" and for "Storage," may be increased by 100 per cent when the building has an approved automatic sprinkler system installed and capable of operation.

Section 4.4. RESTRICTIONS AS TO MIXED OCCUPANCIES.

Section 4.41. General Provisions. When a building is used for the purpose of two or more classes of occupancy and exceeds the limits of height for any one of its occupancies the whole building shall be constructed to conform with the provisions of that class requiring the greatest fire resistance unless the parts used for the several classes of occupancy are separated from one another by construction having an ultimate fire resistance of at least one and one half hours.

Section 4.42. Residential and Business Occupancies. When a building contains occupancies falling under both "Residential" and "Business," the several occupancies shall be separated by construction having an ultimate fire resistance of at least one hour.

Section 4.43. Theatres. No public theatre or place of public entertainment shall be located within or attached to any building unless it is separated by walls having an ultimate fire resistance of at least three hours, and by floors having an ultimate fire resistance of at least two and one half hours. There shall be no openings in such walls or floors, except that in buildings of Class A or Class A' construction whose occupancy comes under Business," but *is* not devoted to manufacturing or storage, openings in walls protected as required in Section 10.62 may be permitted.

Section 4.44. Garages. No garage shall be located within or attached to another building unless it is separated from other occupancies by walls having an ultimate fire resistance of at least two and one half hours. Openings in such walls shall be protected as required in Section 10.62. Door sills between the occupancies shall be raised at least one foot above the garage floor level. See note regarding private garages combined with dwellings.

Note: *Private Garages Combined with Dwellings.*

When a private garage is located beneath or attached to a dwelling the following regulation as to its construction should be observed:

The floor and ceiling construction above the garage when it is located beneath "the building, or the roof of the garage when it is attached to the building, shall be unpierced, and shall have an ultimate fire resistance of at least one hour.

Walls and partitions between the garage and dwellings shall be of such construction as will insure an ultimate fire resistance of at least one hour.

Openings from a dwelling into a garage shall be restricted to a single doorway; such opening shall be protected by an approved swinging, self-closing fire door with approved fire-resistive frame and hardware. No glass shall be permitted in such door. The door sill shall be raised at least one foot above the garage floor level. Garage floors shall be of concrete or equally fire-resistive and impervious material.

Section 4.5. RESTRICTIONS AS TO SPECIAL OCCUPANCIES. Buildings in which persons are restrained under lock and key shall be of Class A or Class A' construction. Hospital buildings of one story in height may be of Class C construction.

CHAPTER V.

Lighting and Natural Ventilation

The provisions of this chapter cover minimum requirements for Lighting and Natural Ventilation. For school buildings the requirements for Lighting and Ventilation shall be approved by the State Board of Education.

Section 5.1. GENERAL.

Section 5.11. New Buildings. For the purpose of providing natural light and adequate ventilation, every building hereafter erected shall be constructed, arranged and equipped to conform to the provisions of this chapter.

Section 5.12. Alterations. No building shall hereafter be altered nor rearranged so as to reduce the size of a room or the amount of window space to less than that required for buildings hereafter erected; or so as to create an additional room, unless such additional room is made to conform to the requirements for rooms in buildings hereafter erected, except that such rooms may be of the same height as existing rooms in the same story. No building shall hereafter be enlarged, nor shall the lot on which it is located be diminished so that the dimensions of a required court shall be less than prescribed for buildings hereafter erected.

Section 5.13. Limitations. Nothing in this chapter shall be construed to modify the provisions of any other ordinance, or of any rule authorized by law or ordinance, regulating yards, courts or other open spaces; but whenever the provisions of this chapter require greater yards, courts, or open spaces than prescribed in such ordinance or rule, the provisions of this chapter shall control.

Section 5.2. ROOMS.

Section 5.21. Habitable Rooms.

(a) Every habitable room shall have one or more windows, opening directly on a street or on a court conforming to the requirements of this chapter.

(b) Such rooms shall be not less than six feet wide in any part, and shall contain not less than sixty square feet of clear floor area. Such rooms shall have a clear height of not less than eight feet for at least sixty square feet of floor area.

(c) It shall be unlawful to divide a habitable room or enclose a part thereof by curtains, portieres, fixed or movable partitions, or other contrivances or devices, unless each part of the room so divided or enclosed shall separately conform to the requirements of this chapter.

Section 5.22. Business and Work Rooms. Every room occupied for office, clerical or administrative purposes, and every room occupied as a store, salesroom, restaurant, market, bakery, hotel or restaurant kitchen, laundry, factory, Workshop, machinery room or boiler room, and every room in a residence building not otherwise provided for, shall be provided with one or more windows or ventilating skylights opening directly on a street or on a court conforming to the requirements of this chapter; or such rooms shall be provided with a means of approved ventilation.

Section 5.23. Public Buildings. In public buildings every room used as an auditorium or for public assembly, and every other room, except a habitable room, that is not provided with windows opening directly on a street or on a court as prescribed in this chapter for business and workrooms, shall be provided with a system of approved ventilation as prescribed in this chapter, unless the space within such room exceeds one hundred and fifty cubic feet for each occupant and windows having an aggregate area of

not less than ten per cent of the floor surface, one fifth of which is openable, and opening on a street or court, are provided on opposite sides of the room.

Section 5.24. Rooms in Institutional Buildings. In institutional buildings every room shall be provided with natural light by one or more windows opening on a street or on a court con- forming to the requirements of this chapter, and with air by windows as required for habitable rooms or by a system of approved ventilation as prescribed in this chapter; provided that in jails and in other detention buildings the opening on such street or court of the windows of cells or similar rooms may be indirect if approved.

Section 5.25. Bathrooms and Water Closet Compartments.

(a) Every bathroom in or connected with an apartment shall be ventilated by one or more windows to a street or on a court conforming to the requirements of this chapter.

(b) Every other bathroom and every room containing one or more water closets or urinals, shall be ventilated by one or more windows opening on a street or on a court conforming to the requirements of this chapter; or on a vent shaft which extends to and through the roof or into a court conforming to the requirements of this chapter; or by a separate duct of incombustible and noncorrodible material, not less than seventy-two square inches in cross-section, extending independently of any other duct to and above the roof; or by a ventilating skylight; or by a means of approved ventilation as prescribed in this chapter.

Section 5.26. Service Pantries and Storerooms. Service pantries and storerooms for food, except in dwellings and in apartments, shall be ventilated as prescribed in this chapter for bathrooms.

Section 5.27. Stairways and Corridors.

(a) Every stairway, public hall or corridor in multi-family houses and in institutional buildings shall have one or more windows opening directly on a street or on a court conforming to the requirements of this chapter. In such stairways there shall be at least one window for each story through which it passes.

(b) Every recess or return, the depth or length of which exceeds twice the width of the hall or corridor, and every part of such a public hall or corridor that is shut off from any other part by a door or doors, shall be deemed a separate hall or corridor within the meaning of this section.

(c) In buildings not exceeding four stories in height, a ventilating skylight conforming to the requirements of this chapter may be used in lieu of the windows required in a stairway; provided there is an unobstructed vertical wellhole in such stairway not less in area than one fourth of the required glass area of the skylight.

Section 5.28. Rooms Needing Special Devices. Unless already provided for by law or duly authorized rules, rooms in which, by reason of use or occupancy, dust, fumes, gases, vapors or other noxious or deleterious impurities tending to injure the health of occupants or to create a fire hazard, exist or develop, shall be provided with an approved system of ventilation to remove effectually such impurities during occupancy.

Section 5.29. Rooms Below Grade. Every room, other than a habitable room, the ceiling of which is below or is less than four feet above grade and which is frequented by the public or in which five or more persons are regularly employed or congregate, shall, unless provided with windows as required for habitable rooms, be provided with a means of approved ventilation as pre- scribed in this chapter.

Section 5.3. WINDOWS.

Section 5.31. Glass Area. The aggregate glass area of windows required by this chapter shall be not less than one tenth of the floor area of the room served by them; provided that in habitable rooms such glass area shall be not less than ten square feet, and in bathrooms it shall be not less than six square feet.

Section 5.32. Openings. In habitable rooms and in bathrooms such windows shall be so constructed that when fully open the aggregate open space shall be not less than one twentieth of the floor area of the room served by such windows.

Section 5.4. VENT SHAFTS.

Section 5.41. Size. Vent shafts required by this chapter shall have a cross-sectional area of not less than one fifth of a square foot for every foot of height of shaft, but not less than nine square feet in any case. No such shaft shall be less than two feet in its least dimension.

Section 5.42. Skylights. Unless open to the outer air at the top for its full area, such shaft shall be covered by a skylight having a net area of fixed louver openings equal to the maximum required shaft area.

Section 5.43. Air Ducts.

(a) Such shafts shall be connected with a street or court conforming to the requirements of this chapter by a horizontal duct or intake at a point below the lowest opening on such shaft.

(b) Such duct or intake shall have a minimum unobstructed cross-sectional area of not less than three square feet with a minimum dimension of twelve inches.

(c) The openings to the duct or intake shall be not less than one foot above the bottom of the shaft and the street surface or bottom of court, at the respective ends of the duct or intake.

(d) Such duct or intake shall be constructed of incombustible, noncorrodible material.

(e) Where a toilet room without outside windows is permitted a vent flue of incombustible material shall be provided, vertical or nearly so, running through the roof, with a cap or hood of the siphon type or its equivalent, and the vent shall be not less than the following sizes:

One fixture (closet or urinal) ----------	C-inch pipe
Two fixtures ----------	8-inch pipe
Three fixtures ----------	10-inch pipe
Four or five fixtures ----------	12-inch pipe
Six or seven fixtures ----------	14-inch pipe
Eight to ten fixtures ----------	16-inch pipe

Section 5.5. VENTILATING SKYLIGHTS. Skylights per- mitted by this article shall have glass areas less than required for the windows they replace. They shall be equipped with movable sashes or louvers of an aggregate net area not less than required for openable parts in the windows they replace, or with approved ventilation of equal efficiency.

Section 5.6. MECHANICAL VENTILATION. General. When approved ventilation is required, or is permitted as an alternative, the system shall be designated and constructed in accordance with generally accepted good practice, to provide the necessary changes of air, but not less than prescribed in Chapter 14.

Section 5.7. COURTS.

Section 5.71. Width.

(a) Every court required by this chapter to serve habitable rooms shall have a width, at any given level, of not less than one third of the height of such court, but not less than six feet.

(b) Every other required court shall have a width at any given level, of not less than one fourth the height of such court, but not less than six feet.

Section 5.72. Area. The cross-sectional area of a required court shall be not less than one and one-half times the square of its width.

Section 5.73. Street Widths. For the purpose of this chapter a street shall be deemed a court. In case such street is of less width than required for a court, the building or that part dependent thereon shall be set back from such street sufficiently to provide the required width, considering the street as part of the court.

Section 5.74. Intakes.

(a) Every court serving one or more habitable rooms that does not open for its full height on one or more sides on a street or yard shall be connected at or near the bottom with a street or yard by a horizontal intake or passage. Such intake or passage shall be constructed with walls, floors and ceilings having a fire- resistance rating of not less than two hours in buildings of fire- proof construction or semi-fireproof construction, and not less than one hour in buildings of heavy timber construction on ordinary construction. They shall have a cross-sectional area of not less than ten square feet. They shall remain fully open at both ends and unobstructed for their full size and length.

(b) Every other court that does not open for its full height on one or more sides on a street or yard shall be provided with an intake or duct as prescribed in this chapter for vent shafts.

Section 5.75. Unobstructed. Every court shall remain unobstructed for its required width and full height, except that ordinary window sills or belt courses, projecting not more than four inches from a wall, and drop awnings shall not be deemed obstructions. But this shall not prohibit in the open spaces at the ground level, in the case of residence buildings and institutional buildings, clothes poles, arbors, garden trellises and other such accessories.

Section 5.76. Drainage. The bottom of every court shall be properly graded and drained, and when required by the local building official in the interest of public health, shall be paved with concrete or other suitable material.

Section 5.77. Accessibility. Every court that is not otherwise accessible at the bottom shall be made accessible by a door or other means to enable it to be cleaned properly.

CHAPTER VI.

Means of Egress

See Special Provisions for Hotels and other Buildings Used for Sleeping Purposes, Section 6.97.

See Special Provisions for Schools, Section 6.96b.

See Special Provisions for Theatres, Section 6.9.

Section 6.1. APPLICATION.

Section 6.11. New Buildings. Buildings hereafter erected shall be provided with exit facilities in accordance with the requirements of this chapter.

Section 6.12. Alterations. No building shall hereafter be altered so as to reduce the number or capacity of exits to less than required for buildings of similar construction and occupancy hereafter erected. Exits hereafter installed shall conform to the requirements for exits in new buildings, except when such exits are installed to comply with a specific order of the Insurance Commissioner.

Section 6.2. GENERAL.

Section 6.21. Kinds of Exits. Exits shall consist of interior stairways, fire towers, horizontal exits, exterior stairways, passageways or doorways, constructed and arranged as specified in this chapter. Exterior spiral fire escapes, tubular fire escapes and chute fire escapes may, under special provisions, be installed on certain types of buildings.

Section 6.22. Number of Occupants.

(a) The dimensions and capacity of exits shall be proportioned to the number of persons to be accommodated.

(b) The number of persons used in determining the necessary exit facilities of any given floor shall be the actual number to occupy the floor, but in no case less than that determined by dividing the following areas per person into the gross area (no deduction for corridors, closets or other subdivisions) within the perimeter of the building serving each particular occupancy at the given floor level; for occupancies not specified the building official shall, by rule, establish the ratio to be used:

Kind or use of building	Number of square feet of floor Space allowed per person
Dance halls, lodge rooms and places of assembly	10 square feet per person
Courtrooms, restaurants, classrooms in schools and colleges, rooms in public buildings not otherwise provided for	15 square feet per person
Stores, markets, lodging houses, and reading rooms	25 square feet per person
Factories and workrooms	35 square feet per person
Offices and showrooms	50 square feet per person
Hospitals, asylums, hotels and other residence buildings	100 square feet per person
Warehouses and garages	150 square feet per person

Section 6.23. Number of Exits.

(a) **From Rooms.** Every room having an occupancy of more than seventy-five persons shall have at least two doorways, remote from each other, leading to an exit or exits.

(b) **From Ground Floor.** Every floor-area having direct exit to a street and occupied by more than seventy-five persons, shall have at least two means of exit.

(c) **From Floor Areas.** Every story not having direct exit to a street shall have at least one interior stairway or fire tower connected thereto. Every such story shall have at least one additional exit when it exceeds two thousand five hundred square feet in area.

(d) **From Places of Assembly.** In buildings occupied as places of assembly for seventy-five or more persons for recreation or amusement, each and every room, gallery, tier or other space, where such assembly occurs shall have direct access to separate and independent exits as follows: not less than two exits when six hundred persons or less are accommodated in such room, gallery, tier or other space; not less than three exits when more than six hundred but not more than one thousand persons are accommodated; and not less than four exits when more than one thousand persons are accommodated.

(e) **From Theatres, etc.** Exits in every theatre, opera-house, moving picture show, and other like places of public amusement, including dance halls and buildings in which boxing matches, wrestling matches and other forms of athletic contests, matches and engagements are given, held or performed, shall be so arranged and located that two-thirds of all occupants of such building (allowing six square feet of floor area for each occupant) may leave such building via either side of such building, either end of such building or either side and end of such building and shall be of sufficient number to allow a number equal to two thirds of all occupants of such building (allowing six square feet of floor area for each occupant) travelling at the rate of fourteen persons per minute per lineal foot of exit area to leave, via either side of such building, either end of such building or either end and side of such building in from

4 to 6 minutes when building is of Class A construction
3 to 4 minutes when building is of Class A' construction
2 to 3 minutes when building is of Class B or Class C construction.
1 to 2 minutes when building is of Class D or Class E construction.

In order that the objects of this requirement, which is primarily a safety to life requirement, will be complied with, any theatre, opera-house, auditorium, assembly hall, moving picture show, or other building in which public entertainment is shown, given, produced or performed in which special scenery is used or in which special acts or performances are given, shown, produced or performed, shall, if not properly equipped with approved proscenium wall and approved fire-curtain, for the purpose of affording safety in keeping with the objects of this requirement, be deemed a building of Class C construction.

And it is further provided that in order to safeguard the public from the dangers of fire and other contingencies arising and resulting in places of this kind, to see that the provisions of this law are complied with, and to save the owner or owners from unnecessary confusion and expense, plans for all theatres, opera-houses, moving picture shows, and other like places of amusement to be hereafter erected shall be submitted to and approved as to the safety of the building and the occupants in case of fire, by the Insurance Commissioner before work is begun on the building. This requirement is to apply also when and/or where any building now standing or part thereof is to be used as a theatre, opera-house, moving picture show or other like place of amusement.

Section 6.24. Fire Towers Required. In buildings exceeding sixty feet in height, at least one stairway shall be a fire tower; provided that in sprinklered buildings in which two or more stair- ways conforming to the requirements of this chapter are provided, such fire tower shall not be required unless the building exceeds one hundred feet in height.

Section 6.25. Location.

(a) **Distance to Exits.** Exits shall be so located that no point in a floor-area, room or space served by them is more than one hundred feet distant from an exit, measured along the line of travel; except that when a floor-area is subdivided into smaller areas, such as rooms in hotels and office buildings, the distance from the door of any room, along an unobstructed hallway, to an exit shall be not more than one hundred and twenty-five feet.

(b) **Remoteness.** Where separate exits are required for a floor-area, they shall be placed as remote from each other as practicable.

(c) **Uniform Distribution.** Where more than two exits are required, they shall be distributed as uniformly as practicable within or around the floor-area, room or space they are to serve, to effect a rapid discharge of occupants.

(d) **Outlets.**

1. Every required stairway, except in dwellings, shall lead, either directly or through a passageway or ha11way, to a street, or to an open space that communicates with a street.

2. In buildings more than two stories high above grade with roofs having a pitch of not more than one in four, at least one required stairway shall continue to the roof.

3. In buildings more than three stories high above grade, when there are two or more required stairways, at least two shall continue to the roof; provided that in case of roofs having a pitch exceeding one in four, such stairways shall be connected by a communicating hallway in the top story.

Section 6.3. INTERIOR STAIRWAYS.

Section 6.31. Construction.

(a) Required stairways shall be constructed of incombustible materials throughout, except in buildings of frame construction, and in buildings of ordinary construction not exceeding thirty feet to the floor of the topmost story and occupied by not more than forty persons above or below the first story above grade.

(b) When treads or landings are of slate, marble, stone or composition, they shall be supported for their entire length and width by solid steel plates at least one eighth of an inch thick, securely fastened. When stairs are of a fireproof construction the treads and landings may be solidly supported for their entire length and width by the materials of which such stairs are constructed.

Section 6.32. Enclosures.

(a) In every building exceeding thirty feet to the floor of the topmost story or occupied by more than for(r persons above or below the first story and above grade and in multi-family houses more than two stories high, interior required stairways, including hallways connecting them to the doorway leading to the outside, shall be enclosed with fire partitions.

(b) In all other buildings, except dwellings, interior required stairways which are not enclosed in fire partitions, shall be enclosed in partitions of wood studs firestopped at every floor with incombustible material and covered on both sides with expanded metal lath and gypsum-mortar not less than three quarters of an inch thick, or of other construction having a fire resistance rating of not less than one hour.

(c) All interior stairways in buildings other than dwellings, connecting two or more stories, whether required as exits or not, shall be enclosed as prescribed in this section for the required stairways in the building; provided that when such stairways do not serve as required exits and do not connect more than two stories the enclosure may be of a construction having a fire resistance rating of not less than one hour, in the assembly of which no combustible material shall be used when the building is of fireproof construction; and provided further that an enclosure shall not be required for a flight of stairs from the main entrance floor to the floor next above when such stairs are not a part of a required stairway, nor for a flight of stairs in a building of fireproof construction, semi-fireproof construction, or a sprinklered building of ordinary construction, when such stairs connect only one story with one other story immediately above or below it.

Section 6.33. Width.

(a) The minimum unobstructed width of a stairway serving as a required exit, except for handrails projecting not more than three and one half inches into such width, shall not be less than forty-four inches; provided that in dwellings, multifamily houses and storage buildings, and in other buildings occupied by a single tenant and limited in occupancy to forty persons, such width may be thirty-six inches.

(b) The aggregate width of exit stairways in any story, except in places of assembly, shall be such that they may accommodate at one time the total number of persons permitted to occupy the largest floor-area served by such stairways above that story, on the basis of one person for each three and one half square feet of floor surface of the halls, landings and stair treads within the stairways; provided that, when the building is sprinklered, the required aggregate exit capacity may be reduced to two-thirds in buildings of heavy timber construction or ordinary construction, and to one half in buildings of fireproof construction or semi-fireproof construction; and when horizontal exits are provided in accordance with the requirements of this chapter, the required aggregate exit capacity may be reduced to one third. The term story as used in this paragraph means the space included between two successive levels at which there are exit doors leading into the stairway.

(c) In places of assembly, such aggregate width shall be not less than at the rate of twenty-two inches for every one hundred persons to be accommodated by such stairways.

(d) The hallway or corridor connecting a stairway with the exit doors leading to the street, or to a court or open space communicating with a street, shall have a clear width of not less than the aggregate required widths of stairways served thereby.

Section 6.34. Treads and Risers.

(a) Treads and risers of required stairs shall be so proportioned that the product of the width of tread, exclusive of nosing, and the height of riser, in inches, shall not be Jess than seventy nor more than seventy-five; but risers shall not exceed seven and three quarters inches in height, and treads, exclusive of nosing, shall be not less than nine and one half inches wide; provided that in schools the proportion and dimensions of the treads and risers may be adjusted to suit the age of the pupils for which the school is intended. Treads and risers shall be of uniform width and height in any one flight.

(b) The use of winders is prohibited in required stairways.

Section 6.35. Landings.

(a) No flight of stairs shall have a vertical rise of more than twelve feet between floors or landings; provided that in stair- ways serving as exits in public buildings such vertical rise shall not exceed eight feet.

(b) The length and width of landings shall be not less than the width of stairways in which they occur.

Section 6.36. Handrails.

(a) Except where permitted in aisles, stairs shall have walls or well-secured balustrades or guards on both sides.

(b) Such stairs when less than forty-four inches in width shall have handrails on at least one side.

(c) Such stairs when required to be forty-four inches or more in width shall have handrails on both sides.

(d) When the required width of a flight of stairs exceeds eighty-eight inches, an intermediate handrail, continuous between landings, substantially supported and terminating at the upper end in newels or standards at least six feet high, shall be provided.

Section 6.37. Space Under Stairs. Except in dwellings, the space under stairs built in whole or in part of combustible materials, shall be left entirely open and kept clear and free from encumbrances.

Section 6.4. FIRE TOWERS.

Except as herein otherwise specified, fire towers shall conform to the requirements of this chapter for interior stairways. The enclosing walls shall be of brick or reinforced concrete not less than eight inches thick. There shall be no openings in such walls, except for the necessary doors or windows. Access to the stairway at each story served by a fire tower shall be by vestibules or outside balconies having solid floors of incombustible materials and provided with substantial railings. Such balconies or vestibules shall adjoin either a street or a court not less than ten feet wide nor less than one hundred and fifty square feet in area, and the permissible doors and windows in the enclosing walls shall open on such street or court. The balconies or vestibules shall be level with the floors of the building and the stair landings of the fire tower. Self-closing fire doors, swinging in the direction of travel from the building to the fire tower, shall be provided at both building and fire tower ends of such balcony or vestibule. The clear width of such connecting balconies and vestibules shall be not less than that required for hallways.

Section 6.5. HORIZONTAL EXITS.

Section 6.51. General. Horizontal exits shall consist of vestibules, open air balconies, bridges, or doorways through firewalls or fire partitions, connecting two floor areas. This construction and arrangement shall be as prescribed in this section.

Section 6.52. Connected Floor Areas. The floor area on either side of a horizontal exit shall be sufficient to hold the occupants of both floor areas, allowing not less than three and one half square feet of clear floor space per person.

Section 6.53. Stairways. On each side of a horizontal exit there shall be at least one interior stairway or fire tower conforming to the requirements of this chapter, adequate for the number of occupants on either side of such horizontal exit.

Section 6.54. Vestibules and Balconies. When vestibules or open air balconies are used, they shall conform to the requirements for vestibules or open air balconies of fire towers.

Section 6.55. Bridges. When bridges are used they shall be constructed of incombustible material. The clear width of such bridges shall be not less than required for hallways.

Section 6.56. Gradients. Where there is a difference in level between the connected floor areas, gradients of not more than one foot in ten feet shall be provided. No stairs or steps shall be used in a horizontal exit.

Section 6.6. EXTERIOR STAIRWAYS.

Section 6.61. Materials. Exterior stairs or stairways hereafter erected under the provisions of this chapter shall be constructed of incombustible materials and shall conform in other respects, except as to enclosure, to the requirements of this chapter for interior stairways.

Section 6.62. Access. Each story served by an exterior stairway shall have a doorway equipped with an approved self-closing fire door, leading to such stairway.

Section 6.63. Openings Protected. All doors and windows opening on or within ten feet of such stairs or stairways or of fire escapes as hereinafter provided shall be protected by approved self-closing fire doors or approved fire windows.

Section 6.64. Metal Guards. Unless otherwise enclosed, metal mesh or other rigid guards at least four feet high shall be provided throughout on each unenclosed side of such stairs or stairways.

Section 6.65. Enclosures. If exterior stairways are enclosed on any side, such enclosures shall be of approved masonry or incombustible materials.

Section 6.66. Glass. Glass used in the construction of enclosures shall be wired glass.

Section 6.67. Fire Escapes.

(a). Exterior fire escapes which are hereafter constructed by direction of the building official on buildings heretofore erected and which by reason of location or other physical limitations, cannot be constructed to conform fully to the requirements for exterior stairways, shall, however, be constructed of incombustible materials.

(b) Such fire escapes shall be of sufficient strength to sustain a live load of one hundred pounds per square foot on balconies and a concentrated load of four hundred pounds on stair treads.

(c) They shall be so placed that they can be readily and safely reached by the occupants of the building.

(d) Unless the stair or ladder leading to the ground at the foot of .such a fire escape is permanently fixed, the stair or ladder shall be constructed with counter-balancing devices that permit it to be easily and quickly released and placed in rigid position for use.

(e) Such fire escapes shall be so located that safe egress will be provided at the foot of the same to a street either directly or through a fireproof passage.

(f) Such fire escapes shall be spacious enough that the movements of those using the fire escape will not be retarded. The angle of the stringers of such fire escapes with the horizontal shall not be greater than forty-five degrees.

Section 6.7. PASSAGEWAYS, HALLWAYS, DOORWAYS.

Section 6.71. Passageways.

(a) **Width.** The clear width of passageways serving as required exits shall be not less than at the rate of twelve inches for every one hundred persons to be accommodated but not less than five feet in any case.

(b) **Height.** Such passageways shall have a clear height of not less than seven feet.

(c) **Openings.** No such passageway shall serve more than two doorways, or stairways, or one of each.

(d) **Floor.** When the floors. of such passageways are not level, gradients of not more than one foot in ten feet may be used; provided that at a. door leading into a. passageway or at the foot of a stairway, the floor shall be level across the entire width of the passageway and

along its length for a distance of twelve inches more than the width of the door, and for a distance of not less than forty-four inches at the foot of the stairway.

(e) **Enclosure.** The enclosing walls, floors and ceilings of such passageways shall have a fire resistance rating of not less than two hours, and shall be without openings other than necessary doorways or stairways.

Section 6.72. Hallways. The clear width of every hallway or passage leading to a required exit shall be not less than at the rate of twelve inches for every one hundred persons to be accommodated but not less than forty-four inches; provided that in dwellings and multi-family houses or in case less than forty persons are to be accommodated, the minimum clear width may be thirty-six inches.

Section 6.73. Doorways.

(a) **Width.** No exit doorway shall have a clear width of less than thirty-six inches. The aggregate clear width of doorways serving as exits for more than forty persons shall be not less than at the rate of twenty-two inches for every one hundred persons to be accommodated.

(b) **Hanging of Doors.**

1. The doors of required doorways shall be so hung and arranged that when opened they shall not in any way diminish or obstruct the required width of passageway, hallway, stair or other means of exit.

2. Except in residence-buildings doorways serving as required exits to a street or to a court or open space communicating with a street, shall have the doors, including the doors of vestibules, so hung as to swing outwards when opening; but this requirement shall not be construed to prohibit the use of doors swinging both inwards and outwards, nor of sliding doors in stables, garages, or shipping and receiving rooms of business buildings and storage buildings.

3. Exit doors leading from rooms occupied by fifteen or more persons, shall be hung to swing to the direction of exit travel.

4. No exit door shall open immediately on a flight of stairs, but a landing the length and width of which are not less than the width of such door, shall be provided between such door and such stairs. No riser shall be located within one foot of an exit door.

(c) **Revolving Doors.** Revolving doors shall not be used as exit doors in public buildings or institutional buildings, nor shall they be used as exit doors in buildings occupied as stores where more than seventy-five persons are likely to be congregated, unless there are also exit doors of the swinging type, having an aggregate width of at least fifty per cent of required width of exit doors and there is at least one swinging door adjacent to each revolving door.

(d) **Door Fastenings.**

1. Fastenings on required exit doors shall be such that the door may be readily opened from the inside without the use of keys; provided that this requirement shall not apply to the doors of rooms where persons are under legal restraint, nor to doors of rooms or floor areas while such rooms or floor areas are not occupied by any persons.

2. Draw bolts shall not be used in places of assembly.

Section 6.8. MAINTENANCE.

Section 6.81. Physical Conditions. All required exits and fire escapes shall at all times be maintained in good, safe, usable condition, and shall at all times during occupancy be kept free and clear of obstructions and readily accessible.

Section 6.82. Exit Signs. Required exits shall be indicated by suitable lights; provided that exits from floor areas occupied as theatres, dance halls and other places of assembly, and from auditoriums accommodating more than seventy-five persons shall be plainly marked by approved exit signs, sufficiently illuminated when the floor area is occupied, to be readily distinguished.

Section 6.83. Lighting.

(a) Required stairways, passageways, hallways and other means of exit including exterior open spaces to or through which exits lead, shall be kept adequately lighted at all times that the building served thereby is occupied.

(b) Artificial lighting shall be provided whenever natural lighting is inadequate.

Section 6.84. Storage Prohibited. No part of a stairway, whether interior or exterior, nor of a fire tower, nor of a hallway, corridor, vestibule, balcony, or bridge leading to a stairway or exit of any kind, shall be used for any other than exit purpose.

Section 6.85. Radiators. No coil or radiator, or steam riser shall be placed in a stairway, passageway, hallway or other means of exit, nor in an aisle of a floor area in which seating accommodation is provided, unless the same be placed in a recess formed in or by the walls or partitions and guarded .by substantial metal screen for a height of not less than six feet.

Section 6.9. THEATRES AND OTHER SPECIAL OCCUPANCIES.

Section 6.91. Seatings-General.

(a) In places of assembly in which seating is provided, except in churches and other places for religious assembly, stadiums and reviewing stands, individual seats shall be provided for the persons congregating therein.

(b) Seats, whether fixed or movable, shall, except in boxes or loges not exceeding sixty square feet in area, be arranged in rows set not less than thirty-two inches apart from back to hack, measured in a horizontal direction.

(c) In places of assembly used regularly for theatrical, operatic or similar performances, or for the display of motion pictures, the seats, except in boxes or loges not exceeding sixty square feet in area, shall be fixed and shall be separated by arms.

(d) In boxes or loges not exceeding sixty square feet in area, and in other locations where loose chairs are permitted, not more than one chair shall be provided for each six square feet of floor space. When individual fixed seats are provided or required, no seat shall have more than seven seats intervening between it and an aisle when the building is of Class A or Class A' construction; and no seat shall have more than six seats intervening between it and an aisle when the building is Class B or Class C construction; and no seat shall have more than five seats intervening between it and an aisle when the building is of Class D or E construction.

Section 6.92. Aisles.

(a) Every aisle shall lead to an exit door, or to a cross aisle, that is, an aisle running parallel with the seat rows and leading to an exit door.

(b) The width of an aisle running at right angles to the seat rows, in places of assembly in which seating is provided, shall be not less than thirty-six inches plus one-quarter inch for every foot of length of such aisle, from its beginning to an exit door or to a cross aisle, or between cross aisles. Cross aisles shall be not less in width than the widest aisle with which they connect.

(c) Steps shall not be placed in aisles unless the gradient would exceed one foot rise in ten feet run. Steps, when necessary, shall be grouped, and so far as practicable isolated steps

shall be avoided. Such steps shall extend across the full width of the aisles and shall be illuminated; treads and risers shall conform to the requirements of this code for exit stairs.

(d) Aisles shall be used only for passage to and from seats and shall be kept unobstructed at all times.

Section 6.93. Galleries. In galleries or other locations where seatings are arranged on platforms or successive tiers, and the height of the rise from one platform to another below and in front of it exceeds twenty-one inches, a substantial railing not less than thirty inches high shall be placed at the edge of the platform along the entire row of seats.

Section 6.94. Stage - General.

(a) No stage for theatrical or similar performances, including drama, opera, vaudeville and the like, which requires or uses a curtain, portable or fixed scenery, lights, mechanical appliances, or any of them, shall be erected, placed or maintained hereafter in a building except in conformity with the provisions of this section.

(b) Every such stage now existing, if reconstructed or altered, shall be made to conform with the provisions of this section.

Section 6.94.1. Enclosure Walls.

(a) Such stage shall be enclosed on all sides, except for the proscenium opening and the necessary doors and windows, with solid walls of approved masonry, extending from the foundation to and at least four feet above the roof of the building. That part of such enclosure walls that separates the stage and auditorium, known as the proscenium wall, shall have a fire-resistance rating of not less than four hours.

(b) There shall be no window opening in such enclosure wall within five feet of a lot line other than a street line.

Section 6.94.2. Proscenium Walls. In that portion of the enclosure walls which separates the stage from the auditorium, there shall be no other openings than the proscenium opening and one doorway at the stage floor level and one doorway from the space below the stage floor to the musicians' pit, if there is one.

Section 6.94.3. Appurtenant Rooms.

(a) Dressing rooms, scene docks, property rooms and other rooms or compartments appurtenant to the stage shall be separated from the stage and other parts of the building by walls of approved masonry.

(b) Such rooms may be placed within the stage enclosure walls, provided they are separated from the rest of the stage by walls or partitions, floors and roofs of fireproof construction.

(c) In no case shall openings other than the necessary doorways at the stage level, connect such rooms with the rest of the stage.

Section 6.94.4. Dressing Rooms. Dressing rooms shall have an independent exit leading directly into a court or street.

Section 6.94.5. Curtain.

(a) The proscenium opening shall be provided with a fireproof metal curtain, or, when the opening does not exceed twenty-eight feet in width nor twenty-two feet in height in places of assembly accommodating less than one thousand persons, with a reinforced asbestos curtain, sliding at its sides in iron grooves securely fastened to the proscenium wall, and extending not less than eighteen inches beyond each side of the opening into such grooves.

(b) The proscenium curtain shall be so arranged and maintained that, in case of fire, it will be released automatically and instantly by an approved heat-actuated device, and will descend safely and close completely the proscenium opening. It shall also be equipped with effective devices to permit prompt and immediate closing of the proscenium opening by manual means.

(c) No part of such curtain shall be supported or fastened to combustible material.

(d) Such curtain shall be so designed and constructed that it will prevent all passage of flame for at least thirty minutes and will withstand without failure a temperature of not less than seventeen hundred degrees Fahrenheit and an air pressure of not less than ten pounds per square foot normal to its surface, during such period.

Section 6.94.6. Construction.

(a) All that portion of the stage not comprised in the working of scenery, traps and other mechanical apparatus for the presentation of a scene, approximately equal to the width of the proscenium opening, and all appurtenant rooms and compartments shall be of fireproof construction.

(b) The fly galleries entire, including pin-rails, shall be constructed of iron or steel, and the floors of said galleries shall be of fireproof construction.

(c) The rigging loft shall be of incombustible material.

(d) The roof over the stage shall be of fireproof construction.

Section 6.94.7. Doors and Windows.

(a) Door openings leading from the stage directly to the outer air shall be equipped with approved self-closing fire doors. Door openings in the proscenium wall shall be equipped with approved automatic fire doors on one side of the wall and with approved self-closing fire doors on the other. All other door openings connecting with the stage shall be equipped with approved automatic fire doors.

(b) Windows shall be approved fire windows.

Section 6.94.8. Electrical Equipment.

(a) The switchboard for the electrical equipment of such stage shall be so located that it will be accessible at all times, and will be protected from falling objects and from the storage or placing of stage equipment against it.

(b) All electric equipment of the stage shall conform to the provisions of this code and the authorized rules relating to electrical control.

Section 6.95. Motion Picture Projection Booths. No aisle or exit or part thereof shall be within ten feet of an opening in the machine booth or area used for rewinding or the storing of films, except in a fire-resistive building and then the distance from opening in machine booth or area used for the rewinding or storage of films or other nitro-cellulose products shall be not less than seven feet.

Section 6.96. Modification of Exit Requirements.

(a) **Auditoriums and Assembly Rooms.** In churches, Sunday schools and in assembly rooms not generally thrown open to the public and which do not contain more than two hundred seats or twelve hundred square feet of seat area, the Insurance Commissioner may allow exit and aisle areas less than prescribed in this chapter when he deems it advisable.

When a theatre, moving picture show, auditorium or assembly room is a part of a building, the type of construction governing the exit and aisle areas shall be based on the type of walls surrounding the same and the formula used shall be for the type wall least fire resistive.

Example: If a theatre is a part of a building of ordinary construction and separated from the remainder of the building by a frame wall, then the exit and aisle area in such theatre shall be the same as required for a frame building. The same to apply in moving picture shows, auditoriums, and assembly rooms.

(b) **Special Exit Requirements for School Buildings.**

1. All school buildings over one story in height, except those of Class A or Class A' construction, hereafter erected shall have the stairways and exits so constructed, arranged and located as to form, without the use of automatic or self-operating devices, a positive barrier to the rapid spread of heat, smoke and/or flame.

2. Exits for auditoriums and gymnasiums in school buildings shall, unless it is established to the satisfaction of the Insurance Commissioner that such auditorium or gymnasium will not be used for entertainment purposes, be of the same size and number as that required for theatres.

(c) **Churches.** Same as theatres except with the approval of the Insurance Commissioner the exit and aisle areas may be reduced one fourth or more if he deems it advisable.

(d) **Schools and Sunday Schools.** Note: Auditorium areas in such buildings must comply with requirements for auditoriums and assembly rooms. Plans for all school buildings of all types of construction and plans for Sunday school buildings, except those of not more than one story and accommodating not more than fifty children and teachers, shall be submitted to and approved by the Insurance Commissioner before any work of any kind is begun on such building.

Section 6.97. Special Requirements for Location of Exits of Hotels, Hospitals, Dormitories, Apartments, Flats and Other Buildings in Which Rooms are Rented for Living and Sleeping Purposes.

(a) All hotels, lodging houses, school dormitories, hospitals, sanatoriums, apartment houses, flats, tenement houses and all other buildings in which rooms are to be rented or leased or let or offered for rent, let or leased for living or sleeping purposes, hereafter constructed in this State shall be constructed so that the occupants of all rooms above the first floor shall have unobstructed access to two separate and distinct ways of egress extending from the uppermost floor to the ground, such ways of egress to be so arranged in reference to rooms that in case of fire on one stairway the other stairway can be reached by the occupant without his or her having to pass the stairway involved. Entrance to all such ways of egress aforementioned in this section shall be from corridors or hallways of not less than five feet in width, and in no case shall entrance to such ways of egress be through a room or closet, and where such building is, in the opinion of the Insurance Commissioner, of sufficient size to require more than two ways of egress, the standard established by this code shall be adhered to.

(b) Every hotel, lodging house, school dormitory, hospital, sanatorium, apartment house, flat, tenement house or other building in which- rooms are rented, leased, let or offered for rent, leased or let for living or sleeping purposes, shall be provided with such additional ways of egress as the Insurance Commissioner shall deem practicable in order that the objects of this code may be accomplished and that existing dangers shall not be perpetuated.

(c) The requirements of the two preceding subsections shall not apply to buildings used as private dwellings, unless such private dwelling exceeds three stories in height and the location of stairways with reference to rooms shall not apply to buildings of Class A or Class A' construction.

CHAPTER VII.

Materials, Loads and Stresses

Section 7.1. QUALITY OF MATERIALS. The quality of materials used in the construction of buildings shall conform to the current standard specifications issued by the American Society for Testing Materials.

Materials not specified in said specifications or herein shall be subject to the approval of the State Insurance Commissioner.

Section 7.2. LOADS. Buildings and all parts thereof shall be of sufficient strength to support safely their imposed loads, live and dead, in addition to their own proper dead loads; provided, however, that no building or part of a building shall be designed for live loads less than those specified in Section 7.22.

Section 7.21. Dead Loads. In the absence of definite information establishing the weights of construction materials which are to be used, the following unit weights shall be assumed:

	lbs. per cu. ft.
Brickwork	120
Concrete, stone	144
Concrete, cinder	108
Gypsum block	48
Hollow tile, wall bearing	60
Hollow tile partition	54
Plaster, mortar	96
Granite, bluestone, and marble	168

Section 7.22. Live Loads. Minimum Requirements.

Human Occupancy. For hospital rooms and wards, guest rooms in· hotels, lodging and tenement houses, and for similar occupancies, the minimum live load shall be taken as 40 pounds per square foot uniformly distributed.

For floors for office purposes and for rooms with fixed seats, as in churches, school classrooms, reading rooms, museums, art galleries and theatres, the minimum live load shall be taken as 50 pounds per square foot uniformly distributed. Provision shall be made, however, in designing office floors for a load of 2,000 pounds placed upon any space 2½ feet square wherever this load upon an otherwise unloaded floor would produce stresses greater than the 50-pound distributed load.

For aisles, corridors, lobbies, public spaces in hotels and public buildings, banquet rooms, assembly halls without fixed seats, grandstands, theatre stages, gymnasiums, stairways, fire escapes or exit passageways, and other spaces where crowds of people are likely to assemble, the minimum live load shall be taken as 100 pounds per square foot uniformly distributed. This requirement shall not apply, however, to such spaces in private dwellings, for which the minimum live load shall be taken as in paragraph 1 of this section.

Industrial or Commercial Occupancy. In designing floors used for industrial or commercial purposes, or purposes other than previously mentioned, the live load shall be assumed as the maxi- mum caused by the use which the building or part of the building is to serve. The following loads shall be taken as the minimum live loads permissible for the occupancies listed, and loads at least equal shall be assumed for uses similar in nature to those listed in this section.

Floor used for:

	Minimum Live Load (lbs. per sq. ft.)
Storage purposes (special)	250
Storage purposes (general)	100
Manufacturing (light)	75
Printing plants	100
Wholesale stores (light merchandise)	100
Retail salesroom (light merchandise)	75
Stables	75
Garages -	
All types of vehicles	100
Passenger cars only	80

Sidewalks – 250 pounds per square foot uniformly distributed or 8,000 pounds concentrated, whichever gives the largest moment or shear.

Roof Loads - The following are minimum requirements. Roofs having a rise of 4 inches or less per foot of horizontal projection shall be proportioned for a vertical live load of 30 pounds per square foot of horizontal projection applied to any or all slopes. With a rise of more than 4 inches and not more than 12 inches per foot a vertical live load of 20 pounds on the horizontal projection shall be assumed. If the rise exceeds 12 inches per foot a minimum vertical live load of 10 pounds per square foot shall be assumed, and provision shall also be made for a wind force acting normal to the roof surface (on one slope at a time) of 20 pounds per square foot of such surface.

Reductions in Live Loads. Except in buildings for storage purposes the following reductions in assumed total floor live loads are permissible in designing all columns, piers or walls, foundations, trusses and girders.

REDUCTION OF TOTAL LIVE LOADS CARRIED

	Percent
Carrying one floor	0
Carrying two floors	10
Carrying three floors	20
Carrying four floors	30
Carrying five floors	40
Carrying six floors	45
Carrying seven or more floors	50

For the loads exerting pressure under the footings of foundation walls the full dead loads and the reduced required live loads on the lowest walls, piers or columns shall be taken.

Footings shall be designed so that the pressure on the soil per unit of area shall be uniform under all parts of the building or structure.

In proportioning the areas of footings the dead loads alone shall be considered; provided that in no case shall the full dead load plus the reduced live load on a footing exceed the bearing capacity of the soil.

Live Loads to be Posted. The live loads for which each floor, or differing parts thereof, of a commercial or industrial building is designed shall be certified by the building official and shall be conspicuously posted in that part of each story where they apply, using durable metal signs. The occupant of the building shall be responsible for keeping the actual loads below the certified limits.

Occupancy Permits. Plans for other than residential buildings filed with the building official with application for permits shall show on each drawing the live loads per square foot of area covered, for which the building is designed, and occupancy permits for buildings hereafter erected shall not be issued until the floor-load signs required by the above paragraph have been in- stalled. No change in the occupancy of a building now existing or hereafter erected shall be made until a revised occupancy permit has been issued by the building official certifying that the floors are suitable for the loads characteristic of the proposed occupancy.

Section 7.23. Wind Pressures. For purposes of design the wind pressure upon all vertical plane surfaces of all buildings and structures shall be taken at not less than 10 pounds per square foot for those portions less than 40 feet above ground, and at not less than 20 pounds per square foot for those portions more than 40 feet above ground.

The wind pressure upon sprinkler tanks, sky signs, or upon similar exposed structures and their supports shall be taken at not less than 30 pounds per square foot of plane surface, acting in any direction. In calculating the wind pressure on circular tanks or stacks this pressure shall be assumed to act on six tenths of the projected area.

Where it shall appear that a building or structure will be exposed to the full force of the wind throughout its entire height and width the pressure upon all vertical surfaces thus exposed shall be taken at not less than 20 pounds per square foot. The overturning moment resulting from the above calculations shall in no case exceed 75 per cent of the resisting moment.

Section 7.3. ALLOWABLE WORKING STRESSES.

General Requirements. Every building or structure hereafter erected and all new construction in the alteration of an existing building or structure shall be so designed and constructed that the working stresses fixed in this section are not exceeded. In using these stresses, the effects of all loads and conditions of loading and the influence of all forces, affecting the design and strength of the several parts shall be taken into account.

Higher stresses than herein specified may be used but only if it is clearly established, by test or other satisfactory evidence, that material of a higher grade or a superior workmanship than is generally provided in accepted good practice is to be employed. The use of higher stresses, however, shall not be allowed until a statement, giving the reasons for such permission together with the facts and circumstances on which it is based, is placed on file and made a part of the official record of the permit.

The working stresses for materials permitted in the construction of buildings or structures which are not provided for in this section shall be established by the Insurance Commissioner.

General Requirements as to Construction. All members shall be so framed, anchored, tied, and braced together as to develop the maximum strength and rigidity consistent with the purposes for which they may be used or to which they are likely to be subjected, and the stresses hereinafter recommended are based on the assumption that the details and connections used are as strong as required by the stresses involved. Workmanship in fabrication, preparation and installation of material shall conform throughout to good engineering practice.

Natural Stone. The working stresses in pounds per square inch in natural stone in compression shall be taken as follows:

Sandstone	400
Marble	600
Limestone	700
Slate	1,000
Granite	1,000

Brick Masonry. The allowable compressive stresses in brick masonry due to combined live and dead loads shall not exceed the limits given in the following table; provided that where the masonry is laid with smooth level horizontal joints and completely filled vertical joints and is thoroughly inspected and where the effects of eccentric and concentrated loads and lateral forces are fully analyzed and allowance made for them, the working stresses in this table may be increased by 50 per cent. In the case of masonry composed of brick of different grades the allowable working stresses shall be the value given in the table for the lowest grade of brick of which the masonry is composed.

Grade of brick: average minimum compressive strength tested flat (in pounds per square inch).	**Allowable working stresses on gross cross-sectional area in pounds per square inch:**		
	Lime mortar	Cement lime or natural cement mortar	Portland cement mortar
8,000 plus	100	300	400
4,500 to 8,000	100	200	250
2,500 to 4,500	75	140	175
1,500 to 2,500	50	100	125

Hollow Walls, Hollow Tile, Concrete Block or Tile, Brick. The maximum allowable compressive stresses in masonry of hollow tile, concrete block, or concrete tile, due to combined live and dead loads shall not exceed 70 pounds per square inch of gross cross-sectional area when laid with cement-lime mortar and 80 pounds per square inch of gross cross-sectional area when laid with Portland cement mortar. The maximum allowable compressive stresses in hollow walls of brick due to combined live and dead loads shall not exceed 100 pounds per square inch when laid with cement-lime mortar nor 125 pounds per square inch when laid with Portland cement mortar.

Plain Concrete. Concrete for bearing walls and piers of plain concrete shall be not leaner in cement than a mixture of one part of cement, two parts of sand and four parts of coarse aggregate, proportioned by volume, unless the cement has an ultimate strength of at least 2,000 pounds per square inch at 28 days.

The maximum allowable stresses in masonry of plain concrete of the proportions specified in this section as a minimum due to combined live and dead loads shall not exceed 400 pounds per square inch in compression, 35 pounds per square inch in tension or diagonal tension; 90 pounds per square inch in punching shear. When plain concrete of greater strength is used, the foregoing stresses may be increased to 20 per cent of the ultimate compressive strength for concrete in compression, 2 per cent in tension or diagonal tension, and 4½ per cent in punching shear.

Stone Masonry. The maximum allowable compressive stresses in ashlar masonry due to combined live and dead loads shall not exceed the following limits:

	Maximum unit working stresses (pounds per square inch) laid in		
	Portland cement mortar	Cement lime or natural lime mortar	Lime mortar
Granite	800	640	400
Limestone	500	400	250
Marble	500	400	250
Sandstone	400	320	160
Rubble Masonry	140	100	70

Veneered Walls. The maximum allowable compressive stresses on the backing of Veneered walls due to combined live and dead loads shall not exceed those elsewhere prescribed for masonry of the type which forms such backing. In no case shall the veneering be considered a part of the wall in computing the strength of bearing walls, nor shall it be considered a part of the required thickness of the wall.

Reinforced Brick Masonry. In designing reinforced brick masonry the methods and stresses shall be used as given in "Brick Engineering, Volume III, published by Brick Manufacturing Association of America, and amendments thereto.

Reinforced Concrete. Stresses and methods of design used in the calculations for reinforced concrete shall not exceed those listed in the building regulations for reinforced concrete as adopted by the American Concrete Institute, 1928.

Cast Iron. Compressive stresses in hollow cast-iron columns shall not exceed values determined by the formula

$$P/A = 9000 - 40\ L/r$$

in which

P/A = compressive stress in pounds per square inch;
L = length of the column in inches; and
r = minimum radius of gyration of the column.

The maximum allowable ratio of L to r shall not exceed 90, except that when allowable working stresses computed by the above formula are reduced one-third; the ratio of L to r may be increased, but shall not exceed 120.

Cast-iron columns shall not be used in any case where the load is so eccentric as to cause tension in the cast iron; nor shall they be used for parts of the structural frame of buildings which are required to resist stresses due to wind. Tensile stresses in the extreme fiber of cast-iron lintels or elsewhere, except in columns, shall not exceed 3,000 pounds per square inch.

Structural Steel Shapes. The allowable working stresses for steel shall not exceed those established by the American Institute of Steel Construction as stated in Section 8.61.

Wood Members. The size of all wood structural members shall be sufficient to carry the imposed loads safely and without exceeding the allowable working stresses as hereinafter specified. Where minimum sizes are required by this code, they refer to the nominal size, but in computations to determine the required size of lumber members, the net cross section area or actual size shall be used and not the nominal size. American Standard dressed sizes shall be accepted as conforming with the corresponding nominal sizes required.

The maximum allowable working stresses for lumber and timber in pounds per square inch of net cross-section area shall not exceed the values given in the following tables for the grades of the respective species, based on American Lumber Standards as contained in Simplified Practice Bulletin R-16-29, Lumber, by the United States Department of Commerce.

(a) Stresses for grades not given in the tables shall be established by the Insurance Commissioner.

(b) Stresses due to dead and live loads, acting singly or in combination, but without wind loads, shall not exceed the allowable stresses for the respective species. For stresses produced by wind loads only, or by a combination of wind loads and dead and live loads, the allowable stresses herein permitted may be in- creased 50 per cent, providing the resulting sections are not less than those required for dead and live loads alone.

(c) For direct tension the same values as for extreme fiber stresses in bending may be used.

(d) Using the stresses for timbers given in the following tables, no allowance need be made for impact when the impact stresses produced by a load does not exceed the live load stresses.

(e) Shearing stresses for joint details may, for all grades, be taken as 50 per cent greater than the horizontal shear values otherwise permitted.

(f) In the case of joists supported on a ribbon board and spiked to the studding, the allowable stresses in compression across the grain may be increased 50 per cent above that specified.

(g) Lumber and timber to be accepted as of grades qualifying for working 3tresses higher than those permitted for the lowest grade provided for in Table No. 1 shall bear an official grade mark or otherwise be identified by an acceptably authenticated certificate.

The working stresses, in pounds per square inch, in lumber and timber of common grade suitable for general conditions, shall be taken as in the following table:

Table No. 1

	Extreme fiber and direct tension	Shear with the grain	Compression across the grain
Cedar: Western red	720	64	200
Northern and Southern white	600	56	175
Port Orford	880	72	250
Alaska	880	72	250
Cypress: Southern	1,040	80	350
Douglas fir: coast region	1,200	72	325
Rocky Mountain region	880	68	275
Fir: balsam	720	56	150
Golden, noble, silver, white	880	56	300
Hemlock: West coast	1,040	60	300
Eastern	880	56	300
Larch: Western	960	80	325
Oak: red and white	1,120	100	500
Pine: Southern No. 1 common	1,200	88	325
dense common[1]	1,400	103	380
California, Idaho and Northern white, Ponderosa and sugar	720	68	250
Norway	880	68	300
Redwood	960	56	250
Spruce: red, white, Sitka	880	68	250
Englemann	600	56	175
Tamarack: Eastern	960	76	300

1. Dense Southern yellow pine shall show on one end or the other an average of at least six annual rings per inch and at least one third summer wood, all as measured over the third, fourth, and fifth inches of a radial line from the pith. Wide-ringed material excluded by this rule will be acceptable, provided that the amount at summer wood as above measured shall be at least one halt.

   The contrast in color between summer wood and spring wood shall be sharp and the summer wood shall be dark in color, except in pieces having considerably above the minimum requirement for summer wood.

When timber *is* used *in* a wet location or exposed to the weather the working stresses shall be appropriately reduced unless timber so used contains sixteen pounds or more of creosote oil or some other approved preservative per cubic foot of timber.

The working stresses, in pounds per square inch, of cross section, for wooden columns shall vary with the ratio of unsupported length to diameter or least side, as follows:

Table No. 2

	For ratios not greater than							
	12	16	20	25	30	35	40	50
Cedar: Western red	553	558	505	425	304	224	171	110
Douglas fir:								
coast region:	870	847	796	675	487	358	274	175
Rocky Mountain	632	617	582	500	365	268	206	132
Hemlock: West coast	712	696	660	573	426	313	240	153
Larch: Western	863	828	752	570	396	291	223	142
Oak: red and white	790	771	728	625	457	336	257	164
Pine: Southern	870	847	796	675	487	358	274	175
Redwood	786	754	688	526	365	268	206	132
Spruce: red, white, and Sitka	632	617	582	500	365	268	206	132

For intermediate ratios the working stresses shall be proportioned to those given. The maximum ratio here given shall not be exceeded. When timber is used in a wet location or exposed to the weather, the working stresses shall be appropriately reduced.

Factor of Safety. The factor of safety for new building materials or for materials not otherwise provided for herein shall be determined by the Insurance Commissioner.

Section 7.4. Bearing Values of Soils. In the absence of satisfactory tests, the sustaining power per square foot of different soils shall be deemed to be as follows:

Soft clay	1 ton	Coarse sand	4 tons
Wet sand	2 tons	Gravel	6 tons
Firm clay	2 tons	Soft rock	8 tons
Sand and clay, mixed or in layers	2 tons	Hardpan	10 tons
Fine, dry sand	3 tons	Medium rock	15 tons
		Hard rock	40 tons

In case a building or structure rests partly on rock or hardpan and partly on some other soil, the bearing capacity of the latter shall be taken at not more than one half of the capacity otherwise assumed.

When a doubt arises as to the safe sustaining power of the soil upon which a building or structure is to be erected, or it is desired to exceed the presumptive capacity, the building official may direct that borings or tests be made by and at the expense of the owner of the proposed building or structure to determine the sustaining power of the soil. Whenever such a test is made the building official shall be notified so that he may be present in person or by representative.

No foundation of a building or structure shall be placed on filled ground until the building official has fixed, by test or inspection, the safe sustaining power that may be assumed.

CHAPTER VIII.

Construction

Section 8.1. WORKMANSHIP. Workmanship in the fabrication, preparation, and installation of materials shall conform to generally accepted good practice. Specific provisions of this chapter shall not be deemed to suspend any requirements of good practice, but shall be regarded as supplementing or emphasizing them, and shall be controlling.

Section 8.2. EXCAVATIONS. All excavations for buildings and excavations accessory thereto shall be protected and guarded against danger to life and property. No excavation for any purpose shall extend within one foot of the bottom of the natural slope of the soil under any footing or foundation, unless such footing or foundation is first properly underpinned or protected against settlement.

Any person causing an excavation to be made on his own property, to a depth of 10 feet or less below the curb level, shall protect the excavation so that the soil of adjoining property will not cave in or settle, but shall not be liable for the expense of underpinning or extending the foundation of buildings on adjoining properties where his excavation is not in excess of 10 feet in depth. Before commencing the excavation the owner shall notify in writing the owners of adjoining buildings not less than ten days before such excavation is to be made that the excavation is to be made and that the adjoining buildings should be protected. The owners of the adjoining properties shall be given access to the excavation for the purpose of protecting such adjoining buildings.

Any person causing an excavation to be made exceeding 10 feet in depth below curb level, shall protect the excavation so that the adjoining soil will not cave in or settle, and shall extend the foundation of any adjoining buildings below the depth of 10 feet below curb levels at his own expense. The owner of the adjoining buildings shall extend the foundations of his building to a depth of 10 feet below curb level at his own expense as provided in the preceding paragraph.

In case there is a party wall along a lot line of the premises where an excavation is being made, the person causing the excavation to be made, shall at his own expense, preserve such party wall in as safe a condition as it was before the excavation was commenced and shall, when necessary, underpin and support the same by proper foundations;

In case a building or structure is so located that the curb level to which it is properly referred is at a higher level than the curb level to which the excavation is referred, such part of the necessary underpinning or foundation as may be due to the difference in the curb levels, shall be made and maintained at the joint expense of the owners of the adjoining premises at that point.

Section 8.3. FOUNDATIONS.

Section 8.31. General Requirements. Except when erected upon solid rock or upon walls or piers on the water front, foundation walls shall be carried not less than 1 foot below frost line and shall rest on solid ground or on leveled rock, or on piles or ranging timbers when solid earth or rock is not found; provided that when one-story buildings of frame construction, ordinary construction, or unprotected metal construction do not exceed seven hundred and fifty square feet in area, such foundation walls shall not be required.

Section 8.32. Footings. Footings consisting of masonry, reinforced concrete, reinforced brick masonry or steel grillages, shall be provided under foundation walls that rest on earth. Footings of wood may be used if they are entirely below permanent water level or if they are thoroughly impregnated with creosote or other approved preservative.

Wood used for this purpose should be framed to length and bored before treatment and completely buried in the earth below the frost line. Where framing is necessary after treating, the cuts should be field treated with at least three applications of hot creosote and a coat of hot tar.

Where metal is incorporated in or forms part of a foundation it shall be protected from rust by paint, asphalt, concrete, or other approved materials and in such manner as may be approved.

Section 8.33. Pile Foundations. Piles intended to sustain a wall or a building or any part thereof, shall be driven to a solid bearing, if practicable to do so, and the method of driving shall be such as not to impair their strength. No pile or group of piles shall be loaded eccentrically. Any type of pile construction not provided for in this chapter shall meet with such requirements as may be prescribed by the rules of the Insurance Commissioner.

Wood Piles. Wood piles shall be of approved timber, sound and straight. The diameter at the point shall be not less than five inches. The diameter at the butt shall be not less than ten inches for piles not over twenty-five feet in length, and not less than twelve inches at the butt for piles of greater length.

The safe sustaining power of any wood pile in tons shall be taken as twice the weight of the hammer in tons multiplied by the height of the fall in feet, divided by the average penetration of the pile in inches under the last five blows, plus one, when a drop hammer is used for driving; and as twice the weight of the hammer in tons, multiplied by the height of the fall in feet, divided by the average penetration in inches under the last five blows, plus one tenth when a steam hammer is used for driving, provided that the driving has reached such a point when successive blows produce approximately equal penetration. No wood pile, however, shall be weighted with a load exceeding twenty tons.

The distance between wood piles shall not be less than twenty- four inches on centers. The tops of untreated wood piles shall be cut off below the permanent water level. When ranging and capping timbers are laid on piles for foundations, they shall be of heart wood not less than six inches thick and properly joined together, and their tops laid below the permanent water level.

When wood piles are used under frame buildings built over the water or on land subject to overflow, they may project above the water a sufficient height to raise the building above high water, and the building may be placed directly thereon without other foundations.

Concrete Piles.

(a) **Concrete-filled Steel Tubes.** For piles consisting of steel tubes filled with concrete, the tube shall have a minimum inside diameter of ten inches and a shell thickness of not less than five-sixteenths of an inch. The ends of each tube shall be faced perpendicular to its axis. Splices shall be of approved design. Where bedrock or hardpan can be reached within sixty feet, the length of such piles shall not exceed forty times the outside diameter of the tube. For pile lengths in excess of sixty feet, the minimum diameter of eighteen inches shall be used; provided that piles exceeding forty diameters in length may be used if a one per cent reduction in load is made for each diameter in length in excess of forty diameters. For each splice in the length of the tube in excess of one, a five per cent reduction in load shall be made. Such piles shall be driven to rock or hardpan. The load on such piles shall not exceed five hundred pounds per square inch on the concrete and seventy-five hundred pounds per square inch on the steel; provided that in computing the effective area of the steel the outer one-sixteenth inch of thickness shall be deducted from the thickness of the tube. No interior steel reinforcement shall be used.

(b) **Piles Moulded Before Driving.** Concrete piles moulded and cured before driving shall be provided with not less than two per cent nor more than four per cent of longitudinal reinforcement. The steel shall be so placed that there is not less than one and one half inches of concrete on all sides. The diameter or lateral dimension of such piles shall be not less than ten inches on the point, and shall average not less than twelve inches throughout the length of the pile for piles up to twenty feet, nor less than fourteen inches for piles up to thirty feet, nor less than fifteen inches for piles up to forty feet. For piles over forty feet in length, the diameter or lateral dimension shall be one thirty-fifth of the length, but no pile shall be required to exceed two feet in diameter or lateral dimension. The maximum allowable load in tons shall not exceed two times the average diameter or least lateral dimension in inches, but shall not exceed forty tons in any case.

(c) **Piles Moulded in Place.** Concrete piles cast in place shall be so made and placed as to insure the exclusion of foreign matter and to insure a continuous and full-sized pile. Piles shall be driven in such order and with such spacing as to insure against distortion or injury to the finished pile. The average diameter of such piles shall be at least eleven inches and the diameter of the point shall be at least eight inches. The placing of the concrete through water in such piles is prohibited. The length of such piles shall not exceed thirty times the average diameter. The maximum load for such piles shall be thirty tons.

(d) **Concrete.** The concrete for concrete piles shall be mixed in the proportion of one part Portland cement to not more than two parts clean, coarse sand, and four parts broken stone or gravel of a size passing through a one-inch ring, with only sufficient water to produce a plastic consistency. The concrete as it is placed must be spaded or otherwise agitated to insure uniform consistency and a complete filling of the pipe or mould. The placing of the concrete of a pile, when once started, must continue uninterruptedly until the pile is entirely filled.

(e) **Tests.** When concrete piles are not driven to rock or hardpan, they shall be treated as friction piles and their carrying capacities shall be determined by test.

(f) **Steel H Piles.** Steel H piling shall be encased in concrete above a point two feet below low water level, and their capacity shall be determined by test.

Section 8.34. Foundation Walls. Foundation walls shall be built of approved masonry, reinforced concrete or steel encased in masonry; provided that no hollow blocks of burnt clay shall be used unless they are vitrified, except for surfaces in contact with mortar.

Foundation walls shall be of adequate strength and thickness to resist lateral pressures from adjacent earth and to support their vertical loads; but the thickness shall be not less than the thickness of walls supported by them.

If built of rubble stone, the thickness shall be not less than sixteen inches. If built of brick, concrete, hollow blocks or solid blocks, the thickness shall be not less than twelve inches; provided that when such walls of dwellings or other buildings not exceeding twenty feet in height do not extend more than five feet below the adjacent ground level, the minimum thickness of solid brick or concrete walls shall be eight inches, and the minimum thickness of hollow walls of brick and walls of hollow blocks or solid blocks shall be ten inches.

Section 8.35. Retaining Walls. Walls built to retain or support adjoining earth or rock shall be constructed of approved masonry, reinforced brick masonry or reinforced concrete. Unless provision is made to drain off water, a hydrostatic pressure due to a head equal to the height of the wall shall be assumed. The pressure on the soil under such walls shall not exceed the safe bearing capacities allowed by this code.

Section 8.4. MASONRY. All masonry shall be constructed of approved materials. Approved masonry shall comply with the provisions of this section. All masonry shall be protected against freezing for at least forty-eight hours after being set. No frozen materials shall be built upon.

Except when carried independently by girders at each floor, no wall shall be built up more than twenty-five feet in height in advance of other walls of the building.

Except as otherwise provided in this section, the thickness of masonry walls, other than fire walls and party walls, shall be not less than twelve inches for the uppermost thirty-five feet of their height; and shall increase four inches in thickness for each successive thirty-five feet or fraction thereof measured downward from the top of the wall.

In business buildings and storage buildings of other than fire- proof construction, the thickness of such walls shall be not less than twelve inches for the uppermost twenty-five feet of their height, and shall increase four inches in thickness for each successive twenty-five feet or fraction thereof measured downward from the top of the wall.

In business buildings and storage buildings of fireproof construction, the thickness of such walls shall be not less than twelve inches for the uppermost thirty-five feet of their height, and shall increase four inches in thickness for each successive twenty- five feet or fraction thereof measured downward from the top of the wall.

Non-bearing walls mar be four inches less in thickness than otherwise required for walls; provided that no such wall shall be less than twelve inches thick in any part, unless eight-inch walls are otherwise specifically permitted; and provided further that no twelve-inch thickness shall extend for more than fifty feet in the height of the wall.

Walls supported by girders at each story may be eight inches thick.

The thickness of rubble stone walls shall be four inches more than otherwise required for walls; provided that no rubble stone wall shall be less than sixteen inches in thickness.

When clip courses or wall ties are used to bond a facing or a lining to a wall, neither such facing or lining shall be regarded as a part of the required thickness of the wall nor as contributing to its strength.

Except for window-paneled backs, and permissible chases and recesses, walls shall not vary in thickness between their lateral supports. When a change in thickness, due to minimum thickness requirements, occurs between floor levels, the greater thickness shall be carried up to the higher floor level.

The height of a masonry wall between successive floors or other substantial lateral supports shall not exceed twenty times its thickness, unless it is reinforced by adequate cross walls, piers or buttresses at intervals not exceeding twenty times the thickness of the wall.

Section 8.41. Miscellaneous Masonry Wall Requirements. Walls heretofore erected may be used without change, if in good condition, in buildings hereafter erected or altered; provided the stresses in the masonry under the new conditions do not exceed the working stresses permitted by this code. All rules, regulations and requirements contained in this code, or set out in this chapter in regard to the erection of buildings, or any part thereof, shall apply also where any building or walls, or any part thereof, is proposed to be raised, altered, repaired or added to, in order that the objects of this code may be accomplished. No building now or hereafter built shall be altered, repaired or moved until it has been examined and approved by the local building official as being in a good and safe condition to be altered as proposed, and the alteration, repair or change so made shall conform to the provisions of this code.

Parapets shall be provided on all fire walls, party walls, and exterior walls of masonry or reinforced concrete, where such walls connect with roofs other than roofs of fireproof construction; provided that a parapet shall not be required for a wall facing on a street having a width of fifty feet or more, nor on a wall of a building the roof of which is ten feet lower than the roof of a building adjoining or adjacent to such wall, nor on the walls of a building which is fifty feet or more distant in all directions from other buildings. Where not

otherwise specified, parapet walls shall be at least 18 inches high, but not higher than four times their thickness unless laterally supported. They shall be at least as thick as the top story wall, except that they need not in any case be more than 12 inches thick. In residential buildings not more than three stories high, parapet walls shall extend through combustible roofs to a height of at least 12 inches above the roof. All parapet walls shall be coped.

Corbelling of Chimneys. No brick wall less than 12 inches thick shall be used to support a corbelled chimney. Such corbelling shall not project more than six inches from the face of the wall, and in all such cases the corbelling shall consist of at least five courses of brick. No chimney shall be corbelled from a wall built of hollow tile, hollow concrete block, concrete tile, or hollow walls of brick.

Anchoring Walls. All walls shall be securely anchored and bonded at points where they intersect.

Cornices. The centers of gravity of stone cornices shall be inside of the outer wall face. Terra cotta or metal cornices shall be structurally supported.

Chases and Recesses. No chase shall extend into a wall more than one third of its thickness; but no chase shall be cut or built in an eight-inch wall or within the required area of a pier.

No horizontal chase shall exceed four feet in length, nor shall the horizontal projection of any diagonal chase exceed four feet.

Chases shall not be cut in hollow walls of brick or walls of hollow block or solid block masonry. When chases are necessary they shall be built in.

Recesses for stairways or elevators may be left in walls of buildings, but the thickness of the wall at such recess shall be not less than the required thickness of the wall at the fourth story above grade, unless reinforced by additional piers, by steel or reinforced concrete girders, or by steel or reinforced concrete columns and girders, securely anchored to walls on each side of such recesses.

The aggregate area of chases and recesses in a wall shall not exceed one fourth of the whole area of the face of the wall in any story.

Chases or recesses that would reduce the thickness below the required minimum, shall not be built or cut in fire walls or fire partitions.

Section 8.42. Fire Walls, Fire Partitions and Partitions.

Brick and Plain Concrete Fire Walls. Solid brick or plain concrete fire walls shall be not less in thickness than required for exterior bearing walls of corresponding height, but not less than twelve inches, except that solid brick fire walls for buildings of residential occupancy shall be not less than eight inches thick for the uppermost 20 feet of height and shall be at least 12 inches thick for the remaining lower portion, except that plain concrete fire walls for such structures may be 8 inches throughout. No 8-inch fire wall shall be broken into, subsequent to building, for the insertion of structural members.

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

A separation of at least 8 inches of solid masonry shall be provided in all fire and party walls between combustible members which may enter such walls from opposite sides.

Fire Partitions. Fire partitions of solid brick or plain concrete shall be not less than 12 inches thick.

Fire partitions of hollow tile, or of concrete block or tile, shall be not less than 12 inches thick in any part, and for buildings of storage and heavy manufacturing occupancy, they shall be not less than 16 inches thick throughout.

Alternate Requirements for Fire and Fire Partition Walls. Wall constructions that in fire tests conducted according to accepted standards develop safe fire-resistance periods of one and one-half hours may be permitted for fire walls and fire division walls between residence occupancies, if otherwise adequate in point of strength and stability. For general mercantile and manufacturing occupancies, excluding buildings or portions of buildings used for storage, wall constructions developing, on the same basis, a safe fire-resistance period of three hours shall be similarly permitted.

Bearing Partitions. All interior bearing walls, except fire walls, fire partition walls, and party walls, are considered as bearing partitions. For bearing partitions, materials meeting the ordinary accepted local standards for the purpose may be used.

Where not utilized as party, fire or fire partition walls solid brick-bearing partitions shall be not less than 8 inches thick, and those of hollow tile, concrete block or concrete tile, or hollow wall of brick shall be not less in thickness than one-eighteenth of the height between floors or floor beams.

Non-bearing Partitions. For non-bearing partitions, materials meeting the ordinary accepted local standards for the purpose may be used.

Brick nonbearing partitions shall be not less than 3% inches thick for a height not exceeding 12 feet between floors or floor beams, and for a length not exceeding 20 feet between vertical supports. Non-bearing partitions of hollow tile, concrete block, or concrete tile, hollow walls of brick or of gypsum block or other similar materials shall be built solidly against floor and ceiling construction below and above, and shall not exceed the following unsupported heights:

Thickness Exclusive Of plaster	Maximum Unsupported Height
2 inches	8 feet
3 inches	12 feet
4 inches	15 feet
6 inches	20 feet
8 inches	25 feet

Section 8.5. REINFORCED CONCRETE.

Section 8.51. General.

(a) Except as otherwise specifically provided in this code or in rules duly promulgated by the Building Code Council, the "Building Regulations for Reinforced Concrete" as adopted and amended from time to time by the American Concrete Institute shall be deemed to be the generally accepted good practice in reinforced concrete construction.

(b) Since tests made to date on reinforced brick masonry construction indicate a comparable structural performance with that of reinforced concrete, it is recommended that the provisions of the "Standard Specifications for Concrete and Reinforced Concrete," as recommended in the Report of the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete (Proceedings, American Society for Testing Materials, 1924; Vol. 24, pp. 303 to 382, both inclusive), be adopted to govern the design and construction of reinforced brick masonry in so far as the recommendations of the Joint Committee may apply.

Section 8.52. Walls.

(a) Enclosure walls of reinforced concrete shall be securely anchored at all floors. Such walls when supported by girders at each story shall be bonded or otherwise securely tied to columns or piers.

(b) In buildings of fireproof construction, the thickness of walls of reinforced concrete shall be not Jess than six inches for the uppermost fifteen feet of their height, and shall increase one inch in thickness for each successive twenty five feet or fraction thereof measured downward from the top of the wall; provided that for walls supported by girders at each story the thickness may be, but shall not be less than, five inches; and provided that in no case shall the thickness of any part of a wall of reinforced concrete be less than one twenty-fifth of the unsupported height between successive floors, unless the walls are laterally supported by cross walls, piers or built-in columns at intervals not exceeding twenty-five times the thickness of the wall.

(c) In buildings of other than fireproof construction, the thickness of walls of reinforced concrete shall be not Jess than one and one half times the thickness required for buildings of fireproof construction.

(d) The steel reinforcement, in both vertical and horizontal directions, shall be not less than one quarter of one per cent. In walls eight inches or more in thickness, the reinforcement shall be divided, and equal amounts placed near each face of the wall. Nothing smaller than the equivalent of a three-eighths inch round rod shall be used for reinforcement and the spacing shall not exceed eighteen inches in either direction.

Section 8.53. Protection of Reinforcement.

(a) The reinforcement in footings shall be covered on all sides by not less than three inches of concrete wherever such footings come in contact with the ground; and by not less than two inches of concrete where the nearest surfaces of the concrete are not in contact with the ground.

(b) The reinforcement in columns, girders and beams shall be covered on all sides by not less than one and one-half inches of concrete; in walls and floor slabs by not less than one inch of concrete; provided that when a highly siliceous aggregate or other aggregate liable to disruptive action under high temperatures is used, the concrete covering the reinforcement shall be at least one-half inch thicker than herein specified and shall be reinforced with three-inch metal mesh or finer, placed one inch from the finished surface.

(c) When the exterior surfaces of the concrete are covered with cement mortar or gypsum mortar three-fourths of an inch or more *in* thickness, the concrete covering the reinforcement, except in footings, may be one-half inch less in thickness than herein otherwise required; provided that in no case shall it be less than three-fourths of an inch.

Section 8.54. Protection against Frost.

(a) Unless approved effective provision is made against freezing, no concrete shall be deposited when the air temperature is thirty-two degrees Fahrenheit or lower.

(b) Freshly deposited concrete shall be adequately protected against freezing so long as the air temperature is thirty-two degrees Fahrenheit or lower.

(c) Frozen concrete shall be removed before further construction.

Section 8.55. Removal of Forms. Forms for reinforced concrete shall remain in place until the concrete has hardened. Removable floor forms, beam and girder sides, column casings and other vertical parts of forms, shall not be removed until the concrete has set sufficiently so that it will not be injured by their removal. Those parts of the forms and shoring that support structural members shall not be removed until such members have acquired sufficient strength to support safely their own weight and such loads as may come upon them.

Section 8.6. IRON AND STEEL.

Section 8.61. General. Except as otherwise specifically provided in this code or in rules duly promulgated by the Building Code Council, the "Standard Specification for Structural

Steel for Buildings" and the "Code of Standard Practice," as adopted and amended from time to time by the American Institute of Steel Construction, shall be deemed to be the generally accepted good practice in steel construction.

Section 8.62. Cast-iron Columns.

(a) Cast-iron columns shall not have a smaller outside diameter or side than five inches.

(b) The thickness of metal shall be not less than one-twelfth the diameter or least dimension of cross section, but not less than three-fourths of an inch.

Section 8.63. Steel columns. In buildings and structures exceeding forty-five feet in height, column connections and connections of girders or beams to columns shall be riveted or welded.

Section 8.64. Column Bases.

(a) Whenever necessary to distribute properly the load, iron or steel shoes or steel billets shall be used at the lower ends of column.

(b) Cast iron bases or shoes shall be not less than one inch thick in any part.

(c) Cast iron bases or shoes shall be planed on top, and, when resting on steel girders, on both top and bottom.

Section 8.65. Lintels, Beams and Girders.

(a) Cast-iron lintels shall not be used for spans exceeding six feet. They shall be not less than three-quarters of an inch in thickl1ess at any point.

(b) When rolled steel beams are used in pairs to form a girder, they shall be connected together by bolts and separators at intervals of not more than five feet. All beams twelve inches and over in depth shall have at least two bolts to each separator.

Section 8.66. Riveting.

(a) All shop work shall be riveted. The registered architect or registered engineer in charge of the work may waive this requirement for light work in favor of bolts of mild steel.

(b) All component parts of built-up columns, girders and trusses, including splices in the same, shall be riveted.

(c) Rivets shall be used for the connections of main members carrying live loads which produce impact and for connections subject to reversal of stresses.

Section 8.67. Bolting. Where riveting is not required by the provisions of this section, connections may be effected by bolts of mild steel.

Section 8.68. Welding.

(a) Nothing in this code shall prohibit the use of arc or gas welding in the erection of steel construction in lieu of riveting or bolting.

(b) Surfaces to be welded shall be free from loose mill scale, rust, paint or other foreign matter.

(c) Surfaces to be welded shall not be painted before they are welded. Parts that are welded in the shop, to be erected by bolts or rivets in the field, shall receive the usual painting after the shop work is completed.

(d) Steel construction which is to be welded in the field shall be temporarily supported and properly aligned by erection bolts or other efficient means before the field welding is done.

(e) Except as otherwise specifically provided in this code or in rules duly promulgated by the Building Code Council, the "Code for Fusion, Welding and Gas Cutting in Building

Construction," as adopted and amended from time to time, by the American Welding Society shall be deemed to be the generally accepted good practice in welding and gas cutting.

Section 8.69. Gas Cutting.

(a) Nothing in this code shall prohibit gas cutting in steel construction; provided that gas cutting shall not be done on a member while it is under stress, and that it is not done where the milling of surfaces is required for proper workmanship.

(b) Gas-cut edges shall be smooth and regular in contour, and when used in the preparation of base metal parts for welding, shall be thoroughly cleaned to expose only clean metal.

(c) Gas cutting of holes in a member which has not been designed therefor shall not be done. Gas cutting of such holes which transmit stresses shall be permitted if the holes are reamed so as to remove all burnt metal.

Section 8.610. Tie Rods. Whenever tie rods may be required, they shall be at least three-fourths of an inch in diameter. Holes for tie rods in floor arches shall be placed as near the thrust of the arch as practicable. The distance between tie rods in floors or roofs shall not exceed eight times the depth of the beams nor eight feet in any case.

Section 8.611. Templates. Lintels, steel joists, beams, girders or trusses, supported at either end by a wall or pier, shall be properly anchored thereto and shall rest upon templates or shoes of cast iron, steel or stone of such design and dimensions to distribute safely the loads on the masonry, unless the bearing surface of the lintels, steel joists or beams is sufficient to distribute the load.

Section 8.612. Protection against Corrosion.

(a) Unless completely covered with cement grout or mortar or completely imbedded in concrete, structural steel shall have at least one coat of paint before erection, and after erection at least one additional coat of a different shade than the first.

(b) Cast-iron columns shall not be painted until after inspection.

(c) All scale, dirt and rust shall be completely removed before painting iron or steel.

(d) Iron or steel other than piles used under ground or under water shall be encased in concrete.

Section 8.613. Protection against Fire. In building or structures of ordinary construction or heavy timber construction, iron or steel hereafter placed to support a masonry wall or a part thereof, or a street surface, if not protected as required for fireproof construction, shall be protected with not less than two inches of fireproofing materials; provided that such protection shall not be required for lintels supporting walls over openings eight feet or less in width; and provided that the above requirements for outside beams over 8 feet in length shall be considered protected when top and two sides are protected.

Section 8.7. WOOD.

Section 8.71. Beams, Joists, Girders and Rafters.

(a) **Anchors.** Each tier of floor joists shall be securely anchored to the masonry walls with T-shaped steel anchors at intervals of not more than six feet. Anchors shall be attached in a way to afford easy release in case of fire burning through the joists.

The ends of lapped joists resting upon girders or bearing partitions shall be securely spiked. When abutted they shall be connected with steel straps or dogs applied to every other pair· of joists.

Girders shall be anchored to the walls and fastened to each other in a suitable manner with steel straps.

When enclosing walls are of wood, each joist, beam and girder entering same shall be securely spiked or anchored to the wall construction. Where joists rest upon ledger or ribbon boards they shall be securely spiked to the studs.

The roof structure where resting on masonry walls shall have· steel anchors not less than four-tenths square inch in cross section, extending down into the wall not Jess than two feet and. spaced not over six feet apart.

(b) **Support of Beams and Rafters.** Every beam supported by masonry shall have bearing at least three inches in length.

The ends of wooden beams and joists resting on masonry walls shall be cut to a level of three inches in their depth.

Wooden trimmers, headers and tail joists over six feet in length, unless supported on walls or girders, shall be hung in approved metal stirrups or hangers.

Joists carrying non-bearing partitions running in the same direction shall be double. If non-bearing partitions cross joists near their center, these joists shall be of size required for nominal loading, with a span two feet greater than the actual span.

Rafters shall be vertically supported near the ridge when the slope is less than six inches per foot, and all rafters shall be thus supported unless their feet are thoroughly tied at the plate.

(c) **Bridging.** All floor and flat roof joists having spans in excess of eight feet shall be rigidly braced with continuous rows of bridging at intervals not exceeding eight feet.

(d) **Heavy Timber Construction.** In heavy timber construction every roof girder and every alternate roof beam shall be anchored to an exterior or interior wall or to an interior column; roof planking where supported by a wall shall be anchored to such wall at intervals not exceeding twenty feet; every monitor and every saw-tooth construction shall be anchored to the main roof construction. Such anchors shall consist of steel or iron bolts or straps of sufficient strength and ample anchorage to resist a vertical uplift of the roof of not less than twenty pounds per square foot of roof surface.

(e) **Girders.** When a wooden girder rests on masonry an air space of one half inch shall be provided on the sides and end of such girder for ventilation.

Section 8.72. Wooden Posts.

(a) Wooden posts in the several stories of a building shall be set directly above one another.

(b) The loads on wooden posts shall be transmitted to the posts below through reinforced concrete or metal caps with brackets, or through metal caps and bases with pintle connections or other approved column connections; provided that wooden bolsters may be used to support roof girders.

(c) Wooden posts shall not rest directly on floor joists.

(d) When supported by masonry, suitable stone or metal bases shall be set between the post and the masonry.

(e) Wooden posts when used in the lowest story, shall rest on masonry or metal footings extending not Jess than six inches above the floor level.

Section 8.73. Bearing Partitions.

(a) Bearing partitions shall be provided at the top with double plates, each at least two inches thick and of the same width as the studs. When the studs are placed directly below each joist,

a single top plate may be used. If properly fire-stopped, studs may run through the floor and rest on girders or on partition plates.

(b) All partitions not resting upon girders, or of which the studs do not rest on partition plates below, shall have sole plates of dimensions not less than the studs.

(c) Partitions unsupported by walls shall be supported on girders or double joists, or on sole plates if placed at an angle to the joists.

Section 8.74. Non-bearing Partitions. Non-bearing partitions shall be provided with at least one 2-inch plate on top and bottom of the same width as the studs or be otherwise properly fire-stopped at floor lines.

Section 8.75. Protection against Termites.

(a) No wood or other material into the composition of which cellulose enters in any form, shall be placed in contact with the ground nor within eighteen inches thereof, unless it has been impregnated in an approved manner with coal tar, creosote or other efficient preservative.

(b) No such wood or other material shall rest upon masonry within four feet of the ground unless there is interposed between it and the masonry a solid continuous layer of cement mortar at least one inch thick, or a continuous sheet of non-corrodible metal projecting over and forming a hood along the edges of the masonry.

(c) No such wood or other material within four feet of the ground shall be allowed to come in contact with piping, posts or other objects that extend to or come in contact with the ground, unless such piping, posts or other objects have been fitted with metal shields to block the shelter tubes of termites against extending to such wood or other material.

Section 8.76. Bolting. All bolts in wood construction shall be provided with washers of such proportions that the compression on the wood at the face of the washer will not exceed the working stresses prescribed in this code.

Section 8.77. Fire Prevention.

(a) Wooden joists, beams and girders resting on opposite sides of a masonry wall shall be separated from one another by at least 8 inches of solid masonry, except as otherwise prescribed for heavy timber construction.

(b) All wooden beams and joists shall be trimmed away from flues and chimneys. Headers, beams and joists running parallel to the wall shall be not less than two inches from the outside face of a chimney or from masonry enclosing a flue. Headers supporting trimmer arches at fireplaces shall be not less than twenty inches from the face of the chimney breast. No woodwork shall be placed within 4 inches of the back wall of any fireplace.

(c) All spaces between chimneys and wooden joists or beams shall be filled with loose cinders, loose mortar refuse, gypsum block or other porous incombustible material to form a firestop.

(d) No wooden studding, furring, lathing, or plugging shall be placed against any chimney or in the joints thereof. Wooden construction shall either be set away from the chimney or the plastering shall be directly on the masonry or on metal lathing or on incombustible furring material. Wood furring strips placed around chimneys to support base or other trim shall be insulated from the masonry by asbestos paper, at least one-eighth inch thick, and metal wall plugs or approved incombustible nail-holding devices attached to the wall surface shall be used for nailing.

(e) No wooden mantel or other woodwork shall be placed within 8 inches of the side or top of any open fireplace.

Section 8.78. Framing Details.

(a) Walls and partitions shall be constructed to develop a strength and rigidity equivalent to wooden studding, not less than two inches by four inches, spaced not to exceed sixteen inches on centers.

(b) Where exterior walls or parts thereof more than one story high are sheathed, the boards shall be not less than three-fourths inch actual thickness. Sheathing boards shall be laid tight and properly nailed to each stud with not less than two eightpenny nails. Where the sheathing is omitted or is not laid diagonally, all corners shall be diagonally braced and such other measures taken to secure rigidity as may be necessary.

(c) Wooden sheathing may be omitted when other approved types of construction of adequate strength and stability are used.

(d) Ledger or ribbon boards used to support joists shall be not less than one by four inches, shall be cut into the studs, and securely nailed with not less than two tenpenny nails to each stud.

(e) Sills shall be not less than four inches by six inches, secured to the foundation walls in an approved manner.

(f) No part of the wooden framework shall be placed below the ground level.

Section 8.79. Stucco. Stucco shall consist of cement mortar or other approved mortar, on wooden lath, or on metal lath weighing not less than three pounds per square yard, or on woven or welded wire lath not lighter than No. 19 gage. If sheathing for frame construction is omitted, the stucco shall be back-plastered. Stucco shall be kept at least eight inches above adjacent ground surfaces. Non-corrodible flashing, to prevent moisture from penetrating behind the stucco, shall be provided at wall openings.

CHAPTER IX.

Precautions During Construction

Section 9.1. INTRODUCTION. The provisions of this chapter are designed to safeguard workmen and the public and shall apply to all work in connection with the erection, alteration, repair, removal or demolition of buildings or structures.

Section 9.2. STORAGE OF MATERIALS.

Section 9.21. Within Building. Materials or equipment needed in a building operation, if stored within the building, shall be so placed that they will not load any part of the construction in excess of the weights for which it was designed, nor interfere with the safe prosecution of the work.

Section 9.22. Outside Building. Materials and equipment shall not be stored in a street except by special permission of the local building inspector and under such conditions as he may impose. In whatever manner building materials may be stored or equipment set up in the street a safe walkway not less than four feet wide, unobstructed for its full length and adequately lighted at all times, shall be maintained for the use of the public.

Section 9.3. PROTECTION OF THE PUBLIC.

Section 9.31. Covered Walkways. Whenever a building or structure within ten feet of a street line is to be erected or raised to exceed forty feet in height, or whenever such a building or structure more than forty feet in height is to be demolished, the owner or the person doing or causing such work to be done shall erect and maintain during such work in front of said building and adjacent to the street line, a shed of sufficient strength and stability to sustain safely the weight of materials that may be placed thereon, and to withstand the shocks incident to the handling of such materials or their preparation for use, and accidental jars from trucks passing or delivering material.

When the roof of such shed is used for the storage of material or for the performance of work of any kind, substantial railings not less than 30 inches high and solid toe boards not less than six inches high shall be placed along the open sides and ends of such roof.

Such shed shall be constructed to afford an unobstructed walkway for pedestrians, not less than eight feet high and five feet wide. Electric lights shall be maintained every fifteen feet.

Such shed shall remain in place until the building is enclosed or, in case of a demolition, until the building has been reduced to twenty feet in height.

Section 9.32. Fences around Excavations. All excavations within five feet of street or alley lines must be protected b)" the erection of substantial fences at least four feet high. Within fire limits these fences shall be solid. Such fences shall be maintained until the walls are sufficiently high to remove all danger. Abandoned excavations for buildings must be properly protected or filled in.

Section 9.33. Derricks and Hoists. No derricks or hoists shall be used on the sidewalk without permission from the local building inspector.

Section 9.4. PROTECTION OF WORKMEN.

Section 9.41. Scaffolds. All scaffolds shall be safely constructed and firmly supported, properly secured, and of sufficient width, to insure the safety of persons working thereon, or passing under or near them.

Every scaffold, other than ir0n workers' scaffolds and carpenters' bracket scaffolds, the platform level of which is more than ten feet above the ground or above a permanent or temporary floor, shall be provided with substantial guard rails not less than thirty-six inches high above the platform level, and with solid toe boards not less than six inches high above the platform level, extending its entire length and along the ends, except where ramps or runways connect with them, unless otherwise enclosed or guarded. On suspended, swinging and pole scaffolds the space between guard rails and toe boards shall be filled with wire mesh screens securely attached.

When objects are likely to fall on a scaffold from above, a substantial overhead protection shall be provided not more than ten feet above the scaffold platform.

Planks used for the platforms of scaffolds shall be not less than one and five-eighths inches thick, of sound, seasoned lumber. The clear span between supports shall not exceed ten feet.

Section 9.42. Hoists. Temporary construction hoists on the interior of buildings or structures shall have the car substantially constructed, the guides rigidly secured, and overhead machinery safely supported. The floor openings or other spaces through which they operate shall be enclosed on all sides and for their full height, except for the necessary doors for loading and unloading with barriers so constructed that heads, arms or legs cannot be thrust through them or loose material cannot fall through.

Temporary construction hoists on the exterior of buildings or structures shall be erected on sufficiently solid foundation to avoid injurious settlement or distortion.

Section 9.43. Temporary Flooring. In steel frame or skeleton construction buildings a solid two-inch plank floor shall be maintained over the entire building within two stories of the riveters and within four stories of the erectors, except spaces required for construction work for raising or lowering materials and for stairways or ladders.

In buildings of ordinary construction or heavy timber construction, the under flooring shall be laid for each story as the building progresses, or if double floors are not to be used, the floor two stories below the one where work *is* under way shall be planked over.

Section 9.44. Floor Openings. All floor openings, unless guarded by permanent enclosures or full-height temporary barriers, shall be covered with substantial temporary flooring, or guarded on all sides by substantial railings not less than three feet high, set at least two feet from the edges of the openings, and by toe boards not less than six inches high set along the edges of the openings, except for such parts of the openings as are necessarily open for traffic purposes.

Section 9.45. Stair Facilities. When the construction of a building has progressed to a height exceeding sixty feet above grade, or when a building exceeding sixty feet in height is undergoing alterations or repairs, unless one or more permanent stairways have been installed, at least one temporary stairway shall be provided, continued in height as rapidly as the work progresses to the highest floor that has been installed, and maintained in serviceable condition until a permanent stairway has been completed.

Section 9.5. PROTECTION OF ADJACENT PROPERTY. See Section 8.2.

Section 9.6. WARNING LIGHTS. All pits, excavations and barriers shall have placed on or by them, after dark, illuminated lamps with red globes, in such manner that there shall be one light at each end, and at intermediate points as may be necessary to afford proper warning.

Section 9.7. SANITATION AND FIRST AID.

Section 9.71. Toilets. Until permanent provision is made, suitable and adequate temporary toilet facilities shall be provided during the erection, alteration or repair of a building.

Section 9.72. Water. An adequate supply of cool, pure drinking water shall be provided for workmen during hours of employment.

Section 9.73. First Aid. On every building operation, a supply of iodine or mercurochrome and aseptic gauze bandages shall be provided and maintained in a clean, sanitary cabinet, and be available at all times.

Section 9.8. DEMOLITION. In the demolition of buildings, other than buildings of frame construction, one story at a time shall be completely removed. No wall, chimney, or other construction shall be allowed to fall in mass on a floor. Bulky materials, such as beams and columns, shall be lowered and not thrown.

In the demolition of buildings of frame construction, no chimney shall be allowed to fall in mass.

CHAPTER X.

Fire Protection

Section 10.1. DETERMINATION OF FIRE RESISTANCE. The fire resistance of building materials or assemblies shall be determined by performance shown under tests made in accordance with the Specifications for Fire Tests of Materials and Construction A2-1926 of the American Standards Association.

Results of tests made in accordance with the foregoing specifications by an approved laboratory shall be accepted as establishing the fire rating for the materials and construction assembly involved.

In the absence of specific performance requirements, either in this code or promulgated by the Building Code Council or other duly constituted authority, for fire doors, curtains, shutters, windows, or other protections for openings, the appliances enumerated for specific locations in the list of Inspected Appliances of the Underwriters' Laboratories (Inc.) or U. S. Bureau of Standards may be accepted as meeting the purpose of this code.

Section 10.2. PROTECTION OF STRUCTURAL MEMBERS.

Section 10.21. Requirements for Walls. Party walls which function also as fire walls shall conform to the requirements for fire walls.

A separation of at least 8 inches of solid masonry shall be provided in all fire and party walls between combustible members which may enter such walls from opposite sides.

Where combustible joists, beams and girders enter masonry walls they shall be beveled so as to be self-releasing in case of fire.

Party or division walls between dwellings occupied by not more than two families each may be constructed of wood studs covered on both sides with at least ¾-inch of gypsum or Portland cement plaster on metal lath or any other construction having an ultimate fire resistance of at least one hour. When constructed with wood studs, fire stops shall extend the full depth of the joists and at least 4 inches above the level of each floor. Such walls shall be supported below the first floor by a masonry wall not less than 8 inches in thickness.

Not more than four families shall be permitted in attached dwellings without a party wall of masonry.

No fire walls of hollow units or of hollow-wall construction and no 8-inch solid walls shall be broken into, subsequent to erection, for the insertion of structural members.

All 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 tile set in the opposite direction shall be used.

Fire or party walls shall project through the roof as parapets, except that when the roof construction bas an ultimate fire resistance of not less than 1½ hours and the walls are carried up to connect with it solidly, such parapets may be omitted.

Parapet walls shall be at least 24 inches high except in the case of dwellings, where they shall be at 1east 12 inches high; such walls shall not be higher than four times their thickness unless laterally supported.

Section 10.22. Protection of Columns, Girders and Beams. Columns, girders, and beams in Class A, Class A', and Class B construction shall be protected against fire to the extent prescribed in Chapter 2.

In a steel joist floor the secondary beams need not be individually encased but shall be protected with one inch of gypsum or Portland cement plaster ceiling and at least 2 inches of concrete floor slab above.

The extreme outer edges of lugs and brackets on steel and cast- iron columns shall not extend nearer than 1 inch to the outer surface of the fire-resistive covering.

Where the fire-resistive covering of columns is exposed to damage from trucking or handling of merchandise it shall be jacketed for a height of at least 5 feet from the floor with a substantial covering.

No pipes, conduits, wires, cables, or other service equipment shall be embedded in the required fire-resistive covering of columns or of other structural members.

Section 10.23. Requirements for Structural Members in Class A' Construction. Steel-roof trusses in buildings of Class A' construction shall be protected against fire by a suspended ceiling or by other protection of such materials and thickness as to insure an ultimate fire resistance of at least one and one-half hours; provided that when such trusses in buildings of public occupancy are over interior spaces having a clear height of at least 20 feet below the bottom chords of the trusses, such protection and protection of roof beams and purlins may be omitted.

Section 10.24. Requirements for Structural Members in Class B Construction. Timber columns of Class B construction shall be at least 8 by 8 inches in nominal size. Wood girders of Class B construction shall be of at least 6 inches nominal width and at least 10 inches nominal depth. Wood beams shall be at least of the size given in Section 10.3.

Columns, girders, beams, and trusses, except roof trusses hereinafter specified, of Class B construction, which are not wood, shall be protected in such a manner as to insure an ultimate fire resistance of at least one hour. Steel roof trusses in buildings of Class B construction shall be protected by a suspended ceiling or by other protection of such materials and thickness as to insure an ultimate fire resistance of at least one hour; provided that when such trusses in buildings of public occupancy are over interior spaces having a clear height of at least 20 feet below the bottom chords of trusses, such protection and protection of roof beams and purlins may be omitted.

Wood roof trusses in buildings of Class B construction shall be of timber of at least 4 inches least nominal dimension.

Section 10.25. Requirements for Structural Members in Class C Construction. Wood roof trusses in buildings of Class C construction shall be of timber at least 2 inches in least nominal dimension.

Section 10.26. Lintels. Stone lintels shall not be used in Class A construction unless supplemented on the inside of the wall with iron or steel lintels or with suitable masonry arches, reinforced concrete, or reinforced masonry beams.

Iron or steel lintels over openings in walls shall be protected so as to have an ultimate fire resistance at least equal to that of the wall in which used; provided that when over openings less than 4 feet wide or spanned by adequate masonry arches, such protection may be omitted.

Section 10.3. FLOORS. In Class A construction, where steel beams or other steel supporting or constituting part of the floor or roof construction are used, they shall be rigidly connected to one another or to girders or columns with sufficient bolts, rivets, or welds to transmit their entire loads. When they rest on masonry or reinforced concrete walls, the ends shall be anchored thereto.

In Class A" construction, metal beams or metal joists constituting part of the panels of the floor or roof construction, if not rigidly connected to the supporting beams or girders, may be carried by metal hangers, supported on the upper flanges of the beams or girders, or supported in some other approved manner. When they rest on masonry or reinforced concrete walls, they shall have at least 4 inches of bearing.

In Class B construction, wood beams shall be of at least 6 inches least nominal dimension and floor construction shall be of splined or tongued and grooved planks of at least 3 inches nominal thickness or of laminated planking laid on edge. Beams other than wood shall be protected sufficiently to insure an ultimate fire resistance of at least one hour.

Section 10.4. PARTITIONS. In buildings of Class A construction, partitions shall be constructed to have an ultimate fire resistance of at least one hour, and no combustible material shall be used in their construction; provided that in such buildings whose occupancy comes under business, partitions of less fire resistance, such as metal, or wood and glass, may be used within rooms or spaces not exceeding 5,000 square feet.

In buildings of other types of construction, partitions separating apartments from one another or from public hallways, and partitions in institutional occupancy, shall be constructed to have an ultimate fire resistance of at least one hour.

Openings in partitions for which a definite fire resistance is required shall be protected as provided in Section 10.62.

Section 10.5. PROTECTION OF VERTICAL OPENINGS.

In buildings other than dwellings of Class A, Class A', Class B and of Class C construction more than two stories in height, there shall be no openings in a floor unless the space in the stories immediately above and below such opening is enclosed by walls or partitions. Such walls or partitions shall have an ultimate fire resistance of at least one hour in buildings of residential occupancy, and at least two hours in other buildings. No combustible material shall enter into the construction of such walls or partitions in buildings of Class A construction.

In residential buildings having apartments over one another, the stairways shall be enclosed by walls or partitions having an ultimate fire resistance of at least one hour. No combustible material shall enter into the construction of such walls or partitions in buildings of Class A construction.

Whenever a stairway is so constructed that the several flights are not directly above one another, the necessary connecting hallways or passages shall be enclosed in walls or partitions of the same ultimate fire resistance as required for the stairway.

Walls or partitions inclosing shafts or inclosing connecting hallways or stairways when not continuous through all stories from foundation to roof, shall be supported by floors or other construction having an ultimate fire resistance at least equal to that required for the partition enclosure.

Openings in the shaft enclosures shall be limited to those necessary for the purposes of the shaft, and be protected as required in Section 10.62.

The bottom of such shafts and the top when not extended through the roof shall have an ultimate fire resistance of not less than one and one-half hours.

Shaft enclosures which extend into the top story of a building of Class B or Class C construction shall continue through the roof and shall project not less than 3 feet above the roof surface; the walls of the shaft above the roof shall be equal in fire resistance to the walls of the shaft and shall be weatherproof. Every such shaft which extends above the roof shall have a thin, plain glass skylight at least three fourths the area of the shaft at the top story unless otherwise ventilated.

Shafts open at the top shall have walls equal in fire resistance to the exterior walls of the building, and shall have openings protected as required in Section 10.61.

Nothing in this section shall require the enclosure of a flight of stairs from the main entrance floor to the floor next above in buildings of public, residential, and business occupancy, provided that such stairs are not part of a required exit stairway.

Section 10.6. PROTECTION OF WALL AND PARTITION OPENINGS.

Section 10.61. Exterior Openings. Every window or other opening above the first story, except show windows on the second story, in the exterior walls of every building, shall be protected by an approved fire door, fire shutter, fire window, open sprinkler, or other approved device.

In buildings whose occupancy or use brings them within the classification of business or storage (except private garages), windows vertically above each other and not required to be protected against fire shall have a distance of at least 3 feet between the top window sill and bottom of lintel of the window directly beneath.

Section 10.62. Interior Openings. Openings in fire walls, fire partitions or party walls shall be limited to those necessary for the business of the occupancies of either side and for exit requirements, and in no case shall the total width of such openings in any one story exceed 25 per cent of the length of the wall. Openings shall not exceed 80 square feet each in area except when proof satisfactory to the administrative building official is furnished that a larger size is necessary, in which case they may be increased to 180 square feet if provided with approved protective devices.

Openings in fire walls or party walls shall be protected on each side by approved automatic fire doors or other approved protective devices; provided that when such openings serve as required exits one door or device shall be self-closing.

Openings in walls or partitions inclosing stairways or shafts shall be protected by approved automatic fire doors, fire windows or other approved protective devices; provided that when such openings serve as required exits the doors or other devices shall be self-closing, and provided further that in buildings not over three stories in height whose occupancy comes under the classification "Residential," wood slab doors at least 1-3/8 inches thick in all parts may be permitted.

Openings in partitions separating apartments from one another or from public hallways shall be protected by approved fire doors, fire windows or other approved protective devices; provided that in buildings of Class C and Class D construction, wood slab doors at least 1-3/8 inches thick in all parts may be permitted.

Fire doors and shutters shall be installed with approved frames and hardware.

Section 10.7. CEILINGS. Buildings more than one story in height of Class C construction, except dwellings and except those whose occupancy falls under business or storage, shall have ceilings of such materials and thickness as to insure an ultimate fire resistance of at least one hour for the floor construction as a whole; and when ceilings are used in buildings whose occupancy falls under business, or storage, they shall be of the same kind.

Hung ceilings shall be of such materials and thickness as to insure an ultimate fire resistance of at least one hour for the floor construction as a whole.

In residential buildings having apartments over one another, the ceilings shall be of such materials as will insure an ultimate fire resistance of at least one hour for the floor construction as a whole.

Section 10.8. RQOF CONSTRUCTION AND ROOFING.

Section 10.81. Roof Structures. Roofs of buildings of Class A' construction, covered in accordance with Section 10.82, may be built of formed sheet steel, or of wooden planks not less than two inches nominal thickness attached by means of wood spiking pieces to a metal framework, provided the roof is wholly separated from the stories below by construction having an ultimate fire resistance of at least one and one-half hours.

Walls and roofs of penthouses, bulkheads, dormers and similar structures upon roofs of buildings shall afford at least the same fire resistance as the roof structure and shall be covered with materials at least equal in fire resistance to the roof covering of the building.

In buildings required to have Class 1 or Class 2 roof coverings as defined in Section 10.82, skylights shall have approved metal frames and sash.

When over stairways, the stages of theaters, or places used by the public, unless otherwise ventilated, skylights shall be glazed with thin plain glass protected above and below with approved wire screens.

Section 10.82. Roof Coverings. Roof coverings shall be divided into the following classes:

Class 1 roof coverings shall be of brick, concrete, slate, tile, slag, or any other material or form of protective covering approved by the Building Code Council after satisfactory evidence that it is effective against severe fire exposure, does not carry or communicate fire, affords a fairly high degree of heat insulation to the roof deck, does not slip from position, possesses no flying-brand hazard, and does not require repairs to maintain its fire-resistant properties.

Class 2 roof coverings shall be of incombustible material approved by the Building Code Council after satisfactory evidence

that it is effective against moderate fire exposure, is not readily flammable under such exposure, does not readily carry or communicate fire, does not slip from position, possesses no flying-brand hazard, and requires only infrequent repairs to maintain its fire-resistant properties. All buildings within the fire limits shall have Class I or Class 2 roof covering.

Class 3 roof coverings shall be of material approved by the Building Code Council after satisfactory evidence that it is effective against light fire exposure, is not readily flammable under such exposure, does not readily carry or communicate fire, and does not slip from position.

The roofs of all buildings hereafter erected in the fire districts of cities and towns shall be of Class 1 described in this section.

Section 10.9. FIRE STOPPING.

Section 10.91. General. Fire stopping shall be arranged to cut off all concealed draft openings and form an effectual fire barrier between stories and between the upper story and the roof space.

Section 10.92. Pipes, Belts, and Shafting. Openings around exposed pipes or power shafting shall be filled with incombustible material or shall be closed off by close-fitting metal caps at the ceiling and floor line or on each side of the wall.

Openings for belts shall be provided with approved slotted doors or be otherwise closed off. Belts shall not pass through fire walls.

Section 10.93. Walls and Partitions. Walls, including masonry walls furred with wood, and stud partitions shall be effectually fire stopped at floors and ceilings and at all junctions with roofs.

Section 10.94. Wood Flooring. In buildings of Class A or Class A' construction having wood flooring, any space between such flooring and the floor construction beneath shall be filled solidly with approved incombustible material.

Section 10.95. Cornices. Cornices built of wood or having wood frames and extending along successive buildings shall be either fire stopped or entirely separated between each building.

Section 10.96. Stairs. Stairs shall be fire stopped between wooden stair carriages at top and bottom, and except in dwellings, no closet shall be located beneath stairs; and the underside, if of combustible construction, shall be covered with metal lath plastered to a total thickness of three-fourths inch or equivalent construction.

Section 10.97. Inspection. No fire stopping shall be concealed from view until opportunity has been given the owner or his representative and the building official to inspect it.

CHAPTER XI.

Chimney and Heating Appliances

Section 11.0. CHIMNEYS.

Section 11.1. Construction.

(a) Chimneys hereafter erected shall be of approved masonry, reinforced brick masonry or of reinforced concrete.

(b) Such chimneys shall extend at least three feet above the highest point at which they come in contact with a roof of the building and at least two feet higher than any ridge within ten feet of such chimney.

(c) Every such chimney shall be properly capped with terra cotta, stone, cast iron or other approved incombustible, weatherproof material.

(d) Such chimneys shall be wholly supported on approved masonry or self-supporting fireproof construction.

(e) No such chimney shall be corbelled from a wall more than six inches; nor shall such chimney be corbelled from a wall less than twelve inches in thickness unless it projects equally on each side of the wall; provided that in the second story of two-story dwellings, corbelling of chimneys on the exterior of the enclosing walls may equal the wall thickness.

(f) No change in the size or shape of a chimney where the chimney passes through the roof shall be made within a distance of six inches above or below the roof joists or rafters.

(g) All chimneys which are or have become unsafe or dangerous shall be repaired and made safe, or taken down.

Section 11.11. Flues Required.

(a) Except electric heating appliances and as otherwise provided in this chapter for gas appliances, every heating apparatus or heat-producing appliance referred to in this and the following sections shall be connected with a flue, conforming to the provisions of this chapter.

(b) No flue shall have smoke pipe connections in more than one story of a building, unless provision is made for effectively closing smoke pipe openings with devices made of incombustible materia1s whenever their use is discontinued temporarily, and completely closing them with masonry when discontinued permanently.

(c) Nothing in this code shall prohibit the joining of two or more smoke pipes for a single flue connection; nor the venting of an automatic gas appliance to a flue serving appliances using other fuel; provided the gas appliance connection into such flue is made at a point not less than twelve inches above the connection from such other appliance; provided further that in every case the smoke pipes and flues are of sufficient size to serve all the appliances thus connected; and provided that, except for outlet pipes for gas appliances, the several smoke pipes shall be constructed to comply with the severest requirements for any one of those connected. An automatic gas appliance, within the meaning of this paragraph, is one that is equipped with a safety pilot light, the extinguishment of which will automatically shut off the supply of gas.

(d) Flues serving non-fuel fired incinerators in residence buildings, institutional buildings, churches, schools and restaurants, shall not have smoke pipe connections with any other appliance.

Section 11.12. Flue Linings.

(a) Required flue linings shall be made of fire clay or other refractory clay to withstand, without softening, the temperatures to which they will be subjected, but not less than eighteen hundred degrees Fahrenheit, or of cast iron of approved quality, form and construction.

(b) Required clay flue linings shall be not less than five-eighths of an inch thick.

(c) Flue linings shall be built in as the chimney construction is carried up, carefully bedded one on the other in mortar with close-fitting joints left smooth on the inside.

(d) Flue linings shall start from a point not less than eight inches below the intake, or in the case of fireplaces, from the throat of the fireplace. They shall extend, as nearly vertically as possible, for the entire height of the chimney.

Note: It is recommended that flue linings be extended four inches above the top or cap of the chimney. This not only tends to prevent down draft but also sheds water from the masonry.

(e) When cleanouts for flues or fireplaces are provided, they shall be constructed the same as such flues or the flues serving the fireplace, and shall be equipped with cast-iron doors arranged to remain tightly closed when not necessarily open for cleaning.

(f) Only cement mortar or cement-lime mortar shall be used in setting flue linings.

(g) When two or more flues are contained in the same chimney, withes of brick or concrete not less than three and three-quarter inches thick shall be provided at intervals not exceeding thirty inches horizontally. Where flue linings are not separated by withes, the joints shall be staggered.

Section 11.13. Flues for Low Heat Appliances.

(a) Smoke flues of stoves, cooking ranges, hot air, hot water and low-pressure steam heating furnaces, and other low-heat appliances other than gas appliances and incinerators elsewhere provided for, hereafter constructed, shall be encased in approved masonry or reinforced concrete not less than eight inches thick; provided that for stone masonry other than sawed or dressed stone in courses, properly bonded and tied with metal anchors, the thickness shall be not less than twelve inches; and provided that in dwellings for smoke flues in brick or solid concrete chimneys, used exclusively for ordinary stoves, ranges, furnaces or open fireplaces, the thickness of the masonry may be reduced to not less than three and three-quarter inches.

(b) Every such flue shall be lined with a flue lining conforming to the requirements of this section.

Section 11.14. Flues for Medium Heat Appliances. Smoke flues of high pressure steam boilers, smoke houses and other medium heat appliances other than incinerators, hereafter constructed, shall be encased in approved masonry or reinforced concrete not less than eight inches thick; provided that stone masonry shall be not less than twelve inches thick; and in addition, shall be lined with not less than four inches of fire brick laid in fire clay mortar, starting not less than two feet below the flue entrance and extending for a distance of at least twenty-five feet above the flue entrance.

Section 11.15. Flues for High Heat Appliances. Smoke flues of cupolas, brass furnaces, porcelain baking kilns and other high-heat appliances shall be built with double walls, each not less than eight inches in thickness with an air space of not less than two inches between them. The inside of the interior walls shall be of fire brick not less than four inches in thickness.

Section 11.16. Flues for Incinerators.

(a) Flues hereafter constructed for non-fuel fired incinerators in which the grate of the combustion chamber does not exceed nine square feet, shall be encased in clay or shale brickwork not less than three and three-quarter inches thick and a flue lining.

(b) Flues hereafter constructed for non-fuel fired incinerators in which the grate of the combustion chamber exceeds nine square feet, shall be encased in clay or hale brickwork not less than three and three-quarter inches thick and a lining of fire brick not less than four and one-half inches thick for a distance of not less than thirty feet above the roof of the combustion chamber, and in clay or shale brickwork not less than eight inches thick beyond thirty feet above the roof of the combustion chamber.

(c) Flues hereafter constructed for fuel fired incinerators in residence buildings, institutional buildings, churches, schools and restaurants, shall be encased as required for non-fuel fired incinerators with grates exceeding nine square feet, but the fire brick lining shall extend for not less than forty feet above the roof of the combustion chamber.

(d) Flues hereafter constructed for rubbish and waste material incinerators shall be encased in clay or shale brickwork not less than eight inches thick and a lining of fire brick not less than four and one-half inches thick, laid in fire clay, for the full height of the flue.

(e) Nothing in this section shall prohibit a fuel fired incinerator or a rubbish and waste material incinerator to connect to a boiler stack or flue for a high-heat appliance by means of an approved breeching, provided the cross-sectional area of such stack or flue is at least four times that of the incinerator breeching.

(f) All flues for non-fuel fired incinerators shall terminate in substantially constructed spark arresters.

Section 11.17. Size of Flues. The cross-sectional area of smoke flues for fireplaces shall be not less than fifty square inches but at least one-twelfth of the fireplace opening. For sizes of other flues and chimneys, see Chapter 14.

Section 11.18. Use of Flues. It shall be unlawful to use as a smoke flue a flue hereafter constructed or placed in a building, or a flue now existing that is not already used as a smoke flue, unless it conforms to the requirements of this section.

Section 11.19. Flues To Be Clean.

(a) Upon the completion of a building or the alteration of existing flues, the flues shall be cleaned and left smooth on the inside.

(b) The building official may require a test to be made to assure this condition before permitting the use of a flue.

Section 11.191. Fireplaces.

(a) The back and sides of fireplaces hereafter erected shall be of approved masonry or reinforced concrete, not less than eight inches in thickness. A lining of fire brick or other approved material at least two inches thick shall be provided unless the thickness is twelve inches.

(b) Fireplaces, except when designed and used for approved gas appliances only, shall have hearths of brick, stone, tile or other approved incombustible material supported on masonry arches. Such hearths shall extend at least twenty inches outside of the chimney breast and not less than twelve inches beyond each side of the fireplace opening along the chimney breast. The combined thickness of hearth and supporting arch shall be not less than six inches at any point.

(c) Wooden centers used in the construction of that part of the supporting arch which is below the hearth of the fireplace inside of the chimney breast, shall be removed when the construction of the arch is completed and before plastering on the underside.

(d) No heater other than an electric heater or an approved gas appliance shall be placed in a fireplace which does not conform to the requirements of this section and is not provided with a flue.

Section 11.2. METAL SMOKESTACKS.

Section 11.21. Construction.

(a) Metal smokestacks, unless structurally self-supporting, shall be guyed securely, or firmly anchored to or otherwise supported by the building served thereby.

(b) All metal work shall be painted.

(c) Clean-out openings shall be provided at the base of every such stack.

(d) All such stacks hereafter erected, outside or independent of a building, shall be supported on substantial masonry foundations, so designed that the pressure on the soil shall not exceed two-thirds of the maximum pressure allowable on the soil.

Section 11.22. Height. All such stacks shall extend to a height of not less than ten feet above the highest point of any roof within twenty-five feet.

Section 11.23. Exterior Stacks.

(a) Every such stack, or part thereof, hereafter erected on the exterior of a building shall have a clearance from the wall of not less than twenty-four inches if the wall is of frame construction, and not less than four inches if it is of any other type of construction.

(b) No such stack shall be nearer than twenty-four inches in any direction from a wall opening, exit or fire escape.

(c) When such stack is insulated on the exterior in some approved manner, the clearances herein prescribed may be reduced to two-thirds of those specified.

Section 11.24. Interior Stacks.

(a) Every such stack, or part thereof, hereafter erected within a building other than a one-story building, shall be enclosed above the story in which the appliance served thereby is located in walls of approved masonry or fire partitions, with a space on all sides between the stack and the enclosing walls sufficient to render the entire stack accessible for examination and repair.

(b) The enclosing walls shall be without openings, except doorways equipped with approved self-closing fire doors at various floor levels for inspection purposes.

(c) Where such a stack passes through a roof constructed of combustible materials, it shall be guarded by a galvanized iron ventilating thimble extending not less than nine inches below and nine inches above such roof construction. Such thimbles shall be of a size to provide a clearance on all sides of the stack of not less than eighteen inches; provided that for stacks of low-heat appliances the clearance may be reduced to not less than twelve inches.

Section 11.25. Prohibition. Smokestacks shall not be carried up inside of vent stacks or vent flues unless such stacks or flues are constructed as required by this chapter for smokestacks or smoke flues and such stacks or flues are used solely for venting the room or space in which the appliance served by the smokestack is located.

Section 11.3. CUPOLA CHIMNEYS. Chimneys of cupola furnaces, blast furnaces and similar devices, hereafter erected, shall extend at least twenty feet above the highest point of any roof within a radius of fifty feet thereof and be covered on the top with heavy wire netting or other approved spark arrester. No woodwork or other combustible material or construction shall be erected or placed within three feet of any part of such device or its chimney.

Section 11.4. RAISING ADJOINING CHIMNEYS.

Section 11.41. When Required. Whenever a building is hereafter erected, enlarged or raised so that a wall along a lot line or within three feet thereof, extends above the top of a chimney or smoke flue of a neighboring existing building, the owner of the building so erected, enlarged or raised, shall, at his own expense, carry up, either independently or in his own building, all chimneys and smoke flues of such adjoining building within ten feet of any portion of the wall extending above such chimney or flue.

Section 11.42. Construction. The construction of such chimneys and flues shall conform to the requirements of this chapter, but in no case shall the internal area of an extended flue be less than that of the existing flue.

Section 11.43. Notice to Owner. It shall be the duty of the owner of the building to be erected, enlarged or raised to notify, in writing, at least ten days before such work is to begin, the owner of the chimneys and flues affected, of his intention to carry up such chimneys and flues as herein provided. Such chimneys and flues shall be carried up simultaneously with the walls.

Section 11.5. Vent Flues. Flues hereafter erected or used for venting appliances that give off grease or grease-laden fumes shall be constructed and used entirely independent of other flues and shall conform to the requirements of this chapter for smoke flues.

Section 11.6. Gas Appliances. Except as otherwise specifically provided in this code or in rules duly promulgated by the Building Code Council, gas appliances shall be installed in conformity with the "Requirements for House Piping and Appliance Installation" of the American Gas Association.

CHAPTER XII.

Elevators

The enforcement of the provisions of this chapter of the Building Code shall be under the jurisdiction of the Department of Labor.

Section 12.0. GENERAL.

Section 12.1. Installation.

(a) Elevators and amusement devices hereafter erected or installed, or hereafter altered shall be constructed, installed and maintained in accordance with the provisions of this chapter and with rules duly promulgated by the Commissioner of Labor, or, in the absence of such rules, with generally accepted good practice.

(b) Except as otherwise specifically provided in this ordinance or in rules duly promulgated by the Commissioner of Labor, "The American Standard Safety Code for Elevators, Dumbwaiters, and Escalators," approved by the American Standards Association, shall be deemed to be the generally accepted good practice for the construction, installation, maintenance and operation of elevators.

Section 12.11. Dumbwaiters Excepted. The provisions of this chapter shall not apply to ordinary dumbwaiters and similar apparatus operated by hand power, which are of such size, arrangement or construction that they cannot be used for the accommodation of persons. Such apparatus shall, however, conform to rules that may be promulgated by the Commissioner of Labor to provide for their safe construction and installation.

Section 12.12. Repairs. Repairs or changes to elevators and amusement devices which involve the type of elevator or its motive power, or the safety devices or operating mechanism shall not be made- until notice has been given to the Commissioner of Labor.

Section 12.2. DESIGN AND EQUIPMENT.

Section 12.21. Carrying Capacity.

(a) Elevators hereafter installed or altered shall be designed to sustain safely in all parts the load to be carried. Such loads per square foot of car platform area shall in no case be less than seventy-five pounds for power-driven passenger elevators; and fifty pounds for hand-power passenger elevators; and fifty pounds for power-driven freight elevators having platform areas not exceeding one hundred square feet.

(b) The safe carrying capacity of every elevator shall be conspicuously posted in or on the car or platform.

Section 12.22. Car Safety Devices. Every elevator, except sidewalk elevators having a rise of not more than fifteen feet, shall be equipped with safety devices for bringing the car or platform to rest without serious injury to persons riding thereon whenever its speed becomes excessive.

Section 12.23. Car and Door Interlocks. Every elevator hereafter installed or altered shall be equipped with a device that will automatically prevent the car or platform from being moved until the shaftway door at which the car or platform is standing is locked as defined in "The American Standard Safety Code for Elevators, Dumbwaiters, and Escalators.,

Section 12.24. Limit Devices. Every elevator hereafter installed or altered shall be equipped with efficient limit devices that will prevent the car or platform moving beyond its line of travel at either end.

Section 12.25. Emergency Exit.

(a) Every passenger elevator car shall be provided with a trapdoor in the top of adequate size, to provide easy egress for passengers in case of accident.

(b) When there is more than one car in a shaft, additional emergency exits consisting of doors in the sides of the cars so located that access may be had to an adjacent car, shall be provided.

Section 12.26. Lighting. All elevator cars or platforms shall be properly lighted when in service.

Section 12.27. Freight Compartment. No elevator car shall have attached above, below or on any side a freight compartment or similar device.

Section 12.3. RIDING ON FREIGHT ELEVATORS RESTRICTED. It shall be unlawful for any person other than the operator or those necessary to handle freight to ride on a freight elevator. Every freight elevator shall have a notice posted conspicuously thereon as follows: THIS IS NOT A PASSENGER ELEVATOR. ANY PERSON OTHER THAN THE OPERATOR RIDING THIS ELEVATOR DOES SO AT HIS OWN RISK.

Section 12.4. AMUSEMENT DEVICES. Amusement devices shall be equipped with safety clutches. The cars or receptacles which persons are permitted to occupy shall have handrails of sufficient number and height or other approved appliances or safeguards, to prevent persons from being thrown therefrom or coming in contact with structural members.

Section 12.5. CERTIFICATE.

Section 12.51. Required In All Cases. It shall be unlawful for the owner to operate or permit the operation or use of a passenger elevator, freight elevator or amusement device hereafter installed or constructed, until a certificate shall have been obtained from the Commissioner of Labor.

Section 12.52. Issuance. The Commissioner of Labor shall, within a reasonable time after being requested to do so, inspect and test or cause to be inspected and tested, every elevator or amusement device hereafter installed or constructed, or hereafter altered, and if the same is found to be safe and in conformity with the provisions of this chapter and the specified rules, shall issue a certificate to that effect.

Section 12.53. Temporary Permission to Use. Nothing herein contained shall prevent the temporary use by special permission of the Commissioner of Labor of an elevator during construction; provided a notice is conspicuously posted on or in connection with such elevator to the effect that such elevator has not been officially approved.

Section 12.6. INSPECTION.

Section 12.61. When Required.

(a) The owner shall make or cause to be made by an authorized elevator inspector an inspection of every passenger elevator at least once in every three months, and of every freight elevator and every amusement device at least once in every six months, and shall file a copy of such inspection with the Commissioner of Labor.

(b) At least once a year the inspection shall include a safety test.

(c) Seasonal amusement devices which have been out of use for a period exceeding thirty days shall not be operated again until re-inspected by the Commissioner of Labor.

Section 12.62. Notice of Repairs.

(a) Upon notice from the Commissioner of Labor, repairs found necessary to an elevator or amusement device shall be made without delay by the owner or person in control of such elevator or amusement device.

(b) In case defects exist which make the continued use of such elevator or amusement device dangerous to life or limb, the use of such elevator or amusement device shall cease; and it shall not be used again until a re-inspection has been made after necessary repairs and a new certificate has been issued.

Section 12.7. OPERATION. Every passenger elevator, except automatic elevators and escalators, and every amusement device shall be in charge of a competent, reliable operator, with previous experience or training under the instruction of a competent person.

CHAPTER XIII.

Plumbing

The State Board of Health shall have general supervision of the administration and enforcement of those sections of the North Carolina Building Code relating to plumbing. It shall be the duty of the State Board of Health to review and revise or amend the plumbing code, designated as Chapter XIII of the North Carolina Building Code, as may be deemed necessary by the State Board of Health after consultation with the North Carolina Building Code Council.

Reference

In compiling this chapter, the United States Department of Commerce Recommended Requirements for Plumbing was used as a guide, and is to be used in interpreting the provisions of this chapter.

Definition of Plumbing

The "plumbing" of a building, as the term is commonly used, includes the pipes for distributing the water supply, the fixtures for using water, and drainage pipes for removing waste water and sewage, together with fittings and appurtenances of various kinds, all within or adjacent to the building. The "service pipes," which form the connection between the water main and the building, and the "house sewer," which conveys the waste water and sewage from the building to the street sewer or other point of disposal, are included in the "plumbing system" of a building, using the term in a broader sense. Connections for rain water are also included if the water is discharged through a house sewer or a house drain. The water supply and drainage system are mutually dependent. Drains are needed to carry away the used water; water is needed to cleanse the fixtures and transport solid wastes.

Basic Plumbing Principles

The following basic plumbing principles have been used in the preparation of this chapter and must be complied with:

1. All premises intended for human habitation or occupancy shall be provided with a supply of pure and wholesome water, neither connected with unsafe water supplies nor cross-connected through plumbing fixtures to the drainage system.

2. Buildings in which water closets and other plumbing fixtures exist shall be provided with a supply of water adequate in volume and pressure for flushing purposes.

3. The pipes conveying water to water closets shall be of sufficient size to supply the water at a rate required for adequate flushing without unduly reducing the pressure at other fixtures.

4. Devices for, heating water and storing it in “boilers,” or hot water tanks, shall be so designed and installed as to prevent all dangers from explosion and also prevent a back flow of hot water through a meter connected with a public water supply.

5. Every building intended for human habitation or occupancy on premises abutting on a street in which there is a public sewer shall have a connection with the sewer, and, if possible, a separate connection.

6. In multiple dwellings provided with a house drainage sys- tem there shall be for each family at least one private water closet and sink.

7. Plumbing fixtures shall be made of smooth non-absorbent material, shall be free from concealed fouling surfaces, and shall be set free of enclosures.

8. The entire house drainage system shall be so designed, constructed, and maintained as to conduct the waste water or sewage quickly from the fixture to the place of disposal with velocities which will guard against fouling and the deposit of solids and will prevent clogging.

9. The drainage pipes shall be so designed and constructed as to be proof for a reasonable life of the building against leakage of water or drain air due to defective materials, imperfect connections, corrosion, settlement or vibrations of the ground or building, temperature changes, freezing, or other causes.

10. The drainage system shall be provided with an adequate number of cleanouts so arranged that in case of stoppage the pipes may be readily accessible.

11. Each fixture or combination fixture shall be provided with a separate, accessible, self-scouring, reliable water-seal trap, placed as near to the fixture as possible.

12. The house drainage system shall be so designed that there will be an adequate circulation of air in all pipes and no danger of siphonage, aspiration, or forcing of trap seals under conditions of ordinary use.

13. The soil stack shall extend full size upward through the roof and have a free opening, the roof terminal being so located that there will be no danger of air passing from it to any window, and no danger of clogging of the pipe by frost or by articles being thrown into it, or of roof water draining into it.

14. The plumbing system shall be subjected to a water or air pressure test and to a final air pressure test in such manner as to disclose all leaks and imperfections in the work.

15. No substances which will clog the pipes, produce explosive mixtures, or destroy the pipes or their joints, shall be allowed to enter the house drainage system.

16. Refrigerators, ice boxes, or receptacles for storing food shall not be connected directly with the drainage system.

17. No water closet shall be located in a room or compartment which is not properly lighted and ventilated to the outer air.

18. If water closets or other plumbing fixtures exist in buildings where there is no sewer within reasonable distance, suitable provision shall be made for disposing of the house sewage by some method of sewage treatment and disposal satisfactory to the State Board of Health.

19. Where a house drainage system may be subjected to backflow of sewage, suitable provision shall be made to prevent its overflow in the building.

20. Plumbing systems shall be maintained in a sanitary condition.

Section 13.1. DEFINITIONS OF TERMS.

Section 13.1.1. Plumbing System. The plumbing system of a building includes the water supply distributing pipes; the fixtures and fixture traps; the soil, waste, and vent pipes; the house drain and house sewer; the storm-water drainage; with their devices, appurtenances and connections all within or adjacent to the building.

Section 13.1.2. Water-Service Pipe. The water-service pipe is the pipe from the water main to the building served.

Section 13.1.3. Water-Distribution Pipes. The water-distribution pipes are those which convey water from the service pipe to the plumbing fixtures.

Section 13.1.4. Plumbing Fixtures. Plumbing fixtures are receptacles intended to receive and discharge water, liquid, or water-carried wastes into a drainage system with which they are connected.

Section 13.1.5. Trap. A trap is a fitting or device so constructed as to prevent the passage of air or gas through a pipe without materially affecting the flow of sewage or waste water through it.

Section 13.1.6. Trap Seal. The trap seal is the vertical distance between the crown weir and the dip of the trap.

Section 13.1.7. Vent Pipe. A vent pipe is any pipe provided to ventilate a house-drainage system and to prevent trap siphonage and back pressure.

Section 13.1.8. Local Ventilating Pipe. A local ventilating pipe is a pipe through which foul air is removed from a room or fixture.

Section 13.1.9. Soil Pipe. A soil pipe is any pipe which conveys the discharge of water closets, with or without the discharges from other fixtures, to the house drain.

Section 13.1.10. Waste Pipe and Special Waste. A waste pipe is any pipe which receives the discharge of any fixture, except water closets, and conveys the same to the house drain, soil, or waste stacks. When such pipe does not connect directly with a house drain or soil stack, it is termed a special waste.

Section 13.1.11. Main. The main of any system of horizontal, vertical, or continuous piping is that part of such system which receives the waste, vent, or back vents, from fixture outlets or traps, direct or through branch pipes.

Section 13.1.12. Branch. The branch of any system of piping is that part of the system which extends horizontally at a slight grade, with or without lateral or vertical extensions or vertical arms, from the main to receive fixture outlets not directly connected to the main.

Section 13.1.13. Stack. Stack is a general term for any vertical line of soil, waste; or vent piping.

Section 13.1.14. House Drain. The house drain is that part of the lowest horizontal piping of a house drainage system which receives the discharge from soil, waste and other drainage pipes inside the walls of any building and conveys the same to the house sewer beginning 5 feet outside of the inner face of the building wall.

Section 13.1.15. House Sewer. The house sewer is that part of the horizontal piping of a house drainage system extending from the house drain 5 feet outside of the inner face of the building wall to its connection with the main sewer or cesspool and conveying the drainage of but one building site.

Se**ction 13.1.16. Size and Length.** The given caliber or size of pipe is for a nominal internal diameter, except that other than iron pipe size, brass pipe is measured by its outside diameter. The developed length of a pipe is its length along the center line of pipe and fittings.

Section 13.1.17. Dead End. A dead end is a branch leading from a soil, waste, vent, house drain, or house sewer, which is terminated at a developed distance of 2 feet or more by means of a cap, plug, or other fitting not used for admitting water to the pipe.

Section 13.2. GENERAL REGULATIONS.

Section 13.2.1. Grades of Horizontal Piping. All horizontal piping shall be run in practical alignment and at a uniform grade of not less than one-fourth of an inch per foot unless special permission is given by the local building official or designated authority, and shall be supported or anchored at intervals not to exceed 5 feet. All stacks shall be supported at their bases, and all pipes shall be rigidly secured.

Section 13.2.2. Change in Direction. All changes in direction shall be made by the appropriate use of 45" wyes, half wyes, long sweep quarter bends, sixth, eighth, or sixteenth

bends, except that single sanitary tees may be used on vertical stacks, and short quarter bends may be used in soil and waste lines where the change in direction of flow is from the horizontal to the vertical. Tees and crosses may be used in vent pipes.

Section 13.2.3. Prohibited Fittings. No double hub, double T, or double sanitary T branch shall be used on soil or waste lines. The drilling and tapping of house drains, soil, waste, or vent pipes, and the use of saddle hubs and bands are prohibited.

Section 13.2.4. Dead Ends. In the installation of any drainage system dead ends shall be avoided.

Section 13.2.5. Protection of Material. All pipes passing under or through walls shall be protected from breakage. All pipes passing through or under cinder concrete or other corrosive material shall be protected against external corrosion.

Section 13.2.6. Workmanship. Workmanship shall be of such character as fully to secure the results sought to be obtained in all of the sections of this chapter.

Section 13.2.7. Installation of Plumbing by Owner. All plumbing installed by the owner shall comply with the requirements of this code and in such event the word “owner” shall be substituted for the word "plumber" throughout this chapter.

Section 13.3. QUALITY AND WEIGHTS OF MATERIALS.

Section 13.3.1. Materials, Quality of. All materials used in any drainage or plumbing system or part thereof, shall be free from defects.

Section 13.3.2. Vitrified Clay or Shale Pipe. All vitrified clay or shale pipe and fittings shall conform to the A. S. T. M. "Standard Specifications for Vitrified Clay Pipe and Fittings" (serial designation, C-13-35).

Section 13.3.3. Cast-iron Pipe.

(a) Quality - All cast-iron pipe and fittings shall conform to the A. S. T. M. "Standard Specifications for Cast-iron Soil Pipe and Fittings" (serial designation, A 74-29).

(b) Coating - All cast-iron pipe and fittings for underground use shall be coated with asphaltum or coal-tar pitch.

(c) **Label, Cast or Stamped.** Each length of cast-iron pipe, fitting, trap, fixture and device used in a plumbing or drainage system shall be stamped or indelibly marked with the weight or quality thereof and the maker's mark or name.

Section 13.3.4. Wrought-iron Pipe. All wrought-iron pipe shall conform to the A. S. T. M. "Standard Specifications for Welded Wrought-iron Pipe" (serial designation, A 72-33), and shall be galvanized.

Section 13.3.5. Mild Steel Pipe. All steel pipe shall conform to the A. S. T. M. "Standard Specifications for Welded and Seamless Steel Pipe" (serial designation, A 53-33), and shall be galvanized.

Section 13.3.6. Brass and Copper Pipe. Brass and copper pipe shall conform, respectively, to the standard specifications of the A. S. T. M. for "Brass Pipe, Standard Sizes," and for "Copper Pipe, Standard Size" (serial numbers B 43-33 and B 42-33, respectively).

Section 13.3.7. Lead Pipe, Diameter, Weights. All lead pipe shall be of best quality of drawn pipe, of not less weight per linear foot than shown below.

(a) Lead soil, waste, vent, or flush pipes, including bends and traps (extra light):

Internal diameter	Weight per ft.		Internal diameter	Weight per ft.	
Inches	Lbs.	Ozs.	Inches	Lbs.	Ozs.
1	2	--	2	4	---
1 ¼	2	8	3	4	12
1 ½	3	8	4	6	---

(b) Lead water supply pipe above ground (strong):

Internal diameter	Weight per ft.		Internal diameter	Weight per ft.	
Inches	Lbs.	Ozs.	Inches	Lbs.	Ozs.
1/2	2	--	1 ¼	4	12
5/8	2	8	1 ½	4	---
3/4	3	--	1 ¾	6	8
1	4	--	2	7	---

(c) Lead water supply pipe under ground (extra strong):

Internal diameter	Weight per ft.		Internal diameter	Weight per ft.	
Inches	Lbs.	Ozs.	Inches	Lbs.	Ozs.
1/2	2	8	1 ¼	6	---
5/8	3	--	1 ½	7	8
3/4	3	8	1 ¾	9	---
1	4	12	2	9	---

Section 13.3.8. Sheet Lead. Sheet lead shall weigh not less than 4 pounds per square foot.

Section 13.3.9. Sheet Copper or Brass. Sheet copper or brass shall be not lighter than No. 18 B. and S. gauge, except that for local and interior ventilating pipe it shall be not lighter than No. 26 B. and S. gauge.

Section 13.3.10. Galvanized Sheet Iron. Galvanized sheet iron shall be not lighter than the following B. and S. gauge:

No. 26 for 2 to 12 inch pipe.

No. 24 for 13 to 20 inch pipe.

No. 22 for 21 to 26 inch pipe.

Section 13.3.11. Threaded Fittings.

(a) Plain screwed fittings shall be of cast iron, malleable iron or brass of standard weight and dimensions.

(b) Drainage fittings shall be of cast iron, malleable iron or brass, with smooth interior waterway, with threads tapped out of solid metal.

(c) All cast-iron fittings used for water supply distribution shall be galvanized.

(d) All malleable iron fittings shall be galvanized.

Section 13.3.12. Calking Ferrules. Brass calking ferrules shall be of the best quality red cast brass, with weights and dimensions in accordance with the following table:

Pipe Size (Inch)	Actual Inside Diameter	Length	Weight	
	Inches	Inches	Lbs.	Ozs.
2	2 ¼	4 ½	1	---
3	3 ¼	4 ½	1	12
4	4 ¼	4 ½	2	8

Section 13.3.13. Soldering Nipples and Bushings.

(a) Soldering nipples shall be of brass pipe, iron-pipe size, or of heavy, cast red brass not less than the following weights:

Diameter Inches	Weight Ozs.	Diameter Inches	Weight Lbs.	Ozs.
1 ¼	6	2 ½	1	6
1 ½	8	3	2	0
2	14	4	3	8

(b) Soldering bushings shall be of brass pipe, iron-pipe size, or of heavy, cast red brass.

Section 13.3.14. Floor Flanges for Water Closets. Floor flanges for water closets shall be not less than three-sixteenths of an inch thick, and of brass or cast iron.

Section 13.4. JOINTS AND CONNECTIONS.

Section 13.4.1. Water- and Air-tight Joints. All joints and connections mentioned under this section shall be made permanently gas- and water-tight.

Section 13.4.2.

(a) **Calked Joints.** All calked joints shall be firmly packed with oakum or hemp, and shall be secured only with pure lead, not less than 1 inch deep, well calked, and no paint, Varnish or putty will be permitted until after the joint is tested.

(b) **Vitrified Pipe Joints.** All vitrified pipe joints to be firmly packed with okum or hemp and secured with an approved type of bituminous rubber or sulphur jointing compound.

Section 13.4.3. Screw Joints. All screw joints shall be American standard screw joints, and all burrs or cuttings shall be removed.

Section 13.4.4. Cast Iron. Cast-iron joints may be either calked or screw joints made in the approved manner.

Section 13.4.5. Wrought Iron, Steel, or Brass to Cast Iron. The joints may be either screwed or calked joints made in the approved manner.

Section 13.4.6. Lead Pipe. Joints in lead pipe or between lead pipe and brass or copper pipes, ferrules, soldering .nipples, bushings, or traps, in all cases on the sewer side of the trap and in concealed joints on the inlet side of the trap, shall be full-wiped joints, with an exposed surface of the solder to each side of the joint of not less than three-quarters of an inch and a minimum thickness at the thickest part of the joint of not less than three-eighths of an inch.

Section 13.4.7. Lead to Cast Iron, Steel, or Wrought Iron. The joints shall be made by means of a calking ferrule, soldering nipple or bushing.

Section 13.4.8. Slip Joints and Unions. Slip joints will be permitted only in trap seals or on the inlet side of the trap. Unions on the sewer side of the trap shall be ground faced, and shall not be concealed or enclosed.

Section 13.4.9. Roof Joints. The joint at the roof shall be made watertight by use of copper, lead, or iron plates or flashings.

Section 13.4.10. Closet, Pedestal Urinal and Trap Standard Slop Sink, Floor Connections. A brass floor connection shall be wiped or soldered to lead pipe, an iron floor connection shall be caulked to cast-iron pipe, or an iron floor connection calked or screwed to wrought-iron pipe, and the floor connection bolted to an earthenware trap flange. A metal to earthenware, a metal to metal union, or a lead or asbestos gasket or washer shall be used to make a tight joint.

Section 13.4.11. Increasers and Reducers. Where different sizes of pipes or pipes and fittings are to be connected, proper size increasers or reducers, pitched at an angle of 45^{o} between the two sizes, shall be used.

Section 13.4.12. Prohibited Joints and Connections. Any fitting or connection which has an enlargement, chamber, or recess with a ledge shoulder or reduction of the pipe area in the direction of the flow on the outlet or drain side of any trap is prohibited.

Section 13.4.13. Expansion Bolts. Connections of wall hangers, pipe supports, or fixture settings with the masonry, stone, or concrete backing shall be made with expansion bolts without the use of wooden plugs.

Section 13.4.14. New Materials. Any other material than that specified in this code, which the proper administrative authority approves as being equally efficient, may be permitted.

Section 13.5. TRAPS AND CLEANOUTS.

Section 13.5.1. Traps, Kind, and Minimum Size. Every trap shall be self-cleaning. Traps for bathtubs, lavatories, sinks, and other similar fixtures shall be of lead, brass, cast iron, or of malleable iron galvanized or porcelain enameled inside. Galvanized or porcelain-enameled traps shall be extra heavy and shall have a full-bore smooth interior water-way, with threads tapped out of solid metal.

The minimum size (nominal inside diameter) of trap and waste branch for a given fixture shall not be less than that shown in the following table:

Kind of Fixtures	Size (in inches), trap and branch	Kind of Fixtures	Size (in inches), trap and branch
Bathtubs[1]	1 ½	Sinks, hotel or public	2
Bath, shower, stall[1]	2	Sinks, large hotel or public	2
Bath, sitz	1 ½	Sinks, small, pantry or bar	1 ¼
Bath, foot	1 ½	Sinks, dishwasher	1 ½
Bidets	1 ½	Sinks, slop with trap combined	3
Combination fixture	1 ½	Sinks, slop sink, ordinary[1]	2
Drinking fountains	1 ¼	Urinals, lip	1 ½
Fountain cuspidor	1 ¼	Urinals, troughs	2
Floor drains	2	Urinals, pedestal	3
Laundry trays	1 ½	Urinals, stall	2
Sinks, kitchen, residence	1 ½	Wash basin[1]	1 ¼
		Water closet	3

1. The present tendency is toward an increase in the size of trap and waste pipe for this fixture, in order to reduce the time required for emptying it.

Section 13.5.2. Traps, Prohibited. No form of trap which de- pends for its seal upon the action of movable parts or concealed interior partitions shall be used for fixtures.

Section 13.5.3. Traps, Where Required. Each fixture shall be separately trapped by a water-seal trap placed as near to the fixture as possible. In no case shall the waste from a bathtub or other fixture discharge into a water closet trap. No fixture shall be double trapped.

Section 13.5.4. Water Seal. Each fixture trap shall have a water seal of not less than 2 inches and not more than 4 inches.

Section 13.5.5. Trap Levels and Protection. All traps shall be set true with respect to their water seals and protected from frost and evaporation.

Section 13.5.6. Pipe Cleanouts. The bodies of cleanout ferrules shall be made of standard pipe sizes, conform in thickness to that required for pipe and fittings of the same metal, and extend hot less than one-quarter inch above the hub. The cleanout cap or plug shall be of heavy red brass not less than one-eighth inch thick and be provided with raised nut or recessed socket for removal.

Cleanouts other than the above may be allowed by the department having jurisdiction over same.

Section 13.5.7. Pipe Cleanouts-Where Required. A cleanout easily accessible shall be provided at the foot of each vertical waste or soil stack. There shall be at least two cleanouts in the house drain, one at or near the base of the stack and the other, with full size Y branch, inside the wall near the connection between the house drain and house sewer. Except for the latter, cleanouts shall be of the same nominal size as the pipes up to 4 inches and not less than 4 inches for larger pipes. The distance between cleanouts in horizontal soil lines shall not exceed 50 feet.

Section 13.5.8. Manholes. All underground traps and cleanouts of a building, except where cleanouts are flush with the floor, and all exterior underground traps shall be made accessible by manholes with proper covers.

Section 13.5.9. Cleanouts-Equivalents. Any floor or wall connection of fixture traps when bolted or screwed to the floor or wall shall be regarded as a cleanout.

Section 13.5.10. Grease Traps. When a grease interceptor is installed, it shall be placed as near as possible to the fixture from which it receives the discharge and should have twice the capacity of the discharge.

Section 13.5.11. Sand Traps. Sand traps when installed should be so designed and placed as to be readily accessible for cleaning.

Section 13.5.12. Basement Floor Drains. Cellar or basement floor drains shall connect into a trap so constructed that it can be readily cleaned and of a size to serve efficiently the purpose for which it is intended. The drain inlet shall be so located that it is at all times in full view. When subject to back flow or back pressure, such drains shall be equipped with an adequate backwater valve.

Section 13.5.13. Backwater Valves. Backwater valves shall have all bearing parts or balls of non-corrodible metal and so constructed as to insure a positive mechanical seal and remain closed except when discharging wastes.

Section 13.6. WATER SUPPLY AND DISTRIBUTION.

Section 13.6.1. Quality of Water. The source and quality of the water supply shall meet accepted standards of purity as required by the State Board of Health.

Section 13.6.2. Distribution. The water supply shall be distributed through a piping system entirely independent of any piping system conveying another water supply.

Section 13.6.3. Water Service. The water service pipe of any building shall be of sufficient size to permit a continuous ample flow of water on all floors at a given time.

Section 13.6.4. Water Supply to Fixtures. All plumbing fixtures shall be provided with a sufficient supply of water for flushing to keep them in a sanitary condition. Every water closet or pedestal urinal shall be flushed by means of an approved tank or flush valve of at least 4 gallons flushing capacity for water closets and at least 2 gallons for urinals, and shall be adjusted to prevent the waste of water. The flush pipe for water closet flush tanks shall be not less than 1¼, inches in diameter, and the water from flush tanks shall be used for no other purpose.

No water closet or urinal bowl shall be supplied directly from a water-supply system through a flushometer or other valve unless such valve is set above the water closet or urinal in a manner such as to prevent any possibility of polluting the water supply.

No plumbing fixture, device, or construction shall be installed which will provide a cross-connection between a distributing system of water for drinking and domestic purposes and a drainage system, soil, or waste pipe so as to permit or make possible the back flow of sewage or waste into the water supply system.

No cross-connection between a public or semi-public water supply or system of piping shall be installed or operated except as expressly permitted by the State Board of Health.

Section 13.6.5. Size of Water Pipe, Valves. The minimum size of water service pipes from the curb to the building shall be ¾- inch, and must extend full size to each bathroom and range boiler, with ½-inch branches to fixtures.

Hot water supply to bathrooms shall be not less than ¾ inch. All branches shall be taken from the same size pipe as riser. Tub and lavatory may be controlled together provided riser is ¾-inch. All water pipe must be reamed. Boiler tubes shall not be less than ¾-inch, and shall be brass or copper. Range boilers shall have a separate control valve on the cold water supply pipe.

Schedule of water pipe sizes in new work, where flush valves are not used:

One to eight fixture job	¾-Inch
Nine to fourteen fixture job	1-Inch
Fifteen to twenty-five fixture job	1¼-Inch
Twenty-six to thirty-five fixture job	1½-Inch
Thirty-six to fifty-five fixture job	1¾-Inch

On the inside of the building, at an approved location, there shall be installed a gate valve, of approved make, which shall be of the same size as main supply pipe, and shall be equipped with a hose drain cock.

At an approved location in the basement, globe or gate valves shall be installed to control each riser, and shall be equipped with proper marking tags. Fittings on wrought iron, steel, or brass pipe shall be beaded.

In buildings that are subject to freezing, risers shall have separate valves or full bore stop and waste cock not less than 14 inches underground protected with broken brick or other suitable porous material. On the risers a ground joint union shall be placed to facilitate repairs, and key rods shall extend through floor. Water closets shall be supplied from a separate riser. The entire water supply system shall be so installed that it can be drained if necessary. Boiler and heater drains shall be installed at the lowest point of the circulation system and below the bottom of boiler.

When a check valve is installed on the cold water supply pipe between the street main and the hot water boiler, there shall be installed an approved relief valve, and a pressure reducing valve of approved make. Bleeder for hot water pipes shall be placed at lowest point on supply pipes.

All pumps and hydrants shall be protected from surface water and contamination.

Section 13.7. PLUMBING FIXTURES.

Section 13.7.1. Materials. All receptacles used as water closets, urinals, or otherwise for the disposal of human excreta, shall be vitrified earthenware, hard natural stone, or cast iron white enameled on the inside.

Section 13.7.2. How Installed. All plumbing fixtures shall be installed free and open in a manner to afford access for cleaning.

Where practical all pipes from fixtures shall be run to the wall, and no lead trap or pipe shall extend nearer to the floor than 12 inches unless protected by casing.

Section 13.7.3. Water Closet Bowls. Water closet bowls and traps shall be made in one piece and of such form as to hold sufficient quantity of water, when filled to the trap overflow, to prevent fouling of surfaces, and shall be provided with integral flushing rims constructed so as to flush the entire interior of the bowl.

Section 13.7.4. Frostproof Closets-Where Permitted. Frostproof closets may be installed only in compartments which have no direct connection with a building used for human habitation or occupancy. The soil pipe between the hopper and the trap shall be 3 inches in diameter and shall be of lead, or cast iron enameled on the inside.

Section 13.7.5. Fixtures Prohibited. Fixed wooden wash trays or sinks shall not be installed in any building designed or used for human habitation. No new copper lined wooden bathtubs shall be installed and an old fixture of this class taken out shall not be reconnected. Pan and valve plunger, offset washout and other water closets having invisible seals or unventilated space, or walls not thoroughly washed at each flush shall not be used. Long hopper closets or similar appliances shall not hereafter be installed. No dry closet or chemical closet shall be installed in a dwelling.

Section 13.7.6. Floor Drains and Shower Drains. A floor drain or a shower drain shall be considered a fixture and provided with a strainer.

Section 13.7.7. Fixture Strainers. All fixtures other than water closets and pedestal urinals shall be provided with fixed strong metallic strainers with outlet areas not less than that of the interior of the trap and waste pipe.

Section 13.7.8. Fixture Overflow. The overflow pipe from a fixture shall be connected on the house or inlet side of the trap and be so arranged that it may be readily and effectively cleaned.

Section 13.8. VENTILATION OF ROOMS AND FIXTURES.

Section 13.8.1. Location of Fixtures. No trapped plumbing fixtures shall be located in any room or apartment which does not contain a window placed in an external wall or is not otherwise provided with proper ventilation.

Section 13.8.2. Ventilating Pipe, How Connected. Ventilation pipes from fixtures and toilet rooms shall be separate and distinct and have no connection whatever with the other ventilating ducts or pipes in the building.

Section 13.9. SOIL, WASTE, AND VENT PIPES.

Section 13.9.1. Material. All main or branch soil, waste, and vent pipes within the building shall be of cast iron, galvanized steel or wrought iron, lead, brass, or copper, except that no galvanized steel or wrought-iron pipe shall be used for underground soil or waste.

Section 13.9.2. Fixture Units. The following table shall be employed to determine the minimum diameters of fixture traps, the minimum diameters of waste pipes from single fixtures, and the fixture unit values to be assigned to fixtures.

In the classification of plumbing installations, class 1 (private) shall apply to fixtures in residences and apartments and to fixtures in private bathrooms of hotels and similar installations where the fixtures are intended for the use of a family or an individual.

Class 2 (semi-public) shall apply to fixtures in office buildings, factories, dormitories, and similar installations where the fixtures are intended for the use of the occupants of the building.

Class 3 (public) shall apply to fixtures in general toilet rooms of schools, gymnasiums, hotels, railroad stations, public comfort stations, and other installations (whether pay or free) where a number of fixtures are installed so that their use is similarly unrestricted.

Fixture unit ratings for all fixtures given a single rating shall apply to those fixtures in all classes of installations.

FIXTURE AND CLASS OF INSTALLATION	Minimum Nominal Trap Diameter	Minimum Nominal Diameter, Individual Drain	Fixture Units
	Inches	Inches	
1 lavatory and wash basin, class 1	1 ¼	1 ¼	1
1 lavatory and wash basin, class 2 or 3	1 ¼	1 ¼	2
1 water closet, class 1	3	3	3
1 water closet, class 2	3	3	5
1 water closet, class 3	3	3	6
1 bathtub, class 1	1 ½	1 ½	3
1 bathtub, class 2 or 3	2	2	4
1 shower stall, shower head only, class 1	1 ½	1 ½	2
1 shower stall, multiple spray, class 1	2	2	4
1 shower stall, shower head only, class 2 or 3	2	2	3
1 shower stall, multiple spray, class 2 or 3	3	3	6
Gang shower, for each shower head	--	--	5
1 urinal, lip, or each 2 feet of trough or gutter	1 ½	1 ½	2
1 urinal, stall or wall hung with tank or flush valve supply	2	2	4
1 urinal, pedestal or blow out	3	3	5
1 bathroom group, consisting of one lavatory, 1 water closet, 1 bathtub with or without overhead shower head or consisting of 1 lavatory, 1 water closet and 1 shower stall, class 1	--	--	6
1 bathroom group, consisting of 1 lavatory, 1 water closet, 1 bathtub and 1 shower stall in same bathroom, class 1	--	--	7
1 sink, residence or apartment kitchen sink, dishwasher, butler's or pantry sink, class 1	1 ½	1 ½	3
1 sink, hotel or restaurant pot sink	3	3	8
1 sink, hotel or restaurant vegetable sink	2	2	6
1 sink, hotel or restaurant glass sink	1 ½	1 ½	3
1 sink, hotel or restaurant silver sink	1 ½	1 ½	3
1 sink, lunch counter bar sink	2	2	6
1 sink, soda fountain bar sink	1 ¼	1 ¼	1 ½
1 sink, ordinary slop sink	2	2	3
1 sink, siphon jet slop sink, flush rim or mop	3	3	6
1 sink, bedpan sink or bedpan washer	3	3	6
1 sink, laboratory, surgeon's or medical sink	1 ½	1 ½	1 ½
1 sterilizer, instrument, utensil or water	1 ¼	1 ¼	½
1 sterilizer, bedpan	3	3	6
1 laundry tray	1 ½	1 ½	3
1 combination fixture	1 ½	1 ½	3
1 foot bath or sitz bath	1 ½	1 ½	2
1 infant's or baby's slab bath	1 ¼	1 ¼	½
1 bidet	1 ½	1 ½	3
1 drinking fountain	1 ¼	1 ¼	½
1 cuspidor, fountain or dental	1 ¼	1 ¼	½
1 floor drain, ordinary	2	2	1
1 floor drain, flush rim	2	2	3
1 floor drain, receiving overflow from tanks or discharge from unrated fixtures shall be rated on the estimated maximum flow, for each gallon per minute	--	--	2
1 sewage ejector, for each 25 gallons per minute discharge capacity	--	--	50

A floor drain receiving regular or intermittent discharges from fixtures shall be counted as the total of the fixtures drained into it.

Sump pumps ejecting storm or seepage water shall be counted as drained area, 600 square feet for each 25 gallons per minute discharge capacity.

Section 13.9.3. Soil and Waste Stacks. Every building in which plumbing fixtures are installed shall have a soil or waste stack, or stacks, extending full size through the roof. Soil and waste stacks shall be as direct as possible and free from sharp bends and turns. The required size of a soil or waste stack shall be determined from the distribution and total of all fixture units connected to the stack in accordance with the following table, except that no water closets shall discharge into a stack less than 3 inches in diameter:

Maximum Fixture Units on One Stack

DIAMETER IN INCHES	With "Sanitary T" Inlets		With All 45^{O} Y or "Combination Y and One-Eighth Bend" Inlet		Maximum Length, Including Extension as Vent
	In One Branch Interval[1]	On Any One Stack	In One Branch Interval[1]	On Any One Stack	
					Feet
1 ¼ ----------	1	1	1	1	50
1 ½ ----------	2	8	4	12	65
2 ----------	9	16	15	36	85
3 ----------	24	48	45	72	212
4 ----------	144	256	240	384	300
5 ----------	324	680	540	1,020	390
6 ----------	672	1,380	1,122	2,070	510
8 ----------	2,088	3,600	3,480	5,400	750

1. The term "branch interval" shall be interpreted to mean a vertical length of stack, not less than 8 feet within which a branch or branches are connected, and the total future units on all branches connected to a stack within an 8-foot length shall not exceed the maximum permitted by the table in one "branch interval."

Section 13.9.4. Soil and Waste Stacks, Fixture Connection. All soil and waste stacks and branches shall be provided with correctly faced inlets for fixture connections.

Section 13.9.5. Changing Soil and Vent Pipes. In existing buildings where the soil or waste vent pipe is not extended undiminished through or above the roof, or where there is a sheet-metal soil or waste vent pipe, and the fixture is changed in style or location or is replaced, a soil or waste vent pipe of the size and material prescribed for new work shall be installed.

Section 13.9.6. Prohibited Connections. No fixture connection shall be made to a lead bend or branch of a water closet or similar fixture. No soil or waste vent, circuit or loop vent above the highest installed fixture on the branch or main shall thereafter be used as a soil or waste pipe.

Section 13.9.7. Soil and Waste Pipe Protected. No soil or waste stack shall be installed or permitted outside a building unless adequate provision is made to protect it from frost.

Section 13.9.8. Roof Extensions. All roof extensions of soil and waste stacks shall be run full size at least 1 foot above the roof, and when the roof is used for other purposes than weather protection such extension shall not be less than 5 feet above the roof.

When there is danger of frost closure, no roof extension shall be less than 4 inches in diameter. Change in diameter shall be made by use of a long increaser at least 1 foot below the roof, and where access to the roof is difficult a test opening shall be provided at this point.

Section 13.9.9. Terminals. The roof terminal of any stack or vent, if within 20 feet of any door, window, scuttle, or air shaft, shall extend at least 3 feet above the same.

Section 13.9.10. Terminals Adjoining High Buildings. No soil, waste, or vent pipe extension of any new or existing building shall be run or placed on the outside of a wall, but shall be carried up in the inside of the roof.

In the event that a new building is built higher than an existing building, the owner of the new building shall not locate windows within 20 feet of any existing vent stack on the lower building unless the owner of such new building shall defray the expenses or shall himself make such alteration to conform with Section 13.9.9 of this chapter.

It shall be the duty of the owner of the lower or existing building to make such alteration therein upon the receipt in advance of money or security therefor, sufficient for the purpose, from the owner of the new or higher building or to permit, at the election of the owner of the new or higher building, the making of such alteration by the owner of said new or higher building.

Section 13.9.11. Traps Protected, Vents. Every fixture trap shall be protected against siphonage and back pressure, and air circulation assured by means of a soil or waste stack vent, a continuous waste or soil vent, or a loop or circuit vent. No crown vent shall be installed.

Section 13.9.12. Distance of Vent from Trap Seal. No trap shall be placed more than 3 ½ feet, horizontal developed length, from its vent. The distance shall be measured along the central line of the waste or soil pipe from the vertical inlet of the trap to the vent opening. The vent opening from the soil or waste pipe, except for water closets and similar fixtures, shall not be below the dip of the trap.

Section 13.9.13. Main Vents to Connect at Base. All main vents or vent stacks shall connect full size at their base to the main soil or waste pipe at or below the lowest fixture branch and shall extend undiminished in size above the roof or shall be reconnected with the main soil or waste vent at least 3 feet above the highest fixture branch.

Section 13.9.14. Vents, Required Sizes. The required size of main vents or vent stacks shall be determined from the size of the soil or waste stack vented, the total number of fixture units drained into it, and the developed length of the vent, in accordance with the following table, interpolating when necessary between permissible lengths of vent given in the table:

Diameter of Soil or Waste Stack (Inches)	Number of Fixture Units	Diameter of Vent (In Inches)									
		1 ¼	1 ½	2	2 ½	3	4	5	6	8	10
1 ¼	1	45	----	----	----	----	----	----	----	----	----
1 ½	Up to 38	35	60	----	----	----	----	----	----	----	----
2	Up to 18	30	50	90	----	----	----	----	----	----	----
2 ½	Up to 36	25	45	75	105	----	----	----	----	----	----
3	12	----	34	120	180	212	----	----	----	----	----
3	18	----	18	70	180	212	----	----	----	----	----
3	24	----	12	50	130	212	----	----	----	----	----
3	36	----	8	35	93	212	----	----	----	----	----
3	48	----	7	32	80	212	----	----	----	----	----
3	72	----	6	25	65	212	----	----	----	----	----
4	24	----	----	25	110	200	300	340	----	----	----
4	48	----	----	16	65	115	300	340	----	----	----
4	96	----	----	12	45	84	300	340	----	----	----
4	144	----	----	9	36	72	300	340	----	----	----
4	192	----	----	8	30	64	282	340	----	----	----
4	264	----	----	7	20	56	245	340	----	----	----
4	384	----	----	5	18	47	206	340	----	----	----
5	72	----	----	----	40	65	250	390	440	----	----
5	144	----	----	----	30	47	180	390	440	----	----
5	288	----	----	----	20	32	124	390	440	----	----
5	432	----	----	----	16	24	94	320	440	----	----
5	720	----	----	----	10	16	70	225	440	----	----
5	1,020	----	----	----	8	13	58	180	440	----	----
6	144	----	----	----	----	27	108	340	510	----	----
6	288	----	----	----	----	15	70	220	510	630	----
6	576	----	----	----	----	10	43	150	425	630	----
6	864	----	----	----	----	7	38	125	320	630	----
6	1,296	----	----	----	----	6	25	92	240	630	----
6	2,070	----	----	----	----	4	21	75	186	630	----
8	320	----	----	----	----	----	42	144	400	750	900
8	640	----	----	----	----	----	30	86	260	750	900
8	960	----	----	----	----	----	22	60	190	750	900
8	1,600	----	----	----	----	----	16	40	120	525	900
8	2,500	----	----	----	----	----	12	28	90	370	900
8	4,160	----	----	----	----	----	7	22	62	252	840
8	5,400	----	----	----	----	----	5	17	52	212	705

Section 13.9.15. Branch and Individual Vents. No vents shall be less than 1¼, inches in diameter. For 1¼ and 1½ inch wastes the vent shall be of the same diameter as the waste pipe, and in no case shall a branch or main vent have a diameter less than one-half that of the

soil or waste pipe served, and in no case shall the length of a branch of a given diameter exceed the maximum length permitted for the main vent serving the same size soil or vent stack.

Section 13.9.16. Vent Pipe Grades and Connections. All vent and branch vent pipes shall be free from drops or sags and be so graded and connected as to drip back to the soil or waste pipe by gravity. Where vent pipes connect to a horizontal soil or waste pipe, the vent branch shall be taken off above the center line of the pipe, and the vent pipe must rise vertically or at an angle of 45^{O} to the vertical to a point 6 inches above the fixture it is venting before offsetting horizontally or connecting to the branch, main waste, or soil vent.

Section 13.9.17. Circuit and Loop Vents. A circuit or loop vent will be permitted as follows: A branch soil or waste pipe to which two and not more than eight water closets, pedestal urinals, trap standard slop sinks, or shower stalls are connected in the series may be vented by a circuit or loop vent, which shall be taken off in front of the last fixture connection. Where fixtures discharge above such branch, each branch shall be provided with a relief one-half the diameter of the soil or waste stack, taken off in front of the first fixture connection.

Section 13.9.18. Vents Not Required. No vents will be required on a down spout or rain leader trap, a back-water trap, a subsoil catch basin trap, or on a cellar floor drain, provided the cellar floor drain branches into the house drain on the sewer side at a distance of 5 feet or more from the base of the stack.

Where bathrooms or water closets or other fixtures are located on opposite sides of a wall or partition or directly adjacent to each other within the prescribed distance, such fixtures may have a common soil or waste pipe and common vent.

Section 13.10. HOUSE DRAINS AND SEWERS.

Section 13.10.1. Independent System. The drainage and plumbing system of each new building and of new work installed in an existing building shall be separate from and independent of that of any other building, except as provided below, and every building shall have an independent connection with a public or private sewer when available.

Exception. Where one building stands in the rear of another building on an interior lot and no private sewer is available or can be constructed to the rear building through adjoining alley, court, yard, or driveway, the house drain from the front building may be extended to the rear building and the whole will be considered as one house drain.

Section 13.10.la. Prohibited Sewer Connections. No roof water, storm water, or storm water drainage shall be admitted to any part of the house plumbing system or to any point along the house sewer line, except when the house sewer connects to a combined sewer system approved by the State Board of Health.

No domestic sewage, industrial sewage or other waste injurious to the public health shall be admitted or discharged into any storm water drain, catch-basin, inlet, or into any other part of a storm or surface water drainage system excepting a combined sewer system approved by the State Board of Health.

Section 13.10.2. Old House Sewers and Drains. Old house sewers and drains may be used in connection with new buildings or new plumbing only when they are found, on examination and test, to conform in all respects to the requirements governing new sewer or drains, as prescribed in this code. If the old work is found defective, the proper administrative authority shall notify the owner to make the necessary changes to conform with this code.

Section 13.10.3. Connection with Cesspools. Where a sewer is not available, drain pipes from buildings shall be connected to a residential sewage disposal plant consisting of a

settling or septic tank, and a sand filter or nitrification bed of a design approved by the State Board of Health.

Location. No .residential sewage disposal plant or any part thereof shall be located closer than 50 feet from any well, spring or source of water supply. Said plant or any part thereof shall, wherever possible, be located at least 20 feet from any residence and on ground draining away from any residence or water supply.

Settling or Septic Tank. The settling or septic tank shall have a capacity of at least 800 gallons for six persons, or less tributary, and at least 45 gallons per capita additional for each additional person above six and up to fifteen persons.

Nitrification Bed. In the sandy coastal plain section a nitrification bed at least 120 feet in length shall be installed to a uniform grade of from 4 to 6 inches per 100 feet, with at least 20 feet additional for each person over six and up to fifteen. In medium clay soil of the Piedmont and Western section of the State at least 240 feet of nitrification bed shall be installed to a uniform grade of from 4 to 6 inches per 100 feet with at least 40 feet additional for each person over six and up to fifteen persons. In dense clay soils a drained filter trench 3 feet wide and 2 feet deep by at least 60 feet long shall be installed to a uniform grade of from 4 to 6 inches per 100 feet with 10 feet additional length for each person over six and up to fifteen persons.

Larger Buildings. Dimensions, capacities and designs for installations involving more than 15 persons and up to 100 persons shall be approved by the State Board of Health.

Section 13.10.4. Pit Privies. During construction for the sanitary accommodation of the workmen, if water carried sewerage is not available, a pit privy shall be built in accordance with plans furnished by the State Board of Health. Such pit privy shall be located not nearer than 50 feet from any water supply, on lower ground, and so that the drainage will be away from said water supply.

Section 13.10.5. Excavations. Each system of piping shall be laid in a separate trench, provided that drainage trenches may be benched not less than 18 inches for lighter piping, if not in violation of any city regulation prescribed for their installation. Where a double system of drainage is installed, the sanitary and surface house sewers or drains may be laid side by side in one trench.

Tunneling for distances not greater than 6 feet is permissible in yards, courts, or driveways of any building site. When pipes are driven, the drive pipe shall be at least one size larger than pipe to be laid.

All excavations required to be made for the installation of a house drainage system, or any part thereof within the walls of a building shall be open trench work. All such trenches and tunnels shall be kept open until the piping has been inspected, tested, and approved.

Section 13.10.6. House Drains Underground. Whenever possible all house drains shall be brought into the building below the basement or cellar floor.

Section 13.10.7. Material.

(a) The house sewer beginning 5 feet outside of the inner face of the building wall shall be of cast iron; provided that vitrified clay or shale pipe may be used if the joints are constructed with an approved type of bituminous rubber or sulphur jointing compound. (See Section 13.4.2(b).)

(b) The house drain when underground shall be of lead, brass, or cast iron.

(c) The house drain when above ground shall be of cast iron, galvanized wrought iron or steel, lead or brass, approved standards. (See Sections 13.3.1 to 13.3.7, inclusive.)

Section 13.10.8. Depth of Drains and Sewers. No house sewer or underground house drain shall be laid parallel to or within 3 feet of any bearing wall, which might be thereby weakened. The house sewer and drains shall be laid at sufficient depth to protect them from frost.

Section 13.10.9. Size of House Sewers, House Drains, and Horizontal Branches. The required size of a sanitary house sewer, sanitary house drain, or branch of the sanitary house drain not receiving the discharge from fixtures on the same floor or level as the branch, shall be determined in accordance with the following table:

House Drains and House Sewers (Sanitary Only)

Diameter of pipe	Maximum number of fixture units for 1/8 inch fall per foot[1]	¼ inch fall per foot	½ inch fall per foot
1 ¼ inches	1	1	1
1 ½ inches	2	2 ½	3 ½
2 inches[2]	7	9	12
2 ½ inches[2]	17	21	27
3 inches (no water closets)	33	45	72
3 inches (not more than 2 water closets)	27	36	48
4 inches	114	150	210
5 inches	270	370	540
6 inches	510	720	1,050
8 inches	1,290	1,860	2,640
10 inches	2,520	3,600	5,250
12 inches	4,390	6,300	9,300
15 inches	8,300	11,600	16,800

1. See Section 13.2.1.
2. No water closet shall discharge into a drain less than 3 inches in diameter, and no main house drain or house sewer receiving discharges from water closets shall be less than 4 inches in diameter.

   NOTE: The table for sanitary drains only is based on gravity flow in drains one-half full, it having been found that full practical capacity is reached at approximately that point on account of air trapped in sanitary house drains.

The required size of a sloping sanitary drain receiving the dis- charge from fixtures on the same floor or level as the drain (termed a horizontal branch) shall be determined in accordance with the following table:

Horizontal Branches (Sanitary Only)

Diameter of pipe	Maximum number of fixture units for 1/8 inch fall per foot[1]	¼ inch fall per foot	½ inch fall per foot
1 ¼ inches	1	1	1
1 ½ inches	2	2	3
2 inches[2]	5	6	8
2 ½ inches[2]	12	15	18
3 inches (no water closets)	24	27	36
3 inches (not more than 2 water closets)	15	18	21
4 inches	84	96	114
5 inches	180	234	280
6 inches	330	440	580
8 inches	870	1,150	1,680
10 inches	1,740	2,500	3,600
12 inches	3,000	4,200	6,500
15 inches	6,000	8,500	13,500

1. See Section 13.2.1.
2. No water closet shall discharge into a drain less than 3 inches in diameter.

The required size of a sloping storm drain shall be determined from the horizontal projection of the total area drained by it in accordance with the following table:

Storm Drains Only

Diameter of pipe	Maximum area drained in square feet for 1/8 inch fall per foot[1]	¼ inch fall per foot	½ inch fall per foot
1 ¼ inches	90	130	185
1 ½ inches	140	210	290
2 inches	300	440	620
2 ½ inches	545	790	1,100
3 inches	865	1,250	1,750
4 inches	1,860	2,650	3,800
5 inches	3,300	4,700	6,650
6 inches	5,250	7,500	10,700
8 inches	11,000	16,000	22,200
10 inches	19,500	27,500	40,000
12 inches	32,500	45,500	65,500
15 inches	58,000	81,000	115,000

1. See Section 13.2.1.

2. NOTE: The table for sanitary drains only is based on gravity flow in drains one-half full, it having been found that full practical capacity is reached at approximately that point on account of air trapped in sanitary house drains.

Section 13.10.9a. Combined Storm and Sanitary House Drains and House Sewers. The required sizes of sloping combined storm and sanitary house drains and house sewers and their sloping branches shall be determined in accordance with the tables and charts in Section 116 of the Progress Revision, May, 1931, of Recommended Minimum Requirements for Plumbing of the United States Department of Commerce, Bureau of Standards.

Section 13.10.10. House Sewers. All soil and waste pipes from main sewer or other point of disposal shall be of cast iron.

Section 13.10.11. Drainage Below Sewer Level. In all buildings in which the whole or part of the house drainage and plumbing system thereof lies below the crown level of the main sewer, sewage or house waste shall be lifted by approved artificial means and discharged ·into the house sewer..

Section 13.10.12. Sumps and Receiving Tanks. All subhouse drains shall discharge into an airtight sump or receiving tank so located as to receive the sewage by gravity, from which sump or receiving tank the sewage shall be lifted and discharged into the house sewer by pumps, ejectors, or any equally efficient method. Such sumps shall be either automatically discharged or be of sufficient capacity to receive the house sewage and wastes for not less than 24 hours.

Section 13.10.13. Ejectors, Vented. The soil or vent pipe leading to an ejector or other appliance for raising sewage or other waste matter to the street sewer shall, where a water closet or closets are installed, be provided with a vent pipe not less than 4 inches in diameter, and where fixtures other than water closets are installed the waste vent pipe shall be the same diameter as the waste pipe. ·

Section 13.10.14. Motors, Compressors, etc. All motors, air compressors, and air tanks shall be located where they are open for inspection and repair at all times. The air tanks shall be so proportioned as to be of equal cubical capacity to the ejectors connected therewith, in which there shall be maintained an air pressure of not less than 2 pounds for each foot of height the sewage is to be raised.

Section 13.10.15. Ejectors for Subsoil Drainage. When subsoil catch basins are installed below the sewer level, automatic water ejectors provided with a ball float attached to the main water supply shall be used. Such ejectors or any device raising subsoil water shall discharge into a properly trapped fixture or into a storm-water drain.

Section 13.11. STORM-WATER DRAINS.

Section 13.11.1. Drainage of Yards, Areas, and Roofs. All roofs and paved areas, yards, courts, and courtyards shall be drained into the storm-water sewerage system or the combined sewerage systems, but not into sewers intended for sewage only. When drains used for this purpose are connected with the combined sewerage systems, they shall be effectually trapped, except roof leaders and conductors, where the roof or gutter opening is located not less than 20 feet from a door, window scuttle, or air shaft, One trap may serve for all such connections, but traps must be set below the frost line or on the inside of the building. Where there is no storm or combined sewer accessible, such connections shall be discharged into the public gutter, unless otherwise permitted by the proper authorities, and in such case need not be trapped.

Section 13.11.2. Size of Gutters and Leaders. No gutter or inside leader shall be of less size than the following:

Area of Roof (in Square Feet)	GUTTER Inches	LEADER Inches
Up to 90	3	1 ½
91 to 270	4	2
271 to 810	4	3
811 to 1,800	5	3
1,801 to 3,600	6	4
3,601 to 5,500	8	5
5,501 to 9,600	10	6

Outside leaders to the frost line shall be one size larger than required in the above table.

Gutters 8 inches or over in width on new buildings shall be hung with wrought-iron hangers of approved type.

The above sizes of rain leaders are based on diameter of circular rain leaders, and gutters based on semicircular sheet-metal gutters with the top dimension given and other shapes shall have the same sectional area.

Section 13.11.3. Inside Conductors. When placed within the walls of any building or run in an inner or interior court or ventilating pipe shaft, all conductors or roof leaders shall be constructed of cast iron or of galvanized wrought iron or steel pipe.

Section 13.11.4. Outside Conductors. When outside conductors or down spouts of 'sheet metal are connected with the' house drain, they shall be so connected by means of not less than one length of cast-iron pipe extending vertically at least 1 foot above the' grade line.

Along public driveways without sidewalks they shall be placed in niches in the walls, protected by wheel guards, or enter the building through the wall at a 45° slope at least 12 feet above the grade.

Section 13.11.5. Defective Conductor Pipes. When an existing sheet-metal conductor pipe within the walls of any building becomes defective, such conductor shall be replaced by one which conforms to this code.

Section 13.11.6. Vent Connections with Conductors Prohibited. Conductor pipes shall not be used as soil, waste, or vent pipes, nor shall any soil, waste, or vent pipes be used as conductors.

Section 13.11.7. Overflows. Overflow pipes from cisterns, supply tanks, expansion tanks, and drip pans shall connect only indirectly with any house sewer, house drain, soil, waste, or vent pipe.

Section 13.11.8. Subsoil, Foundation, Clear Water, and Absorption Tile Drains. Where subsoil drains are placed under the cellar floor or used to encircle the outer walls of a building, the same shall be made of open-jointed drain tile or earthenware pipe, not less than 4 inches in diameter, and shall be properly trapped and protected against back pressure by an automatic back-pressure valve accessibly located before entering the house sewer or drain. They may discharge through a cellar drain.

Section 13.11.9. Subsoil Drains Below Sewer Level. Subsoil drains below the main sewer level shall discharge into a sump or receiving tank, the contents of which shall be automatically lifted and discharged into the drainage system above the cellar through some properly trapped fixture or drain.

Section 13.12. REFRIGERATOR, SAFE, AND SPECIAL WASTES.

Section 13.12.1. Fixtures Permitted to Connect. No waste pipe from a refrigerator or ice box floor drain, or any other receptacle where food is stored shall connect directly with any house drain, soil, or waste pipe. Such waste pipes shall in all cases empty into an open sink that is properly supplied with water, connected, trapped, and vented, the same as other fixtures, or they may discharge into a down spout or rain leader trap located inside the building or into a cellar floor drain, but their ends must be left open. Such waste connections shall not be located in inaccessible or unventilated cellars.

Section 13.12.2. Refrigerator Wastes. Refrigerator waste pipes shall.be not less than 1¼ inches for 1 opening, 1½ inches for 3 openings, and for 4 to 12 openings must be not Jess than 2 inches, and shall have at each opening a trap, and cleanout at angles, so arranged as properly to flush and clean pipe. Such waste pipes shall be continued not less than full size through the roof, except where such fixtures are located in the basement or first floor.

Section 13.12.3. Overflow Pipes and Motor Exhausts. Pipes from a water-supply tank or exhaust from a water lift shall not be directly connected with any house drain, soil, or waste pipe. Such pipe shall discharge upon the roof or be trapped into an open fixture or discharge as for refrigerator wastes.

Section 13.13. MAINTENANCE.

Section 13.13.1. Defective Fixtures. All installed fixtures found defective or in an insanitary condition shall be repaired, renovated, replaced, or removed within 30 days upon written notice from the proper administrative authorities.

Section 13.13.2. Temporary Toilet Facilities. Suitable toilet facilities shall be provided for the use of workmen during the construction of any building. These toilet facilities shall be maintained in a sanitary condition.

Section 13.14. INSPECTIONS AND TESTS.

Section 13.14.1. Inspections. All piping, traps, and fixtures of a plumbing system shall be inspected by the proper administrative authority to insure compliance with all the requirements of this code and the installation and construction of the system in accordance with the approved plans and the permit.

Section 13.14.2. Notification.

(a) It shall be the duty of the plumber to notify the proper administrative authority and the owner, or his authorized agent orally, by telephone, or in writing, not less than eight working hours between the hours of 8 a.m. and 4 p.m. before the work is to be inspected or tested.

(b) It shall be the duty of the plumber to make sure that the work will stand the test prescribed before giving the above notification.

(c) If the proper administrative authority finds that ·the work will not stand the test, the plumber shall be required to renotify as above and to pay the sum of one dollar for each renotification.

(d) If the proper administrative authority fails to appear within 24 hours of the time set for each inspection or test, the inspection or test shall be deemed to have been made, and the plumber required to file an affidavit with the proper administrative authority that the work was installed in accordance with the code, the approved plans, and permit, and that it was free from defects and that the required tests had been made and the system found free from leaks; also whether the owner or his authorized agent was present when such inspection or test was made, or was duly notified.

(e) At the time the permit is taken out a written waiver by the owner of notification may be filed with the proper administrative authority.

Section 13.14.3. Material and Labor for Tests. The equipment, material, power, and labor necessary for the inspection and test shall be furnished by the plumber.

Section 13.14.4. System Tests. All the piping of a plumbing system shall be tested with water or air. After the plumbing fixtures have been set and their traps filled with water the entire drainage system may be submitted to a final air-pressure test. The proper administrative authority may require the removal of any cleanouts to ascertain if the pressure has reached all parts of the system.

Section 13.14.5. Methods of Testing.

(a) **Water Test.** The water test may be applied to the drainage system in its entirety or in sections. If applied to the entire system, all openings in the piping shall be tightly closed, except the highest opening above the roof and the system filled with water to the point of overflow above the roof.

If the system is tested in sections, each opening shall be tightly plugged, except the highest opening of the section under test, and each section shall be filled with water; but no section shall be tested with less than a 10 foot head of water or a 5-pound pressure of air. In testing successive sections at least the upper 10 feet of the next preceding section shall be retested, so that no joint or pipe in the building shall have been submitted to a test of less than a 10-foot head of water or a 5-pound pressure of air.

Under any test the water or air pressure shall remain constant for not less than 15 minutes without any further addition of water or air.

(b) **Air Test.** The air test shall be made by attaching the air compressor or test apparatus to any suitable opening and closing all other inlets and outlets to the system, then forcing air into the system until there is a uniform pressure sufficient to balance a column of mercury 10 inches in height or 5 pounds per square inch on the entire system. This pressure shall be maintained for 15 minutes.

(c) **Final Air Test.** The air machine shall be connected to any suitable opening or outlet and an air pressure equivalent to 1 inch water column shall be applied and left standing at least 15 minutes. If there is no leakage or forcing of trap seals indicated by the fluctuation of the drum, float, or water column, the system shall be deemed airtight.

Section 13.14.6. Order of Test. The tests may be made separately as follows:

(a) The house sewer and all its branches from the property line to the house drain.

(b) The house drain and yard drains, including all piping to the height of 10 feet above the highest point on the house drain, except the exposed connections to fixtures.

(c) The soil, waste, vent, inside conductor, and drainage pipes which would be covered up before the building is enclosed or ready for completion. The tests required for (b) and (c) may be combined.

(d) The final test of the whole system.

(e) After each of the above tests has been made and proved acceptable the proper administrative authority shall issue a written approval.

Section 13.14.7. Covering of Work. No drainage or plumbing system or part thereof, including the connection to a public sewer, shall be covered until it has been inspected, tested, and approved as herein prescribed.

Section 13.14.8. Uncovering of Work. If any house drainage or plumbing system or part thereof is covered before being regularly inspected, tested, and approved, as herein prescribed, it shall be uncovered upon the direction of the proper administrative authority.

Section 13.14.9. Defective Work. If inspection-or test shows defects, such defective work or material shall be replaced within three days and inspection and test repeated.

Section 13.14.10. House Sewer and House Drain Test. The house sewer and house drain shall be tested with water or air. The water test shall have not less than a 10-foot head of water and the air test not less than a 5-pound pressure. All alterations, repairs, or extensions, which shall include more than 10 feet, shall be inspected and tested.

Section 13.14.11. Conductor Pipes. Conductor pipes and their roof connections within the walls of buildings, or conductor branches on the outside system where such branches connect with the house drain or are less than 3 feet from the wall of the building, shall be tested by the water or air test. Conductor branches on the outside system may be tested in connection with the house drain.

Section 13.14.12. Stable and Stable Yard Drain Test. If a stable or any part of a stable be used for human habitation, the same inspections and tests of plumbing and drainage systems thereof shall be made as in the case of an ordinary dwelling. Otherwise, all stable and stable yard drains shall be inspected, but need not be tested.

Section 13.14.13. Garage and Drainage System. For a garage or any part of a garage the same tests and inspection of the plumbing and drainage system thereof shall be made as in the case of an ordinary dwelling.

Section 13.14.14. Test of Water-Distribution System. Upon the completion of the entire water-distribution system it shall be tested and proved tight under a water pressure not less than the maximum working pressure under which it is to be used.

Section 13.14.15. Certificate of Approval. Upon the satisfactory completion and final test of the plumbing system a certificate of approval shall be issued by the proper administrative authority to the plumber to be delivered to the owner.

Section 13.14.16. Air Test of Defective Plumbing. The air test shall be used in testing the sanitary condition of the drainage or plumbing system of all buildings where there is reason to believe that it has become defective. In buildings condemned by the proper administrative authority because of insanitary conditions of the plumbing system the alterations in such system shall not be considered as repairs, but as new plumbing.

Section 13.14.17. Inspections and Tests Not Required. No test or inspections shall be required where a plumbing system or part thereof is set up for exhibition purposes and is not used for toilet purposes and not directly connected to a sewerage system; nor after the repairing or replacing of an old fixture, faucet, or valve by a new one (to be used for the same purpose); nor after forcing out stoppages and repairing leaks.

CHAPTER XIV.

Heating and Mechanical Ventilation

Except as may be otherwise provided by rules promulgated by the Building Code Council, the Heating and Mechanical Ventilation system of a building or structure shall be installed in conformity with the "Code of Minimum Requirements for the Heating and Ventilation of Buildings," as amended from time to time, of the American Society of Heating and Ventilating Engineers.

CHAPTER XV.

Electrical Control

Except as may be otherwise provided by rules promulgated by the Building Code Council, the electrical systems of a building or structure shall be installed in conformity with the "National Electrical Code," as approved by the American Standards Association.

The electric wiring of houses or buildings for lighting or for other purposes shall conform to the regulations prescribed by the organization known as National Board of Fire Underwriters.

In order to protect the property of citizens from the dangers incident to defective electric wiring of buildings, it shall be unlawful for any firm or corporation to allow any electric current for the purpose of illuminating any building belonging to any person, firm, or corporation to be turned on without first having had an inspection made of the wiring by the building inspector and having received from the inspector a certificate approving the wiring of such building. It shall be unlawful for any person, firm, or corporation engaged in the business of selling electricity to furnish any electric current for use for illuminating purposes in any building or buildings of any person, firm, or corporation, unless the said building or buildings have been first inspected by the inspector of buildings and a certificate given as above provided. The fee that shall be allowed said inspector of buildings for the work of such inspector of electrical wiring shall be one dollar for each building inspected, to be paid by the person applying for the inspection.

CHAPTER XVI.

Fire Extinguishing Equipment

Section 16.0. GENERAL.

Section 16.1. Installation. Except as otherwise specifically provided by law, ordinance or duly authorized rule, buildings shall be equipped with fire extinguishing appliances conforming to the provisions of this chapter.

Section 16.11. Construction. Fire extinguishing equipments installed in accordance with the regulations of the National Board of Fire Underwriters shall be deemed to conform to the provisions of this chapter unless inconsistent therewith.

Section 16.12. Appliances. Appliances, fittings, and devices bearing the label of Underwriter's Laboratories, Inc., or listed in "List of Inspected Fire Protection Appliances," as amended from time to time, issued by Underwriters' Laboratories, Inc., shall be deemed to be approved and shall be accepted as conforming to the requirements of this chapter.

Section 16.2. STANDPIPES.

Section 16.21. When Required. All business buildings, schools, hospitals, prisons, and like structures which are not already provided with a 4-inch or larger standpipe shall have standpipes provided as follows:

(a) Buildings exceeding fifty-five feet in height shall have standpipes not less than four inches in diameter.

(b) Buildings exceeding seventy-five feet in height shall have standpipes not less than six inches in diameter.

Section 16.22. Number. The number of standpipes shall be such that all parts of every floor area can be reached within thirty feet by a nozzle attached to one hundred feet of hose connected to a standpipe.

Section 16.23. Location. Standpipes shall be so located that they are protected against mechanical and fire damage, with outlets within stairway enclosures; provided that in buildings heretofore erected in which the stairways are not enclosed, the standpipe outlets shall be located as near the stairway as possible or they shall be outside or immediately inside of the exterior walls, within one foot of a fire tower, exterior stairway, or fire escape.

Section 16.24. Construction.

(a) Standpipes shall be constructed of wrought iron or steel, and shall be designed to withstand a working pressure of not less than one hundred pounds per square inch in excess of the static· head of water due to the height of the standpipe.

(b) Standpipes shall extend from the lowest story, including basement of the building, through the roof; provided that standpipes serving parts of buildings that are not of the full height of the building, need extend only to the top story of that part.

(c) When more than one standpipe is required in a building, they shall be connected at their bases by pipes of a size equal to that of the largest standpipe, to permit water from any source to supply all the standpipes.

(d) Where the water supply is furnished by a gravity tank or a pressure tank located in the building at or above the topmost outlet, a check valve shall be provided below the tank and a stop valve between the check valve and the tank.

(e) Standpipes shall be equipped in every story, including basement and roof, with hose connections of the same standards used by nearest fire department and valves located not more than five feet above the floor level.

(f) Sufficient stop valves or check valves shall be provided to permit cutting off any standpipe riser without interrupting the supply to other risers from some source of supply. Stop valves which are located above the ground floor and which must be closed to permit contin1led use of one standpipe in case of failure of another, shall be arranged to permit operation from the ground floor or from the pump room.

(g) Only approved fittings, connections, and valves shall be used in the construction of standpipes.

Section 16.25. Fire Department Connection.

(a) Standpipes shall be equipped with approved outside Siamese connections, having check valves in each inlet. The pipe from the standpipe to the Siamese connection shall be at least four inches in diameter.

(b) There shall be at least one Siamese connection to each standpipe riser.

(c) Siamese connections shall be placed not less than eighteen inches nor more than thirty-six inches above the level of the adjoining ground or sidewalk.

(d) The thread of such connections shall be uniform with that used by the fire department of the municipality. Substantial caps to protect the threads shall be provided on each connection.

(e) Each such connection shall be suitably marked with raised letters reading "To Standpipe."

(f) Just inside of the building in a horizontal section of the standpipe connection, an approved straightway check valve shall be placed, with an automatic drip connection valve between the check valve and the exterior Siamese connection to prevent freezing.

Section 16.26. Water Supply.

(a) Standpipes shall be supplied under full pressure from an adequate water supply or the water supply shall be furnished automatically by the opening of a hose outlet or by the operation of suitably located thermostats; except in churches, and other buildings having floor areas of less than twenty-five hundred square feet in which not less than one approved 2½-gallon chemical extinguisher is provided for each floor area; and except in sprinklered building in which 11/z-inch hose is connected to the sprinkler risers in each floor area; and except in buildings which, because of occupancy or type of construction, do not, in the opinion of the chief of the fire department, require such constant and automatic water supply.

(b) When a tank which supplies a standpipe is also used for ordinary house supply and is located at the required height, the inlet to the house supply pipe shall be placed at a height above the bottom of the tank to reserve for fire purposes not less than the quantity of water specified for such purposes.

(c) When the normal pressure on an outlet exceeds fifty pounds per square inch, an approved adjustable reducer or regulator, set to maintain a pressure of approximately fifty pounds per square inch on the discharge side with a flow of two hundred gallons per minute through the hose and nozzle, shall be provided.

Section 16.27. Tests.

(a) Upon the completion of a standpipe installation and at least every two years thereafter, every standpipe shall be tested in the presence of a representative of the fire department assigned to witness such test.

(b) Such test shall consist of a static pressure test, with all outlets closed, equivalent to the designed pressure due to the height of the standpipe. Flow tests shall also be made to prove that the standpipe, line valves, check valves, and Siamese connections are free from obstructions and are workable, and the fire pump is in good condition.

Section 16.28. Maintenance for Use.

(a) In buildings hereafter erected required standpipes shall be installed as the construction progresses, in such a way that they are available for use by the fire department to the topmost floor that has been constructed.

(b) After the completion of a building hereafter erected and in buildings heretofore erected, standpipes and any pumps, tanks, and other equipment as a part of the standpipe system, shall be maintained in readiness for use at all times.

Section 16.3. AMUSEMENT PARK PROTECTION.

Within the grounds of every amusement park, fire hydrants, uniformly distributed, connected by a system of pipes to an adequate water supply, with sufficient hose, properly housed, to reach into each building, shall be installed. All equipment shall be designed to fit fire department equipment.

GENERAL INDEX

(Except Plumbing Code, Chapter XIII)

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