

City of Cambridge
Massachusetts

ZONING LAW
AND
BUILDING CODE

GOVERNING
THE CONSTRUCTION, ALTERATION, RE-
MOVAL, EQUIPMENT, OCCUPATION, AND
TEARING DOWN OF BUILDINGS, STRUC-
TURES OR OBSERVATION STANDS AND
FOR THE PLUMBING AND GAS FITTING
THEREIN, AND FOR THE SETTING AND
MAINTENANCE OF STEAM BOILERS AND
FURNACES, AND THE INSTALLATION
AND ALTERATION OF ELEVATORS



1924

MAIN FEATURES OF ZONING ORDINANCE

The zoning ordinance, with certain precise exceptions designed to prevent hardship or unreasonable severity, protects specific districts of the city from unsuitable new buildings or uses. No existing uses are stopped but any changes must be towards conformity. It will be enforced as part of the Building Code. Amendments may be made by the Council, but in case of protest will require a three-fourths vote. Further relief is provided by Chapter 133, Acts of the Year 1924, which is as follows:

[CHAP. 133.]

AN ACT RELATIVE TO APPEALS UNDER ORDINANCES OR BY-LAWS
LIMITING BUILDINGS TO SPECIFIED ZONES OR DISTRICTS.

Be it enacted, etc., as follows:

Chapter forty of the General Laws is hereby amended by inserting after section twenty-seven the following new section:—
Section 27 A. A board of appeals designated or appointed under the preceding section may vary the application of any by-law or ordinance adopted under section twenty-five in specific cases wherein its enforcement would involve practical difficulty or unnecessary hardship and wherein desirable relief may be granted without substantially derogating from the intent and purpose of such by-law or ordinance, but not otherwise. No such variance shall be authorized except by the unanimous decision of the entire membership of the board, rendered upon a written petition addressed to the board and after a public hearing thereon, of which notice shall be mailed to the petitioner and to the owners of all property deemed by the board to be affected thereby as they appear on the most recent local tax list and also advertised in a newspaper published in the city or town. The board shall cause to be made a detailed record of all its proceedings relative to such petition, which record shall set forth the reasons for its decision, the vote of each member participating therein, and the absence of a mem-

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ber or his failure to vote. Such record, immediately following the board's final decision, shall be filed in the office of the city or town clerk and shall be open to public inspection, and notice of such decision shall be mailed forthwith to each party in interest as aforesaid. Any person aggrieved by a decision of the board of appeals, whether previously a party to the proceeding or not, or any municipal officer or board, may, within fifteen days after the entry of such decision, bring a petition in the supreme judicial court for a writ of certiorari to correct errors of law therein, and the provisions of section four of chapter two hundred and forty-nine shall, except as herein provided, apply to said petition. No costs shall be allowed against the board unless the court finds that it acted with gross negligence or in bad faith. *Approved March 24, 1924.*
Effective June 24, 1924.

UNREST

KEY TO ZONE MAP

District

✓	U-1	No change:— All uses now permitted, Buildings to height now permitted (100'), and covering as much of the lot.
		Permitted
		Prohibited
		None.
✓	U-2	All uses now permitted, 6 story or 80' buildings. No change in sizes of open spaces.
		Permitted
		Prohibited
		No uses prohibited. Buildings of 7 or more stories or over 80'.
		Permitted
	U-3	All uses now permitted, 6 story or 80' buildings, except within 100' of a B or R district.
		Prohibited
		No uses prohibited. Buildings of 7 or 8 stories, or over 80', and within 100' of a B or R district buildings of 5 or more stories or over 60'. Yards and courts where provided must be somewhat larger than at present.
		Permitted
	U-4	All uses now permitted. 2½ story or 40' buildings.
		Prohibited
		No uses prohibited. Buildings of 3 or more stories or over 40'. Yards must be considerably larger than at present.
✓	B-1	Residence, business, light and other non-noxious industries and similar uses. Buildings to height now permitted (100'), and covering as much of the lot.
		Permitted
		Prohibited
		Industries emitting noxious odors, dust, smoke, gas or noise.

District

Permitted

- ✓ B-2 Residence, business, light and other non-noxious industries and similar uses. 6 story or 80' buildings. No change in sizes of open spaces.

Prohibited

Industries emitting noxious odors, dust, smoke, gas or noise.

Buildings of 7 or more stories or over 80'.

Permitted

- ✓ B-3 Residence, business, light manufacturing chiefly for sale at retail and similar uses supplying of local needs. 4 story or 60' buildings (on large plots building may if set back 100' from every lot line have 6 stories and be 80' high.)

Prohibited

Heavy and general industry.

Buildings of 5 stories or more or over 60' high.

Yards and courts where provided must be somewhat larger than at present.

Permitted

- B-4 Residence, business, light manufacturing chiefly for sale at retail and similar uses supplying local needs. 2½ story or 40' buildings.

Prohibited

Heavy and general industry.

Buildings of 3 stories or more or over 40' high.

Yards must be provided and must be considerably larger than at present.

Permitted

- ✓ R-1 Dwellings, hotels, clubs, churches, schools, philanthropic institutions, greenhouses and gardening, with customary incidental accessory uses including garage for not more than two cars. Buildings to height now permitted (100'), and covering as much of lot.

Prohibited

Business and industry of all sorts.

District

RES

Permitted

- ✓ R-2 Dwellings, hotels, clubs, churches, schools, philanthropic institutions, greenhouses and gardening, with customary incidental accessory uses including garage for not more than two cars. 6 story or 80' buildings. No change in sizes of open spaces.

Prohibited

Business and industry of all sorts.

Buildings of 7 or more stories or over 80'.

Permitted

- ✓ R-3 Dwellings, hotels, clubs, churches, schools, philanthropic institutions, greenhouses and gardening, with customary incidental accessory uses including garage for not more than two cars. 4 story or 60' buildings (on large plots buildings other than apartment houses may if set back 100' from every lot line have 6 stories or be 80' high).

Prohibited

Business and industry of all sorts.

Buildings of 5 or more stories or over 60' high.

Yards and courts where provided must be somewhat larger than at present.

Buildings must be set back 5' and be at least 25' from the center of any street.

Permitted

- R-4 Private and two-family dwellings, clubs, churches, schools, greenhouses, and gardening, with customary incidental accessory uses including garage for not more than two cars. 2½ story or 40' buildings, 3 story private dwellings.

Prohibited

Business and industry of all sorts.

Car barns, amusement parks, hospitals, hotels and multiple dwellings.

Buildings of 3 or more stories and over 40' high (except 3 story private dwellings).

Yards must be provided and must be considerably larger than at present.

Buildings must be set back 10' and be at least 30' from the center of any street.

CITY OF CAMBRIDGE

In the year One Thousand Nine Hundred and
Twenty-three

AN ORDINANCE

entitled "Construction, Use, Maintenance and In-
spection of Buildings."

DIVISION 1.—ADMINISTRATION.

Section 1. The provisions of this ordinance shall apply to the construction, alteration, removal, equipment, occupation, height, area, location and maintenance of all buildings as hereinafter set forth in the City of Cambridge but not to existing buildings when specifically treated, nor to bridges, quays, wharves, railway stations, buildings on land ceded to the United States, buildings owned or occupied by the Commonwealth or Middlesex County, portable school buildings erected and maintained by the city, nor to voting booths.

In interpreting and applying the provisions of this ordinance, they shall be held to be the minimum requirements adopted for the promotion of the health, safety, convenience and welfare of the inhabitants. This ordinance shall not repeal, abrogate, annul or in any way impair or interfere with any existing provision of law or ordinance other than an ordinance entitled "Construction, Maintenance and Inspection of Buildings" which is hereby repealed, or with any rules, regulations or permits previously adopted or issued or which shall be adopted or issued pursuant to law relating to the use of buildings or premises; nor shall this ordinance interfere with or abrogate or annul any easements, covenants or other agreements between parties; provided, however, that where this ordinance imposes

a greater restriction upon the use of buildings or premises or upon height of buildings or requires larger yards, courts, or other open spaces than is imposed or required by such existing provision of law or ordinance, or by such rules, regulations or permits or by such easements, covenants or agreements, the provisions of this ordinance shall control.

Section 2. There shall be a Building Department, hereinafter designated as the Department, under the charge of a Superintendent of Public Buildings, hereinafter designated as the Superintendent, who shall also be the Inspector of Buildings. The Superintendent shall be qualified by thorough training and experience in the supervision or execution of building operations. He shall be appointed by the mayor, subject to confirmation by the city council, and he shall receive such salary as shall be fixed by ordinance.

He shall enforce the provisions of this ordinance. He, except as otherwise provided by law, under the provisions of this ordinance, shall have sole charge of all buildings. He shall have the care of all public buildings not wholly in the charge of some board or department. He shall have charge of the construction of all buildings erected by the City of Cambridge or any department thereof. He shall submit yearly to the mayor a report of the doings of the Department.

The present officers and employees of the Department shall hold their several offices and positions during their term or office or until removed or discharged.

Under civil service rules, he shall appoint a deputy superintendent, a clerk, inspectors, and employees. No person shall be appointed an inspector of

construction who has not had at least five years' experience as a builder, architect, superintendent, foreman, or competent mechanic in charge of building construction.

The Deputy Superintendent shall, during the absence or disability of the Superintendent, exercise all his powers. In case the superintendent fails to appoint such deputy superintendent, the mayor may designate an employee of the Department as such deputy. No officers connected with the Department, except members of the Board of Appeal, shall engage or be interested in any other business or in the making of the plans or specifications, or in the doing of the work, or the purchase of the materials used in connection with any building for which a permit has been requested or granted by the Department, except as an owner of the building.

Under the direction of the Superintendent the clerk of the Department shall keep a record of its doings which shall be open to the public for inspection. The Superintendent may require plans and specifications of any proposed structure or for the alteration of any structure or building to be filed with him, duplicates of which, when approved by him, shall be kept at the building during the progress of the work.

If the Superintendent finds that the terms of a permit are being violated, he may, after notice mailed to the person to whom the permit was issued, order the whole or any part of the work which is being done under the permit to be stopped, and such work shall not be resumed until the terms of the permit have been complied with to the satisfaction of the Superintendent.

The Superintendent shall have power to determine any requirement to be necessary for the

strength or stability of any proposed structure or the safety of the occupants thereof even if not specifically covered by this ordinance.

Methods of construction or maintenance equivalent to those required by the provisions of this ordinance may be allowed with the written consent of the Superintendent and the Board of Appeal. A record of the required and equivalent method allowed shall be kept in the office of the Superintendent.

The Superintendent shall cause to be examined as often as is practicable every building in the course of construction or alteration, any building reported as dangerous or damaged, and all buildings in respect to which applications have been made for permits to raise, enlarge, alter, or repair, and shall make a record of every such examination.

Section 3. There shall be a board to be called the Board of Appeal, which shall be appointed by the mayor, subject to confirmation by the city council, and consisting of three members, including always one architect, and one master builder.

In the month of February of each year the mayor shall appoint one member of said board, who shall hold office for a term of 3 years from the first day of March following.

The present members of the Board of Appeal shall hold their positions during their respective terms of office unless removed according to law.

The mayor shall likewise, subject to confirmation, as aforesaid, fill all vacancies in said board caused by death, resignation, or removal, for any unexpired term.

Members of said board shall hold office until their successors shall have been appointed and shall have qualified.

No member of said board shall sit on a case in which he is interested, and in case of such disqualification, or of the necessary absence of any member, the other two members shall appoint a substitute. If two or more members are so disqualified or absent, the mayor may appoint substitutes to act during disqualification or absence.

The clerk of the Department shall act as clerk of said board. The members shall serve without pay but the reasonable expenses of said board, including such clerical assistance and office expenses as shall be approved by the mayor, shall be paid.

Section 4. An applicant for a permit whose application has been refused by the Superintendent may appeal therefrom within 90 days. A person may appeal from any other decision of the Superintendent within 10 days after being notified of such decision by giving the Superintendent notice in writing of his appeal. Said notice or a certified copy thereof shall be at once transmitted by the Superintendent to the Board of Appeal.

Section 5. After notice to the appealing party, to the Superintendent, and to such other parties as the board shall order, a hearing shall be had, and said board shall affirm, annul or modify said refusal.

The board may vary the provisions of this ordinance in specific cases in regard to existing buildings where such provisions or a requirement of the Superintendent would cause manifest injustice.

Every decision of said board shall be in writing, shall require the assent of two members, except as otherwise provided herein, and shall be filed in the office of the Superintendent within 10 days after the hearing. A certified copy shall be sent by mail or otherwise to the applicant, and a copy publicly posted in the office of the Superintendent for two

weeks thereafter. If the order or the refusal of the Superintendent is affirmed, such order or refusal shall have full force and effect. If said order or refusal is modified or annulled, the Superintendent shall issue a permit in accordance therewith.

The provisions of this section shall also apply to any similar action or order of the City Electrician.

It shall be the duty of the Board of Appeal to submit to the mayor on or before the first of December of each year a report giving a summary of all decisions of the board, together with such recommendations of revisions of this ordinance as may seem advisable to them.

Section 6. (See also Board of Health regulations for additional permits required for stables and rendering works, Department of Public Safety regulations for additional permits required for certain boilers, and for additional permits required for garages). The Superintendent shall grant permits for the construction, alteration, removal, equipment, occupation, or tearing down of buildings, structures, or observation stands, and for the plumbing and gas-fitting therein, and for the setting and maintenance of steam boilers and furnaces and the installation and alteration of elevators. No such work shall be started without such a permit nor shall be done except in accordance with drawings bearing the approval of the Superintendent.

All applications for permits under the provisions of this ordinance shall be in writing, on forms furnished by the Superintendent, and shall include a plan at suitable scale, showing the location of the proposed buildings upon the lot. Every application shall state the name and address of the owner. The Superintendent may require the material facts set forth in the application to be verified by the

oath of the applicant; he may also require in his discretion, a survey of a lot on which any proposed building is to be erected to be filed with the application.

No building shall be used for a grain elevator or chemical works, and no boiler, engine, dynamo, furnace, or machinery for generation, transmission, or application of power except for domestic purposes shall be placed in any building without a special permit from the Superintendent covering such installation; provided, however, that the provisions of this paragraph shall not apply to installations for power or heating for dwellings, nor to installations of machinery for heating, ventilating, and elevator purposes, nor to the plants of the city of Cambridge, the Cambridge Electric Light Company, the Cambridge Gas Light Company, and the Boston Elevated Railway Company, nor to extensions or additions to existing plants or installations unless such extensions or additions shall, in the opinion of the Superintendent, be of a nature to become a nuisance or to injure the character of the neighborhood.

Every application for such permit shall be in writing in such form as the Superintendent may require. The applicant shall publish in at least two newspapers published in the City of Cambridge and shall also post conspicuously on the premises a copy of the application and shall deliver personally or by mail, postage prepaid, copies thereof to all the neighbors within a distance of 100 ft. from the property lines of the lot upon which the installation is proposed, and to such other persons as the Superintendent shall designate.

If no objection is filed with the Superintendent before the expiration of 10 days after the first application of the notice or within 10 days of the delivery or mailing and first posting of such notice if required, the

Superintendent shall, if the arrangement, location, construction, and character of the proposed apparatus is proper; suitable to the neighborhood, and in accordance with the provisions of this ordinance, issue a permit for the same. If the objection is filed by anyone within the time above mentioned, the application shall be referred to the Board of Appeal. After such notice as the board shall order, it shall hear the same and shall direct the Superintendent to issue a permit under such conditions as it may prescribe, or withhold the issuance of permit at its discretion.

No wall or ceiling of any building shall be lathed or otherwise covered until the Superintendent has been notified that the building is ready for such work and he has issued a permit therefor. The Superintendent shall act upon such permit within two days of its receipt.

Any permit under which no work is commenced within six months from the time of issuance shall expire by limitations.

Section 7. There shall be charged for all permits issued by the Superintendent the following fees:

Permits shall be kept posted in a conspicuous place on the building.

First-class buildings	\$15.00
Second-class buildings	10.00
Third-class buildings	5.00
Alterations and additions to cost less than \$300 ..	1.00
Alterations and additions to cost \$300 or more ..	3.00
Taking down buildings	3.00
Boilers, engines, etc.	1.00
New plumbing	3.00
Alterations in plumbing	1.00
New gas fitting	1.00
Alterations in gas fitting	0.25
Installation of elevators	3.00

Fees for permits for sheds, private garages, and like small buildings, and for preliminary permits for driving piles and for concrete foundations shall be determined in the discretion of the Superintendent, but not to exceed \$5.00.

Section 8. Any notice required by this ordinance shall be sufficient if mailed postage prepaid to the address of the interested party or parties given in the application filed by them or subsequently changed by notice in writing to the Superintendent.

Handwritten note: All 1930 (p. 1, 10, 11)

DIVISION 2.—DEFINITIONS.

(See also definitions in Division 26.)

Section 9. Certain words in this ordinance are defined for the purposes thereof as follows:

Alcove.—A portion of an apartment separated from an adjoining room by a partition, with an opening between the two of 60% to 80% of the area of the separating partition and with no door to close such opening. If the opening is less than 60%, or if it is closed by a door or doors, the portion thus enclosed shall be considered as a separate room, if more than 80%, the portion thus enclosed shall be considered as a part of the room.

Alteration.—Any change in the arrangement of a building, or any work affecting the structural parts of a building, or any change in walls, floors, partitions or means of exit affecting the fire resistance or the safety of persons in the building.

Apartment.—A room, or suite of two or more rooms, occupied as a residence for one family.

Approved.—Where not otherwise specifically stated, the word "approved" means approved by the Superintendent.

Ashlar.—A masonry wall facing backed by masonry.

Basement.—A story or portion of a story partly underground but having at least one half of its clear height above the highest level of the adjoining ground. (See also definition of first story.)

Bearing Wall or Bearing Partition.—One carrying a load other than its own weight.

Block Stone Walls.—Walls built of stone split into approximately rectangular blocks so as to form continuous beds substantially horizontal.

Cellar.—A story or portion of a story having more than one-half of its clear height below the highest level of the adjoining ground.

Court.—An open unoccupied space, other than a yard, on the same lot with a dwelling.

An "outer court" is one extending to a street or yard.

An "inner court" is one not extending to a street or yard.

Curb Level.—The level of the established curb in front of a building measured at the middle of such front. Where no curb has been established, the city engineer shall establish such curb level or its equivalent for the purposes of this ordinance.

Dwelling.—A house or building or portion thereof which is occupied by one or more families doing their cooking on the premises.

Private Dwelling.—A dwelling occupied by one family only.

Two-family dwelling.—A dwelling occupied by two families only, one living above the other.

Multiple-dwelling.—A dwelling occupied by more than two families.

Existing.—Existing at the date of the passage of this ordinance.

Family.—A group of persons living together, whether related to each other by birth or not, and may consist of one or more persons.

First, Second and Third-class Construction.—See classification in Division 7.

First Story.—In all buildings of class 1 (residence buildings) the first story shall be the lowest habitable story.

In all buildings of class 2 (public buildings) the first story shall be the story with its level not more than 10 ft., and in all buildings of class 3 (business buildings) not more than 6 ft. above the curb level, or the level of the adjoining ground when the street line is more than 20 feet distant.

Foundation.—That part of a wall below the level of the curb, or, if a wall is not on a street, that part of the wall below the level of the highest ground next to the wall, or, if so construed by the Superintendent, that part of a party, fire or bearing wall below the cellar floor, or below the basement floor where there is no cellar.

Habitable Story.—Includes basements if occupied by one or more families, except those in multiple dwellings occupied solely by the janitor and his family.

Half-story.—Any story which is under a sloping roof, which has the point of intersection of the tops of the rafters and the face of the wall less than 3 ft. above the floor level and which does not contain an independent apartment.

Height of a Building.—The vertical distance of the highest point of the roof above the mean grade of the curbs of all the streets upon which it abuts, or, if it does not abut on a street, above the mean grade of the ground adjoining the building.

Incombustible.—Sufficiently fire-retarding or fire-resisting for its purpose as shall be determined by the Superintendent.

Lot.—The plot of ground covered by and adjacent to a building and devoted exclusively to the purposes of such building, as shown by the plan furnished to the Superintendent in pursuance of Sec. 6 of this ordinance.

A "corner lot" is a lot situated at the junction of two streets, or of a street and passageway; provided that such street or passageway is at least 20 ft. wide or where a street changes direction, provided that at such junction or change of direction the interior angle is less than 120 degrees. Any portion of a corner lot distance more than 75 ft. from the corner shall be sub-

ject to all the provisions of this ordinance respecting interior lots.

An "interior lot" is any lot other than a corner lot.

The "front of a lot" is that boundary line which borders on the street. In the case of a corner lot the owner may elect by statement on his plans either street boundary line as the front.

The "rear of a lot" is the side opposite the front. In the case of a corner lot with streets on three sides, or of a triangular or irregular shaped lot abutting on a corner, the rear shall be a side not bordering on a street.

The "depth of a lot" is the dimension measured from a front of the lot to the extreme rear line of the lot. In the case of irregularly shaped lots the mean depth shall be taken.

Non-bearing Wall or Non-bearing Partition.—One carrying no load except its own weight.

Occupied.—Where the word "occupied" is used it shall be construed as if followed by the words "or is intended, arranged, designed, built, altered, converted, rented, or leased to be occupied."

Party Wall.—A masonry wall that separates two or more buildings and is used or adapted for the use of more than one building.

Public Corridor.—A hall, corridor or passageway in a multiple-dwelling but not within an apartment.

Repairs.—The renewal of such superficial parts of a building as are injured by ordinary wear and tear or by weather. Special provisions made elsewhere in this ordinance may further define this definition.

Rubble Walls.—Walls built of irregular stone.

Shaft.—A shaft, whether for air, light, elevator, dumb-waiter or any other purpose, is an enclosed space within a building, extending through more than one floor.

Stair Hall.—A hall which includes the stairs, stair landings, and those portions of the building through which it is necessary to pass in going from the entrance floor to the top.

Story.—That part of a building between any floor and the floor or roof next above.

Theatre.—See Department of Public Safety regulations for definition.

Thickness of Wall.—The minimum thickness.

Used.—Where the word "used" is used it shall be construed as if followed by the words "or is intended, arranged, designed, built, altered, converted, rented, or leased to be used."

Yard.—An open unoccupied space on the same lot with a building.

A "front yard" is a yard between the front line of the building and the front line of the lot.

A "rear yard" is a yard between the extreme rear line of the building and the rear line of the lot.

The depth of such yard shall be measured at right angles to the rear line of the lot. Where the rear of the lot abuts on a street, a public alley, or a right of way dedicated to public use for the full width of the lot, the depth of the lot may be measured to the middle of such street, alley, or right of way.

A "side yard" is a yard between the side line of the building and the side line of the lot and extending from the street or front yard to the rear yard.

DIVISION 3.—CLASSIFICATION BY USE.

Section 10. For the purposes of this ordinance all buildings shall be classified according to occupancy, as residence buildings, public buildings and business buildings.

Residence Buildings

- A. Private dwellings, two-family dwellings; club and boarding houses with less than 5 sleeping rooms above the second story and not over 2½ stories high.
- B. Multiple-dwellings.
- C. Lodging houses, dormitories, convents.
- D. Hotels, club and boarding houses other than A.

Public Buildings

- A. Hospitals, asylums, nurseries, detention buildings.
- B. Libraries, museums, court houses, city halls, fire and police stations, railroad passenger stations.
- C. Schoolhouses, college class-room buildings.
- D. Churches.
- E. Buildings having an assembly hall or lodge rooms; amusement halls, exhibition buildings.
- F. Theatres, moving-picture houses, opera houses, music halls.

Business Buildings

- A. Office buildings.
- B. Stores, restaurants.
- C. Storage buildings and manufacturing buildings not used for any purposes listed under D.
- D. Buildings used for any of the following trades, industries or uses:—
 - Ammonia, chlorine or bleaching powder manufacture.
 - Arsenals.
 - Asphalt manufacture or refining.
 - Assaying (other than gold or silver).
 - Blacksmithing or horseshoeing.

Boiler making.
 Brewing or distilling of liquors or spirits.
 Brick, concrete products, terra cotta or tile manufacture.
 Carpet or bag cleaning.
 Celluloid manufacture or treatment.
 Cold storage.
 Contractors' yards.
 Crematory other than a crematory located in a cemetery.
 Disinfectant or insecticide manufacture.
 Distillation of coal, wood or bones.
 Drop forging.
 Dyeing or dry cleaning at wholesale.
 Dyestuffs manufacture.
 Explosive manufacture or storage.
 Fat rendering.
 Fertilizer manufacture.
 Flour and grain milling.
 Gas (illuminating or heating) manufacture or storage, in excess of 1,000 cubic feet.
 Glue, size or gelatine manufacture.
 Ice manufacture.
 Incineration or reduction of garbage, offal, dead animals or refuse.
 Junk, scrap iron, scrap paper or rag storage or baling.
 Lamp black manufacture.
 Leather and leather goods manufacture.
 Lime, cement or plaster of Paris manufacture.
 Lumber storage except as incidental to the manufacture on the premises of furniture, boxes or other wooden products.
 Milk bottling or distribution station.
 Oil cloth or linoleum manufacture.
 Paint, oil, varnish or turpentine manufacture.

Petroleum refining or storage in excess of 1,000 gallons.
 Printing ink manufacture.
 Pyroxylin manufacture or articles therefrom.
 Raw hides or skins—storage, curing or tanning.
 Rubber manufacture from the crude material.
 Saw or planing mill except as incidental to the manufacture on the premises of furniture, boxes or other wooden products.
 Shoddy manufacture or wool scouring.
 Slaughtering of animals or fowls.
 Smelting of iron.
 Soap manufacture.
 Starch, glucose or dextrine manufacture.
 Stock yards.
 Stone crushing.
 Stone or monumental works.
 Structural steel.
 Sugar refining.
 Sulphurous, sulphuric, nitric, or hydrochloric acid manufacture.
 Tallow, grease or lard manufacture or refining.
 Tar distillation or manufacture.
 Tar roofing or tar waterproofing manufacture.
 Textiles manufacture.
 E. Car barns, foundries, light and power plants and other buildings not classified herein.
 F. Amusement parks, armories, baseball parks, bath houses, grand stands, greenhouses, ice houses.
 G. Stables.
 H. Garages. (See also Department of Public Safety regulations.)
Section 11. Each building or part of a building shall be constructed and maintained as herein provided, according to its use; provided, however, that if in the opinion of the Superintendent, the requirements for a

part of a building conflict with the requirement of any other part of the same building, the best and safest requirement shall apply to the whole building, subject, however, to the following other provisions:

When parts of a residence building are of class B, C, or D, and other part or parts are used for public or business purposes, such other part or parts shall be separated from the residence portion at least by metal lath and plaster ceiling and partitions nogged full height with brick or solid gypsum blocks laid in mortar, with cinder or stone concrete or with mineral wool and metal lathed and cement plastered on the side used for public or business purposes. No openings shall be allowed in such ceiling or partitions.

For any business buildings of class E or F the Superintendent may require construction, equipment, and maintenance giving protection and safety equivalent to that obtained by the requirements for other buildings in the same building district.

Section 12. For the purpose of regulating and restricting the location of trades and industries and the location of buildings designed for specified uses, the City of Cambridge is hereby divided into three classes of use districts: Residence districts, business districts and unrestricted districts, as shown on the zone map which accompanies this ordinance and is hereby declared to be part hereof. The use districts designated on said map are hereby established. The use district designations and map designation rules which accompany said zone map are hereby declared to be part thereof. No building, structure or premises shall be erected or used for any purpose other than a purpose permitted in the use district in which such building or premises are located.

In a residence district no building shall be erected other than a building, with its usual accessories, ar-

ranged, intended or designed exclusively for one or more of the following classes of use, as defined in Section 10:—

(1) Residence Buildings A, B, C, D.

(2) Public Buildings (A), except detention buildings, B, C, D, and buildings accessory to Public Buildings D.

(3) Business Buildings F.

(4) Garages for not more than two motor vehicles and with no space for commercial trucks.

(5) College, University or Technical School Buildings and buildings accessory to them.

(6) Accessory Buildings not over one and one-half stories high on the same lot with any of the above Residences or Public Buildings; provided that, on a street occupied by street car tracks, between a business building of Class A or B, as defined in Section 10, and an intersecting street not more than 100 feet distant from such building or between two such business buildings of Class A or B not more than 100 feet apart, a business building of Class A or B not extending farther from the street occupied by street car tracks, nor higher than such building or either of them shall not be excluded.

In a residence district no building or premises shall be used for any use other than a use above specified, for which buildings may be erected and for the accessory uses customarily incident thereto unless heretofore so used. The term accessory use shall not include a business outside the building to which it is accessory or which occupies a total floor area in excess of 25% of the floor area of one story of such building, or which by reason of the appearance of the buildings or premises, or the emission of odor, smoke, dust or noise or in any other way is objectionable or detrimental to the residential character of the neighborhood or which

involves features in design not customary in buildings for the above uses or any structural alteration of the building.

Where any portion of a residence district lies within the boundaries of a Building District 4, as designated on the zoning map, no building in such portion of a residence district shall be used or erected which is arranged, intended or designed to be used for any one or more of the following classes of use as defined in Section 10:—

(1) Residence Buildings B, C, D, provided, however, that any building to be located between two residence buildings B, not more than 100 ft. apart measured along the street line and excluding from such measurement the width of any intersecting street, may be erected to a height of three stories.

(2) Public Buildings A.

(3) Business Buildings F, except Greenhouses.

In a business district no building or premises shall be used, and no building shall be erected which is arranged, intended, or designed to be used for any one or more of the following classes of use as defined in Section 10:—

Business Buildings D, E, except light or power plants of less than 5,000 K. W. hourly capacity.

In a business district no building or premises shall be used, and no building shall be erected which is arranged, intended or designed to be used for any trade, industry or use that is noxious or offensive by reason of the emission of odor, dust, smoke, gas or noise; but car barns or places of amusement shall not be excluded.

Where any portion of a business district lies within the boundaries of a building district 3 or 4 as defined in Section 16 no building in such portion of a business district shall be used or erected which is arranged, intended or designed to be used for any kind of manu-

facturing, other than the manufacture of products, the major portion of which are to be sold at retail on the premises by the manufacturer to the ultimate consumer.

No use permitted in a residence district by this section shall be excluded from a business district.

In an unrestricted district a building may be erected or used for any purpose in conformity with the provisions of this ordinance, and other existing ordinances and laws and regulations.

Section 13. In any building or premises any lawful use existing therein at the time of the passage of this ordinance may be continued therein, although not conforming to the regulations of the use district in which it is maintained, or such use may be changed or converted or extended throughout the buildings, *provided*, in either case, that no structural alterations, except as required by then existing laws and ordinances, are made therein and no new building is erected, and provided that in a residence or business district no building or premises unless now devoted to a use that is by Section 12 prohibited in a business district shall be converted to such use.

No existing building designed, arranged, intended or devoted to a use not permitted by this ordinance in the district in which such use is located shall be enlarged, extended, reconstructed or structurally altered unless such use is changed to a use permitted in the district in which such building is located, except that such building may be reconstructed or structurally altered to an extent not greater than 50 per cent of the value of the building, exclusive of foundations, for the purpose of continuing therein, without any extension thereof, a lawful use existing therein, at the time of the passage of this ordinance, and such use may be continued therein, although not conforming to the regulations of the use district in which it is maintained.

Section 14. The Board of Appeal may, in appropriate cases, after public notice and hearing, and subject to appropriate conditions and safeguards, determine and vary the application of the use district regulations herein established in harmony with their general purpose and intention where such provisions or a requirement of the Superintendent would cause manifest injustice as follows:—

(a) Permit the extension of an existing building and the existing use thereof upon the lot occupied by such building or upon contiguous land in the same ownership at the time of the passage of this ordinance or permit the erection of an additional building upon a lot occupied at the time of the passage of this ordinance by a commercial or industrial establishment and which additional building is a part of such establishment;

(b) Where a use district boundary line divides a lot in a single ownership at the time of the passage of this ordinance permit a use authorized on either portion of such lot to extend to the entire lot, but not more than 25 feet beyond the boundary line of the district in which such use is authorized;

(c) Permit the extension of an existing building into a more restricted district under such conditions as will safe-guard the character of the more restricted district;

(d) Permit the restoration, subject to other provisions of this ordinance, of a building partly or wholly destroyed by fire, explosion, act of God or act of the public enemy;

(e) Permit in a residence district a central telephone exchange or any building or use in keeping with the uses expressly enumerated in Section 12 as the purposes for which buildings or premises may be erected or used in a residence district.

Section 15. The Board of Appeal may permit in a residence district a garage for more than two motor vehicles and with space for commercial vehicles, but in no case with repair facilities, provided there are on file with the Board the written consents of the owners of seventy-five per cent of the area of the private property within five hundred feet of the center of the lot on which the garage is proposed to be erected, excluding such lot and excluding any property not abutting on the same street or alley, or one of them, and not within the same block bounded by public ways more than twenty-five feet wide.

DIVISION 4.—BUILDING DISTRICTS.

Section 16. For the purpose of this ordinance, the City of Cambridge is hereby divided into four classes of building districts, designated Building Districts 1, 2, 3 and 4 respectively, as shown on the zone map which accompanies this ordinance and is hereby declared to be part thereof. The building districts designated on said map are hereby established. The building district map designations and map designation rules which accompany said zone map are hereby declared to be part thereof. No building or part of a building shall be erected, and no existing building shall be altered, enlarged or rebuilt, except in conformity with the regulations herein prescribed for the district in which the building is located.

DIVISION 5.—BUILDING HEIGHTS.

Section 17. In building districts 1 no building or part thereof shall be erected to a height exceeding 2 times the width of the widest street on which the building stands measured from the face of any such part to the line of the street on the other side, nor exceeding 100 ft. in any case.

In building districts 2 no building or part thereof shall be erected to a height exceeding 2 times the width of the widest street on which the building stands, measured from the face of any such part to the line of the street on the other side, nor exceeding 6 stories or 80 feet in any case.

In building districts 3 no building or part thereof shall be erected to a height exceeding $1\frac{1}{2}$ times the width of the widest street on which the building stands, measured from the face of any such part to the line of the street on the other side, nor exceeding 4 stories or 60 feet in any case; *provided, however*, that a building not used in any part as a dwelling for more than one family and not within one hundred feet of any street or property line or, if within an unrestricted district as designated on the zone map, not within one hundred feet of a residence district or of the nearer side of a street adjacent to a residence district may be erected to a height permitted in building districts 2.

In building districts 4 no building or part thereof shall be erected to a height exceeding the width of the widest street on which the building stands, measured from the face of any such part to the line of the street on the other side, nor exceeding $2\frac{1}{2}$ stories or 40 feet in any case; *provided, however*, that any buildings to be located between two three-story buildings other than private dwellings and not more than 100 feet apart measured along the street line and excluding

from such measurement the width of any intervening street, may be erected to a height of three stories.

Section 18. On streets less than 20 feet wide the same height regulations shall be applied as on 20-foot streets.

The height upon a corner lot may be controlled by the widest street upon which the building abuts, but this height shall not extend along the narrower street more than twice the width of the narrower street.

When the width of a street opposite a building is variable, the mean width shall be used in the calculations.

All measurements shall be taken at right angles to the center line of the street.

Section 19. No part of any dwelling shall be built to a greater height than one habitable story for each 10 ft. in width of the street measured from the face of any such part to the line of the street on the other side, except that for existing accepted streets less than 40 ft. wide there may be one story for each 8 ft. of such width in Building Districts 1, 2 and 3 and *provided, further*, that a three-story dwelling may be erected on any existing accepted street 24 ft. or less wide in Building Districts 1, 2 and 3.

The provisions of this Division shall not apply to:

Parapets, pent houses and other roof structures as provided in Div. 22.

Towers, steeples, domes, statuary, cupolas, or bell-towers, not used for human occupancy.

Chimneys, gas holders, and coal or grain elevators.

Poles, masts with their rigging, weather vanes, vent pipes, steam exhausts, and similar parts.

DIVISION 6.—AREA REGULATIONS.

Section 20. Yards and courts shall be at every point open to the sky unobstructed by buildings or parts thereof, except for the following projections, which are permitted:—

Cornices, balconies, belt courses, window and door heads and sills projecting not more than 1/10th of the actual width of the court or yard measured to the opposite wall of a court or to the lot line, except that returns of wider cornices on front may be carried back 12 ft. into a court or yard.

Fire-escapes permitted or required by this ordinance.

First story steps, platforms and porches when no contiguous portions of the basement are occupied for habitation.

Section 21. All yards and courts shall be graded and drained in an approved manner, and, when required by the Superintendent, they shall be suitably paved as directed.

Section 22. No yard, court, or setback shall be deemed to satisfy the requirements of more than one building.

No building shall be built, moved, or altered so as to reduce any dimension herein required for yards or courts. If any lot is subdivided or changed in size so as to bring a new lot line nearer to a building than the minimum distance required for such building, then the building shall be moved or altered so as to conform to the requirements; otherwise it may be ordered vacated and removed or demolished as a nuisance as herein or elsewhere provided.

A yard or setback need not be of the same dimensions for the full height of the building; provided, that throughout the height of every story it fulfills the requirement for that story.

Section 23. In building districts 3 no part of a

building above the first floor, except one-story unenclosed porches and piazzas, shall be erected in a residence district designated on the zone map within 25 feet of the center line of any abutting street, nor within 5 feet of the line of any street; provided, that on no lot existing at the time of the passage of this ordinance shall either the width or length of the portion that may be built upon be reduced to less than 40 feet by this requirement and provided further that between existing buildings not more than 100 feet apart no building need by this requirement be erected further from the street line than the mean of their distances from such street line.

Section 24. In building districts 4, no part of a building above the first floor, except one-story unenclosed porches and piazzas, shall be erected within 30 feet of the center line of any street, nor, if in a residence district as designated on the zone map, within 10 feet of the line of any street; provided, that on no lot existing at the time of the passage of this ordinance shall either the width or length of the portion that may be built upon be reduced to less than 35 feet by this requirement; and provided, further, that between existing buildings not more than 100 feet apart no building need by the requirement be erected farther from the street line than the mean of their distances from such street line.

***Section 25.** Immediately behind every dwelling, in the rear of the lot, there shall be, except as otherwise provided, a yard extending across the entire width of the lot with every part accessible from every other part except that one garage for not more than two motor vehicles and with no space to be occupied as a domicile and with no space for commercial trucks may be built in said yard.

*Amended—May 23, 1924.

Section 26. In building districts 1, 2 and 3 the depth of rear yard behind a dwelling, for interior lots 80 or more feet in depth, shall be in accordance with the following table of minimum dimensions:—

Height of dwelling in habitable stories	Rear Yards	
	Districts 1 and 2	District 3
1.....	10.....	13
2.....	10.....	13
2½.....	10.....	13
3.....	12.....	15
4.....	14.....	17
5.....	16.....	
6.....	18.....	
7.....	20.....	
8.....	22.....	
9.....	24.....	
10.....	26.....	

In building district 4 no building other than an accessory building may be erected on lots 80 feet or more in depth so as to produce rear yards less than 20 feet in depth.

All dwellings on interior lots less than 80 ft. deep shall have rear yards not less than 1-80th of the depths given in the foregoing requirements for each foot in depth of the lot.

Section 27. The rear yard may be omitted when the lot upon which the dwelling is built is bounded on every side by a street, a cemetery, or a public park.

No yard shall be required behind a dwelling erected upon an interior lot less than 150 feet deep and running

alley or open passageway not less than 15 feet in width.

The depth of rear yard, for a corner lot, may be reduced to one-half the depth required for an interior lot for a length not exceeding 30 ft.

No yard shall be required behind a dwelling erected on a corner lot adjoining a lot less than 150 ft. deep and running through from street to street or from a street to an alley or open passageway not less than 15 ft. in width.

No yard shall be required behind a dwelling erected on a corner lot adjoining a lot 150 ft. or more in depth and running through from street to street or from a street to an alley or open passageway not less than 15 ft. in width; but if there be no yard an outer court upon such corner lot shall extend from the street, alley or open passageway along the line of such adjoining lot to the middle line of the block.

No yard shall be required behind a dwelling erected on a corner lot adjoining two or more lots any one of which bounds upon a single street, alley or open passageway not less than 15 ft. in width; but if there is no yard an outer court upon such corner lot shall extend from the street, alley or passageway along the line of such adjoining lot either to the extreme rear of the adjoining lot or to the extreme rear of said corner lot.

Whenever a dwelling is erected on a lot 150 ft. or more in depth and running through from street to street or from street to an alley, or open passageway there shall be left near the middle of the lot a yard extending across the entire width of the lot and not less than two times the depth required herein for a rear yard for the higher of the two buildings. The height of each building shall be fixed in relation to the street, alley, or open passageway which it faces.

If a dwelling is built behind or in front of another dwelling on the same lot there shall be left between the two buildings a yard extending across the full width of the lot and the distance between the two buildings shall not be less than two times the depth required herein for a rear yard for a building of the height of the higher of the two buildings. There shall be behind the rear dwelling a rear yard as herein required, and if this rear yard does not have access directly to a street, alley, or other public way, there shall be a passageway not less than 10 ft. wide leading from the yard between the two buildings directly to a street, alley, or other public way. The rear dwelling shall in no case be built to a greater height than is permitted for the front dwelling.

If the first story of a multiple-dwelling is used for business purposes, it may cover the whole area of the lot, and in such case the rear yard shall be maintained above the first story of the depth herein provided.

In the case of irregular shaped lots, the rear yards shall be so arranged as to be, in the opinion of the Superintendent, as nearly as possible equivalent in effect to the rear yards herein prescribed.

Where a block of dwellings is so arranged as to give, in the opinion of the Superintendent, an adequate distribution of light and air, the arrangement of yards may be varied from the requirements of this section; provided, however, that the width of the yard behind the whole block shall in no case be less than that required by this section.

Section 28. In building districts 1, 2 and 3 no side yard is required, but if any side yard is left between a dwelling and a lot line for the purpose of affording light and ventilation to rooms as required by this division, its width shall be in accordance with the following table of minimum dimensions:—

Side Yards

Height of building in habitable stories	Width of yard in ft.
1.....	5
2.....	5
2½.....	5
3.....	6
4.....	7
5.....	8
6.....	9
7.....	10
8.....	11
9.....	12
10.....	13

Provided, however, that side yards for 3-story multiple dwellings of third-class construction shall be not less than 7 feet wide, except that one bay window 12 feet or less in length may project on each side of such dwelling to not less than 5 feet from the side line.

In building districts 4 there shall be a side yard 7 feet wide on the same lot with every building, unless it occupies a street corner.

If the length of the building measured along the side yard is in excess of 50 ft., then the width of the side yard noted above shall be increased by 6 in. for every 10 ft. or portion thereof of such excess.

Section 29. Where a dwelling is erected by the side of but not contiguous to another building on the same lot there shall be left between the two buildings a space equal to the combined yards herein required for the two buildings.

A side yard space may begin at any level and its width shall be determined by the tables in this ordinance, according to the number of stories in the building above such level.

Section 30. An outer court may begin at any level, and the minimum dimensions shall be determined by the tables in this ordinance, according to the number of stories in the building above such level.

An outer court may be less than the minimum width allowed, provided, that its length be not greater than its width.

Where outer courts are irregular in shape, their dimensions shall be such as to provide, in the opinion of the Superintendent, a court equivalent in effect to a rectangular court as herein prescribed.

Section 31. Outer courts shall be in accordance with the following table of minimum dimensions:—

Outer Courts

Height of building in habitable stories	Width in ft.	
	Outer court between wings	Outer court on lot line
1.....	10.....	6
2.....	10.....	7
3.....	12.....	8
4.....	14.....	9
5.....	16.....	10
6.....	18.....	11
7.....	20.....	12
8.....	22.....	13
9.....	24.....	14
10.....	26.....	15

Extension of outer courts at an angle with the initial horizontal direction of the court, or offsets or recesses in outer or inner courts may be built; provided, however, that the length of any such extension, offset, or recess shall not be greater than its width. There shall be no further extension to or offset or recess opening from any such extension, offset, or recess.

Walls may be built across the inner angles of outer courts; provided, however, that the length of such angle walls shall not be greater than 2/3rds of the actual length of the court.

Section 32. Inner courts shall be in accordance with the following table of widths and areas:—

Inner Courts

Height of building in habitable stories	Inner court		Inner court on lot line	
	Width in ft.	Area in sq. ft.	Width in ft.	Area in sq. ft.
1	12	200	7	150
2	14	300	8	200
3	16	400	9	250
4	18	500	10	300
5	20	600	11	350
6	22	700	12	400
7	24	800	13	450
8	26	900	14	500
9	28	1000	15	550
10	30	1100	16	600

An inner court on lot line shall have a length parallel to the line of not less than twice the minimum required width.

Section 33. Every inner court shall have at least one air intake.

An inner court may begin at any level and the minimum dimensions shall be determined by the table in this ordinance, according to the number of stories in the building above such level.

Where inner courts are irregular in shape, their dimensions shall be such as to provide, in the opinion of the Superintendent, a court equivalent in effect to a rectangular court as herein prescribed; provided, how-

ever, that the area shall in no case be less than the minimum required in the above table.

Walls may be built across the angles of the inner courts, but the resulting unobstructed area of the court must not be less than the minimum area as above required.

In computing the area of an inner court, the additional area afforded by offsets, or recesses shall not be included.

Section 34. A vent shaft is a shaft used to light and ventilate stairways and, if covered at the top, shall have a metal skylight of the full size of shaft and shall have openings beneath the skylight on all sides, with or without louvres, of such height that the total area of such openings on any two adjacent sides shall equal the area of the shaft. Vent shafts shall be in accordance with the following table of minimum widths and areas:

Vent Shafts.

Height of shaft in stories	Ft. in width	Area in sq. ft.
1.....	3.....	15
2.....	3.....	15
3.....	3.....	15
4.....	4.....	25
5.....	5.....	35
6.....	6.....	45
7.....	7.....	55
8.....	8.....	65
9.....	9.....	81
10.....	10.....	100

Div. 6

Section 35. An air intake is a passageway enclosed with incombustible material, not less than 4 ft. sq. for vent shafts and not less than 3 ft. wide and 7 ft. high for courts, connecting the bottom of a vent shaft or court with a street or yard to permit circulation of air and, when serving courts, closed only by open grille doors containing not less than 15 sq. ft. of unobstructed area.

In all dwellings every inner court shall be provided with one or more horizontal air intakes at the bottom. One such intake shall always communicate directly with the street or yard.

Div. 7

DIVISION 7.—CLASSIFICATION BY CONSTRUCTION.

Section 36. For the purposes of this ordinance all buildings shall be classified according to construction as a first-class, second-class, and third-class.

First-Class Construction.

A first-class building shall have external and party walls of brick, stone, steel, concrete, or other equally substantial and fire resistive material; floor and roof construction of metal, reinforced concrete, terra cotta, or brick; inside walls, partitions, and stairs of incombustible materials; structural metal protected as required by Sec. 38; roofs and roof structures covered with incombustible material; bays, cornices, and projections of incombustible materials. Under and upper floors, windows and door frames, sashes, doors, interior finish, hand rails for stairs and necessary sleepers or furrings bedded in concrete or mortar may be of wood.

Second-Class Construction.

Second class A. Shall be like a first-class building except that roof construction may be of wood but covered with incombustible materials and roof shall be fire-stopped. Columns supporting roof protected as for first-class construction.

Second class B. Shall have external and party walls of brick, stone, steel, concrete, or other equally substantial and fire-resistive material; roofs and roof structures covered with incombustible materials; bays, cornices, and projections of incombustible materials; steel columns in buildings three stories or more high or if supporting masonry walls or piers, and steel beams supporting masonry walls or piers over openings wider than 10 ft. shall be protected by at least metal lath and cement plaster; first floor construction

and any floors or supports below it of first-class construction; the wooden floors and roofs fire-stopped.

Second class C. Shall have external and party walls of brick, stone, steel, concrete, or other equally substantial and fire-resistive material; roofs and roof structures covered with incombustible materials, bays of incombustible materials; girders and beams, if of wood, shall have a sectional area of not less than 56 sq. in.; columns, girders, and beams, if of metal, need not be protected except that steel columns supporting masonry walls or piers or steel beams supporting masonry walls or piers over openings wider than 10 ft. shall be protected as required by Sec. 38. Under-floors and roof plank shall not be less than 1½ in. thick, tongued and grooved, or splined. No bearing partitions shall be allowed, but other partitions shall be of incombustible materials or of tongued and grooved or splined plank, not less than 1½ in. thick, or of double matched boards. No concealed spaces, wooden furring or wooden lathing shall be allowed. Shall be entirely equipped with approved automatic sprinklers on the interior.

Second class D.—Shall be like second class C, except that no automatic sprinklers are required, but columns, girders, and beams, if of metal, even if not supporting masonry, shall be protected by at least metal lath and cement plaster.

Second class E. Shall have external and party walls of brick, stone, steel, concrete, or other equally substantial and fire-resistive material; roofs and roof structures covered with incombustible materials, bays, gutters, and cornices of incombustible material; steel columns supporting masonry walls or piers and steel beams supporting masonry walls or piers over openings wider than 10 ft. shall be protected by at least metal lath, and cement plaster. Shall be fire-stopped;

basement or cellar ceiling of metal lath and cement plaster or approved plaster boards not less than ½ in. thick, well-nailed and coated with not less than ¼ in. of cement or gypsum plaster.

Third-Class Construction.

Third class A. May have wooden frame; shall be fire-stopped and walls, roofs, and dormer sides shall be covered with incombustible materials; main gutters and cornices made of, or lined with, incombustible materials; basement or cellar ceiling of metal lath and plaster or of approved plaster boards not less than ¼ in. thick, well nailed, and coated with not less than ¼ in. of plaster.

Third class B. May have wooden frame but shall be fire-stopped, and roofs and dormer sides shall be covered with incombustible material. No building shall be built of less than third class B construction.

Section 37. Any building, parts of which vary from other parts in classes of construction shall be rated as the lowest class unless such parts are separated by walls and floors of first-class construction with openings as permitted for fire and party walls according to Division 18.

Section 38. Buildings built in whole or in part of a better class of construction than required by this ordinance shall be required to have only such protection for structural metal as would be required in a building of the type that would be allowed in the given case. In all other cases fire-proofing for structural metal, when required, shall be of brick, terra cotta, concrete, or solid gypsum blocks, except that solid gypsum blocks shall not be used on the outside of wall columns. Metal lath and plaster shall be considered as fire-proofing only where specifically allowed.

Thickness of fire-proofing, except where metal lath and plaster are specifically allowed, shall be as follows:

Wall columns, 4 in., but may be reduced to 1 in. on the outside if covered with cast iron at least $\frac{3}{8}$ in. thick or steel at least $\frac{3}{16}$ in. thick.

Interior columns, 3 in. Where this column protection is likely to be broken or damaged it shall be protected by a casing of steel not less than $\frac{1}{8}$ in. thick, and 5 ft. high.

When any column has projecting flanges, the spaces between the flanges shall be filled solid with fire-proofing material against the web and extending at least 1 in. beyond the edges of the flanges.

Wall girders, 4 in. on the web and at least 1 in. beyond the edges of the flanges, plates or angles.

Interior floor girders and floor trusses 2 in. When the spaces between girder or truss flanges are filled solid with fireproofing material it need not extend more than 1 in. beyond the edges of the flanges.

Girders and trusses carrying only roof and ceiling load and protected by a suspended metal lath and plaster ceiling need not have any other fireproofing.

Girders and trusses carrying only roof load and with a clear open space at least 20 ft. high below need not be fireproofed.

In buildings not more than one story in height, girders, trusses, beams, purlins and bracing carrying only roof load need not be fireproof.

Floor and roof beams, 1 in.: *provided, however*, that roof beams protected by a suspended metal lath and plaster ceiling need not have any other fireproofing.

Lintels carrying masonry walls in first-class buildings; 2 in.

Section 39. Metal lath and plaster, wherever required, shall have thickness of $\frac{3}{4}$ in. from the lath. Where cement plaster is required, the plaster shall be

at least $\frac{1}{3}$ Portland cement. Approved equivalents may be used.

Section 40. Fire stopping for second-class buildings, when required, shall be as follows:

At all sills, dropped girts, ledger boards, plates, girders, bearing walls and bearing partition caps which support floor beams or rafters, spaces shall be filled to a height of 5 in. above floor beams, and above plates supporting rafters to the under side of the roof boarding with brick or solid gypsum blocks laid in mortar, with cinder or stone concrete or with mineral wool.

Spaces between chimneys and wooden beams and between wooden furrings on masonry walls for 5 in. above and below the floor beams with mortar or other approved incombustible material. Around pipes passing through wooden floors with metal or other approved incombustible stops.

Between the carriages of stairs twice in each flight and between rafters over dwarf partitions and between rafters at ends of ceiling beams, with closely fitted wood, tin, or galvanized iron.

Fire-stopping for third-class buildings shall be as required for second-class buildings except that closely fitted 2 in. plank may be substituted for the incombustible materials in all places except around chimneys and required stair enclosures.

In all places where fire-stopping is required the plastering shall run to the under-floor.

All fire-stopping shall be in place before the lathing permit required under Sec. 6 will be issued.

Section 41. Within the building districts herein defined all buildings shall be of such class of construction as their use and height determine, and not inferior to the classes required by the following tables: *provided, however*, that nothing in this division shall

change the height limitations established by Div. 5, and *provided, further*, that for the purposes of this section a basement in a residence building shall be counted as a story when occupied by more than one family. (See definition of first story.)

RESIDENCE BUILDINGS A.

(Private dwellings, two-family dwellings; all club and boarding houses with less than 5 sleeping rooms above second story and not over 3 stories high.)

		Number of Stories.						
		1	2	2½	3	4	5	6 or more
District	1	2	2	2	2	2	1	1
Districts 2, 3 and 4		3-B	3-B	3-B	3-A	2	1	1

RESIDENCE BUILDINGS C—D.

(Lodging houses, dormitories, convents, hotels; club and boarding houses other than class A.)

		Number of Stories.					
		1	2	3	4	5	6 or more
District	1	2	2	2	2-B	1	1
Districts 2, 3 and 4		3-B	3-B	2	2-B	1	1

PUBLIC BUILDINGS A.

(Hospitals, asylums, nurseries, detention buildings.)

		Number of Stories.					
		1	2	3	4	5	6 or more
District	1	2	2	2-B	1	1	1
Districts 2, 3 and 4		3-B	3-A	2-B	1	1	1

PUBLIC BUILDINGS B.

(Libraries, museums, courthouses, city halls, fire and police stations.)

		Number of Stories.					
		1	2	3	4	5	6 or more
District	1	2	2	2-A	1	1	1
Districts 2, 3 and 4		3-B	3-A	2	1	1	1

PUBLIC BUILDINGS C.

(Schoolhouses, college classroom buildings.)

		Number of Stories.					
		1	2	3	4	5	6 or more
District	1	2	2	2-B	2-A	1	1
Districts 2, 3 and 4		3-B	2	2-B	2-A	1	1

PUBLIC BUILDINGS D.

(Buildings having an assembly hall or lodge room; churches, amusement halls, exhibition buildings.) A hall with one or more balconies shall be considered respectively as one or more stories above the story containing the main floor of the hall. The table determines the type of construction to be employed for the portion of the building up to and enclosing the assembly hall according to the floor on which the main floor of the hall is placed. If there are floors above the assembly hall and its balconies, the type of construction to be employed for the whole building shall be determined under Sec. 11. (See Department of Public Safety Regulations.)

		Number of Stories.					
		1	2	3	4	5	6 or more
District	1	2	2	2	2-B	2-A	1
Districts 2, 3 and 4		3-B	3-A	2	2-B	2-A	1

PUBLIC BUILDINGS E.

(Theatres, moving picture houses, opera houses, music halls.)

Each balcony shall be considered as a story for the requirements of this section. (See Department of Public Safety Regulations.)

		Number of Stories.					
		1	2	3	4	5	6 or more
District	1	2-A	2-A	1	1	1	1
Districts 2, 3 and 4		2-A	2-A	2-A	2-A	1	1

Provided, however, that open air theatres without balconies may be built in District 2, 3 and 4 of 3-A construction.

BUSINESS BUILDINGS A-B.

(Office buildings, stores, restaurants.)

		Number of Stories.					
		1	2	3	4	5	6 or more
District	1	2	2	2	2	2-C	1
Districts 2, 3 and 4		2	2	2	2	2-C	1

BUSINESS BUILDINGS C.

(Manufacturing and storage buildings.)

		Number of Stories.						
		1	2	3	4	5	6	7 or more
District	1	2	2	2-D	2-C	2-C	2-C	1
Districts 2, 3 and 4		3-A	3-A	2-D	2-C	2-C	2-C	1

Provided, however, that storage buildings may be built of 2-C construction to a height of 75 ft. also they may be built of steel frame with metal siding not over one story high in District 1.

BUSINESS BUILDINGS D.

(Stables.)

		Number of Stories.					
		1	2	3	4	5	6 or more
District	1	2	2	2-D	2-C	1	1
Districts 2, 3 and 4		3-B	3-B	2-D	2-C	1	1

BUSINESS BUILDINGS E.

(Amusement parks, armories, baseball parks, bath-houses, car barns, grandstands, green houses, ice houses, light and power plants, other buildings not classified herein.)

		Number of Stories.					
		1	2	3	4	5	6 or more
District	1	2	2	2	2-D	1	1
Districts 2, 3 and 4		3-A	3-A	2	2-D	2-C	2-C

Any business building without definite stories established by its design shall be considered to have one story for each 20 ft. in height. The Superintendent may vary requirements as provided in Sec. 11.

The restrictions of these tables shall not apply to wharves, nor to buildings not exceeding 27 ft. in height on wharves, nor to market sheds or market buildings not exceeding such height, nor to buildings for the storage of coal, wood, lumber or grain, if the external parts of said buildings, elevators and structures are covered with slate tile, metal or other equally incombustible material, and the mode of construction and the location thereof are approved by the Superintendent. Temporary structures to facilitate the prosecution of any authorized work may be erected under such conditions as the Superintendent may prescribe.

The protection for structural metal in business buildings of Classes C and E may be omitted when, in the concurrent opinion of the Superintendent and the Board of Appeal, the occupation of fire equipment of the building will render such protection useless or unnecessary.

Permanent Grandstands. All permanent grandstands shall be built of second class A construction except that in Districts 2, 3 and 4 grandstands less than 10 ft. high above the ground may be of third class A construction: *provided, however,* that when such third class A grandstands are within 30 ft. of any other building the Superintendent may require additional protection by incombustible coverings to portions thereby exposed and endangering life and property. No space underneath any grandstand shall be used for any purpose unless the part so used is of first class construction.

Temporary Grandstands. Temporary grandstands may be erected for a limited time. Their construction shall be approved by the Superintendent and the permit for their construction shall state the length of time of use and the further length of time allowed for removal.

DIVISION 8.—LOADS, MATERIALS, AND STRESSES.

Section 42. Dead loads shall consist of the weight of the walls, floors, roofs, and permanent partitions. Office building partitions are included in the live loads required in Sec. 43.

The weights of various materials shall be assumed as follows:

	Lb. per cu. ft.
Birch	48
Brickwork	120
Concrete, cinder, structural	108
Concrete, cinder filling	72
Concrete, stone	144
Granite	168
Granolithic surface	144
Limestone	150
Maple	48
Marble	168
Oak	48
Pine, yellow	48
Sandstone	144
Spruce	30
Terra cotta, architectural, voids unfilled	72
Terra cotta, architectural, voids filled	120
Plastering on metal lath, exclusive of furring, 8 lb. per sq. ft.	

Section 43. Live loads shall include all loads except dead loads. Every permit shall state the purpose for which the building is to be used and every floor shall be of sufficient strength to bear safely the weight to be imposed thereon in addition to the dead load, but shall safely support a minimum uniformly distributed live load per sq. ft. as specified in the following table:—

Class of Building	Lb. per sq. ft.
Armories, assembly halls, and gymnasiums	100
Fire houses:	
Apparatus floors	150
Residence and stable floors	50
Garages (private), storage and repair floors	75
Garages (public), storage and repair floors ..	150
Grandstands	100
Hotels, lodging houses, boarding houses, dormitories, convents, clubs, hospitals, asylums and detention buildings:	
Public portions	100
Residence portions	50
Office buildings:	
First floor	125
All other floors	75
Residence buildings A and B including porches and piazzas	50
Schools and colleges:	
Assembly halls	100
Classrooms, never to be used as assembly halls	50
Sidewalks	250
(Or 8,000 lb. concentrated, which ever gives the larger moment or shear.)	
Stables (public or mercantile)	
Street entrance floors	150
Feed room	150
Carriage room	50
Stall room	50
Stairs, corridors, and fire-escapes from thea- ters, assembly halls, armories, and gym- nasiums	100
Stairs and fire-escapes <i>except</i> from theaters, assembly halls, armories, and gymnasiums	75
Stores, retail	125

The Superintendent may require design for heavier loads than the above minimum values if, in his judgment, the purpose of the building requires it.

For buildings or structures not included in the above table, the Superintendent shall establish allowable live loads.

Section 44. Every plank, slab, and arch, and every floor beam carrying 200 sq. ft. of floor or less, shall be of sufficient strength to bear safely the combined dead and live load supported by it, but the floor live loads may be reduced for other parts of the structure as follows:—

In all buildings except armories, garages, gymnasiums, storage buildings and assembly halls, for all flat slabs of over 200 sq. ft. area reinforced in more than one direction and for all floor beams, girders or trusses carrying over 200 sq. ft. of floor, 15% reduction.

For the same, but carrying over 300 sq. ft. of floor, 25% reduction.

These reductions shall not be made if the member carries more than one floor and therefore has its live load reduced according to the table below.

In public garages, for all flat slabs of over 300 sq. ft. area reinforced in more than one direction, and for all floor beams, girders, and trusses carrying over 300 sq. ft. of floor, and for all columns, walls, piers, and foundations, 25% reduction.

In all buildings except storage buildings, wholesale stores, and public garages, for all columns, girders, trusses, walls, piers and foundations.

Carrying 1 floor.....	No reduction
" 2 floors.....	25% reduction
" 3 "	40% reduction
" 4 "	50% reduction
" 5 "	55% reduction
" 6 "	60% reduction

Section 45. Roofs shall be designed to safely support minimum live loads as follows:—

Roofs with pitch of 4 in. or less per ft., a vertical load of 40 lb. per horizontal sq. ft. applied either to half or to the whole of the roof.

Roofs with pitch of more than 4 in. and not more than 8 in. per ft., a vertical load of 30 lb. per horizontal sq. ft. and a wind load of 10 lb. per sq. ft. of surface acting at right angles to one slope, these two loads being assumed to act either together or separately.

Roofs with pitch of more than 8 in. and not more than 12 in. per ft., a vertical load of 20 lb. per horizontal sq. ft. and a wind load of 20 lb. per sq. ft. of surface acting at right angles to one slope, these two loads being assumed to act either together or separately.

Roofs with pitch of more than 12 in. per ft., a vertical load of 10 lb. per horizontal sq. ft. and a wind load of 30 lb. per sq. ft. of surface acting at right angles to one slope, these two loads being assumed to act either together or separately.

Section 46. All buildings shall be calculated to resist a pressure per sq. ft. on any vertical surface as follows:—

For 40 ft. in height10 lb.

Portions from 40 to 80 ft. above ground ..20 lb.

Portions more than 80 ft. above ground ..30 lb.

but the Superintendent may require a building to be designed for larger pressures than those given in the table, if, in his judgment, the exposure of the building requires it.

If the resisting moments of the materials of construction are not sufficient to resist the moment of distortion due to wind pressure without exceeding the stresses allowed in this ordinance, additional bracing shall be introduced to supply the deficiency in the moment.

Section 47. All materials shall be of such quality as to insure, in the judgment of the Superintendent, ample safety to life, limb, and neighboring property. The Superintendent shall have power to reject all materials which in his opinion are unsuitable. He may establish standards and regulations for materials covered in this ordinance or for new materials and may require tests to be made by the owner or producer or may accept tests made elsewhere in his discretion. Wherever approval is mentioned in this ordinance it shall refer to the approval of the Superintendent. In case of doubt by the Superintendent as to quality of any material the owner shall furnish a proper amount of samples for comparison with standard samples or to be subjected to such examination or tests as the Superintendent may establish. Any tests thus required shall be made under the supervision or direction of the Superintendent, but at the expense of the owner.

Section 48. Brick may be of burnt clay, sand-lime, or cement, and, except for nogging, fire-stopping, and non-bearing and curtain walls not exposed to the weather, shall be hard and strong, of quality approved as satisfactory by the Superintendent. Second-hand bricks shall be thoroughly cleaned before delivery to the building.

Section 49. The term block as used in this section shall mean any shape of block, brick, or tile which forms a hollow or cellular wall.

Concrete building blocks shall be made of Portland cement and suitable aggregates in such proportions as to develop at the age of 28 days an ultimate crushing strength per sq. in. of gross area of not less than 750 lb. when tested with the cells placed vertically and 300 lb. with the cells placed horizontally.

Terra cotta building blocks shall be hard burned and shall develop an ultimate crushing strength per

sq. in. of gross area of not less than 1200 lb. when tested with the cells placed vertically and 300 lb. with the cells placed horizontally.

The absorption of building blocks to be used for bearing or enclosing walls shall not exceed 12% in 48 hours as an average, nor more than 15% in any case.

Section 50. Sand shall be clean and not more than 6% shall pass a sieve having 100 meshes per linear in.

Sand or other fine aggregate for reinforced concrete shall be of such quality that mortar of 1 part Portland cement and 3 parts sand by weight shall show a tensile strength of not less than 90% of the strength of mortar made in the same proportions with the same cement and standard Ottawa sand. The Superintendent may require such tests when, in his judgment, they are necessary, the tests to be at the expense of the owner.

Section 51. Stone for concrete shall be clean, hard, and durable.

Section 52. Lime shall be free from ashes, clinker, and other foreign material and shall not be air slacked.

Section 53. Portland cement shall conform to such specifications as may be promulgated by the Superintendent, or, in the absence of such specifications, to the standard specifications of the American Society for Testing Materials as from time to time revised.

Section 54. Lime mortar shall be made of slaked lime or hydrated lime with a proper proportion of sand.

Section 55. Cement-lime mortar shall be made 1 part Portland cement, not more than 2 parts slaked lime or hydrated lime and not more than 8 parts of sand by volume but mixtures with larger proportion of cement shall be allowed higher stresses as in Sec. 65.

Section 56. Portland cement mortar shall be made of 1 part Portland cement and not more than 3 parts of sand by volume. Lime putty or hydrated lime may be added to an amount equal to 25% of the volume of the cement.

Section 57. Concrete shall be made of Portland cement and a fine and coarse aggregate. Rubble concrete shall be made of Portland cement, a fine aggregate, and a coarse aggregate to which, after depositing, stones are added. The fine aggregate shall be sand or crusher screening passing a $\frac{1}{4}$ in. screen. The coarse aggregate shall be screened gravel, crushed stone, or cinders from steam power plants, composed of hard clean, vitreous clinker, reasonably free from sulphides, unburned or partially burned coal and ashes, but cinder concrete may be used for walls of one-story buildings, for floor slabs, roof slabs, partitions, fire-stopping, and fireproofing only. Run-of-bank gravel shall be used only when approved by the Superintendent. When one-man stones are used to form rubble concrete there shall be not less than 3 in. between the stones and the forms and between edges of adjacent stone. When stones larger than one-man size are used to form rubble concrete there shall be not less than 6 in. between the stones and the forms and between edges of adjacent stones. Stones shall be clean and wet and shall be deposited in concrete already in place before the latter has commenced to set. In piers less than 4 ft. long in greatest horizontal dimension no stone shall be larger than one quarter of the horizontal cross-section of the pier. Rubble concrete shall not be used for any projecting footing.

Joints formed between portions of concrete placed at different times shall be made in such a manner as not to weaken the completed structure. Whenever

fresh concrete joins concrete which is set or partially set, the surface of the old concrete shall be rough, clean, and thoroughly wet.

Section 58. Steel for all structural work in buildings shall conform to such specifications as may be promulgated by the Superintendent, or, in the absence of such specifications, to the requirements of Standard Specifications for Structural Steel for Buildings of the American Society for Testing Materials as from time to time revised.

Section 59. Wrought iron shall be fibrous, tough and ductile.

Section 60. Cast iron for all structural work shall conform to such specifications as may be promulgated by the Superintendent, or, in the absence of such specifications, to the requirements of the Standard Specifications for Medium Gray Iron Castings of the American Society for Testing Materials as from time to time revised.

Section 61. Timber for structural purposes shall be of quality approved by the Superintendent.

Section 62. When doubt arises as to the safe sustaining power of soil upon which a building is to be erected, the Superintendent may order borings to be made or he may order tests of the sustaining power of the soil at the expense of the owner of the proposed building. The Superintendent shall be notified before any test is made, shall be present or represented thereat, and shall decide upon the allowable load to be used, and records of such borings or tests shall be filed with him. In the absence of an actual test of the sustaining power of the soil to the satisfaction of the Superin-

tendent the area of the footing shall be proportioned so that the load per sq. ft. upon the respective characters of soil shall not exceed those in the following tables:—

<i>Loads on Soil.</i>	
Soil	Load in tons per sq. ft.
Soft clay, running sand (confined).....	1 to 2
Medium blue clay, whether or not mixed with fine sand	2 to 3
Compact damp sand, hard sandy clay, hard blue clay	4
Dry hard yellow clay, boulder clay, dry sand or dry gravel	5
Hardpan, to be determined by the Superin- tendent, but not to exceed	10

Section 63. Wooden piles driven to refusal through loose fill or wet soil, incapable of adequately resisting lateral bending, shall be figured as columns with an area equal to the middle cross-section. The safe load on all other wooden piles driven by drop hammer shall not exceed 12 tons for spruce or Norway pine or 15 tons for yellow pine or oak, and shall be determined by the following formula:—

$$L = \frac{2 WH}{P + 1}$$

If driven by single-acting power hammer the safe sustaining power shall be determined by the following formula:

$$L = \frac{2 WH}{P + 0.1}$$

In both formulas

W is the weight of the hammer in lb.

L is the allowable load in lb.

H is the fall of the hammer in ft.

P is the average penetration in inches under the last three blows after the pile has been driven to a point where successive blows produce approximately equal penetrations.

Section 64. Concrete piles driven to refusal through loose fill or wet soil, incapable of adequately resisting lateral bending, shall be allowed a load not exceeding 400 lb. per sq. in. of the middle cross-section, plus 6,000 lb. per sq. in. of the steel reinforcement. The safe load for other piles shall be determined by the formulas given in Sec. 63 determined by striking the pile without cushion cap, or the Superintendent may require test piles to be loaded and may fix allowable loads based upon such tests, but he shall not allow a greater load than one half of the test load giving $\frac{1}{4}$ in. settlement. Such tests shall be under the supervision of the Superintendent and the results shall be filed in his office, but shall be at the expense of the owner.

Section 65. Any body of masonry less than 4 ft. long in its greatest horizontal dimension shall be called a pier. The height of a pier between openings having a continuous wall above or below them shall be assumed equal to the height of the opening. The height of a pier or wall supporting floors or roofs shall be assumed as the distance from top of footing or concrete floor to under side of floor or roof beams or from center to center of beams.

The safe carrying capacity of the various materials of construction shall be determined by the following working stresses:

Stresses for Brickwork.

Mortar	Piers of height not more than 6 times their least dimension and walls of height not more than 9 times their least dimension (Tons per sq. ft.)	times their least dimension Piers of height more than 6 times their least dimension and walls of height more than 9 times their least dimension (Tons per sq. ft.)
Cement to be Portland. Parts measured by volume.		
Cement mortar	20	18
2 parts cement, 1 part hydrated or slaked lime, 8 parts sand	16	14
1 part cement, 1 part hydrated or slaked lime, 6 parts sand	14	12
1 part cement, 2 parts hydrated or slaked lime, 8 parts sand	12	10
Lime mortar	8	6

Stresses for Concrete.

Cement to be Portland. The volumes given for aggregate to be the sum of the volumes of fine and coarse aggregate measured separately before mixing and proportioned so as to give a dense mixture.	Piers of height not more than 6 times their least dimension and for walls of height not more than 9 times their least dimension (Tons per sq. ft.)	Walls of height more than 9 times their least dimension (Tons per sq. ft.)
1 part cement, 6 parts aggregate	30	25
1 part cement, $7\frac{1}{2}$ parts aggregate	25	21
1 part cement, 9 parts aggregate	20	17
1 part cement, 4 parts run-of-bank gravel	15	10
1 part cement, 6 parts run-of-bank gravel	10	6

No plain concrete bearing pier shall have a greater height unstayed laterally than 6 times its least dimension, and no plain concrete bearing wall unless it is properly braced by cross walls, piers, or other means shall have a greater height unstayed laterally than 12 times its least dimension.

Stresses for Grout and Stone Masonry.

Cement to be Portland. Parts measured by volume	Tons per sq. ft.
Grout, 1 part cement, 1 part sand, when not less than 2 feet in least lateral dimension, not more than 1/2-in. joints	72
Granite masonry, 1 part cement, 2 parts sand, not more than 1/2-in. joints	72
Granite masonry, cement mortar, not more than 1/2-in. joints	60
Limestone and marble masonry, cement mortar, not more than 1/2-in. joints	40
Sandstone masonry, cement mortar, not more than 1/2-in. joints	30

Provided, however, that in stone masonry columns or in piers of excessive heights, the loads may be modified by the Superintendent.

Section 66.

Stresses for Steel and Iron.

Kind of Stress	Working Stresses lb. per Sq. In.		
	Rolled Steel	Cast Steel	Cast Iron
Bearing, direct (including bearing of stiffeners)	20,000	20,000	16,000
Bearing, pins and shop rivets	24,000		
Bearing, field rivets	20,000		
Bearing, bolts	16,000		
Extreme fibre (where top flange is stayed laterally at distances not greater than 20 times the width of flange)	16,000	16,000	*16,000 **4,000
Extreme fibre, pins and rivets	24,000		
Shearing (including gross section of plate girder webs)	10,000	9,000	2,000
Shearing, pins and rivets...	10,000		
Shearing, bolts	8,000		
Direct tension	16,000	16,000	

When the top flange of a steel plate girder, beam or channel is not stayed laterally at distances of 20 times its breadth, the above stress on extreme fiber shall be reduced as follows:—

l/b.	20	25	30	35	40	45
Stress per sq. in.	16,000	15,200	14,400	13,600	12,800	12,000
l/b.	50	55	60	65	70	
Stress per sq. in.	11,200	10,400	9,600	8,800	8,000	

Where l is length of flange in inches.

b is breadth of flange in inches.

Section 67. Steel compression members shall not have a greater value of l/r than 160, nor have metal (except for filling) less than $\frac{1}{4}$ in. for interior columns, nor with metal less than $\frac{5}{16}$ in. for exterior columns enclosed in masonry. The stress due to eccentric or transverse loading combined to that due to central loading shall not exceed 16,000 lb. per sq. in.

* Compression.

** Tension.

For centrally loaded steel compression members the safe load in lb. per sq. in. shall be as follows:

Steel Compression Members.

l/r	70 or less	80	90	100	110
Load per sq. in.	13,000	12,000	11,000	10,000	9,000
l/r	120	130	140	150	160
Load per sq. in.	8,000	6,000	4,000	2,000	0

Where l is length of the column in inches

r is the radius of gyration in inches taken around the axis about which the column will bend.

Section 68. Concrete-filled pipe columns of steel or wrought iron may be used only when manufactured under such inspection as the Superintendent shall direct and with such stresses as he may determine.

Section 69. Cast-iron compression members shall not have a greater value of l/r than 70, nor a smaller outside diameter or side than 5 in., nor a greater unsupported length than 24 times their least lateral dimension or diameter: *provided, however*, that columns supporting roof loads only may have a value of l/r not greater than 86 and an unsupported length of not more than 28 times the least lateral dimension or diameter. They shall not have metal less than $\frac{3}{4}$ in., nor thinner than $\frac{1}{12}$ of the greatest lateral dimension or side. The stresses due to eccentric or transverse loading, combined with those due to central loading, shall not exceed 9,000 lb. per sq. in.

Cast iron columns shall not be used where the loading is so eccentric as to cause tension.

Whenever the core of a column has shifted more than $\frac{1}{4}$ of the thickness of the shell, the strength shall be computed assuming the thickness of metal all around to be equal to the thinnest part.

For centrally loaded cast-iron compression members the safe load in lb. per sq. in. shall be as follows:—

Cast-Iron Compression Members.

l/r	10	20	30	40	50	60	70	80	86
Load per sq. in.	8600	8200	7800	7400	7000	6600	6200	5800	5560

Provided, however, that the Superintendent may reduce these loads when, in his judgment, vibrating machinery makes it advisable.

Section 70.

Stresses for Timber.

	Stress per Sq. In.				
	Southern Yellow Pine, Dense Grade	Southern Yellow Pine, Sound Grade	Spruce	White Pine	Oak
Bearing					
across grain	350	300	250	250	500
with grain	1200	900	700	700	900
Extreme fiber	1600	1200	1000	1000	1400
Shear with grain	125	85	80	80	125

Southern yellow pine for both dense and sound grades shall have defects restricted in accordance with specifications promulgated by the Superintendent, or, in the absence of such specifications, in accordance with the section on defects in the rules of the Southern Pine Association for Select Structural Material.

Timber compression members shall not have knots greater in diameter than $\frac{1}{3}$ the least dimension of the member or 4 in. in any case.

Section 71. Timber compression members shall not be used of a greater unstayed length than 30 times their least dimension for isolated columns or 40 times their least dimension for columns in partitions or truss members. The stresses due to eccentric or transverse loading combined with those due to central loading shall not exceed the maximum stress allowed in table below.

For centrally loaded timber compression members the safe load in lb. per sq. in. shall be as follows:—

Timber Compression Members.

Length divided by Least Dimension	Southern Yellow Pine, Dense Grade	Southern Yellow Pine, Sound Grade	Spruce	Pine	Oak
10 or less	1,050	800	650	650	800
15	975	740	600	600	740
20	900	680	550	550	680
25	825	620	500	500	620
30	750	560	450	450	560
35	675	500	400	400	500
40	600	440	350	350	440

Timber compression members shall not have knots greater in diameter than $\frac{1}{3}$ of the least dimension of the member or 4 in. in any case.

Section 72. Methods for reinforced concrete are given in Div. 14. For all other materials, the following methods shall be used:

The span of beams, girders, or trusses shall be taken as the distance from center to center of the bearings. If connected to the side of column, the span shall be taken to the center of a column.

If a tension piece is loaded eccentrically or transversely the maximum combined fiber stress shall not exceed the allowed stress in tension.

An eccentric load upon a column shall be taken as affecting eccentrically only the length of column extending to the next point below at which the column is stayed securely in the direction of the eccentricity.

If a piece is exposed to tension and compression at different times it shall be proportioned and connected to resist the maximum of each kind of stress.

Base-plates, bearing plates, and grillage beams shall be figured on the assumption that the maximum bending moments are under the center of bearing.

DIVISION 9.—EXCAVATIONS AND CELLARS.

Section 73. Excavations shall be properly guarded by the person making them against danger to life and so that the adjoining soil, wall, building, or structure shall not cave in.

Whenever an excavation is not carried more than 10 ft. below the curb level opposite the party line, the owner of every nearby wall, building or structure shall protect the same, so that they shall be safe, and he shall be permitted to enter upon the premises where such excavation is being made for the purpose if necessary.

Whenever an excavation is carried more than 10 ft. below curb level the person causing such excavation to be made, if afforded permission by the nearby owner, shall, at his own expense and under the direction of the Superintendent, preserve every nearby wall, building, or structure from injury, and support the same by proper foundation or retaining walls so that they shall be safe, whether said wall, building, or structure is down more or less than 10 ft. below the curb, and for this purpose proper foundations or retaining walls may be built upon the nearby premises.

If the necessary permission is not given by the nearby owner, then such nearby owner shall, at his own expense, and under the direction of the Superintendent, make his wall, building, or structure safe, supporting same so that the new excavation can be made, and he shall be permitted to enter upon the premises where such excavation is being made for that purpose if necessary.

No party wall between two estates shall be added to in height or underpinned unless the whole wall when so added to or underpinned conforms to the requirements of this ordinance, and in so far as said wall is

used or intended to be used in common, all additions or underpinning thereto shall be made symmetrically with the center of gravity of the wall. If the wall is added to by building in columns or a steel or reinforced concrete frame to be used exclusively on one side, proper foundations shall be built for such columns or frame, and the parties making such installation shall have the right to extend such foundations only as far under the adjoining premises as the foundations of the party wall existed before the addition.

Section 74. The cellar and basement of every building shall be protected from dampness as approved by the Superintendent, and, if below the grade 12 ft. above mean low water, shall be waterproofed to his satisfaction.

DIVISION 10.—PILING.

Section 75. All buildings shall, if the Superintendent determines that piling is necessary, be constructed on foundation piles, and the number, diameter and bearing of such piles shall be sufficient to support the superstructure proposed. The Superintendent shall determine the grade at which the piles shall be cut. He may require any applicant for a permit to ascertain by boring the nature of the ground on which it is proposed to build, and he may require a competent inspector satisfactory to him to be on the work at all times while piles are being driven, which inspector shall keep an accurate record of the length of each pile, the weight and fall of the hammer, and the penetration of each pile for each of the last two blows of the hammer.

Section 76. Wooden piles shall be sound, straight and not less than 6 in. in diameter under the bark at the tip.

Section 77. Concrete piles shall be subject to the regulations of the Superintendent as to their materials, method of fabrication, and driving.

Section 78. The minimum distance in the clear between piles shall be not less than 12 in., except that the Superintendent may allow the piles in any one row to be closer together if, in his judgment, it is proper, but the piles adjacent to such closely spaced row shall not be less than 12 in. apart in the clear. Detached column or pier footings shall have at least 3 piles each, but column or pier footings connected by proper masonry foundations or steel construction to provide adequate lateral support in both directions may be supported by one pile if the load does not exceed that allowed by this ordinance. Light wall foundations may be supported on a single row of piles, *provided* the length unsupported laterally by proper masonry foundations or steel construction does not exceed 10 ft. All

other foundations shall be supported on at least two rows of piles, the rows to be at least 16 in. c. to c.

Piles under masonry buildings shall be capped with concrete or with block granite. If capped with concrete, the proportions shall be 1 part Portland cement to not more than 6 parts aggregate, the volume of the aggregate being the sum of the volumes of the fine and coarse aggregate measured separately before mixing and proportioned so as to give a dense mixture. If capped with block granite, each block shall have a firm bearing on not more than 3 piles and shall be not less than 12 in. thick and shall project enough to fully cover the pile caps.

Piles under steel or wooden frame buildings without masonry walls may be capped with timber not less than 6 in. thick and securely joined together, in which case the piles may be cut off at any desired grade.

DIVISION 11.—FOUNDATIONS AND MASONRY CONSTRUCTION.

Section 79. Bricks shall be wet before laying except in freezing weather. Brick walls shall be laid with full mortar joints and shall be bonded at least every 8th course by an all header or alternate-header course. Bricks laid in running bond without whole brick headers, or bricks laid in patterns without whole brick headers in the face for any length greater than 1 ft. in a pier or 3 ft. in a wall shall be bonded with metal ties. Brick footings shall not project more than $1\frac{1}{2}$ in. per course, and bricks which are corbelled in chimneys or to support floors shall not project more than 1 in. per course. Corbels to support floors shall provide bearing not less than 4 in. wide, and the top of corbel shall be not less than two courses higher: but the Superintendent may allow smaller bearing for timber or other arch construction. All walls meeting at an angle shall be securely bonded to each other, or, if one wall is built in advance of the other, shall be united by proper bonding and at intervals of 5 ft. by metal anchors of type approved by the Superintendent built into one wall to at least half the thickness of the wall and into the side or partition wall not less than 2 ft.

Brick walls with air spaces shall contain, exclusive of bonding bricks, the same amount of material as required for solid walls, and the wall inside of the air space supporting more than two floors shall be not less than 8 in. thick. The double walls shall be headed over for at least 2 courses below all floor or roof beams and shall be bonded by brick or metal ties not more than 2 ft. apart vertically and horizontally.

The walls of each story shall be carried up full thickness to the tops of the beams above.

All walls shall be anchored to the floor construction, and to the roof construction where parapet walls occur, by metal anchors of type approved by the Superintendent, at intervals of not more than 10 ft. for walls supporting floor beams or slabs and to girders and partition caps, and at intervals of not more than 20 ft. for walls parallel to wooden or steel floor beams.

Hollow brick, when hard burned and of the dimensions of common brick and when properly bonded to wall, may be reckoned as part of the thickness of the wall.

Recesses in outer walls shall leave not less than 8 in. of masonry. Horizontal recesses and wide recesses for stairs, elevators, etc., may be allowed when, in the opinion of the Superintendent, the arrangement will give proper strength.

No timber lintels or posts shall be used to support masonry walls.

Section 80. Brick, stone, concrete, or terra cotta veneer on a wooden frame shall be bonded by proper painted or galvanized metal ties not less than 2 ft. apart horizontally, and not less than 16 in. apart vertically.

Section 81. Rubble walls shall have through stones for bonding built in at intervals of not more than 3 ft. vertically and horizontally.

Section 82. Block stone walls shall have joints thoroughly filled with spalls and mortar so that each stone will come to a solid bearing.

Section 83. Bearing walls faced with ashlar shall be at least 16 in. thick. Ashlar shall not be included in reckoning the thickness of walls unless it is either at least 8 in. thick or alternately 4 in. and 8 in. to allow at least a 4-in. bond. Ashlar not having at least 4-in. bond in alternate courses shall be tied to the backing

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by metal anchors, one to each block 3 ft. or less long, and two to each block over 3 ft. long.

Section 84. Architectural terra cotta shall be hard burnt, properly stiffened by webs, and with all voids filled with masonry as far as the outer face of the wall.

Section 85. In case it is necessary to increase the thickness of an existing wall the thickened wall must have a total thickness of 4 in. more than required for a new wall; the lining shall be not less than 8 in. thick; shall be supported on a proper foundation; shall be laid up in Portland cement mortar, bonded to the old wall to the satisfaction of the Superintendent.

No wall shall be lined until permission has been given by the Superintendent, nor until the existing wall has been cleaned of plaster, paint, or other coating.

Section 86. Wooden floor and roof beams entering the same fire or party wall from opposite sides shall have at least 4 in. of masonry between their ends in any direction, except in case of 8 in. walls, when there must be 8 in. of masonry between ends.

Section 87. Masonry shall not be built in freezing weather unless suitable precautions are taken.

Section 88. Mortar for foundations of all masonry buildings and for any rubble wall retaining more than 15 ft. of earth, for portions of chimneys and parapets above roofs, for all hollow block walls with cells set vertical, and for walls less than 12 in. thick and exposed to the weather, shall be Portland cement mortar. Mortar for first and second-class buildings and for piers and foundations for third-class buildings, and for all chimneys below roof shall be no poorer than cement-lime mortar.

Section 89. Foundations for all first and second-class buildings, of all third-class buildings having a

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cellar or basement, of all third-class buildings of more than one story, and of all third-class buildings of area greater than 300 sq. ft., shall be of such depth as shall extend 4 ft. below any adjoining surface level to frost unless they rest on bed rock, and they shall reach through loam or fill to undisturbed natural soil or shall rest on piles. All trenches shall be kept reasonably free from water when laying foundations, and no foundation shall be started on frozen ground.

The thickness of foundation walls shall, in all cases, irrespective of any other requirements of this section, be sufficient to keep the stresses in the masonry and on the soil within the working stresses prescribed by this ordinance.

Cellar or trench walls above grade not more than 6 ft. high for third-class buildings shall have the following minimum thickness in inches:—

Concrete, solid, or concrete blocks	8
Brick	8
Block stone, one course high	8
Block stone, more than one course high	12
Rubble	16

and any of these shall be increased 4 in. if more than 6 ft. high.

Foundations below grade for third-class buildings shall have the following minimum dimensions in inches:—

	Wall Thickness	Footing Width Except on Ledge
Concrete, solid	10	16
Brick	12	16
Block stone	16	20
Rubble	20	20

Provided, however, that walls retaining more than 6 ft. and less than 10 ft. of earth shall have the following minimum dimensions in inches:—

	Wall Thickness	Footing Width Except on Ledge
Concrete, solid	12	20
Brick	16	20
Block stone	16	24
Rubble	24	24

Foundations for masonry buildings, retaining not more than 10 ft. of earth shall be at least 4 in. thicker than the first story wall, but not less than the following dimensions in inches in any case:—

	Wall Thickness	Footing Width Except on Ledge
Concrete, solid	12	24
Brick	16	24
Block stone	16	24
Rubble	24	24

and each additional 10 ft. in depth shall be 4 in. thicker than the section above and the footing shall be widened 4 in.

Battered walls may be built, provided they give the same cross-sectional area and footing width as required above.

The Superintendent may allow reduction in the required thicknesses if the walls are of properly reinforced concrete, or are properly strengthened by steel columns or beams, or are held laterally by intermediate floors.

Isolated piers may be used instead of continuous foundations if the character of soil, building, or structure makes it necessary or advisable and the Superintendent approves.

Rubble foundation walls shall not be used for build-

ings over 4 stories high. When rubble foundations are used under masonry buildings, the lowest course, if of stone, shall be good flat stones full width of footing, well bedded in mortar upon the ground.

Block stone foundations shall have the lowest course well bedded in mortar upon the ground. In projecting footing courses, the projecting portion of each stone shall be less than the width of the portion built in.

Concrete foundations shall not be poorer than 1 part Portland cement to $7\frac{1}{2}$ parts of aggregate for pile cap-pings and for all other foundations shall be not poorer than 1 part Portland cement to 9 parts of aggregate, the volume of the aggregate in both cases being the sum of the volumes of the fine and coarse aggregate measured separately before mixing and proportioned so as to give a dense mixture: *provided, however,* that 1 part Portland cement to not more than 6 parts run-of-bank gravel may be used when the Superintendent approves. Foundations for masonry buildings shall be laid in forms both sides except for the lowest projecting footings course.

Brick footings shall project not more than $1\frac{1}{2}$ in. per course and there shall be a double course at bottom, projecting not more than 3 in.

Reinforced concrete foundations and footings shall conform to requirements of Div. 14, but the concrete shall be no poorer than 1 part Portland cement and $7\frac{1}{2}$ parts aggregate, the volume of the aggregate being the sum of the volumes of the fine and coarse aggregate measured separately before mixing and proportioned so as to give a dense mixture and there shall be not less than 3 in. of concrete below reinforcement or between reinforcement and the top of piles unless protected by waterproofing satisfactory to the Superintendent.

Steel grillage foundations shall have at least 6 in. of concrete below, and shall be entirely embedded in and surrounded by concrete at least 4 in. thick between steel and earth, and the concrete shall be no poorer than 1 part Portland cement and 7½ parts aggregate, the volume of the aggregate being the sum of the volumes of the fine and coarse aggregate measured separately before mixing and proportioned so as to give a dense mixture.

Section 90. For the purpose of this section a basement wall shall be construed to include any exterior wall between the ground and the first story and any party, fire and bearing walls from the top of foundations to the first floor.

The thickness of masonry walls shall in all cases, irrespective of the requirements of this section, be sufficient to keep the stresses in the masonry within the working stresses prescribed by this ordinance.

Brick walls above foundations for exterior, bearing, fire, or party walls shall have the following minimum thickness in inches:

For Private and Two-Family Dwellings with Wooden Floor Beams Spanning Not More Than 15 ft.

	Exterior Walls			Party Walls, Fire Walls, Bearing Walls				
	B'm't	1	2	3	B'm't	1	2	3
1 and 2-story buildings...	12	8	8	12	8	8		
2½-story buildings	12	8	8	12	8	8		
3-story buildings	12	8	8	12	12	8	8	

Provided, however, that wooden floor beams resting on both sides of an 8-in. wall shall not enter the wall, but shall be supported upon corbels or hangers.

For All Other Residence Buildings.

Stories	B'm't	1	2	3	4	5	6	7	8
1-story building	12	12						
2 " "	12	12	12					
3 " "	12	12	12	12				
4 " "	12	12	12	12	12			
5 " "	16	12	12	12	12	12		
6 " "	16	16	12	12	12	12	12	
7 " "	16	16	16	12	12	12	12	12
8 " "	20	16	16	16	12	12	12	12

Provided, however, that if roof frame be of wood the top story walls may be 8 in.

For All Public and Business Buildings.

Stories	B'm't	1	2	3	4	5	6	7	8
1-story building	12	12*						
2 " "	12	12	12					
3 " "	16	12	12	12				
4 " "	16	16	12	12	12			
5 " "	16	16	16	12	12	12		
6 " "	20	16	16	16	12	12	12	
7 " "	20	20	16	16	16	12	12	12
8 " "	20	20	20	16	16	16	12	12

**In case the floor area is less than 500 sq. ft. the wall thickness may be 8 inches.

Provided, however, that if any portion of any building is lower than the rest, the low portion may have walls of the thicknesses required for a building of height equal to that of the low portion.

For the purpose of this section a half story shall not be considered but any balcony or mezzanine floor of more than 10 ft. span shall be considered as forming a story in fixing the thickness of the walls which support it.

No brick pier carrying floor or roof loads shall have a greater height unstayed laterally than 12 times its least dimension, and no brick wall carrying floor or roof loads, unless it is properly stayed by cross walls, piers, or other means, shall have a greater height unstayed laterally than 20 times its least dimension except by approval of the Superintendent.

Non-bearing walls not used for fire or party walls may be 4 in. less in thickness than required by the preceding table: and walls supporting stairs and stair landings only may be 8 in. less; *provided, however*, that no such non-bearing or stair wall shall be less than 8 in. thick nor have a greater height unstayed laterally than 30 times its thickness except by the approval of the Superintendent.

Curtain walls between columns, buttresses or projecting piers may be thinner than required by preceding tables: *provided, however*, that in dwellings not over three stories high such curtain walls shall not be less than 4 inches thick and in all other buildings such curtain walls shall not be less than 12 inches thick for party walls nor less than 8 inches thick for exterior walls, except that the portion between the top of one window opening and the bottom of the window opening above, if faced with metal, shall be backed by at least 4 inches of incombustible material.

Curtain walls in buildings of skeleton construction shall be securely anchored to the frame at each floor level. No curtain wall exceeding 20 feet in length shall have a greater height unstayed laterally than thirty times its thickness.

Section 91. Hollow block walls shall be the same minimum thickness as required for brick walls and may be used for bearing walls in buildings not over forty feet in height. In buildings more than forty feet in height hollow block walls may be used in the upper

forty feet and shall be of the same minimum thickness as required for brick bearing walls.

Solid, unreinforced concrete walls shall be the same minimum thickness as required for brick walls.

Reinforced concrete walls shall be of the thickness and construction required by the Superintendent.

Section 92. Masonry cornices and balconies may project as required in Div. 21 and shall balance about a point 1 in. inside the outer face of the wall with a live load of 40 lb. per sq. ft. on the projecting portion without relying upon any load above or upon the cornice, or shall be anchored to the floor construction, if the latter is of steel or reinforced concrete in an approved manner, or shall be supported by a metal frame work.

Section 93. For all buildings which have roofs sloping less than 4 in. per ft., all party walls, fire walls, and exterior walls less than 5 ft. from adjoining lot lines, except where such walls are finished with gutters, crown moulds, or cornices, shall have parapet walls of the same thickness as the walls below but shall not be required more than 12 in. thick. In buildings less than 45 ft. high the parapet shall be at least 12 in. high above roof covering, and in all other buildings the parapet shall be 2 ft. 6 in. high at least: *provided, however*, that in the first-class buildings the fire walls need not extend above the roof.

Section 94. Chimneys shall be carried to a height sufficient to protect adjoining buildings from fire and smoke, shall extend 4 ft. above any flat roof, and unless the roof covering is of incombustible material, shall extend at least 2 ft. above any part of the roof covering within 6 ft. horizontally distant, and shall be capped with incombustible material.

No chimney of stone or of hollow blocks shall be built without terra cotta flue lining for all smoke flues.

All smoke flues, except as in hereinafter provided, shall be constructed of brick or reinforced concrete not less than 4 in. thick or of hollow terra cotta or concrete blocks not less than 6 in. thick, or of stone or plain concrete not less than 8 in. thick, and shall be lined continuously from the lowest thimble or smoke chamber to the top of the chimney with well burnt terra cotta flue linings with cemented joints: *provided, however,* that if the walls are constructed 8 in. thick of brick or of solid concrete the flue linings may be omitted. If the flue linings are omitted the joints on inside of flues shall be neatly struck. The walls between the flue linings may be 4 in. thick or may be omitted for a set of flues not exceeding four in number. Rough brick jambs of fireplaces and range and grate openings shall be at least 8 in. thick if there is no flue in the jamb. The walls between the flue linings and fireplaces may be omitted: *provided, however,* that not more than one on each side of the fireplace shall be left without side partition.

When smoke flues are connected with hot water or low pressure boilers having a grate area of over 10 sq. ft., bakers' ovens, or hotel or restaurant ranges, the flues shall be lined and the walls enclosing the linings, for a height of not less than 12 ft. from the point where the smoke connection enters the flue, shall be of brick or reinforced concrete 8 in. thick or of plain concrete, hollow terra cotta, or concrete block not less than 10 in. thick.

When smoke flues are connected with high pressure steam boilers or other appliances producing similar flue temperatures, they shall be constructed as approved by the Superintendent.

Exterior metal smoke flues shall be located and constructed as approved by the Superintendent.

All chimneys of brick, terra cotta blocks, or con-

crete blocks shall be plastered on the outside surfaces behind all woodwork. Access for cleaning out shall be provided at the foot of all flues.

No chimney shall be corbelled from any wall less than 12 in. thick, nor for more than the thickness of the wall. Flues in party walls shall have the outside of their linings not less than 2 in. from the party line, or, if unlined, the inside of the flue shall not be less than 6 in. from the party line.

No chimney shall be supported on wood except that in one-story buildings, not over 400 sq. ft. in area, smoke flues may be built of well burned terra cotta pipe with hubs set in cement mortar, and such chimneys may be supported on wood to the satisfaction of the Superintendent.

When there is woodwork directly back of a fireplace, the backs shall have either a 2 in. air space with 4 in. of brick or concrete on each side of it, or, if of hollow terra cotta or concrete blocks, shall be at least 8 in. thick with a fireplace lining of cast iron or 4 in. of brick. Between fireplaces or where back of fireplace is exposed there shall be not less than 8 in. of masonry.

In all second and third-class buildings all fireplaces shall have hearths of incombustible materials not less than 18 in. wide from the finished facing and at least 8 in. longer on each side than the finished opening and supported on incombustible trimmer arches or slabs.

All woodwork around chimneys shall be kept at least 1 in. clear of the brickwork, except that projecting piers may be built to support girders or posts.

DIVISION 12.—STEEL CONSTRUCTION

Section 95. Materials, stresses, and methods of computation shall be as provided in Div. 8.

Section 96. Connections shall be designed to develop the full strength of the member under the conditions of loading, even though the computed stress is less.

Rivets shall be placed in accordance with good engineering practice. The diameter of rivet holes in tension members shall be assumed as $\frac{1}{8}$ in. larger than the rivet.

Section 97. Every beam, channel, lintel, or girder supported by a wall shall be properly anchored thereto, and shall have bearing plates if necessary to distribute the load properly at the stresses required by this ordinance.

Beams and channels acting as skew-backs for arches shall be designed to resist the lateral thrusts in addition to their vertical loads, and tie rods not less than $\frac{1}{4}$ in. in diameter shall be placed as near the line of thrust as practicable, and in any event shall be spaced not more than 8 times the depth of the beams, and not more than 8 ft.

Where beams or channels are used in pairs they shall be connected together with iron or steel separators near each end and at each concentrated load, and not more than 5 ft. elsewhere; and beams 12 in. or more in depth, if connected by bolted separators, shall have two bolts to each separator.

Section 98. Steel column ends shall either be machine faced and brought into actual contact or full riveted connections shall be provided to develop the strength of the columns. Latticing and tie plates shall be provided in accordance with good engineering practice.

Section 99. In proportioning the flanges of plate girders $\frac{1}{8}$ of the web may be considered as available in each flange. When the top flange is not stayed laterally at distances of 20 times its breadth the stresses shall be reduced as required in Sec. 66. Stiffeners, properly fitted at ends, shall be provided over supports and under concentrated loads with sufficient area in the outstanding legs to transmit the stresses in bearing at 20,000 lb. per sq. in. and with sufficient rivets to transmit the stresses to the web. Intermediate stiffeners shall be so spaced, that the clear distances between the stiffeners or the clear distance between flange angles shall not exceed that given by the formula.

$$d = \frac{t}{40} (12,000 - s)$$

where d is the clear distance between stiffeners or flange angles

t is the thickness of web

s is the shear per sq. in.

Section 100. Trusses shall be designed so that the stresses in each member can be calculated with reasonable accuracy by statical methods. The center of gravity lines of members meeting at a joint shall, if possible, intersect at a point, and the center of gravity of a group of rivets connecting one member to another shall, in general, lie as nearly as practicable in the center of gravity line of the member. Trusses shall be properly braced.

DIVISION 13.—CAST IRON CONSTRUCTION.

Section 101. Materials, stresses, and methods of computation shall be as provided in Div. 8.

Section 102. Cast iron columns shall not be used in the structural frames of buildings whose height exceeds 2 times the least width of base. Cast iron columns shall be faced at ends to a true surface perpendicular to the axis to give full bearing for the cross-section of the column.

All hollow cast iron columns, except when open at both ends and without flanges, shall have two $\frac{3}{8}$ in. holes drilled on the top or bottom side of column as cast, if the columns are cast on side, one hole about 12 in. each side of the center of the length of the column, to exhibit thickness of the shell. Columns cast on end shall have two $\frac{3}{8}$ in. holes drilled by the maker, at an angle of 90 degrees to each other at the middle of the column, to exhibit thickness of shell. Additional holes shall be drilled when required by the Superintendent.

Section 103. Cast iron lintels shall not be used for spans exceeding 6 ft. and shall have no metal thinner than $\frac{3}{4}$ in.

DIVISION 14.—REINFORCED CONCRETE CONSTRUCTION.

Section 104. Reinforced concrete shall mean an approved mixture of Portland Cement water, and fine and coarse aggregate, reinforced by steel.

Section 105. The Portland cement and fine and coarse aggregate for reinforced concrete work shall conform to the quality of materials as defined in division eight of this ordinance.

Section 106. Steel for reinforcement shall conform to the Standard Specifications for Steel Reinforcement Bars of the American Society for Testing Materials, as from time to time revised. It shall be free from mill scale and loose rust and shall not be coated in such manner as to weaken the bond.

Section 107. The ingredients shall be thoroughly mixed, and the mixing shall continue until the cement is thoroughly distributed and the mass is uniform in color. The consistency shall be such that the concrete will flow freely about and entirely enclose the reinforcement, but shall not be so wet as to cause separation of the ingredients in handling.

Section 108. The Superintendent may require an applicant for a permit for the structural use of concrete to have a competent inspector satisfactory to the Superintendent at all times on the work while concrete is being mixed or deposited, and such inspector shall make daily reports to the Superintendent on the progress of the work.

Section 109. Forms shall be sufficiently tight to prevent any considerable loss of material in the pouring.

Section 110. Concrete shall be used immediately after mixing, it shall not be placed in the work after it has begun to harden, and it shall be deposited in such manner and under such regulations as to secure a com-

compact mass of the best quality for the proportions used. Forms shall remain until the concrete has hardened sufficiently to carry its load safely, and shall be removed without damage to the concrete.

Concrete shall not be deposited in forms until the reinforcement has been put in place and secured against displacement.

Columns shall be poured without any interruption to the bottom side of beams or girders which they support, or to the bottom of the flare in flat slab construction. Special care shall be taken in their pouring that no voids may result.

Columns and walls shall be poured not less than three hours in advance of the beams, girders, or slabs which they support. All columns of the same type in a story shall be of concrete mixed in the same proportions.

Structural slabs shall be poured the full thickness at time of pouring floor.

Section 111. Proper precautions shall be taken in stopping concrete work to stop it at the points of low shear.

Section 112. When fresh concrete is exposed to a hot or dry atmosphere or wind, special precautions to prevent premature drying shall be taken.

Concrete shall not be deposited when the temperature is below thirty-two degrees Fahrenheit, unless adequate precautions are taken to prevent freezing.

Section 113. Main reinforcement in floor slabs shall be protected by a minimum of three-fourths of an inch of concrete: in beams, girders, columns and walls by one and one-half inches from the surface of the concrete to the surface of the main reinforcement.

In columns the outer one and one-half inches of concrete shall be regarded as fireproofing which shall be assumed to carry no stress.

Section 114. In foundations and retaining walls the steel shall be protected, and on the side toward the earth or water by a minimum of three inches of concrete.

Section 115. Slab reinforcement bars in tension shall be not farther apart horizontally than two and one-half times the total thickness of the slab. In beams and girders the lateral spacing of parallel bars shall be not less than three diameters from center to center, and the clear space between two layers of bars shall be not less than one inch.

Section 116. Calculations shall be made with reference to working stresses and safe loads rather than with reference to ultimate strength and ultimate loads, and shall be based on the following assumptions:

- (a) A plane section before bending remains plane after bending.
- (b) The modulus of elasticity of concrete in compressions, within the usual limits of working stresses, is constant. The distribution of compressive stresses in beams, therefore, is rectangular.
- (c) The tensile strength of the concrete in direct resistance to bending is neglected.
- (d) Under compressive stresses the two materials are stressed in proportion to their moduli of elasticity.
- (e) Initial stress in the reinforcement due to contraction or expansion in the concrete is neglected.

Section 117. The span length for beams and slabs simply supported shall be taken as the distance from center to center of supports, but need not be taken to exceed the clear span plus the depth of beam or slab. For continuous or restrained beams, or slabs built mon-

olithically into supports, the span length may be taken as the clear distance between faces of supports. Brackets shall not be considered as reducing the clear span in the same sense here intended, except that when brackets which make an angle of forty-five degrees or more with the axis of a restrained beam or the plane of a slab are built monolithically therewith, the span may be measured from the section where the total depth is at least one-third more than the depth at the edge of the bracket. Maximum negative moments are to be considered as existing at the end of the span as here defined.

Section 118. Bending moments for uniformly distributed dead and live loads, in beams and slabs reinforced in one direction only shall be computed upon the following assumptions, where "w" is the total dead and live load per linear foot, and "l" is the span length:

(a) for a single span freely supported bending at mid-span is

$$\frac{wl^2}{8}$$

(b) for a single span restrained at the ends bending at mid-span is

$$\frac{wl^2}{12}$$

(c) for two equal continuous spans freely supported, the bending at mid-span is

$$\frac{wl^2}{10}$$

and at central support is

$$\frac{wl^2}{8}$$

(d) for two equal continuous spans restrained at supports, the bending at mid-span is

$$\frac{wl^2}{12}$$

and at central support is

$$\frac{wl^2}{10}$$

(e) for three or more equal continuous spans freely supported the bending at mid-span of the end span, and at the first interior support is

$$\frac{wl^2}{10}$$

and the bending at mid-span of interior spans and at other interior supports is

$$\frac{wl^2}{12}$$

(f) for three or more equal continuous spans restrained at supports, the bending at the first interior support for beams is

$$\frac{wl^2}{10}$$

and for the slabs is

$$\frac{wl^2}{12}$$

and the bending at all other interior supports and at mid-span of all spans is

$$\frac{wl^2}{12}$$

(g) at the restrained ends of continuous beams a negative bending of

$$\frac{wl^2}{16}$$

16

shall be generally assumed, but this shall be increased to not more than

$$\frac{wl^2}{12}$$

12

for small beams running into large columns. Beams and slabs shall be considered as restrained at the ends when they frame monolithically into a structure sufficiently stiff and strong to introduce a negative bending moment into the beam at the end in amount not less than

$$\frac{wl^2}{16}$$

16

For continuous beams subject to other than uniformly distributed loads, the positive bending moment shall first be computed as though the beam were freely supported. The positive moment may then be reduced in the same proportion as specified above for beams loaded uniformly, and provision shall be made at the restrained ends for negative moments having the same ratio to the positive moment first computed that the negative moments specified above bear to

$$\frac{wl^2}{8}$$

8

Beams parallel to the main reinforcement of a one-way slab and into which no other beams frame and which are restrained at the ends by being built monolithically

lithically into supporting columns shall be designed for bending moments at the ends equal to wl^2 and at

$$\frac{wl^2}{12}$$

mid-span as follows:

When the width columns parallel to the axis of the beam is not less than fifteen per cent. of the distance center to center of columns, or twice the depth of the beam $m = wl^2$; otherwise $m = \frac{wl^2}{20}$

20

16

For spans of unusual or unequal length and other special cases the design shall be such as to carry out the intent of this ordinance to the satisfaction of the superintendent.

Section 119. For slabs supported on four sides and reinforced in both directions the distribution of loads shall be determined by the formula

$$r = \frac{l}{b} - 0.5$$

where

b is the breadth of slab.

l is the length of slab.

r is the proportion of load carried by the transverse reinforcement.

In placing reinforcement in such slabs account shall be taken of the fact that the bending moment is greater near the center of the slab than near the edges, and two-thirds of the calculated moments shall be assumed as carried by the center half of the slab and one-third by the outside quarters.

Beams supporting rectangular slabs reinforced in both directions shall be assumed to take the proportions of load as determined by the formula in this section.

tion, the distribution of the load being assumed to vary in accordance with the ordinates of a parabola having its vertex at mid-span.

Section 120. Opening in floors and roofs shall be so framed as not to exceed the allowable stresses.

Section 121. In roof slabs the total depth shall not be less than three inches, and in floor slabs four inches.

In "T" beams the depth below the slab shall not exceed eight times the thickness of the slab adjacent to the stem. Cinder concrete slabs shall not be less than four inches thick; they shall not exceed eight feet in span.

Section 122. Reinforcing materials which are self-centering shall not be used in spans to exceed eight feet. Fireproofing under self-center reinforcement may be of Portland cement plaster.

Section 123. If a beam or floor slab is assumed as fixed or partially restrained at a support, the column, wall, or other structure furnishing such restraint shall be proportioned to resist the stresses thereby induced.

Section 124. Where adequate bond and shearing resistance between slab and web of beam is provided, the slab may be considered an integral part of the beam, but its effective width shall not exceed one-fourth part of the span length of the beam, nor shall its overhanging width on either side of the web exceed six times the thickness of the slab.

Section 125. Columns or piers of concrete shall be reinforced when the unsupported height exceeds six times the least gross dimension, and no reinforced concrete column shall have an unsupported height of more than twelve times its least gross di-

mension except with stresses reduced from those allowed by this ordinance in accordance with the ratio.

$$24 \frac{h}{d}$$

where h is unsupported height and d is least dimension and $\frac{h}{d}$ shall not in any case exceed eighteen.

The maximum effective area of columns shall be taken as the area within the outer one and one-half inches of concrete covering, or, in the case of hooped columns or columns reinforced with structural shapes, it shall be taken as the area within the circle enclosing the spiral or the polygon enclosing the structural shapes. Longitudinal reinforcement shall be assumed to carry stress in proportion to the respective moduli of elasticity as given in this ordinance.

Exterior columns and their reinforcement shall be so proportioned as to withstand bending in addition to the direct load without exceeding the fiber stresses specified for beams elsewhere in this ordinance.

Reinforced concrete buildings may be supported by structural steel or cast iron columns, fireproofed where required, as provided elsewhere in this ordinance.

Brackets shall be provided to transmit the load from the floors to the column. Such columns shall be computed as follows:

- (a) If the brackets are placed immediately below the floor the structural steel or cast iron columns shall be assumed to carry the load of all the floors above.
- (b) If the brackets are placed immediately above a floor the structural steel or cast iron columns shall be assumed to carry all the load

above the brackets, and the floor or floors below the brackets shall be carried on reinforced concrete encasing the metal, designed in accordance with the requirements of this ordinance, to the next bracket below or to the foundation. In this case, however, the surrounding concrete shall be so separated from the steel or cast iron as to permit the separate action of both.

Circular hollow steel or wrought iron columns filled with concrete shall be allowed to carry a load equal to the capacity of the metal casing plus the capacity of the concrete filling. The average unit stress in the casing shall be that specified elsewhere in this ordinance for columns, and that in the concrete filling shall be in the same ratio to the unit stress in the casing which the modulus of elasticity of the concrete bears to that of the casing.

Columns with longitudinal reinforcement only shall have a steel area of not less than one per cent. and not more than four per cent. of the required effective area, and shall be allowed the stresses given in this ordinance. Longitudinal reinforcement bars shall be straight and shall be secured against lateral displacement by steel ties not less than one-fourth of an inch diameter, and placed not farther apart than sixteen diameters of the bars, nor more than twelve inches.

Columns which have longitudinal reinforcement to an amount not less than one per cent., and not more than four per cent. of the effective area, and which also have hoops or spirals to an amount not less than one per cent. of the volume of the enclosed core, spaced not farther apart in the clear than one-sixth of the diameter of the enclosed core, and in no case more than two and one-half inches, shall be allowed the stresses given in this ordinance: *provided, however,* that no such column shall have a height greater than

ten diameters of the enclosed core. The ends of hoops or spirals shall be united in such a way as to develop their full strength. The hoops or spirals shall be securely fastened to the longitudinal reinforcement or to approved spacers.

Section 126. Concrete floors with permanent blocks or forms of incombustible materials, with ribs of reinforced concrete between, shall conform to the requirements of this ordinance as far as they are applicable, but the blocks or forms shall not be assumed as taking stress. If a slab not less than two inches thick above the blocks or forms is cast monolithic with the rib, the rib and slab may be considered as a T section. If such construction forms a flush ceiling, or if a plastered ceiling on metal lath is suspended below the ribs, the fireproofing for such construction shall be that required for slabs.

Section 127. The following table gives the compressive strength in pounds per square inch which shall be assumed as the basis for design, a bag of cement weighing ninety-four pounds being assumed to measure one cubic foot in proportioning material, and the values given for aggregate to be the combined volume of fine and coarse aggregate measured separately:

Mixture	1:3	1:4½	1:6	1:7	1:7½	1:9
Stone concrete	3300	2800	2200	—	1800	1400
Cinders or slag concrete	1000	875	750	675	625	—

In all computations allowable stresses shall be used, based, as hereinafter specified, upon assumed ultimate strengths as given above, and no concrete shall be used which, when made under laboratory conditions into test cylinders eight inches diameter and sixteen inches long and tested in compression at an age of twenty-

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eight days, does not show a strength at least equal to that given in the table.

Concrete one year old shall be considered to have a compressive strength twenty-five per cent. greater than that given in the table for concrete of the same grade and proportions.

Section 128. When compression is applied to a portion of a concrete surface, of which the area is at least twice that to which the load is applied, a stress of thirty-five per cent. of the compressive strength fixed by this ordinance shall be allowed.

For concentric compression on columns with longitudinal reinforcement only, twenty-two and five-tenths per cent. of the compressive strength fixed by this ordinance shall be allowed.

Section 129. For concentric compression on columns, the length of which does not exceed ten diameters of the core, with longitudinal reinforcement combined with hoops or spirals, thirty-five per cent. of the compressive strength fixed by this ordinance shall be allowed.

Section 130. Compression on extreme fiber in bending shall not exceed thirty-two and five-tenths per cent. of the compressive strength fixed by this ordinance: *provided, however,* that adjacent to the supports of continuous beams or slabs thirty-seven and five-tenths per cent. may be used.

Section 131. In calculation of beams in which the maximum shearing stress in a section is used as a means of measuring the resistance to diagonal tension stress, the vertical shearing unit stress as computed

by the formula $v = \frac{V}{bjd}$ where v is the shearing unit stress, V is the total shear, b is the breadth of the beam, and jd is the arm of the resisting couple, shall

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not exceed the following percentages of the respective compressive strengths fixed by this ordinance.

For beams with horizontal bars only, and without web reinforcement, two per cent.

For beams with web reinforcement, consisting of vertical stirrups looped about the longitudinal reinforcing bars in the tension side of the beam, suitably anchored in the compression side and spaced horizontally not more than one-half the depth of the beam; or for beams in which longitudinal bars are bent up at an angle of not more than forty-five degrees, nor less than twenty degrees, with the axis of the beam and the points of bending are spaced horizontally not more than three-fourths of the depth of the beam apart, or both, the web reinforcement being designed, in each case, to carry two-thirds of the total shear, six per cent.

Section 132. Punching shear shall not exceed six per cent. of the compressive strength fixed by this ordinance.

Section 133. The bond stress between concrete and steel bars shall not exceed four per cent., except that the bond between concrete and approved deformed steel bars shall not exceed five per cent., and between concrete and drawn wire shall not exceed three per cent. of the compressive strength fixed by this ordinance.

Section 134. The tensile or compressive stress in steel shall not exceed sixteen thousand pounds per square inch in rods, and twenty thousand pounds per square inch in drawn wire and other approved cold stretched fabric, except that in slabs of stone concrete the tensile stress in rods shall not exceed eighteen thousand pounds per square inch, and in drawn wire and other approved cold stretched fabric it shall not

exceed twenty-two thousand five hundred pounds per square inch.

Section 135. The modulus of elasticity of concrete shall be taken as:

1-30 that of steel for cinder concrete with a compressive strength of 1,000 pounds per square inch or less.

1-15 that of steel for stone concrete with a compressive strength of 2,200 pounds per square inch, or less.

1-12 that of steel for concrete with a compressive strength greater than 2,200 pounds per square inch, but less than 2,900 pounds per square inch.

1-10 that of steel for concrete with a compressive strength of 2,900 pounds per square inch or more, the compressive strength referred to in all three cases being that fixed by this ordinance.

Section 136. Symmetrical concentric column footings shall be designed for punching shear, diagonal tension and bending moment.

Section 137. The area effective to resist punching shear in column footings shall be considered as the area having a width equal to the perimeter of the column or pier, and a depth equal to seven-eighths the depth of footing from top to center of reinforcing steel.

Section 138. Shearing stresses as indicative of diagonal tension shall be measured in footings on vertical sections distant from the face of the pier or columns equal to the depth of the footing from top to center of reinforcing steel.

Section 139. The bending moment in rectangular isolated column footings at a section taken at the edge of pier or column shall be determined by multiplying the load on the cantilever projection by three-eighths

the distance from the edge of pier or column to the edge of footing. The section of maximum moment in a footing supporting a round column or pier shall be taken one-eighth the radius from the tangent toward the center. The effective area of concrete and steel to resist bending moment shall be considered as that within a width extending both sides of pier or column a distance equal to depth of footing plus one-half the remaining distance to edge of footing, except that reinforcing steel crossing the section other than at right angles shall be considered to have an effective area determined by multiplying the sectional area by the sine of the angle between the bar and the plane of the section. The bond stress in the steel shall not exceed that allowed by this ordinance.

Section 140. Floor slabs supported upon columns without beams or girders and extending two or more bays in each direction shall conform to the following requirements:

Section 141. Columns may be provided with enlarged capitals. The horizontal width of capitals shall be taken where the vertical thickness is at least one and one-half inches, and the contour of capitals shall not fall within that of an inverted cone or pyramid whose apex is on the center line of the column, whose sides incline at forty-five degrees with the vertical, and whose base lies in a plane one and one-half inches below the underside of the dropped panel, and if no dropped panel is used, below the underside of the slab, and has the same size and shape in plan as the capital. The width of capital in any direction shall not be less than one-fifth the distance, center to center, of columns in that direction, and shall be such that the allowable unit stresses elsewhere specified in this ordinance shall not be exceeded.

Section 142. A thickening of the slab on the underside in the vicinity of the columns is termed a dropped panel. The width of the dropped panel in any direction shall be not less than 3-2 that of the column capital. The depth of the dropped panel below the bottom of the slab shall not be more than half the slab thickness, but shall be such that the allowable unit stresses shall not be exceeded either in shear about the column capital or in bending. The allowable unit shear to be used shall be that specified for punching shear elsewhere in this ordinance. The allowable compression in bending shall be that specified for extreme fibers adjacent to support in continuous beams.

Section 143. In flat slab construction, the minimum thickness of slab shall not be less than 1-40 in the case of roofs, or 1-32 in the case of floors, of the distance from center to center of the columns in the longer direction. The thickness shall be such as to withstand the shear about the column capital or dropped panel without exceeding the allowable stress herein specified for punching shear.

Section 144. For the purpose of determining the bending in flat slab floors, the slab shall be considered as divided by lines parallel to the lines of columns into strips whose width is one-half the distance, L , center to center of columns measured at right angles to the span of strips. The center line of alternate strips shall coincide with the center line of the columns. These shall be known as A-strips. The other strips located midway between columns shall be known as B-strips. The span length of the strips shall be taken as the distance center to center of columns, less two-thirds the width of the column capital measured in the direction of the span.

Provision shall be made in the A and B strips com-

prising any panel width for the whole bending moment specified, and the proportion of the whole provided for within each strip shall not be less than that given in the following table:

	Either		
	A-Strip	B-Strip	Strip
Positive moment, dropped panel	.60%	25%	15%
Positive moment, no dropped panel55%	25%	20%
Negative moment, no dropped panel80%	15%	5%
Negative moment, no dropped panel65%	20%	15%
Interior Bays.—If			

$$l = \text{span as given} = L - 2 \div 3c.$$

where c = diameter of column capital

w = total load per square foot.

whether the panels be square or oblong, and in whichever direction the span be taken, the bending moments at the critical portions of interior bays shall be assumed as follows:

Positive Bending:

The positive bending moment for a whole panel width shall be taken as

$$M = \frac{WL^2}{25}$$

Negative Bending:

The negative bending moment for a panel width shall be taken as

$$M = \frac{WL^2}{15}$$

Wall Bays; Restraint:

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For wall bays when the wall is of reinforced concrete (l is the distance from the inside face of the

exterior column to the center of the interior column, less one-third the width of the interior column capital) the bending moment for strips running perpendicular to the wall shall be as follows:

Positive Bending:

The positive bending moment for a panel width shall be taken as

$$M = \frac{WLl^2}{20}$$

Negative Bending:

The negative moment for a panel width at the interior line of columns shall be taken as

$$M = \frac{WLl^2}{12.5}$$

The negative bending moment for a panel width at the wall shall in general be taken as

$$M = \frac{WLl^2}{30}$$

This may be increased, according to degree of restraint, up to

$$M = \frac{WLl^2}{15}$$

for complete restraint: *provided, however*, in case the co-efficient for negative bending at the wall is increased, the other two bending moment co-efficients may be correspondingly decreased.

Wall Bays; No Restraint:

For wall bays supported on one edge upon brick walls or other construction incapable of providing adequate restraint in negative bending, l is distance from inner face of wall to center of interior column, less one-third the width of the interior column capital.

Positive Bending:

The positive bending moment for a panel width shall be taken as

$$M = \frac{WLl^2}{16}$$

Negative Bending:

The negative bending moment for a panel width at the interior column line shall be taken as

$$M = \frac{WLl^2}{10}$$

Negative bending along such walls shall be provided for by reinforcement in the top of the slab at right angles with the wall equal to four-tenths per cent. in floors and to two-tenths per cent. in roofs of the area of cross section of the slab.

Bays discontinuous upon one or two adjacent sides shall be treated as wall bays.

When a flat slab is supported by a beam or wall on one or two sides, the half strip parallel with and adjacent to the beam or wall may be reinforced as half a B-strip.

The bending in exterior concrete columns supporting flat slab floors shall in general be taken as

$$\frac{wLl^2}{30} + \frac{Wh}{4}$$

or more up to

$$\frac{wLl^2}{15} + \frac{Wh}{4}$$

in case of complete restraint, where W is the total load on the wall panel and h is the thickness of the exterior column.

For floors, half this bending shall be assumed as acting below and half above the slab; for roofs, the whole bending acts below the slab.

Section 145. Brackets or haunches shall be provided on exterior columns when necessary to transmit the shear and bending from the slab to the column.

Section 146. The least dimension of interior concrete columns supporting flat slabs shall not be less than one-fifteenth the span, center to center of columns in the longer direction.

Section 147. Reinforcement shall be provided at the critical sections of all strips in sufficient quantity to withstand the bending herein specified without exceeding the allowable unit stresses elsewhere specified in this ordinance. Reinforcements lying obliquely to the axis of any strip shall be counted as having an area effective for that strip equal to its actual area of cross-section multiplied by the cosine of the angle it makes with the axis of the strip.

Section 148. No reinforcing for positive bending shall be bent up to the top of the slab further from the center line of the column than one-fourth L where L is the distance center to center of columns in the direction of the reinforcing. Positive reinforcement in A-strips shall be provided to within $0.15 L$ of the center line of interior columns and extending to the inside face of wall columns; in B-strips shall be provided extending to within $0.10 L$ of the interior column line and to the inside face of wall support. Negative reinforcement in A-strips shall extend beyond the center line of the columns half the width of the column capital plus enough to develop the strength of the rods; at least one-quarter of the negative reinforcement shall extend six inches beyond the quarter point of the panel or the fifth point of the span length. Negative reinforcement in B-strips shall extend forty diameters beyond the center line of column, and at least half thereof shall extend to the quarter point of the panel.

For determining the stress in concrete due to the bending in each strip, the width shall be taken as the width of the strip except that for negative bending in A-strips when a dropped panel is used, the width shall be that of the dropped panel.

Section 149. Wall beams in flat slab construction shall be assumed to carry a width of floor equal to one-quarter the clear span of the beam in addition to the weight of beam and wall. Such beams, when continuous, shall be designed for a negative bending at columns equal to

$$\frac{wl^2}{12}$$

and the positive bending at mid-span shall be assumed as follows:

- (a) When the width of the columns (parallel to the beam) is not less than fifteen per cent. of the distance, center to center of the columns, or twice the depth of the beam.

$$M = \frac{wl^2}{20}$$

- (b) Otherwise.

$$M = \frac{wl^2}{16}$$

Section 150. In case a flat slab is supported by a brick wall, the wall shall in general be four inches thicker than the minimum thickness otherwise required by this ordinance; or have equivalent pilasters.

DIVISION 15.—FIREPROOF BLOCK
CONSTRUCTION.

Section 151. Fireproof blocks for floors, walls, partitions, and fireproofing shall be of hard burned terra cotta, concrete, or other approved material.

Section 152. Partitions of fireproof blocks shall extend from the steel or masonry of the floor construction to the steel or masonry of the floor construction above, except that in the upper story where there is a space between an incombustible ceiling and the roof, these partitions need not extend above the ceiling. Blocks shall not be less than 3 in. thick for a height of 10 ft. or less, and shall be increased 1 in. for every 4 ft. or fraction thereof. If blocks are not plastered on at least one side, the thickness shall be 1 in. greater than specified above.

DIVISION 16.—TIMBREL ARCH CONSTRUCTION.

Section 153. Timbrel arches and domes, built of overlapping tiles in two or more layers, shall be used as approved by the Superintendent.

DIVISION 17.—WOODEN CONSTRUCTION.

Section 154. Stresses and quality of timber shall be as provided in Div. 8.

Section 155. All timber sizes given are nominal sizes. Wooden buildings shall have braced frames, balloon frames, or types equivalent in the opinion of the Superintendent, but balloon construction shall be allowed only for residence buildings not more than $2\frac{1}{2}$ stories in height and for private stables and farm buildings.

Braced frames shall have sills, corner posts, and girts not less than 4x6 in., plates not less than two 2x4 in., and braces not less than 2x4 in. Girts and posts shall be tenoned and pinned together. If posts are in more than one length they shall have a splice at least 12 in. long.

Balloon frames shall have sills and corner posts not less than 4x6 in., plates not less than two 2x4 in., and ledger boards not less than 1x4 in., and notched into studs 1 in. deep. Outside wall studs shall run in one length from sill to plate, shall be doubled at sides and top of openings and trussed or otherwise strengthened above openings more than 5 ft. wide in walls supporting floors. Floor beams shall be spiked to wall studs or to blocking of full width of studs.

Buildings three stories high shall have wall studs not less than 2x4 in., spaced not more than 16 in. c. to c.

Section 156. Bearing partitions shall be of not less than 2x4 in. studs, not more than 16 in. c. to c., and bridged the full thickness of studs once in the height of each story.

Section 157. Wooden floor and roof beams shall be not less than 2 in. thick, and, if built into ma-

sonry, shall have not less than 4-in. bearing, and shall be cut with a 3-in. bevel at ends to allow easy falling out in case of fire.

No floor or roof timber entering a party wall shall have less than 4 in. of masonry between it and the end of any other timber.

In second class buildings, floor beams, and, where parapets occur, flat roof beams, shall be tied together end to end and shall be anchored to the walls with metal dogs and anchors of types approved by the Superintendent so as to form continuous ties across the building parallel to the floor beams at intervals of not more than 10 ft., or at every beam when spacing exceeds 10 ft. When floor beams are parallel to the walls, the girders and partition caps shall be anchored to the walls, and, if the intervals are more than 20 ft., the floor beams shall be anchored to the walls.

Every wooden header more than 4 ft. long, and carrying more than 50 lb. per sq. ft. live load, shall be properly tenoned or shall be supported on stirrup irons or hangers.

Floor beams, except in second class C and D buildings, shall be cross-bridged if more than 10 ft. span, and the distance between bridgings, or between bridgings and bearings, shall not exceed 8 ft.

Section 158. Wooden plates on masonry walls to receive sloping rafters shall be anchored to wall with bolts not less than $\frac{3}{8}$ in. diameter, not less than 2 ft., 6 in. long, and not more than 6 ft. c. to c.

Section 159. All woodwork shall be kept at least 1 in. clear of the masonry of any chimney and no woodwork shall be supported by, or nailed to, the masonry of the chimney.

DIVISION 18. RESTRICTION OF AREAS, SIDE YARDS, PARTY AND FIRE WALLS.

Section 160. All buildings shall be so constructed that the areas of separate portions enclosed by exterior walls or by exterior party and fire walls shall not be in excess of the following:

(For private, two-family, and multiple-dwellings, see Div. 29.)

Residence buildings C and D of second class B construction or poorer, and of two or more stories, 5000 sq. ft.

Public buildings A, of second class B construction or poorer, and of two or more stories, 5000 sq. ft.

Public buildings, B, C, and D, of third-class construction, 3000 sq. ft.

Business buildings A, B, C, D, and E not exceeding 65 ft. in height.

Fronting on	Without Automatic Sprinklers	With Automatic Sprinklers
One street	10,000 sq. ft.	16,667 sq. ft.
Two streets	12,000 sq. ft.	20,000 sq. ft.
Three or more streets	15,000 sq. ft.	25,000 sq. ft.

Business buildings A, B, C, and D exceeding 65 ft. in height.

Fronting on	Without Automatic Sprinklers	With Automatic Sprinklers
One street	7,500 sq. ft.	11,250 sq. ft.
Two streets	10,000 sq. ft.	15,000 sq. ft.
Three or more streets	12,500 sq. ft.	18,750 sq. ft.

Business buildings A, B, C, and D, of first class and second class A and C construction may have a

maximum area of 30,000 sq. ft. if equipped with automatic sprinklers.

Business buildings C, D, and E in district 2 may have such areas as the Superintendent may prescribe, but not to exceed 25,000 sq. ft. if one story high nor 12,500 sq. ft. if two or more stories high unless equipped with automatic sprinklers.

The automatic sprinklers referred to in this section shall be installed to the satisfaction of the Superintendent.

Section 161. For dwellings, see Div. 6. No building shall be built nearer than 5 ft. to a lot line or nearer than 10 ft. to any other building on the same lot, unless the side wall of such building next to such lot line or other building is constructed of masonry. All openings in such walls shall be protected by approved fire doors or fire windows.

Section 162. Two contiguous buildings having independent use and access shall be considered as separate buildings and shall be separated by a party wall.

Section 163. Party and fire walls shall be of brick or solid concrete not less than 12 in. thick, except as otherwise permitted for dwellings, constructed as required by Div. 11.

Openings in party walls and fire walls shall not exceed 100 sq. ft. each in area, and the aggregate width of all openings in any such wall in any story shall not exceed 50 per cent. of the length of the wall. Every such opening shall be protected by two sets of approved fire doors separated by the thickness of the wall, one of the doors in each set to be automatic. Openings, not exceeding 144 sq. in. area, constructed and protected as approved by the Superintendent, may be permitted in any wall.

Party and fire walls in buildings with roof sloping

4 in. per ft. or less shall have parapets where so required in Div. 11. In buildings with roofs sloping more than 4 in. per ft. parapets will not be required, but party and fire walls shall be carried to the under side of the roof boarding, slab or arch.

DIVISION 19.—ENCLOSURES OF STAIRS, ELEVATORS, AND OTHER SHAFTWAYS.

Section 164. Where stairs, elevators, and other shaftways are required to be enclosed, and for all vent shafts, the enclosure walls shall extend to the under side of the roof boarding, slab or arch: *provided, however,* that elevator shaftings running to the top floor shall extend 3 ft. above the roof. The enclosure construction shall be as follows or an approved construction at least equivalent:

For first and second-class buildings as follows:—

(1) Brick or solid concrete or concrete block walls built according to the provisions of this ordinance and not less than 8 in. thick.

(2) Terra cotta or solid gypsum blocks at least 4 in. thick, if supported on reinforced concrete or steel framing properly fireproofed. Blocks shall be plastered on both sides.

(3) Metal lath and cement plaster, making solid 2 in. partition, or hollow partition with metal studs and metal lath and cement plaster at least $\frac{3}{4}$ in. thick on each side if supported on reinforced concrete or steel framing properly fireproofed.

(4) Wire glass in metal frames, no light of glass being over 720 sq. in. area. To be supported on reinforced concrete or steel framing properly fireproofed.

For third-class buildings as follows:

Walls of 4-in. studs, firestopped at each floor with brick or solid gypsum blocks laid in mortar or with cinder or stone concrete or with mineral wool and covered on both sides with metal laths and cement plaster or with approved plaster boards not less than $\frac{1}{2}$ in. thick and coated with at least $\frac{1}{4}$ in. of cement or gypsum plaster, except that elevator shaftways shall be built as required for first and second-class buildings.

Section 165.

Stairways. All doorways leading into stairways required to be enclosed shall be fitted with approved self-closing fire doors in metal or metal covered frames. Windows in interior enclosure walls shall be approved fixed fire windows.

Vent Shafts. Openings in vent shafts and shaftways other than stairways or shaftways included in Department of Public Safety regulations, shall be fitted with approved fire doors or fire windows which are to be automatic if required by the Superintendent. (See also Department of Public Safety regulations.)

Section 166. Elevator, stair and other shaftways, in addition to any requirements of the Department of Public Safety shall be enclosed with the constructions required above as follows:—

(For stairways in dwellings, see Div. 29.)

Hospitals, asylums, nurseries, and detention buildings to have all stairways enclosed.

Libraries, museums, court houses, city halls; fire or police stations, 3 stories or more high, to have at least one stairway enclosed.

Buildings having an assembly hall or lodge room, churches, amusement halls, and exhibition buildings to have all basement stairs enclosed, and, if such rooms are in the third story or above, shall have one stairway enclosed.

For schoolhouses, college classroom buildings, theatres, moving picture houses, opera houses, and music halls, see Department of Public Safety regulations.

Office buildings, if 4 or 5 stories high, shall have at least one stairway enclosed. If 6 or more stories high shall have all stairways enclosed: *provided, however*, that they need not be enclosed in first story if opening into a public lobby leading direct to exit and separated

from rest of building by first-class construction: and *provided, further*, that independent flights connecting not more than 2 stories need not be enclosed.

Buildings more than 3 stories high and used above the first floor for the storage or sale of merchandise or for restaurant purposes, shall have all stairways enclosed except independent flights connecting not more than 2 stories.

Manufacturing buildings over 2 stories high shall have all stairways enclosed.

Stables, 3 or more stories high, shall have all stairways enclosed except runway for horses from first to second floors.

(For garages, see Department of Public Safety regulations.)

Amusement parks, armories, baseball parks, car barns, foundries, grandstands, green houses, ice houses, light and power plants, mill and other buildings constructed for special industries, and other buildings not classified in this ordinance shall have stairways enclosed when required by the Superintendent.

Vent Shafts and Chutes. Vent shafts and other vertical shaftways or chutes of more than 4 sq. ft. area shall be enclosed if they extend through more than one floor. Shaftways or chutes of 4 sq. ft. or less in area shall be made of, or lined with, incombustible materials if they extend through more than one floor.

DIVISION 20.—EXITS, CORRIDORS, AND STAIRS.

(For two-family and multiple-dwellings, see Div. 29.)
(See also Department of Public Safety regulations.)

Section 167. In addition to provisions of the Department of Public Safety regulations, the requirements of this division shall apply to all buildings except dwellings.

Section 168. Wherever dimensions of exits are proportioned to the number of occupants, the Superintendent shall determine the probable number of such occupants.

Section 169.

Number. Every floor above the first shall have at least two exits leading directly or indirectly to street, placed as far apart as practicable and so far as possible arranged so that from every portion of the floor there shall be access to one of two stairways without passing any other. At least one stairway shall continue to the roof, if flat.

Marking. All doors to exits in buildings 2 or more stories in height shall be plainly marked by a sign and by a red light unless specifically excepted by the Superintendent.

Lighting. All exits shall be adequately lighted by artificial light.

Section 170.

Width. Required stairways except in dwellings, and except when serving less than 150 persons, shall be at least 3 ft. 8 in. wide between faces of walls, or 3 ft. 4 in. wide between face of walls and face of balustrade or between faces of two balustrades. If posts project above tops of rails, the required width shall be main-

tained between the face of the post and the face of the wall or post opposite.

For stores and restaurants, the aggregate width of the stairs leading down from each story above the first shall be 20 in. for each 100 persons or fractions thereof occupying such floors and all the floors above, and the aggregate width of the stairs leading up from each story below the first shall be 20 in. for each 100 persons or fraction thereof occupying such floor and all the floors below.

Construction. All stairs in buildings required to be of first-class construction and all stairways required to be enclosed in buildings of second-class construction shall have all stairs, stair landings, and floors inside the enclosure of metal or masonry, except that hand rails may be of wood. All stairs shall be framed for live loads required in Div. 8. Required stairs shall have not more than 15 nor less than 3 risers between landings, landings shall be not less than 3 ft. 6 in. wide between risers, the risers shall not exceed 8 in. in height and the treads shall not be less than 9 in. wide, exclusive of nosings. Required stairs shall have no winders but the Superintendent may allow curved runs of large radius. Required stairs over 4 ft. wide shall have hand rails on both sides, and, if over 7 ft. wide, shall have center hand-rails, terminating at their upper ends in posts at least 6 ft. high. No closet shall be built under any stairway of wooden construction except in one or two-family dwellings.

Section 171. An outside metal or reinforced concrete fire-escape, approved as to construction and access, shall be considered equivalent to one of the required exits for all buildings not more than 3 stories high except for stores, restaurants, and manufacturing buildings. A fire-escape may project over a public way.

Section 172. A horizontal exit leading to another floor area beyond a fire wall or party wall shall be considered equivalent to one of the required exits for such a floor if such an exit be through an opening constructed as required in Div. 18 or by an approved outside balcony, and *provided* that such other floor area shall be large enough to contain the joint occupancy, allowing 4 sq.-ft. per person.

Section 173. When the total occupancy of a building above the second floor is more than 500 persons, one of the exits shall be an approved smoke-proof tower with access at each floor by means of outside balcony or open air vestibule.

Section 174.

Corridors. Public exit corridors shall be not less than 3 ft. 8 in. wide, and any corridor serving as an exit for more than 200 persons shall have a width of 20 in. for each 100 persons and fraction thereof so served. Corridors connecting two flights of stairs in the line of travel of an exit shall be at least as wide as the wider of the two flights.

Doors serving more than 50 persons and opening to public corridors or to enclosed stairs shall open toward the stairs. Rooms accommodating more than 50 persons shall have at least two doors leading to exits, each door to be not less than 3 ft. wide, and with an aggregate width of 20 in. for each 100 persons and fraction thereof accommodated. Any fastenings on doors required by this section shall be such as may be easily opened from the inside without the use of keys; *provided, however*, that this requirement shall not apply to the doors of rooms where persons are held under legal restraint.

Section 175. Outside and vestibule doors for buildings accommodating more than 100 persons, except

one-story stores of less than 2000 sq. ft. area, shall swing out or shall be double-swing or revolving doors; *provided, however*, that this requirement shall not prohibit the use of sliding doors which are in addition to the required exits or sliding doors which may be used for closing buildings after business hours.

DIVISION 21.—BAYS, BALCONIES, PORCHES, CORNICES, AND OTHER PROJECTIONS.

Section 176. No parts of a building other than those mentioned in this division, shall project over any street, square, or other public way.

Cornices, balconies and bay windows may project a distance equal to $1/20$ of the width of the public way; *provided, however*, that in no case shall they in any part so project more than 3 ft.

No bay projecting over a public way shall be more than 15 ft. long and no two such bays in any story shall be less than 5 ft. apart.

When a building is set back to allow increased height, the line of setback required for the increased height shall be considered the street line beyond which projections shall be allowed on the portions of the building that are so set back.

Window caps and sills, string courses and other projections may project $1/4$ of the projection allowed for a cornice of the wall on which they occur.

Rain water leaders and conductors shall not project more than 7 in.

Fire escapes, required or permitted by this ordinance, may project according to regulations of the Superintendent.

When any projection occurs it shall be at least 10 ft. above the level of the curb.

Signs and marquees shall be as prescribed in Div. 24 of this ordinance.

DIVISION 22.—ROOFS AND ROOF STRUCTURES.

Section 177. No roof shall be arranged as to discharge water upon a public way or adjoining property.

Section 178. Chimneys shall be carried above roofs as provided in Div. 11.

Section 179. Every building over one story high and having a flat roof shall have permanent access to the roof, from the inside of the building through an opening at least 2 ft. x 3 ft. with fixed step ladder or stairs. Such opening shall have direct access from a public corridor or stair hall and shall not be equipped with a lock.

Section 180. No roof houses shall be constructed on any building above the highest level permitted for the roof, except over stairs, tanks, elevators and elevator machinery, and such roof houses shall be no larger than is necessary to serve properly their purpose, and as approved.

Method of construction and exterior covering of roof houses shall be at least equivalent to the construction permitted for the roof, according to Div. 7. In second and third-class construction the scuttle or the door to a roof house may be of wood core covered with metal.

Section 181.

Roof Tanks. Support and construction of roof tanks shall be according to regulations or approval.

Section 182. All skylights on roofs of buildings of second and third-class construction shall be of metal and glass, and shall not be at any point higher than 6 ft. above the highest level permitted for the roof except with special approval. Skylights not glazed with wire glass shall be protected with approved wire screens.

Section 183. No elevated staging or stand for observation purposes shall be constructed or occupied upon the roof of any building.

DIVISION 23.—FIRE DOORS, WINDOWS, AND SHUTTERS.

Section 184. A "self closing door" is one normally kept closed by gravity, a weight, or a spring attachment. An "automatic fire door" is a door equipped with fusible link so as to close by the action of heat.

Fire doors, fire windows, and fire shutters shall, where required, be built in accordance with detailed regulations for construction and installation issued by the Superintendent.

Where fire windows are required in exterior walls, fire shutters may be substituted with the approval of the Superintendent.

Section 185. Doors and windows in the following locations shall be equipped with approved fire doors and fire windows:

In stairway enclosures as required by Div. 19.

Adjacent to fire-escapes, permitted or required by this ordinance, according to regulations of the Superintendent.

Openings in walls of buildings for offices, stores, restaurant, manufacturing, and storage within 20 ft. of another building.

Openings in any walls overlooking and within 50 ft. of the roof of a theatre stage.

Doors to boiler rooms as required in Div. 27.

Doors in party and fire walls herein required or permitted, and shall be so equipped on both sides of the wall.

Windows in party walls above the roof of an adjacent building.

Windows in walls within 5 ft. of a party line.

Elsewhere as the Superintendent may require on account of special hazard.

DIVISION 24.—SIGNS, BILLBOARDS, MAR-
QUISES, FLAG POLES, AND POLES
OR FRAMES ON BUILDINGS TO
SUPPORT WIRES.

(See also Department of Public Safety regulations.)

Section 186. Within building district 1 no signs or billboard of greater area than 12 sq. ft. shall be erected on any building unless made of or covered with incombustible material, nor over 100 sq. ft. area unless of incombustible material, nor over 200 sq. ft. area unless of skeleton construction.

The top of a sign or billboard placed upon any building shall not be higher than the height allowed for any building upon that lot.

The top of any sign or billboard placed upon a third-class building in district 2 shall not be higher than 12 ft. above the eaves.

Signs or billboards erected on the ground in district 2 shall not be placed within 20 ft. of any building, unless made of or covered with incombustible material.

Signs or billboards placed on the ground must have a space of at least 4 ft. between the ground and the bottom of such sign or billboard.

Section 187. The Superintendent shall make regulations governing the character, construction and maintenance of signs, billboards, and marquees wherever placed, and of flag poles, and poles or frames placed on buildings to support wires.

DIVISION 25.—TEMPORARY STRUCTURES
AND BARRICADES.

Section 188. During building operations temporary structures in connection therewith and barricades, sidewalk coverings, and scaffolds, to safeguard both workmen and public, shall be constructed and maintained, where required, subject to the approval of the Superintendent.

DIVISION 26.—PLUMBING.

Section 189. Certain words in this division are defined for the purpose thereof as follows:

Air pipes or back-air pipes. Air pipes connected to not more than 3 traps and extending toward the main soil pipe or the outer air.

Fixture. A receptacle or outlet for the disposal of waste water or other matter and connected with the waste, soil, or drain pipe of a building.

House drain. The horizontal portion of the drainage system in the basement or cellar connecting the soil and waste pipes to the house sewer 10 ft. outside the inside face of the wall.

House sewer. That part of the drainage system of a building connecting the house drain to the public sewer.

Repair of leaks. Such repairs as are necessary to protect property, but do not involve any extensive change in construction.

Soil pipe. That part of the drainage system, 4 in. or more in diameter, between the house drain and the highest fixture in the building.

Surface drain. A connection with house drain to allow escape of surface water or overflow.

Ventilation pipe. The extension of the soil pipe from the highest fixture to and through the roof.

Vent pipes. General lines of back-air pipes connecting with more than 3 fixtures.

Y-branch. A branch at sufficient angle to direct the flow and prevent backing up.

Section 190. Every plumber, before doing any work in a building, shall, except in the case of repair of leaks, file at the office of the Superintendent, upon blanks for that purpose, an application for a permit, and, if required by the Superintendent, a plan or sketch

of the work to be performed; and no such work shall be done in any building without a written permit from the Superintendent.

Section 191. The plumbing of every building shall be separately and independently connected outside the building with the public sewer, if such sewer is provided, or with a proper and sufficient private drain or sewer laid outside the building, or if a sewer is not accessible, with a proper cesspool. Several buildings may have a common sewer connection if such connection is approved by the Superintendent.

Section 192. The waste pipe of every independent sink, basin, bathtub, water-closet, slop-hopper, urinal, or other fixture shall be furnished with a separate trap, which shall be placed as near as practicable, to the fixture which it serves; *provided, however,* that a sink and a set of 3 wash trays or a bathtub and basin, when they adjoin, may be connected to a waste pipe through one 5-in. round trap, when the outlets are not over 4 ft. apart. Not more than 4 wash-bowls or sinks in a continuous line shall be connected to the house drain through one 5-in. round trap. Two water-closets or 2 other traps on the same level with not more than 3 ft. of waste pipe connecting with the soil or waste pipe not more than 18 in. below the top water line of the trap, shall not require other vent than the continuation of the soil or waste pipe full size for its whole length. Lateral branches of soil or waste pipe, if more than 20 feet in length, shall be extended through the roof in a size prescribed for the ventilation of the attached trap, or be vented into a main vent line. All connections on lead waste and back air pipes and of lead pipes to brass ferrules and soldering nipples shall be full size, wiped soldered branch, round, or flanged joints. Soil and waste pipes shall have proper T-Y or

Y-branches for all fixtures connections. No connection to lead bends for water-closets or slop-sinks shall be permitted, except the required back air pipe where a continuous vent is not practicable.

Earthenware traps shall have heavy brass floor plates soldered to the lead bends if used, and bolted to the trap flange, and the joint made gas tight with red or white lead. Rubber washers for floor connections shall not be used.

Section 193. All drip or overflow pipes shall be extended to some place in open sight, and in no case shall any such pipe be connected directly with the drain pipe. No waste pipe from a refrigerator or other receptacle in which provisions are stored shall be connected directly with a drain or other waste pipe. The waste pipes from all other fixtures shall be connected directly with a drain pipe. Refrigerator wastes connecting with two or more stories shall be supplied with a trap on the branch for each floor and extended through the roof.

Section 194. Except as otherwise provided, traps shall be protected from siphonage or air pressure by special iron or brass air pipes of a size not less than the waste pipes they serve; back air pipes shall not be connected to the trap or branched into the waste pipe, except where a continuous vent is not practicable, but a suitable non-siphon trap may be used without a back air pipe upon the approval of the Superintendent. Back air pipes shall enter the waste pipe within 18 in. from the trap and shall be a continuation of the waste pipe. Lead air pipes may be used only for short connections, where they are exposed to view. Air pipes for water-closet traps shall be connected to the highest point of bend, and may be of 2-in. bore if for not more than 3 fixtures and less than 30 ft. in length; if for

more than 3 fixtures or more than 30 ft. in length, they shall be of 3-in. bore. Air pipes shall be run as direct as practicable, and, if 1½ in. or less in diameter, shall not exceed 30 ft. in length. Two or more air pipes may be connected together or with a vent pipe; but in every such case the connection shall be above the top of the fixture. The trap for the upper fixture on a line of soil or waste pipe, if within 5 ft. of the stack in a horizontal line, shall not require a special air pipe, unless the outlet is branched into a stack more than 18 inches below the top water line of the trap. Diameters of vent pipes shall not be less than 2 in. for main vents through less than 7 stories; 3 in. for water-closets on more than 3 stories and for other fixtures in more than 7 stories. All vent pipes shall be at least 4 in. in diameter when they pass through the roof. Vent lines shall be connected at the bottom with a soil or waste pipe or with the drain in such a manner as to prevent accumulation of rust scale and properly to drip the water of condensation. Offsets shall be made at an angle of not less than 45 degrees.

Except for water-closets, all traps not provided with special air pipes shall be suitable non-siphon traps. Round traps shall be not less than 4 in. in diameter and if of lead, shall be 8 in. long and made of 8-ll. lead. All trap screws shall be water-sealed.

In buildings where a series of bathrooms or kitchens are located directly over each other and have a common soil or waste pipe, the branch vents in each story shall connect to the vent line above the top of the highest fixture on each floor and the vent line shall connect to the ventilation pipe or to the extension of the waste pipe above the highest fixture in the building.

In the case of batteries of water-closets or other fixtures, the special air pipe from each trap may be omitted, provided the soil or waste pipe, undimin-

ished in size, is continued from the farthest fixture through the roof or is looped into the ventilation pipe or to the extension of the waste pipe above the highest fixture in the building.

Section 195. The diameters of soil and waste pipes shall be not less than those given in the following table:

	Inches
Soil pipes	4
Main waste pipes	2
Main waste pipes for kitchen sinks on 5 or more floors	3
Branch waste pipes for laundry tubs	1½
Branch waste for kitchen sinks	1½
Branch waste for urinals	1½
No branch waste for other fixtures shall be less than	1

Provided, however, that, with the approval of the Superintendent, a 3-in. soil pipe may be used for one water-closet where it is not practicable to use a 4-in pipe.

Section 196. House drain, soil, waste, ventilation pipes, vents and back air pipes shall be of sufficient size, and made of extra heavy cast iron pipe if under ground, and if above ground shall be made of extra heavy cast iron, galvanized wrought iron or standard weight, or brass pipe of not less than No. 13 Stubbs gauge within the building except that lead pipes may be used for short connections exposed to view; *provided,* that no house sewer, house drain, soil, or waste pipe shall be of wrought iron or steel.

House drains shall be extended in cast iron not less than 10 ft. from the inside face of the wall, beyond the inside face of the wall, beyond and away from the building.

Drainage and vent piping above ground shall be supported by clamps to the woodwork, iron drive hooks to brick walls, bolted clamps to steel beams, or supported on masonry. Proper manholes shall be supplied to reach cleanouts and traps. Every house drain shall have a fall of not less than ¼ in. per ft. and shall be extended as a soil and ventilation pipe through the roof undiminished in size, and to a height not less than 2 ft. above the roof and not less than 1 ft. above the top of any window within 15 ft. and not less than 8 ft. above the roof if the roof is used for drying clothes or as a roof garden. Every house drain shall be provided with a running trap not less than the size of the drain and with a heavy brass cleanout.

Changes in direction shall be made with curved pipes, and all connections with horizontal or vertical pipes shall be made with Y-branches. Saddle hubs shall not be used. All house drain pipes shall be exposed to sight within the building if such exposure is practicable, and shall not be exposed to pressure where they pass through the wall.

Section 197. (See Divisions 29 and 31 for water-closets in dwellings.) Every water-closet or urinal shall be supplied with water from a tank or flushing valve through a pipe of not less than 1¼ in. diameter.

Section 198. No steam, vapor, or water of a temperature over 130 degrees Fahr. shall be discharged from any premises into any sewer, drain, or catch-basin, nor shall any matter or thing be discharged into any sewer which may tend to cause an obstruction of the public sewer or a nuisance or a deposit therein or any injury thereto.

All high-pressure steam boilers shall be connected with a blow-off tank of a capacity not less than 30 per cent. of the largest boiler connected with such tank.

The location of, and the connections, to such blow-off tank shall be subject to the approval of the Superintendent.

No steam exhaust or steam drip, unless it be provided with a cooling tank of a capacity approved by the Superintendent, or unless it be connected with the blow-off tank, shall connect with any drain leading to the sewer. Every blow-off tank shall be supplied with a vapor pipe not less than 2 in. in diameter, which shall be carried above the roof and above the highest windows of the building.

The Superintendent may require such additional means for cooling the blow-off tanks by the injection of cold water or otherwise as may be necessary to reduce the temperature of the water passing from the blow-off tank so that it shall not exceed 130 degrees Fahr.

Section 199. (See also Department of Public Safety regulations.) Every building from which, in the opinion of the Superintendent, grease may be discharged in such quantity as to injure the sewer, shall have a special grease trap, satisfactory to the Superintendent. Every building in which gasoline, naphtha, or other inflammable compounds are used for business purposes shall be provided with a special trap, satisfactory to the Superintendent, so designed as to prevent the passage of such material into the sewer, and ventilated with a separate pipe rising to a point 4 ft. above the roof. The waste pipe of every washstand for vehicles shall be provided with a sand box of sufficient capacity.

The waste pipe from the sink of every hotel, eating house, restaurant, or other public cooking establishment shall be connected to a grease trap of sufficient size, easily accessible to open and clean, placed as near as practicable to the fixture that it serves.

Fixtures and waste pipes in chemical laboratories shall be installed in accordance with plans approved by the Superintendent.

The drainage of stable fixtures shall be constructed in accordance with plans approved by the Superintendent.

Section 200. Rain-water leaders shall not be connected to soil and waste pipe at any point above the basement or cellar ceiling. Wherever a surface drain is installed in a cellar or basement, it shall be provided with a deep seal trap and back water valve. Drain pipes from fixtures in cellars and basement liable to back flow from a sewer shall be supplied with back water valves. (See Statutes as to separation of rain water and sewage piping.)

Section 201. Cast-iron pipes shall be uncoated, sound, cylindrical, and smooth, free from cracks and other defect, of uniform thickness and of the grade known to commerce as "extra heavy." If buried underground, they shall be coated with asphaltum or red lead.

Pipe, including the hub, shall weigh not less than the following average weights per linear ft.:

Diameter in inches	2	3	4	5	6	7	8	10	12
Wt. per lin. ft. in lb.	5½	9½	13	17	20	27	33½	45	54

Brass pipe for soil, waste, vent, and back air pipes shall be thoroughly annealed, seamless, drawn brass tubing, of not less than No. 13 Stubbs gauge.

Lead bends shall not be less than 8 lb. per ft.

Screw caps for clean-outs shall have a solid square or hexagonal nut, not less than ½ in. high, with a least diameter of 1½ in. The bodies of brass cleanout ferrules shall be at least equal in

weight and thickness to the calking ferrule for the same size pipe.

No slip joints or unions shall be used on traps, waste, vents, or back air pipes. Threaded connections on brass pipe shall be of the same size as pipe threads for the same size of pipe and shall be tapered. Connections between lead and iron shall be made by brass sleeves or screw nipples wiped to the lead and calked or screwed into the iron.

All joints in cast iron pipe shall be made with picked oakum and molten lead run full, and be made gas tight. No cement joints nor connections between iron and cement or tile pipe or brick drains shall be made within any building.

Fittings on wrought-iron vent or back air pipes shall be cast-iron threaded fittings. Fittings for "plumber's tubing" shall be heavy weight, with sharp threads.

Section 202. Pipes or other fixtures shall not be covered or concealed from view until approved by the Superintendent or his representative, who shall examine or test the same within two working days after notice that they are ready for inspection. The lathing permit required by Sect. 6 will not be issued until this test is satisfactory.

Plumbing shall not be used unless, when roughed in, the wastes, vents, back air pipes, and traps are first tested by water or sufficient air pressure in the presence of the Superintendent or his representative when, in his opinion, such testing is practicable.

DIVISION 27.—HEATING AND VENTILATION.

(See also Department of Public Safety regulations.)

Section 203. All rooms containing a furnace or boiler or other heating apparatus having a grate area of more than 10 sq. ft. shall be separated from all parts of the building by masonry partitions at least 8 in. thick and by ceilings of metal lath and cement plaster or with approved plaster boards not less than $\frac{1}{2}$ in. thick and coated with at least $\frac{1}{4}$ in. of cement or gypsum plaster when the floor above is not of first-class construction. The openings in the partitions shall be fitted with approved self-closing doors.

Section 204. No boiler shall be placed or maintained under a public way.

No furnace or boiler shall be placed upon a wooden floor.

The tops of all heating furnaces, boilers, and smoke pipes shall be at least 12 in. below the nearest woodwork. All ceilings immediately over a furnace or boiler and for 2 ft. on each side thereof, and all ceilings within 12 in. of indirect radiators, shall, except under floors of first-class construction, be metal lathed and plastered or covered with metal or with approved plaster boards not less than $\frac{1}{2}$ in. thick and coated with at least $\frac{1}{4}$ in. of cement or gypsum plaster and any woodwork or wooden lath partitions within 4 ft. of any furnace or boiler shall be covered with metal to a height of 4 ft. above the floor. Metal shields shall be so attached as to leave at least a 1-in. air space behind.

No smoke pipe shall project through any exterior wall or window, and every smoke pipe shall be kept at least 18 in. clear below any wooden floor beams

or wooden lath and plaster and not less than 12 in. clear below any wooden floor beams which are protected with metal lath and plaster unless, in either case, an approved metal shield is installed, but shall not be less than 6 in. clear below in any event except for floors of first-class construction. When a smoke pipe passes through a combustible partition it shall be protected by a ventilated thimble for at least 6 in. outside the pipe.

No horizontal hot air pipe leading from a furnace shall be less than 6 in. from any woodwork unless the woodwork be covered with loose fitting tin or the pipe be covered with approved protective material.

All hot air pipes passing transversely through combustible partitions must be double tin pipes with 1 in. between. No hot air pipe shall be placed within any wood stud partition or other wood enclosure less than 8 ft. distant from a furnace, unless placed inside another pipe or unless the surrounding spaces are lined as approved.

Hot air register boxes in the floors or partitions of all buildings shall be set in soapstone or equally fireproof borders not less than 2 in. in width, shall be made of tin plate, and shall have double pipes and boxes properly fitted to the stone borders. There shall be one register without valves or louvres in every furnace installation.

No steam or hot air pipe shall be placed within 1 in. of any woodwork.

Every ventilating flue shall be constructed of, or lined with incombustible material.

All heating pipes that are to be buried in partitions shall be in place before the lathing permit required by Sect. 6 will be issued.

DIVISION 28.—GAS FITTING.

Section 205. Gas-fitting shall mean the work of putting together any fitting, pipe, or fixture, or other appliances, which are to contain gas for heat, light, or power purposes.

Section 206. No pipe or fitting shall be covered or concealed from view until inspected by the Superintendent or his representative.

All work shall be installed in accordance with permit granted, complete in all details, properly fastened and made tight, before making appointment for inspection, and 24 hours' notice shall be given the Superintendent on all appointments for inspection. The lathing permit required by Sect. 6 will not be issued until this inspection is complete.

Gas shall not be turned on in any building, or turned on in any new fit contained in any new or old building, until the piping, fixtures, appliances, and the work performed has been approved by the Superintendent.

In buildings that have been damaged by fire, the gas piping and fixtures shall not be used or the gas turned on until authorized by the Superintendent.

All gas pipes shall be of the best quality wrought iron or steel, all fittings of malleable iron. Galvanized fittings and pipe are prohibited.

Meter connection of lead pipe shall be of the same size as the fit or riser, and brass solder nipples shall be used on all connections except on flange meters.

No second-hand pipe shall be installed in any building, without the written permission of the Superintendent.

All cast fittings, such as cocks, swing joints, double centers, and nozzles, shall be standard fittings,

except for factory use, where extra heavy or mill fittings shall be used. The plugs of all cocks must be ground to a smooth and true surface for their entire length, be free from sand holes, have not less than $\frac{3}{4}$ in. bearing on all cast fittings and $\frac{1}{8}$ in. on all turned fittings, have two flat sides on the end for the washer and have two nuts instead of a tail screw. All stop pins to keys on cocks or fixtures shall be screwed into place.

All brass tubing used for arms or stems of fixtures shall be at least No. 18 standard gauge and full size outside so as to cut a full thread. All threads on brass pipe shall screw in at least $\frac{5}{16}$ in. All rope or square tubing shall be brazed or soldered into fittings and distributors, or have a nipple, one end of which shall be brazed into the tubing, and the other end provided with male thread to screw into distributor.

Section 207. Iron or steel gas pipes shall be installed in accordance with the following scale:

Diam. in inches	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4
Length in feet	26	30	50	70	100	150	200	300	450	500	600
No. of burners	3	6	20	35	60	100	200	300	450	600	750

No riser or main pipe less than $\frac{3}{4}$ in. shall be installed in any building without the approval of the Superintendent.

Iron or steel gas pipes, arms, and the stems of fixtures shall be of standard pipe and shall weigh according to the following table:

Diam in in.	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{4}$
Lb. per ft.	0.24	0.42	0.56	0.85	1.12	1.67	2.24
Diam in in.	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	
Lb. per ft.	2.68	3.61	5.74	7.54	9.0	10.66	

Section 208. The service pipe must have connected to it, close to the foundation wall, an extra heavy malleable iron tee, and the end on the run opposite the service shall be reduced to $\frac{3}{4}$ in. and be plugged with a three-quarter nipple and cap. The outlet side shall have connected to it a close nipple and L with a main shut off cock made into the L. In buildings of more than one riser, each inlet riser should have connected to it in the cellar a shut-off the same size as the riser.

Piping installed in cold or damp places shall be properly dripped, painted with two coats of red lead and linseed oil, and protected in a manner satisfactory to the Superintendent.

Inside services shall be tested by the fitter who receives the permit to connect the service; connections for the meter must be installed, and the service connected when the test is made. This section applies to all inside services whether the meters are set in bathrooms or the basement.

Risers shall be run to within 5 ft. of that part of the foundation wall at which the service pipe will enter the building. The bottom of all risers shall have drip tees.

Section 209. Outlets for gas ranges shall have a diameter not less than that required for 6 burners except in buildings where gas is used for cooking and heating only, then the outlet shall be not less than $\frac{3}{4}$ in., and all ranges and heaters shall have

a tee handle cock on the service pipe. When several appliances are used from one supply pipe, the supply pipe must be provided with a shut-off to control all.

Drops and outlets less than $\frac{3}{4}$ in. shall not be left more than $\frac{3}{4}$ in. below plastering, centerpiece or woodwork; and other outlets shall not project more than $\frac{3}{4}$ in. beyond plaster or woodwork, and no outlets shall be placed back of doors, under tanks, or within 4 ft. of any meter.

All bracket outlets shall be at least 6 in. from window or door casings.

Alteration work and new fits in old buildings on each floor shall have no outlets except those that are supplied by the meter for that floor, and any outlet that may be connected to any other meter shall be disconnected and plugged under the floor, or back of the plastering, and be covered up.

Section 210. Meters shall not be located nearer than 12 in. to any electric cutouts, switches, meters, or other exposed live metal parts.

No meter shall be located in any room that is used as a sleeping room, or under stairways in any second or third-class building, or in closets unless they are properly ventilated at the upper part close to the ceiling, or in close proximity to any boiler or furnace, or directly over ranges.

No meter shall be set in any kitchen, kitchenette, or any room containing a gas range unless the floor area is at least 36 sq. ft. and the meter can be set at least 8 ft. from any range or stove, and the room is properly ventilated.

There shall be a brass cock or valve according to size of fit, one at the inlet side and one at the outlet side of every meter. Iron valves shall not be used.

When the meter sets near the service pipe, and not over 8 ft. of piping is used to connect the inlet side, the cock at the inlet may be left off, provided in all cases that the cock at the service tee can be readily reached.

Section 211. All cocks on illuminating fixtures that are installed in any building containing rooms used for sleeping purposes shall be separated one from the other at least 6 in.; and no hose cock or independent fitting, or any cock that controls the gas supply to any appliance, shall be nearer than 6 in. to any other cock.

Gas arc fixtures, inverted light fixtures, and all fixtures of this description, the burners of which are ignited from a pilot or several pilot lights, shall have in the stem of the fixture an extra heavy brass lever cock which can be operated from the floor, and if fixture is constructed with arms, the cocks on same must comply with rules as regards size and bearing; pilot light tubing shall be made gas tight.

Gas burners less than 2 ft. from plastered ceilings, or less than 3 ft. from overhead woodwork, shall be protected by a shield satisfactory to the Superintendent.

Stiff bracket fixtures should be installed in preference to swing brackets and no stiff bracket installed in any second or third-class building shall be less than 6 in. long, and, unless provided with a globe or a shade, shall have on the wall immediately back of it a suitable metal shield.

Swing brackets shall have a globe or guard to prevent the burner from coming in contact with the wall; no guard or ring to be less than 5 in. in diameter and the guard to be securely fastened to fixture independent of the burner.

Pendants and all one-burner fixtures shall not be smaller than $\frac{1}{4}$ in. iron size; if of brass it shall conform to the rule as regards the bore and gauge.

Top couplings on all brass stems shall be soldered or brazed to the stem, and the top couplings and insulating joints of all other fixtures shall be cemented and screwed on stem.

Fixtures shall be put together by heating and cementing, and be securely screwed into the drop so that it cannot be turned off by hand, and the arms made up so that they will remain safe and secure.

L-burner cocks shall not be used at the end of chandelier arms, except in stores, churches, theatres, halls, and places of assembly or public resort. All stems of fixtures of two lights or more each shall be not less than $\frac{1}{4}$ in. iron size.

Ranges and stoves shall be kept at least 8 in. from any woodwork or any lath and plastered partition, or protected to the satisfaction of the Superintendent.

All appliances of any description that can be connected to supply pipe with iron piping shall be so connected; the use of rubber tubing and flexible piping shall be allowed only when approved.

For all gas boilers for generating steam or for all automatic water heaters in which the burners are ignited automatically from a pilot light there shall be a ventilating pipe of cast-iron or of standard weight wrought iron or steel steam pipe to carry the gas to the open air.

This vent shall be carried in the open not less than 3 ft. before entering any wooden partition and if, within this length, it is nearer than 3 in. to any woodwork or wooden lathing they shall be protected by incombustible materials. If vent pipes

are installed for gas stoves they shall be arranged in the same way.

Ventilating pipes shall not have any damper, deflector or other device which will reduce the area of same and shall be not smaller than collar of the heaters to which they are attached.

Auxiliary water heater connected to hot water boilers, as set in kitchens in dwellings, shall have a supply pipe of not less than $\frac{1}{2}$ in., but may be figured as 3 burners each.

Gas engines shall not be connected to a service from which gas for illuminating purposes is used. Exhaust pipes shall be run to roof when possible, shall not come in contact with woodwork, and shall be properly protected. Diaphragms and bags shall be on the same floor with engine and shall have a valve governing same.

The sizes of pipe used in connecting gas engines shall be approved by the Superintendent.

No patented device designed for the use of gas, and no improvement on any fixture, device, or appliance, or patent burners shall be installed in any building until the same has been approved by the Superintendent.

Section 212. All drop pipes shall have tee nipple and cap and shall be double fastened, and, when required by the Superintendent, this shall apply to piping done on the outside of plastering. Fastening boards shall not be cut away to accommodate electric wires.

Pipes shall be laid above the timbers and shall be run and laid to avoid any strain or weight on same, except that of fixtures, unless otherwise permitted by the Superintendent.

No gas pipe shall be laid within 6 in. of any

electric wire, unless the wire is in an insulated conduit or provided with a porcelain tube insulator.

In installing and connecting pipes, fittings, fixtures, and appliances, the red lead, white lead, or compound that is used must be applied to the male thread only.

The use of gas fitters' cement is prohibited except in putting fixtures together.

On concealed work no unions will be allowed, but right and left couplings shall be used. All unions shall be made up with ground metal seats.

Section 213. The gas fitter shall make a final test in the presence of the Superintendent or his representative with a gauge made of glass tubing of uniform interior diameter, and so constructed that both surfaces of the mercury will be exposed. All fixtures and pipes must stand 2 in. of mercury for 5 minutes.

All ranges, stoves, and appliances shall be tested to the cocks or valves that control the burners.

Wherever spark lighting or self-lighting burners are used, the mercury test shall be applied to the cocks.

DIV. 29. ADDITIONAL FOR DWELLINGS

Section 214. No cellar shall be occupied for living purposes.

Section 215. The area of a window is the clear opening. Every window herein required shall be arranged so that approximately half its area may be opened at one time.

Every room, kitchenette, and alcove, except bathrooms and water closet compartments, shall have a window or windows of a total clear area of not less than $\frac{1}{8}$ of the area of the room, so located as to light the room properly, opening upon a street, yard, or court located upon the same lot and of the dimensions specified in this division: *provided, however*, that this requirement shall not apply to rooms used for art galleries, swimming pools, gymnasiums, squash courts, or for similar purposes, nor to public rooms in multiple-dwellings, which have approved artificial ventilation. In multiple-dwellings, the top of at least one window in every room shall be not less than 7 ft. 6 in. above the floor.

Section 216. Every water-closet compartment and bathroom shall have at least one window opening directly upon the street, or upon a yard, court, or offset to court, of the dimensions specified for each in this division and located on the same lot. No such window shall be less in size than 3 sq. ft. and the aggregate area of windows for each water-closet compartment shall not be less than 6 sq. ft. A ventilating skylight not less in size than 3 sq. ft., open to the sky, may be used in lieu of windows required by this section. Nothing contained in this section shall be construed so as to prohibit a general toilet room containing several water-closet compartments separated from each other by dwarf partitions, *provided*, such toilet

room is adequately lighted and ventilated to the outer air as above provided.

Section 217. In two-family and multiple-dwellings there shall be in each apartment one room of not less than 150 sq. ft. area, and not more than one room, besides kitchenettes and bathrooms, of less than 80 sq. ft. area, and no room less than 63 sq. ft. area.

No room, except kitchenettes, bathrooms, and water-closet compartments, shall be less than 7 ft. wide, nor shall its length be more than twice its width, the width being the dimension measured along a window wall. No room in a multiple-dwelling shall be less than 8 ft. 6 in. high.

There shall be access to every living room and bedroom and to at least one water-closet compartment without passing through a bedroom, bathroom, or water-closet compartment.

Section 218. Every public corridor extending more than 20 ft. from a stair hall shall have at least one window of not less than 12 sq. ft. area opening upon a street, a public alley or open passageway not less than 10 ft. wide, a yard, a court, an offset of a court, or a vent shaft, all of the dimensions required by this division, or, in lieu of such window, every door opening into such corridor shall have a wire glass panel of not less than 320 sq. in. area.

Sashes glazed with wire glass may be required by the Superintendent if, in his opinion, they are needed for the adequate lighting of any public corridor.

Section 219. Every public stair hall shall have at least one window on each floor of not less than 12 sq. ft. area opening upon a street, a public alley, or open passageway not less than 10 ft. wide, a court, an offset of a court, or a vent shaft, all of the dimensions required by this division: *provided, however,*

that two stairways serving the same apartment shall not open into the same vent shaft and, *provided,* further, that no such windows shall be required when there shall be, within the space enclosed by the stairway and its landings, from the second story upward, an open area for light and ventilation whose least dimension shall be 3 ft. for a 3-story building and 1 ft. additional for each additional story, and with a skylight directly over the well with an area equal to the area of the well, but not less than 20 sq. ft. in any case. Such skylight shall have either ridge ventilators with a minimum opening of 40 sq. in. or shall have louvres giving a clear area of 40 sq. in.

Glazing at the entrance of at least 5 sq. ft. shall be considered adequate for the lighting of the entrance hall between the entrance and the stairs.

Section 220. Every dwelling shall have a basement, cellar, or excavated space under the entire entrance floor at least 3 ft. in depth, or shall be elevated above the ground so that there will be a clear space of at least 24 in. between the top of the ground and the bottom of the entrance floor so as to ensure ventilation and protection from dampness. Such space shall in all cases be enclosed, but provided with ample ventilation and properly drained. When necessary to make basement or cellar floors dry, waterproofing shall run through the walls and up the same as high as the ground level and shall be continued throughout the floor, and the said cellar or lowest floor shall be properly constructed so as to prevent dampness or water from entering. All cellars and basements in dwellings shall be properly lighted and ventilated.

Section 221. Within every dwelling and apartment there shall be a water-closet. Each such water-closet shall be placed in a compartment completely

separated from every other water-closet; such compartment shall be not less than 3 ft. wide, and shall be enclosed by partitions which shall extend from the floor to the ceiling. In multiple-dwellings such partitions shall not be of wood or other absorbent material and no wooden sheathing or wainscoting shall be permitted and the floor shall be made water-proof, and such water-proofing shall extend at least 2 in. above the floor.

Nothing in this section shall be construed so as to prohibit in any dwelling a general toilet room containing several water-closet compartments separated from each other by dwarf partitions: *provided* such toilet room is adequately lighted and ventilated to the satisfaction of the Superintendent, and that such water-closets are supplementary to the water-closet accommodations required by other provisions of this section. In multiple-dwellings every water-closet compartment shall be provided with proper means of lighting the same at night. No drip trays shall be permitted in any water-closet. No water-closet shall be placed out of doors. No water-closet shall be placed in the cellar of any multiple-dwelling unless such closet is adequately ventilated and lighted by a window to the outer air.

Section 222. No multiple-dwelling shall be built on any street unless there is a public sewer in such street or a private sewer connecting directly with a public sewer.

Section 223. No plumbing fixtures shall be enclosed with woodwork.

Section 224. In every dwelling there shall be a proper sink or wash bowl with running water, exclusive of any sink in the cellar. In two-family dwellings and in multiple-dwellings there shall be such a

sink or wash-bowl in each apartment, suite, or group of rooms.

Section 225. No dwelling of third class B construction shall hereafter be erected exceeding $2\frac{1}{2}$ stories in height in any part, nor shall it be occupied by more than two families.

Dwellings of third-class A construction occupied by not more than three families, not exceeding three full stories or 50 feet in height above the curb, not over 2000 square feet area, and not less than 7 feet from each side lot line may be erected in Districts 2 and 3, *provided, however*, that one bay window, 12 feet or less in length, may project on each side of such a dwelling to not less than 5 feet from the side lot line. Such 3 story dwellings may be built of third-class A construction, but without the incombustible wall covering, *provided, however*, that no permit for such construction shall be granted unless there has been filed with the Superintendent, the written consent of seventy-five per cent. of the lots of real estate of which either 2500 square feet or one-third of the total area lie within 200 feet of the center of the lot on which the dwelling is proposed to be erected; each lot to be entitled to one vote on the question of consent. Such real estate shall include all land, public, institutional, or private, except highways.

No dwelling of second-class E construction shall be erected exceeding 4 stories in height and no dwelling of second-class B construction exceeding 5 stories, nor shall any multiple dwelling of second-class construction exceed 3000 square feet in area between fire walls, party walls and exterior walls. Every dwelling hereafter erected which exceeds 5 stories in height shall be of first-class construction.

Section 226. In two family dwellings two means

of egress satisfactory to the Superintendent shall be provided from the third story or half story. In all multiple dwellings a main stairway, accessible from each apartment, shall extend from the entrance floor to the top floor. The stairs and landings shall be at least 3 feet 4 inches wide between faces of walls, or three feet between face of wall and face of balustrades, or between faces of two balustrades, and no winders shall be allowed. In multiple dwellings exceeding two stories in height such stairway shall be constructed as specified in Division 20 and surrounded by the respective types of enclosure specified in Division 19. Such stairway shall not extend below the entrance floor. In multiple dwellings exceeding three stories in height the entrance floor of such stairway shall either be of first-class construction or, if the floor is of combustible construction, the enclosure walls shall be continued to the basement or cellar floor without openings below the entrance floor.

In addition to the main stairway specified above, there shall be a second way of egress from each apartment in multiple-dwellings without passing through the first way. Such second way of egress may be any of the following the owner may elect.

In multiple dwellings not exceeding three stories in height such additional way of egress may be an outside open stairway of wood with wooden balconies or piazzas, or an interior stairway which, if it extends to the basement or cellar shall be surrounded in the basement by an enclosure of wooden studs covered on the side toward the basement of cellar with metal laths and cement plaster or with approved plaster boards not less than $\frac{1}{2}$ in. thick coated with at least $\frac{1}{4}$ in. of cement or gypsum plaster. Any doorway from basement or cellar into such stairway shall be fitted with approved self-closing fire door in metal or metal cov-

ered frame. Such interior stairway shall have stairs and landings at least three feet wide between faces of walls or two feet 8 inches between face of walls and face of balustrade or between faces of two balustrades, and winders will be permitted.

In multiple dwellings exceeding three stories in height such second way of egress may be any of the following the owner may elect.

(1) An interior stairway surrounded by the respective types of enclosure specified in Division 19 and constructed as specified in Division 20.

(2) Exterior metal or reinforced concrete fire escape, approved as to construction and access.

(3) A horizontal exit as specified in Division 20.

For multiple dwellings three stories high and with a flat roof, one stairway shall be extended to the roof by stairs or stationary ladder to a scuttle not less than two feet by three feet. For dwellings four stories or more high and with a flat roof, one stairway shall be extended to the roof by stairs through a bulkhead with door not less than 6 feet 8 inches high. No lock shall be placed on any bulkhead door or scuttle, but they may be fastened on the inside by movable bolts or hooks.

Portions of multiple-dwellings separated by fire or party walls may have a common entrance and stairway: Provided, that such stairway and entrance hall are surrounded by the respective types of enclosure specified in Division 19 and constructed as specified in Division 20.

Section 227. Entrance halls in multiple-dwellings shall be at least 3 ft. 6 in. wide in the clear, and shall be constructed and enclosed like the corresponding stairway.

Section 228. Public corridors in multiple-dwell-

ings shall be surrounded by enclosures like those specified for stairways in Div. 19, and all doors from public corridors to apartments shall be approved self-closing fire doors with metal or metal covered frames, and all windows from public corridors shall be approved fixed metal covered windows with wire glass.

Section 229. In every multiple-dwelling there shall be an entrance to the cellar or other lowest story from the outside.

Section 230. No garbage chute shall be erected in any dwelling.

DIVISION 30—EXISTING BUILDINGS, OTHER THAN DWELLINGS.

(For lining existing walls, see Div. 11.)

Section 231. Repairs as defined in this ordinance may be made without a permit.

Section 232. Alteration or addition in existing buildings shall be made to comply with the requirements of this ordinance for new buildings, and if the Superintendent decides that an alteration, when completed, will produce a practically new building or impair the stability or increase the fire risk of the building as a whole, then the whole building shall be made to conform to the requirements of this ordinance for a new building. A building damaged by fire or other casualty to an amount less than one-half of the cost of a like new building may be repaired or restored so as to conform to its original condition, or, may be reconstructed in some or all of its parts, as the Superintendent may specify in his permit.

No third-class building within district 1 shall be so altered or repaired as to increase the fire hazard, nor altered or repaired if the estimated cost of the proposed alterations or repairs exceeds one-half of the cost of a like new building. Changes in existing dwellings may be made to permit of their occupancy by not more than three families under such conditions as the Superintendent may require. This amendment shall become null and void on the first day of January, in the year Nineteen Hundred and Twenty-two.

Section 233. No third-class building shall be moved from without to within district 1, and no third-class building within district 1 shall be moved to any position away from the lot upon which it is built or to any position where the fire hazard would be increased.

Section 234. The Superintendent may prescribe the maximum loads which may be imposed upon the floors of existing buildings.

Section 235. In work in connection with alterations of existing buildings, the character and amount of protection of structural metal shall be, as far as reasonable, equivalent to that required for like buildings hereafter erected.

Section 236. No existing building shall be so altered or enlarged as to contain an unenclosed area greater than that allowed in Div. 18 of this ordinance for buildings hereafter erected.

Section 237. Every existing building shall have, with reference to its height, condition, construction, surroundings, character of occupation, and number of occupants, reasonable means of egress in case of fire and for this purpose the Superintendent may require that exits, corridors, and stairs to be, as far as reasonable, equivalent to those required for like buildings hereafter erected.

Section 238. The Superintendent may require in existing buildings, fire doors, windows, and shutters, as far as reasonable equivalent to those required for like buildings hereafter erected or otherwise so as to secure an equivalent degree of fire protection.

Section 239. Alterations required in existing buildings shall be made within 6 months after the written notice of such requirements.

DIVISION 31.—EXISTING DWELLINGS.

Section 240. Excepting water-closet compartments and bathrooms, wherever a room in any existing two-family or multiple-dwelling has window area of less than 9 sq. ft. opening on a yard, court, alley, or open passageway, all of which are not less than 10 ft. wide, or upon a street, railroad right of way, cemetery, public park, or above the roof of an adjoining building, such window or windows shall be enlarged and provided with the above area, unless such room is located on the top floor and is adequately lighted and ventilated by a skylight opening directly to the outer air. Wherever a room has no windows at all to the outer air or has only a window opening upon a yard, alley or open passageway less than 10 ft. in width or upon a shaft or court less than 6 ft. in its least dimension such a room may be occupied if provided with a double-hung window or windows of not less than 15 sq. ft. total area, opening into an adjoining room in the same apartment having a window or windows of a total clear area of not less than $\frac{1}{8}$ of the area of the room and opening upon such a yard, court, alley, or open passageway, all of which are not less than 10 ft. wide or upon a street, railroad right of way, cemetery, public park, or above the roof of an adjoining building. Such windows shall be glazed with translucent glass in the lower half, and, as far as possible, shall be in line with windows in the outer room.

One wall of every alcove in an existing two-family or multiple-dwelling shall be provided with an opening equal in area to at least 60% of the separating partition, and no door shall be allowed to close such opening.

No existing two-family or multiple-dwelling shall be so altered as to reduce the provisions for light and

ventilation of any room, alcove, public corridor, or stair hall below the requirements of this ordinance.

Section 241. When the public corridor in an existing multiple-dwelling extends more than 20 ft. from a stair hall and is not provided with windows opening as provided in Sec. 218, all doors leading from such public corridor into apartments shall be provided with wire glass panes of not less than 4 sq. ft. for each door.

Section 242. In every existing multiple-dwelling over three stories high there shall be in the roof, directly over each stair hall, a skylight of not less than 6 sq. ft. area with a ventilator or louvres giving a clear area of at least 40 sq. in.: *provided, however,* that this section shall not apply to any existing multiple-dwellings, having windows as provided in Sec. 219 or a bulkhead in the roof over the stairs, which bulkhead is provided with a window or windows, made so as to open readily, and of not less than 12 sq. ft. total area.

Section 243. In all existing multiple-dwellings the woodwork enclosing the space underneath all water-closets used in common by two or more families shall be removed, and the space underneath the seat shall be left open. The floor and other surface beneath and around the closet shall be put in good order and repair.

Section 244. The floor of the cellar or lowest floor of every dwelling shall be free from dampness, and, when deemed necessary and ordered by the Superintendent, shall be concreted with not less than 3 in. of concrete of good quality and with a finished surface.

In every existing multiple-dwelling which is more than 3 stories in height and having more than 8 apartments, all stairways, elevators; vent shafts, and other shaftways or chutes shall be enclosed in the basement as provided in Div. 19.

Section 245. In every existing multiple-dwelling where there is a court or shaft of any kind, there shall be at the bottom of every such shaft and court a door or window giving sufficient access to such shaft or court to enable it to be properly cleaned out.

Section 246. Every existing multiple-dwelling exceeding one story in height shall have at least two independent ways of egress accessible from each apartment constructed and arranged to the satisfaction of the Superintendent.

All existing fire-escapes which do not conform to the requirements of Sec. 226 may be altered by the owner to make them conform in lieu of providing new fire-escapes, but no existing fire-escape shall be extended or have its location changed except with the approval of the Superintendent. All fire-escapes hereafter erected on any existing multiple-dwelling shall be located and constructed as prescribed in Sec. 226 of this ordinance.

Section 247. Every existing flat-roofed multiple-dwelling exceeding two stories in height shall have in the roof a bulkhead or a scuttle with stairs or stationary ladder giving access thereto to the satisfaction of the Superintendent and all key locks on scuttles or bulkhead doors shall be removed.

Section 248. No garbage chute shall be erected in any existing dwelling.

DIVISION 32.—MAINTENANCE AND OCCUPANCY.

For permits for certain classes of buildings see Department of Public Safety regulations.

OCCUPANCY PERMITS

Section 249. It shall be unlawful to use or permit the use of any building or premises or part thereof hereinafter created, erected, changed or converted wholly or partly in its use or structure, except private and two-family dwellings, until a permit for occupancy to the effect that the building or premises or the part thereof so created, erected, changed or converted and the proposed use thereof conform to the provisions of this ordinance shall have been issued by the Superintendent. In the case of such buildings or premises it shall be the duty of the Superintendent to issue a permit for occupancy within ten days after a request for the same shall be filed in his office by any owner of a building or premises affected by this ordinance, provided said building or premises, or the part thereof so created, erected, changed or converted, and the proposed use thereof, conforms with all the requirements herein set forth. Upon written request from the owner, the Superintendent shall issue a permit for occupancy for any building or premises existing at the time of the passage of this resolution certifying after inspection the use of the building or premises and whether such use conforms to the provisions of this ordinance. Permits shall remain in force until revoked, altered or more void as herein provided.

Section 250. Pending the issuance of a regular permit, a temporary permit may be issued for such period,

not exceeding 6 months, as the Superintendent may designate, during the completion of alterations required by him in accordance with the provisions of this ordinance, or during partial occupancy of a building pending its completion. Such temporary permits shall be issued under such restrictions and provisions as the Superintendent may order for the safety of the occupants. No temporary permit shall be issued if, in the opinion of the Superintendent, the building fails to conform to the provisions of this ordinance or regulations issued under it to such a degree as to render it unsafe for the occupancy proposed.

Section 251. A permit issued as herein provided shall be conclusive evidence of compliance with the provision of this ordinance, its regulations, and other ordinances having effect at the time of its issuance, subject only to its being made void by act or neglect of the owner as herein provided.

Section 252. If the conditions of use or occupancy of any building or part thereof are substantially changed, or so changed as not to be in conformity with the conditions required by a permit issued therefor, said permit shall be void and the owner shall notify the Superintendent who shall order an inspection of the building. The owner shall make the building conform to the requirements of this ordinance for such new use or occupancy as directed by the Superintendent and a new permit shall thereupon be issued as herein provided.

If, on any inspection, the conditions of a building or its use or occupancy are found not to conform to the requirements of this ordinance or the conditions of an existing permit therefor, the Superintendent shall at once issue written notice to

the owner, specifying the manner in which the building fails to so conform, and the owner shall at once take steps to make it so conform, as directed by the Superintendent; and if the Superintendent deems it necessary for the proper protection of the occupants he may order the use or the occupancy of the building modified or the building vacated until its condition is made satisfactory in conformity with this ordinance, at which time a permit shall be issued as herein provided.

Section 253. Nothing herein contained shall require any change in the plans or construction or designated use of a building for which a building permit has been heretofore issued, or plans for which are on file with the Superintendent of Buildings at the time of the passage of this ordinance, and a permit for the erection of which is issued within two months of the passage of this ordinance, and the construction of which, in either case, shall have been diligently prosecuted within six months of the date of such permit, and the ground story framework of which, including the second tier of beams, shall have been completed according to such plans, as filed within two years from the date of the passage of this ordinance.

Nothing in this ordinance shall prevent the restoration of a wall declared unsafe by the Superintendent.

Section 254. The invalidity of any section or provision of this ordinance shall not invalidate any other section or provision hereof.

Section 255. This ordinance shall take effect on its passage.

In City Council Dec. 31, 1923.

Passed to be ordained.

JAMES T. BARRETT,
President.

EXECUTIVE DEPARTMENT

Jan. 7, 1924.

Approved:

EDWARD W. QUINN,
Mayor.

A true copy,

Attest:—

FREDERICK H. BURKE,
City Clerk.

INDEX OF DIVISIONS

Note:—The sections of the Building Code that in effect may be called the Zoning Law are as follows:—
Divisions 3, 4, 5 and 6, Sections 10 to 35 inclusive.

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