1969 MANUAL

NEW YORK BUILDING LAWS

(Administrative Building Code with Amendments to December, 1968).

'OLD CODE'

NEW YORK SOCIETY OF ARCHITECTS
275 SEVENTH AVENUE - 15th FL.
NEW YORK, NEW YORK 10001

(212) 675-6646

Rules Adopted by the New York City Board of Standards and Appeals

RULES

	Last Publication in Bulletin
Arc and Gas Welding and Oxygen Cutting	Nov. 27, 1956.
Cements, Air Entraining Portland, Rules for Approval and Use of	April 12, 1955.
Cements, Blended, Rules for Testing and Use of	Mar. 15, 1955—Vol. 40, No. 11
Certificate of Occupancy, approved form	Dec. 28, 1943—Vol. 28, No. 52A
Concrete Masonry, Units, Rules for Manufacture, Testing and Use of	Dec. 10, 1962.
Concrete Rules (Hydrated Lime)	Aug. 3, 1937—Vol. 22, No. 31
Coin-Operated Dry Cleaning Establishments, Rules Covering	Aug. 8, 1962.
Dry Cleaning Establishments, Rules Covering	New Rules, 1963
Erection, Alteration, Repair, Excavation for and Demolition of Buildings	July 20, 1962.
Exterior Veneering Materials, Rules for	Mar. 11, 1952—Vol. 37, No. 11A
Factory Exit Rules	Feb. 22, 1955.
Fire Alarm Rules (Interior)	May, 1963.
Fire Drill Rules	June 20, 1963—Vol. 48, No. 25
Fire Resistive, Flameproof Materials, etc., Rules for Testing of	Jan. 31, 1963—Vol. 48, No. 5
Hatchway Protection	June 5, 1928—Vol. 13, No. 23
Hazards, Medium and High (Supplement to Sec. 280 of The Labor Law)	May 25, 1961—Vol. 48, No. 21
Insulating Fibre Board Rules	Mar. 25, 1952—Vol. 37, No. 13A
Oil Burner Rules	June 1, 1962.
Opening Protective Assemblies, Rules for Inspection of	May 27, 1954.
Plumbing Rules (Submerged Inlets; Protective Methods to Prevent Contamination of Water Supply)	March 20, 1960.
Procedure, Rules of	Jan. 17, 1963—Vol. 48, No. 3
Smoking in Factories, Rules for	April 25, 1963—Vol. 48. No. 17
Spraying and Drying of Paints, Varnishes, Lacquers, etc.	May 3, 1963—Vol. 48, No. 18
Sprinkler, Rules	June 29, 1937—Vol. 22, No. 26
Wire Glass Rules (Amendment to Rule 505 of Industrial Code)	Sept. 3, 1946—Vol. 31, No. 36

Section I, List of Approval Gas Fired Heating Equipment, Gas Burner and Heater Accessories, Oil Fired Heating Equipment and Oil Burner and Heater Accessories, issued June 1, 1955, listing all approvals through May 24, 1955.

Section II, List of Approved Concrete and Clay Products, issued June 27, 1958, listing all approvals through July 2, 1957.

Administrative Building Code of The City of New York

Contents

Administrative Building Code of The City of New York

Index

ADMINISTRATIVE BUILDING CODE INDEX

Department of Buildings New York City Charter

Chapter 26

(Local Law No. 112 for the Year 1955 did not specifically change the title from department of housing and buildings to department of buildings, but the amendment to section 641 of the charter enacted by that local law definitely makes the change in the name of the department and in the title of the commissioner).

Department; commissioner

§ 641. There shall be a department of buildings the head of which shall be the commissioner of buildings who shall be appointed by the mayor.

Deputies and employees

§ 642. a. The commissioner may appoint two deputies, one of whom shall have had at least ten years' experience as an architect or as a builder or as a professional engineer employed in structural work, and the other of whom shall have had experience in the management and administration of multiple dwellings or in any other field in which knowledge of the multiple dwelling law and other laws relating to housing standards is essential.

b. Persons appointed as inspectors shall be architects, engineers, masons, carpenters, plumbers, plasterers or ironworkers who shall have had at least five years' experience as such respectively.

Department; powers

§ 643. a. Except as otherwise provided in this charter or by statute, the department shall enforce the multiple dwelling law, the labor law and such other laws, rules and regulations as may govern the construction, alteration, maintenance, use, occupancy, safety, sanitary conditions, mechanical equipment and inspection of buildings or structures in the city, and shall have charge of the removal of buildings or other structures and of the location, construction, alteration and removal of signs, illuminated or non-illuminated, attached to the exterior of any building or structure, together with all surface and subsurface construction within the curb line, including curb cuts and driveways, the coverings thereof and entrances thereto, and the issuance of permits in reference thereto.

b. The jurisdiction of the department shall not extend to water front property owned by the city, to bridges, tunnels or subways or to structures appurtenant thereto.

c. It shall be the duty of the commissioner to cooperate with state and city housing authorities and the city planning commission and with the organizations engaged in the improvement of housing conditions or in the study thereof.

Division of housing

§ 644. There shall be in the department a division of housing which shall enforce the multiple dwelling law and any other provision of law, rule or regulation in relation to the maintenance, use, occupancy, safety, sanitary condition and inspection of any building or portion thereof which is occupied or is arranged or intended to be occupied as the home, residence or sleeping place of one or more human beings, not, however, including one- or two-family houses. If a building is occupied in part for such purposes, the commissioner may assign jurisdiction over it to the division, and he may assign other duties to the division not inconsistent with the duties conferred on it in this charter.

Officers of department: powers and duties

§ 645. a. There shall be a main office of the department and in each borough a branch office and a borough superintendent.

b. The commissioner shall have exclusive power, which shall not be subject to review except by the board of standards and appeals as provided by law,

(1) to examine and approve or disapprove plans for the construction or alteration of any building or structure and to direct the inspection of such building or structure in the course of construction or alteration;

(2) to require that the construction or alteration of any building or structure shall be in accordance with the provisions of law and the rules, regulations and orders appli-

cable thereto; but where there is a practical difficulty in the way of carrying out the strict letter of any provision of law relating to buildings in respect to the use of prescribed materials or methods of construction and where equally safe and proper materials or forms of construction may be employed in a specific case, he may permit the use of such materials or of such forms of construction, provided that the spirit of the law shall be observed, safety secured and substantial justice done, but he shall have no power to allow any variance from the provisions of any law in any other respect except as expressly allowed therein, or of any rule, regulation or order of the fire commissioner or of the board of standards and appeals.

The term "practical difficulty" as used in this chapter shall not include any difficulty in relation to the height or bulk of any buildings, required open spaces, dimensions of yards or courts, means of egress or of sanitation, or devices for prevention or alarm in case of fire;

(3) to issue certificates of occupancy for any building or structure situated in the city.

c. The commissioner may, by instrument in writing filed in the department, designate the borough superintendent of any borough to possess within such borough any of the powers granted to the commissioner by this section and section six hundred forty-six of the charter, and to exercise the same within such borough, in the name of the commissioner, for such times and under such conditions as he may specify. The superintendent shall also perform in his borough such other duties as the commissioner may direct.

Certificate of occupancy

§ 646. a. No building or structure hereafter constructed may be occupied or used in whole or in part for any purpose until a certificate of occupancy has been issued.

b. No building or structure or part thereof for which a certificate of occupancy has not been previously issued or required shall be occupied or used for any purpose whatever in case such building shall hereafter be altered or converted so as to decrease or increase the number of living rooms or apartments, until a certificate of occupancy has been issued.

c. No building hereafter altered or converted from one class to another class shall be occupied or used for any purpose whatever in case such building was vacant during the progress of the work. In case such an alteration does not necessitate the vacation of the building during the progress of the work, the occupancy or use of the building shall not continue more than thirty days after the completion of such alteration, unless a certificate of occupancy has been issued.

d. A certificate of occupancy of a building or structure shall certify that such building or structure conforms to the requirements of all laws, rules, regulations and orders applicable to it and shall be in such form as the board of standards and appeals shall authorize.

e. 1. No certificate of occupancy shall be issued for any building, structure, enclosure, place or premises wherein containers for combustibles, chemicals, explosives, inflammables and other dangerous substances, articles, compounds or mixtures are stored, or wherein automatic or other fire alarm system is required by a provision of law to be installed, until the fire commissioner has tested and inspected and has certified his approval in writing of the installations of such containers or fire alarm system to the commissioner of buildings, except that no such testing, inspection, or certification shall be necessary for storage tanks and auxiliary storage tanks for oil-burning equipment; provided, however, that a certificate of occupancy may be issued without such a test inspection and certificate of approval of a fire alarm system by the fire commissioner where such fire alarm system is installed or required to be installed pursuant to an order of the fire commissioner acting within the discretion vested in him by law. No certificate of occupancy shall be issued for any building, structure, enclosure, place or premises wherein any standpipe or sprinkler system is required by a provision of law to be installed until the fire commissioner has witnessed the flow and pressure test for such system and has certified his approval thereof in writing to the commissioner of buildings; provided, however, that a certificate of occupancy may be issued without such a test and certificate of approval of a standpipe or sprinkler system by the fire commissioner where such standpipe or sprinkler system is installed or required to be installed pursuant to an order of the fire commissioner acting within the discretion vested in him by law. Such approval shall be recorded on the certificate of occupancy.

2. A certificate of occupancy may be issued for an alteration or conversion which does not change the classification of occupancy of a building, structure, enclosure, place or premises, without any test, inspection or certificate of approval by the fire commissioner of a container, fire alarm system or standpipe or sprinkler system which was installed in such building, structure, enclosure, place or premises prior to such alteration or conversion provided that such alteration or conversion does not affect or change such container, fire alarm system or standpipe or sprinkler system and provided further, that the installation of such container, fire alarm system or standpipe or sprinkler system was tested, inspected and approved in accordance with the provisions of paragraph one of this subdivision, prior to such alteration or conversion.

(Subd. e as relettered from former subd. f and amended by Local Law No. 112 for the year 1955. Former subd. e. repealed).

f. Every certificate of occupancy shall, unless and until set aside or vacated by the board of standards and appeals or a court of competent jurisdiction, be and remain binding and conclusive upon all agencies and officers of the city, and shall be binding and conclusive upon the department of labor and of the state of New York, as to all matters therein set forth, and no order, direction or requirement at variance therewith shall be made or issued by any agency or officer of the city, nor by the department of labor of the state of New York, or any commission, board officer or member thereof.

g. The commissioner may, on request of the owner of a building or structure or his authorized representative, issue a temporary certificate of occupancy for any part of such building or structure, provided that such temporary occupancy or use would not in any way jeopardize life or property; but no such temporary certificate shall be issued unless and until any certificate required for subdivision e of this section is issued. (As relettered from former subd. h and amended by Local Law No. 112 for the Year 1955).

h. The term "class" as used in this chapter refers to the classification of buildings in the building code or local law regulating building as it may be amended from time to time and shall be deemed to refer also to the terms "class" or "kind" as used in the multiple dwelling law where such law is affected.

Inspection of standpipe and sprinkler systems

647. Neither the commissioner nor the borough superintendent shall approve the installation of any standpipe or sprinkler system which is required to be installed pursuant to an order of the fire commissioner acting within the discretion vested in him by law until the fire commissioner has inspected such system, has witnessed the flow and pressure test for such system and has certified his approval thereof in writing to the commissioner. Neither the commissioner nor the borough superintendent shall approve the installation of any standpipe or sprinkler system which is required by a provision of law to be installed until the fire commissioner has witnessed a test of such system as prescribed by law, and has notified the commissioner in writing of his satisfaction with the results of such test.

Appeals

§ 648. Appeals may be taken from decisions of the commissioner of buildings and of the borough superintendent acting under a written delegation of power from the commissioner of buildings filed in accordance with the provisions of section six hundred forty-five of the charter, to the board of standards and appeals as provided by law.

Inspection

§ 649. The commissioner, a deputy commissioner, any borough superintendent in his borough, any inspector or any officer of the department authorized by the commissioner or a borough superintendent to act in his borough, may, for the purpose of performing their respective official duties, enter and inspect any building, structure, enclosure, premises or any part thereof, or anything therein or attached thereto; and any refusal to permit such entry or inspection shall be triable by a city magistrate and punishable by not more than thirty days imprisonment, or by a fine of not more than fifty dollars, or both.

Construction clause

§ 650. Any law, rule, regulation, contract or other document which refers or is is applicable to the department of housing and buildings of the city or the commissioner of housing and buildings of the city, shall be deemed to refer to the department of buildings of the city or the commissioner of buildings of the city, as the case may be. Any law, rule, regulation, contract or other document which refers or is applicable to the deputy commissioner of housing of the department of housing and buildings of the city shall be deemed to refer to the commissioner of buildings of the city.

Functions, powers and duties of division of housing, how exercised.

§ 651. Any functions, powers or duties conferred by this charter or by any other

law upon the division of housing either expressly or by reference to the former deputy commissioner of housing, shall be deemed to have been conferred upon the division of housing, subject to the direction and control of the commissioner of buildings, and all such functions, powers and duties shall be exercised by such division of housing under the direction and control of the commissioner. (As amended by Local Law No. 112 for the Year 1955).

Functions, powers and duties of borough superintendents; how exercised.

§ 652. Any functions, powers or duties conferred by this charter or by any other law upon a borough superintendent shall be deemed to have been conferred upon the commissioner of buildings, and any such function, power or duty may be exercised by the commissioner of buildings or may be delegated by him to a borough superintendent in the manner provided in subdivision c of section six hundred forty-five of this charter.

Note: Source of this data. Booklet of Charter provisions printed and issued by the City Record in 1962.

Administrative Building Code of the City of New York

With Amendments to December, 1968

Numbers in parentheses ( ) preceding the section numbers, indicate the Decimal System contained in the Code as adopted by the former Board of Aldermen and the numbers beginning with § C26 are the corresponding sections in the administrative code.

ARTICLE 1. GENERAL PROVISIONS

(1). § C26-1.0 Short Title.—This title shall be known and may be cited as the "Building Code."

(2). § C26-2.0 Matter Covered.—All matters, affecting or relating to the construction, alteration, demolition, or removal of structures, erected or to be erected in the city, are presumptively provided for in this title. This title does not provide presumptively for matters that are contained in the charter, the labor law, the multiple dwelling law, title D of chapter twenty-six of the code, the general city law, the building zone resolution, or in the rules promulgated in accordance with the provisions of this title by the board. This title does not apply to railroads owned by the city, or the title to which is in a board of transit control under the public service law, nor to the stations, yards, shops, power houses, transforming substations, or any other buildings or structures thereof.

(3). § C26-3.0 Purpose.—The purpose of this title is to provide standards, provisions and requirements for safe and stable design, methods of construction and sufficiency of materials in structures constructed, or demolished, after January first, nineteen hundred thirty-eight, and to regulate the equipment, maintenance, use and occupancy of all structures and premises.

(4). § C26-4.0 Title Remedial.—This title and the rules of the board made in pursuance hereof are hereby declared to be remedial, and shall be liberally construed to secure the beneficial purposes thereof. Where there is practical difficulty in the way of carrying out the strict letter of any provision of law, the superintendent may permit variations from the strict letter of the law, as provided in paragraph two of section six hundred forty-five, subdivision a of the charter.

(5). § C-26-5.0 All New Work to Conform.—a. Every structure or part thereof constructed in the city, after January first, nineteen hundred thirty-eight, and the plumbing or other equipment of any structure or premises shall be constructed or demolished in conformity with the provisions of this title.

b. It shall be unlawful to construct or demolish any structure in any manner violating any provision of this title or any rule of the board or any approval of the superintendent made and issued hereunder, except that the raising or lowering of any structure to meet a change of grade in the street on which such structure is located shall be permitted, provided the structure is otherwise unaltered.

(5a). § C26-6.0 Exemption from this Title.—Structures on any water front property not used in conjunction with and in furtherance of water front commerce and/or navigation may be constructed or altered in accordance with the requirements of the commissioner of marine and aviation provided plans have been filed with and approved by the department of marine and aviation and an application or a permit in connection therewith has been made to such commissioner before the effective date of this local law, and provided further that substantial work on the construction or alteration shall have been done within one year after the permit therefor has been issued, and provided further that all of the work shall have been completed within two years from the date of the issuance of such permit. Where necessary for the clearance and development of property under the jurisdiction of the department of marine and aviation at the time this local law goes into effect, private dwellings located thereon and erected without a permit issued by the department of buildings may be relocated under a permit and certificate of completion of the department of marine and aviation, provided such permit is issued within one year from the effective date of this local law.

(6). § C26-7.0 Undeveloped Localities.—In those parts of the city, outside the fire limits, in which a system of streets has not been constructed nor legally

established, only such requirements of this title shall apply which in the judgment of the superintendent may be necessary for safety of life and health. This section shall be construed to prohibit the erection of any structures that exceed in height or area the limits fixed by this title for such structures.

(7). § C26-8.0 **Structures Affected.**—All provisions of this title shall apply with equal force to municipal and private structures, except as may be otherwise specifically provided by law.

ARTICLE 2. DEFINITIONS

(1.1). § C26-9.0 **General Provisions Respecting Definitions.**—a. For the purposes of this title, the words and terms listed in this article shall have the meanings herein given, except as they are defined in any other law or regulation which may in particular cases apply.

b. The use of the present tense includes the future tense; the masculine gender includes the feminine and neuter; the singular number includes the plural and the plural number includes the singular. The word "person" includes a corporation as well as an individual; "writing" includes printing and typewriting; "oath" includes affirmation; "signature" or "subscription" include a mark made by a person who cannot write, if his name is written near to such mark.

(1.2). § C26-10.0 *Repealed December 1962*

(1.3). § C26-11.0 **Alteration.**—The term "alteration," as applied to a building or structure, shall mean any change or rearrangement in the structural parts or existing facilities of any such building or structure, or any enlargement thereof, whether by extension on any side or by any increase in height, or the moving of such building or structure from one location or position to another.

(1.4). § C26-12.0 **Amusement Device.**—The term "amusement device" shall mean a device used to convey persons in any direction as a form of amusement.

(1.5). § C26-13.0 *Repealed December 1962*

(1.6). § C26-14.0 **Approved.**—The term "approved", as applied to any material, device or mode of construction, shall mean approved by the board or legally approved by the superintendent under the provisions of this title or by any other authority legally designated to give approval of the matter in question.

(1.7). § C26-15.0 **Apron Wall.**—The term "apron wall" shall mean that part of a panel wall between the window sill and the support of the panel wall.

§ C26-15.1 **Arc Welding.**—A group of welding processes wherein coalescence is produced by heating with an electric arc or arcs, with or without the application of pressure and with or without the use of filler metal. Pressure as herein used refers to pressure necessary to the welding process.

(2.4.1.4.1). § C26-16.0. **Area.**—The term "area" shall mean an open space below the ground level immediately outside of a structure, and enclosed by substantial walls.

(1.8). § C26-17.0 **Area Of A Structure.**—a. The term "area of a structure" shall mean, except in the application of the building zone resolution, the horizontal area within the exterior walls or between fire walls. Premises between fire walls shall be considered as separate structures, if the fire walls comply with article eleven of this title.

b. For the purposes of the building zone resolution the term "area of a structure" shall mean the total horizontal area including the exterior walls.

(1.9). § C26-18.0 **Ashlar Facing.**—The term "ashlar facing" shall mean facing composed of solid rectangular units of burnt clay or shale, natural or manufactured stone, larger in size than brick, with sawed, dressed or squared beds, and joints laid in mortar and used in facing masonry walls.

(1.10). § C26-19.0 **Ashlar Masonry.**—The term "ashlar masonry" shall mean masonry of natural or manufactured stone rectangular units larger in size than brick having sawed, dressed or squared beds, and the joints of which are laid in mortar with proper bond.

(1.11). § C26-20.0 **A. S. T. M.**—The term "A. S. T. M." shall mean The American Society for Testing Materials.

(1.12). § C26-21.0 **Automatic Doors, Shutters and Windows.**—The term "automatic", as applied to fire doors, fire shutters, fire windows and other opening protectives, shall mean doors, shutters, windows and other opening protectives which are normally held in an open position and which close automatically upon the action of some heat actuated releasing mechanism.

(1.13). § C26-22.0 **Basement.**—The term "basement" shall mean a story partly underground, but having at least one-half of its height, measured from finished floor to finished ceiling, above the curb level at the center of the street front.

(1.14). § C26-23.0 **Bearing Wall.**—The term "bearing wall" shall mean any wall which carries any load other than its own weight.

(1.15). § C26-24.0 *Repealed December 1962*

(1.16). § C26-25.0 **Board.**—The term "board" shall mean the board of standards and appeals, unless specifically designated otherwise.

(1.17). § C26-26.0 **Brick.**—The term "brick" shall mean a structural unit of burned clay or shale, formed while plastic into a rectangular prism, usually solid and approximately eight inches by three and three-quarters inches by two and one-quarter inches in size, the net cross-sectional area of which shall be at least seventy-five percent of the gross cross-sectional area. Similar structural units made of other substances, such as lime and sand, cement and suitable aggregates or fire clay which meet the strength requirements of subdivision a of section C26-307.0, or section C26-359.0, shall be considered as brick within the meaning of this title.

(1.18). § C26-27.0 **Bulkhead.**—The term "bulkhead" shall mean any structure above the roof of a structure enclosing stairways, shafts, tanks, elevator machinery, ventilating apparatus and other accessories to the structure, except where otherwise specifically provided.

(1.19). § C26-28.0 **Buttress.**—The term "buttress" shall mean a masonry structure built against and bonded into a wall.

(1.20). § C26-29.0 **Cabaret.**—The term "cabaret" shall mean any room, place or space in the city in which any musical entertainment, singing, dancing or other similar amusement is permitted in connection with the restaurant business or the business of directly or indirectly selling to the public food or drink.

(1.20.1). § C26-29.1 **Car Port**—The term "car port" shall mean a structure not more than one story in height, without walls, doors or other enclosure, on at least two sides, the floor of which rests upon the ground, used exclusively for the storage or parking of not more than two motor vehicles, and which is accessory to a private dwelling.

(1.21). § C26-30.0 **Cellar.**—The term "cellar" shall mean a story having more than one-half of its height, measured from finished floor to finished ceiling, below the curb level at the center of the street front.

(1.22). § C26-31.0 **Chimney.**—The term "chimney" shall mean chimneys, stacks, or smoke flues intended for the purpose of removing the products of combustion from solid, gas or liquid fuel.

(1.23). § C26-32.0 **Closed Shaft.**—The term "closed shaft" shall mean a shaft enclosed at the top.

(1.24). § C26-33.0 **Column.**—The term "column" shall mean an upright compression member the length of which exceeds three times its least lateral dimension.

(1.27). § C26-36.0 *Repealed December 1962*

§ C26-36.1 **Combustible Occupancy Permit.**—The term "combustible occupancy permit" shall mean a permit issued by the fire department under the provisions of part I, of title C of chapter nineteen of the administrative code, except that such permit when issued for class C refrigerating systems containing not more than twenty pounds of refrigerant, or for the transfer of carbonic acid to a container of lower pressure for use only by the operator at his own retail soda water stand, shall not be considered as a combustible occupancy permit for purposes of chapter twenty-six of the administrative code.

(1.28). § C26-37.0 **Commercial Building.**—The term "commercial building" shall mean a structure occupied as described in subdivision c of section C26-235.0.

§ C26-37.1 **Commissioner.**—The term "commissioner" when used in this title shall mean the commissioner of housing and buildings unless specifically designated otherwise.

(1.29). § C26-38.0 **Concrete.**—a. The term "concrete" shall mean a mixture of Portland cement, fine aggregate, course aggregate and water.

b. Average concrete.—The term "average concrete" shall mean concrete mixed in accordance with the provisions of section C26-1477.0 and any other applicable section of this code.

c. Controlled concrete.—The term "controlled concrete" shall mean concrete mixed in accordance with the provisions of section C26-1478.0 and any other applicable section of this code.

d. Grade I cement concrete.—The term "Grade I cement concrete" shall mean concrete in which the course aggregate consists of limestone, trap rock, blast furnace slag, cinders or calcareous gravel.

e. Grade II cement concrete.—The term "Grade II cement concrete" shall mean concrete in which the course aggregate consists of granite or silicious gravel.

(1.30). § C26-39.0 **Concrete Products.**—The term "concrete products" shall mean bricks, blocks or other units made of cement, aggregates, and water.

(1.31). § C26-40.0 **Consistency.**—The term "consistency" shall mean the relative plasticity of freshly mixed concrete or mortar.

(1.32). § C26-41.0 **Construction.**—The term "construction" shall mean and include alterations and repairs and operations incidental to construction.

(1.33). § C26-42.0 *Repealed December 1962*

(1.34). § C26-43.0 **Coursed Rubble.**—The term "coursed rubble" shall mean masonry composed of roughly shaped stones, laid in mortar, fitting approximately on level beds.

(1.35). § C26-44.0 *Repealed December 1962*

(1.36). § C26-45.0 **Curb.**—a. The term "curb", when used in defining the height of a structure, shall mean the legally established level on the curb in front of the structure, measured at the center of such front. When a building faces on more than one street, the term "curb" shall mean the average of the legally established level of the curbs at the center of each front.

b. The term "curb", when used in fixing the depth of an excavation, shall mean the legal curb level at the nearest point of that curb which is nearest to the point of the excavation in question.

§ C26-45.1 **Curb levels.**—Where no curb has been established a curb level shall be established by the agency empowered to fix curb levels.

§ C26-45.2 **Curb Level in Front of Multiple Dwellings.**—When an open unoccupied space in front of any multiple dwelling is above the curb level, and also extends along the entire street lot line on any street and is not less than five feet in depth, the level of such open unoccupied space shall be considered the curb level, provided it is not more than three feet above the level of the established curb in front of the building measured at the center of such front.

(1.37). § C26-46.0 **Curtain Wall.**—The term "curtain wall" shall mean a non-bearing wall built between piers or columns for the enclosure of the structure, but not supported at each story.

(1.38). § C26-47.0 *Repealed December 1962*

(1.39). § C26-48.0 **D.**—The term "D" shall mean designation.

(1.40). § C26-49.0 **Dance Hall.**—The term "dance hall" shall mean any room, place or space in which dancing is carried on and to which the public may gain admission, either with or without the payment of a fee.

(1.41). § C26-50.0 **Dead Load.**—The term "dead load" when applied to a structure, shall include the weight of walls, permanent partitions, framing, floors, roofs, columns and their fireproofing, and all other permanent stationary construction entering into a structure

(1.42). § C26-51.0 *Repealed December 1962*

(1.43). § C26-52.0 **Department.**—The term "department" shall mean the branch office of the department of housing and buildings in each borough unless specifically designated otherwise.

(1.46). § C26-55.0 *Repealed December 1962*

(8.3.2.6.5). § C26-56.0 **Driving to Refusal.**—The term "driving to refusal", as used in connection with concrete filled steel piles, shall mean inability to drive a pile further under a hammer of approved adequate weight after the tube has been completely washed and blown at the bottom, and before filling with concrete.

(1.49). § C26-58.0 *Repealed December 1962*

(1.50). § C26-59.0 *Repealed December 1962*

(1.51). § C26-60.0 **Elevator.**—a. The term "elevator" shall mean a hoisting and lowering mechanism equipped with a car or platform which moves in guides in a substantially vertical direction.

b. The term "elevator" excludes dumbwaiters, hoists, endless belts, conveyors, chains, buckets, and similar machines used for the purpose of elevating materials, and tiering or piling machines.

(1.52). § C26-60.0 **Enclosure Wall.**—The term "enclosure wall" shall mean an exterior non-bearing wall in skeleton construction anchored to columns, piers, or floors, but not necessarily built between columns, or piers, nor wholly supported at each story.

(1.54). § C26-62.0 **Faced Wall.**—The term "faced wall" shall mean a wall faced with masonry in which the facing and backing are so bonded, or so bonded and anchored, with masonry as to exert common action under load.

(1.55). § C26-63.0 **Fire Door.**—The term "fire door" shall mean a door and its assembly, capable of resisting fire as specified in this title.

(1.56). § C26-64.0 **Fire Partition.**—The term "fire partition" shall mean a partition provided for the purpose of protecting life by furnishing an area of exit or refuge, and having a fire resistive rating of at least three hours.

(1.57). § C26-65.0 **Fire Resistive Materials.**—The term "fire resistive materials" shall mean those materials which offer a degree of resistance to the passage or to the effects of fire or heat sufficient to meet the minimum requirements of this title.

(1.58). § C26-66.0 **Fire Shutter.**—The term "fire shutter" shall mean a shutter capable of resisting fire as specified in this title.

New. § C26-67.0 **Fire Tower.**—The term "fire tower" shall mean an interior stairway constructed and arranged as provided in section C26-294.0.

(1.59). § C26-68.0 **Fire Wall.**—The term "fire wall" shall mean a wall provided primarily for the purpose of resisting the passage of fire from one structure to another or from one area of a structure to another, and having a fire resistive rating of at least four hours.

(1.60). § C26-69.0 **Fire Window.**—The term "fire window" shall mean a window frame with sash and glazing having a fire resistive rating of three-quarters of an hour in accordance with the rules of the board.

(1.61). § C26-70.0 **Fireproof Partition.**—The term "fireproof partition" shall mean a partition, other than a fire partition, provided for the purpose of restricting the spread of fire, and having a fire resistive rating of at least one hour.

(1.62). § C26-71.0 **Foundation Wall.**—The term "foundation wall" shall mean any wall or pier built below the curb level or the nearest tier of beams to the curb, which serves as a support for walls, piers, columns, or other structural parts of a structure.

(1.64). § C26-73.0 **Floor Area.**—a. The term "floor area" shall mean any floor space within a story of a structure enclosed on all sides by either exterior walls, fire walls, or fire partitions. Adjoining rooms having openings in dividing partitions in excess of one-quarter of the length of such partitions, whether or not separated by rolling, folding, sliding or other forms of movable enclosures, shall be considered as one area.

b. The term "net area" for any floor shall mean the gross area within the exterior walls less the area occupied by enclosed stair, elevator and other permanent shafts completely enclosed in fire partitions.

(1.64.1). § C26-73.1 *Repealed December 1962*

(1.65). § C26-74.0 **Footing.**—The term "footing" shall mean a structural unit used to distribute loads to the bearing materials.

(1.68). § C26-76.0 **Garage.**—The term "garage" shall mean a building, shed or enclosure or any portion thereof in which a motor vehicle, other than one in which the fuel storage tank is empty, is stored, housed or kept

(1.69) § C26-77.1 **Gas Welding.**—A group of welding processes where coalescence is produced by heating with a gas flame or flames, with or without the application of pressure and with or without the use of filler metal. Pressure as herein used refers to pressure necessary to the welding process.

(1.70). § C26-78.0 **Gasoline Selling Station.**—The term "gasoline selling station" shall mean any structure or premises or any portion thereof in which volatile inflammable oil is stored or furnished to motor vehicles and in which motor vehicles are not stored.

(1.71). § C26-79.0 **Gravel.**—The term "gravel" shall mean rounded particles, larger than sand grains, resulting from the natural disintegration of rocks.

(1.72). § C26-80.0 **Gypsum Block or Tile.**—The terms "gypsum block" or "gypsum tile" shall mean a solid or hollow building unit of gypsum, or of a suitable aggregate with a gypsum binder.

(1.73). § C26-81.0 **Hallway.**—a. The term "hallway" shall mean an enclosed hall or corridor leading to a stairway, fire tower or other required exit.

b. The term public hallway shall mean a corridor or hallway leading directly to a stairway, fire tower or other required exit, within a story of a structure which story is occupied by more than one tenant or lessee, or within a structure included in section C26-235.0a.

(1.74). § C26-82.0 **Height.**—a. The term "height" of a structure shall mean the vertical distance from the curb level to the highest point of the roof beams in the case of flat roofs or to a point at the average height of the gable in the case of roofs having a pitch of more than one foot in four and one-half, except that in the case of

structure where the grade of the street has not been legally established or where the structure does not adjoin the street, the average level of all the ground adjoining such structures shall be used instead of the curb level.

b. The term "height," as applied to walls, shall mean the distance above the base of the wall or its means of support, but shall not include the parapet if the latter is four feet or less in height.

c. The term "height," as applied to a story, shall mean the vertical distance from top to top of two successive tiers of floor beams.

(1.75). § C26-83.0 Hollow unit.—The term "hollow unit" shall mean any masonry unit whose net cross-sectional area is less than seventy-five percent of its gross cross-sectional area in any plane, measured in the same plane.

(1.76). § C26-84.0 Hollow Masonry.—The term "hollow masonry" shall mean masonry consisting wholly or in part of hollow units meeting the strength requirements of sections C26-308.0, C26-309.0 and C26-310.0, and in which the units are laid contiguously with the joints filled with mortar.

(1.77). § C26-85.0 Hollow Wall.—The term "hollow wall" shall mean a wall built of solid masonry units so arranged as to provide an air space within the wall.

(1.78). § C26-86.0 Horizontal Exit.—The term "horizontal exit" shall mean the connection of any two floor areas, whether in the same structure or not, by means of a vestibule, or by an open air balcony or bridge, or through a fire partition or fire wall.

(1.79). § C26-87.0 Human Occupancy—The term "human occupancy" for the purposes of Article 6, Ventilation shall mean the use of any space or spaces in which any human does or is required to live, work or remain for continuous periods of two hours or more.

(1.80). § C26-88.0 Incombustible Material.—The term "incombustible material" shall mean any material which will not ignite nor actively support combustion in a surrounding temperature of twelve hundred degrees Fahrenheit during an exposure of five minutes and which will not melt when the temperature of the material is maintained at nine hundred degrees Fahrenheit for a period of at least five minutes.

(1.81). § C26-89.0 Legal Curb Level.—The term "legal curb level" shall mean the curb level established by the borough president.

(1.82). § C26-90.0 Lintel.—The term "lintel" shall mean a structural member providing support for masonry above an opening in a wall or partition.

(1.83). § C26-91.0 Livable Room.—The term "livable room" shall mean any room used for normal living purposes in a residence structure and shall not include kitchens, laundry rooms, bathrooms or storerooms.

(1.84). § C26-92.0 Live Load.—The term "live load" shall mean all loads other than dead loads.

(1.85). § C26-93.0 Masonry.—The term "masonry" shall mean stone, brick, concrete, hollow tile, concrete block or tile, or other similar building units or materials or a combination of them, bonded together with mortar.

(1.87). § C26-95.0 Motor Vehicle Repair Shop.—The term "motor vehicle repair shop" shall mean a building, shed or enclosure or any portion thereof wherein is conducted the general business of repairing motor vehicles.

(1.88). § C26-96.0 Negative Bending Moment.—The term "negative bending moment" shall mean that moment of which the intensity is greatest at the supports.

(1.89). § C26-97.0 *Repealed December 1962*

(1.90). § C26-98.0 Non-Bearing Wall.—The term "non-bearing wall" shall mean any wall which carries no load other than its own weight.

(1.91). § C26-99.0 Non-Storage Garage.—The term "non-storage garage" shall mean a garage in which no volatile inflammable oil, other than that contained in the fuel storage tanks of motor vehicles, is handled, stored or kept.

(1.92). § C26-100.0 Occupied.—The term "occupied", as applied to any structure, shall mean, occupied or intended, designed or arranged to be occupied.

(1.93). § C26-101.0 Occupied Space.—The term "occupied space" shall mean any room or space in which any person normally does or is required to live, work or remain for any period of time.

(1.94). § C26-102.0 Open Shaft.—The term "open shaft" shall mean a shaft extending through the roof of a structure and open to the outer air at the top.

(1.96). § C26-103.0 Owner.—The term "owner" shall mean and include the owner or owners of the freehold of the premises or lesser estate therein, a vendee in possession, a mortgagee or receiver in possession, an assignee of rents, a lessee or joint lessees of the whole thereof, an agent or any other person, firm or corporation directly in control of such building.

§ C26-103.1 Oxygen Cutting.—A group of cutting processes wherein the severing of metal is effected by means of the chemical reaction of oxygen with the base metal at elevated temperatures. In the case of oxidation-resistant metals the reaction is facilitated by the use of a flux.

(1.98). § C26-105.0 *Repealed December 1962*

(1.99). § C26-106.0 Panel Wall.—The term "panel wall" shall mean a non-bearing wall in skeleton construction built between columns or piers and wholly supported at each story. Window and other openings shall be included in the wall dimensions.

(1.100). § C26-107.0 Parapet Wall.—The term "parapet wall" shall mean that portion of a wall extending above the roof.

(1.101). § C26-108.0 Partition.—The term "partition" shall mean a non-bearing interior wall one story or less in height.

(1.102). § C26-109.0 Party Wall.—The term "party wall" shall mean a wall used or adapted for joint service between two structures.

(1.103). § C26-110.0 Passageway.—The term "passageway" shall mean an enclosed passage or corridor connecting a stairway, fire tower or elevator with a street or open space communicating with a street.

(1.105). § C26-111.0 Pedestal.—The term "pedestal" shall mean an upright compression member, the height of which does not exceed three times its least lateral dimension.

(1.106). § C26-112.0 Pedestal Footing.—The term "pedestal footing" shall mean a column footing which projects less than one-half its depth from the faces of the column on all sides and the maximum depth of which is three times its least width.

(1.107). § C26-113.0 Penthouse.—The term "penthouse" shall mean any closed roof structure, other than a bulkhead, which extends twelve feet or less above the roof of a structure and occupies thirty percent or less of the roof area.

(1.107.1). § C26-113.1 Perlite.—An acid, igneous, glassy rock of the composition of obsidian, expanded by heating and divided into small spherical bodies by the tension developed by its contraction on cooling.

(8.3.2.2) (part). § C26-114.0 Permanent Water Level.—The term "permanent water level" shall mean sea level unless special conditions exist. If special conditions exist, the term "permanent water level" shall mean such lower level as the superintendent in his opinion may deem to represent the permanent water level.

(1.108). § C 26-115.0 Pier.—The term "pier" shall mean an isolated column of masonry.

(1.109). § C26-116.0 Place of Assembly.—The term "place of assembly" shall mean a room or space which is occupied by seventy-five or more persons and which is used for educational, recreational or amusement purposes and shall include assembly halls in school structures; dance halls; cabarets; night clubs; restaurants; any room or space used for public or private banquets, feasts, socials, card parties or weddings; lodge and meeting halls or rooms; skating rinks; gymnasiums; swimming pools; billiard, bowling, and table tennis rooms; halls or rooms used for public or private catering purposes; funeral parlors; markets; recreation rooms; concert halls; broadcasting studios; school and college auditoriums; and all other places of similar type of occupancy. Nothing in this section shall be construed to apply to instruction rooms, libraries, lecture rooms, recreation rooms, lunchrooms or classrooms in elementary or high schools, as defined in section C26-132.0 of this code, or in colleges which are licensed to operate by the state board of regents, when such rooms are used solely and exclusively by the students of such schools or colleges.

The term "licensed place of public assembly" as used in this article shall mean any room or space which is used or occupied as a "place of assembly" as defined in this section, when the lawful use, occupancy or operation of such place is contingent upon the issuance of a license by the fire department, the police department or the department of licenses.

Whenever the words "place of assembly" are used in this chapter, such words shall be construed as if followed by the words "or any room or space which is occupied for or is intended, arranged, or designed to be occupied for such use."

Nothing in this section shall be construed to apply to any room or space used exclusively for dwelling purposes in a private dwelling as defined in section C26-122.0 of this code or used exclusively for dwelling purposes as defined in subdivision one of section four of the multiple dwelling law, nor shall this section be applicable to places of incarceration, an asylum, a convent, a monastery, a church, a synagogue, or a theatre, motion picture theatre, opera house or concert hall subject to and complying with the provisions of article thirteen of this code and which are required to obtain a license as a "licensed place of public assembly."

(1.110). § C26-117.0 *Repealed December 1962*

(1.111). § C26-118.0 **Positive Bending Moment.**—The term "positive bending moment" shall mean that moment the intensity of which is least at or near the supports.

(1.112). § C26-119.0 **Positive Reinforcement.**—The term "positive reinforcement" shall mean reinforcement so placed as to resist tensile stress due to positive bending moment.

(1.113). § C26-120.0 **Premises.**—The term "premises" shall mean land including improvements or appurtenances or any part thereof.

(1.115). § C26-122.0 **Private Dwelling.**—The term "private dwelling" shall mean a structure occupied exclusively for residence purposes by not more than two families.

(1.116). § C26-123.0 **Protective Assembly.**—The term "protective assembly" shall mean an opening protective including its surrounding frame, casings and hardware attachments.

(1.116.1). § C26-123.1 **Public Museum.**—The term "public museum" shall mean a structure owned by the city of New York and operated by an institution no part of the net earnings of which inures to the benefit of any private shareholder or individual, which maintains a supervised public education program, and which operates a structure or structures in which are preserved and exhibited objects of permanent interest in one or more of the arts and sciences available to school children and to the general public.

(1.117). § C26-124.0 **Random Rubble.**—The term "random rubble" shall mean masonry composed of roughly shaped stone, laid in mortar without regularity of coursing, but fitting together to form well-defined joints.

(1.118). § C26-125.0 **Ratio of Reinforcement.**—The term "ratio of reinforcement" shall mean ratio of the effective area of the reinforcement cut by a section of a beam or slab to the effective area of the concrete at that section.

(1.119). § C26-126.0 **Rectangular Direction.**—The term "rectangular direction" shall mean a direction parallel to a side of a flat slab panel.

(1.120). § C26-127.0 **Reinforced Concrete.**—The term "reinforced concrete" shall mean concrete in which metal is embedded in such a manner that the two materials act together in resisting stresses.

(1.121). § C26-128.0 **Retaining Wall.**—The term "retaining wall" shall mean any wall designed to resist lateral pressure.

(1.122). § C26-129 **Root of Weld.**—The points as shown in cross-section at which the bottom of the weld intersects the base metal surfaces.

(1.123). § C26-130.0 **Rough or Ordinary Rubble.**—The terms "rough rubble" or "ordinary rubble" shall mean masonry composed of unsquared or field stones laid in mortar without regularity of coursing.

(1.126). § C26-131.0 **Sand.**—The term "sand" shall mean small grains one-quarter of an inch or less in size resulting from the natural disintegration of rocks.

(1.127). § C26-132.0 **School.**—The term "school" shall mean an elementary school or a high school or a college where regular supervised fire drills are held in which pupils are trained in rapid dismissal from the building. Such fire drills shall be held several times each semester, including summer classes.

(1.128). § C26-133.0 **School Structure.**—The term "school structure" shall mean a structure devoted entirely to school purposes and activities incidental to school use.

(1.129). § C26-134.0 **Self-Closing Doors.**—The term "self-closing doors", as applied to fire doors or other opening protectives, shall mean doors which are normally kept in a closed position by some mechanical device and which are closed automatically after having been opened, except as otherwise provided in section C26-832.0.

(1.130). § C26-135.0 **Shaft.**—The term "shaft" shall mean an enclosed space for the transmission of light, air, materials or persons through one or more stories of a structure which connects a series of two or more openings in successive floors, or floors and roof, except as may be otherwise provided in paragraph two of section C26-262.0.

(1.131). § C26-136.0 **Solid Masonry**—The term "solid masonry" shall mean masonry consisting of stone, brick, sand-lime or concrete brick, or other solid masonry units, or a combination of these materials, laid contiguously with the spaces between the units filled with mortar, or monolithic concrete.

(1.132). § C26-137.0 **Solid Structural Unit.**—The term "solid structural unit" shall mean a building unit having a gross volume at least fifty per cent greater than a brick, with a net cross-sectional area in any plane at least seventy-five per cent of the gross cross-sectional area measured in the same plane.

(1.133). § C26-138.0 **Space Below Grade.**—The term "space below grade" shall mean a space or portion thereof or a room, whose height measured from finished floor to finished ceiling is more than fifty per cent below the level of the nearest point of the nearest curb or whose ceiling is less than four feet six inches above such level.

(1.134). § C26-139.0 **Spandrel Wall.**—The term "spandrel wall" shall mean that part of a panel wall above the window and below the apron wall.

(15.0). § C26-140.0 **Sprinkler System.**—The term "sprinkler system" shall mean a system of piping connected to one or more acceptable sources of water supply, which system is provided with distributing devices so arranged and located as to discharge an effective spray over the interior of the building area.

(1.135). § C26-141.0 **Sprinklered.**—The term "sprinklered", as applied to a structure, shall mean equipped throughout with an approved system of automatic sprinklers.

§ C26-141.1 **Stage.**—The term "stage" shall mean the raised platform with its scenery and theatrical accessories on which the performance in a theatre, concert hall, auditorium, or place of entertainment, takes place.

This definition shall not include an unenclosed raised platform placed on an open floor to elevate the performers, musicians or speakers, provided no curtain, scenery or other theatrical accessories associated with the stage are provided. A back drop of incombustible materials, or materials treated so as not to ignite or support combustion, may be provided.

(1.136). § C26-142.0 **Stair Exit.**—The term "stair exit" shall mean a direct connection of any floor area to a stairway constructed in accordance with the requirements of this title for required stairs.

§ C26-143.0 **Steel joist.**—The term "steel joist" shall mean any approved form of open webbed beam or truss nominally twenty-four inches or less in depth, produced directly by rolling, cold-forming or pressing or fabricated from rolled, cold-formed or pressed shapes by welding riveting or expanding.

(1.137). § C26-144.0 **Storage Garage.**—The term "storage garage" shall mean a garage in which volatile inflammable oil, other than that contained in the fuel storage tanks of motor vehicles, is handled, stored or kept.

(1.138). § C26-145.0 **Story.**—The term "story" shall mean that part of any building comprised between the level of one finished floor and the level of the next higher finished floor, or if there is no higher finished floor, then the term "story" shall mean that part of the building comprised between the level of the highest finished floor and the top of the roof beams. A basement shall be counted as a story. A cellar shall not be counted as a story.

(1.139). § C26-146.0 **Structural Clay Tile.**—The term "structural clay tile" shall mean a hollow building unit made from burned clay, shale, fire clay or admixtures thereof.

(1.140). § C26-147.0 **Structure.**—The term "structure" shall mean a building or construction of any kind.

(1.141). § C26-148.0 **Strut.**—The term "strut" shall mean a compression member other than a column or pedestal.

(1.142). § C26-149.0 **Superintendent.**—The term "superintendent" shall mean the administrative official in charge of the branch office of the department of housing and buildings in a borough of the city.

(1.143). § C26-150.0 *Repealed December 1962*

(8.7.2.7.1). § C26-151.0 **Temporary Wood Frame Structures and Tents.**—The term "temporary wood frame structures and tents" shall mean platforms, reviewing stands, gospel tents, circus tents, and other structures that are erected to serve their purpose for a limited time.

(12.10.2.9). § C26-153.0 **Tier.**—The term "tier", as used in connection with exits or seats in special occupancy structures, shall mean an orchestra floor, mezzanine, loge, balcony, gallery, or other similar level in the auditorium of such special occupanc structure in which seats are provided for the audience.

(1.146). § C26-154.0 **Unsanded Gypsum Plaster.**—The term "unsanded gypsum plaster" shall mean gypsum plaster containing a maximum of thirty-five percent of sand by weight.

(1.147). § C26-155.0 **Unsprinklered.**—The term "unsprinklered", as applied to a structure, shall mean not equipped throughout with an approved system of automatic sprinklers.

(2.4.2.18.1); C.O. Ch. 23, Art. 17, § 240(1). § C26-156.0 **Vault.**—The term "vault" shall mean every opening below the surface of the street, that is covered over as limited by sections 82d5-1.0 through 82d5-5.0 of the code, in front of any improved or

unimproved property, except cesspools and openings which are used exclusively as places for descending by means of steps to the cellar or basement floor of any building or buildings.

(1.148). § C26-157.0 **Veneered Wall.**—The term "veneered wall" shall mean a wall with a masonry facing which is attached to, but not bonded so as to form an integral part of, the wall for purposes of load bearing and stability.

(1.148.1). § C26-157.1 **Vermiculite.**—A micaceous mineral, or hydrous silicate, derived generally from the alteration of some kinds of mica which expand when heated. Used in the expanded form as a lightweight aggregate.

(1.149). § C26-158.0 **Welds, Butt, Groove, Fillet, Length and Dimensions of.**—a. The term "but weld" shall mean a weld in a butt joint. The term "groove weld" shall mean a weld made in the groove between two members to be joined. The size of a groove weld shall be expressed in terms of joint penetration or depth of chamfering plus the root penetration.

b. The term "fillet weld" shall mean a weld of approximately triangular cross-section joining two surfaces approximately at right angles to each other in a lap joint, tee joint or corner joint. The size of an equal leg fillet weld shall be expressed in terms of leg length of the largest isosceles right-triangle which can be inscribed within the fillet-weld cross-section. The size of an unequal leg fillet-weld shall be expressed in terms of the leg lengths of the largest right-triangle which can be inscribed within the fillet-weld cross-section.

c. The term "weld length" shall mean the unbroken length of the full cross-section of the weld exclusive of the length of any craters.

d. The term "weld dimensions" shall be expressed in terms of their size and length.

(1.151). § C26-159.0 *Repealed December 1962*

(1.152). § C26-160.0 *Repealed December 1962*

ARTICLE 3. ADMINISTRATION

Sub-Article 1. General Administrative Provisions

GROUP 1

Application for Permits

(2.1.1.1). § C26-161.0 **Permits for Construction or Alteration.**—a. Before the construction or alteration of any structure, or any part of a structure, shall be commenced and before construction or alteration of the plumbing of any structure or premises shall be commenced, the owner, or the registered architect or licensed professional engineer employed by the owner, shall submit to the superintendent a statement in triplicate, on appropriate blanks furnished by the superintendent, describing the proposed work, and such computations, plans, and detail drawings as the superintendent may require. Such statement shall constitute an application for a permit. Such statement shall be accompanied by a further signed statement giving the full name and residence of each of the owners of the structure, proposed structure or premises, and, except as otherwise herein provided in section C26-161.0 through C26-188.0 by a diagram of the lot or lots showing the established grade and the existing surface elevation of the street, if any, on which the construction is to be made, the exact location of any proposed new construction and of all existing structures that are to remain, including information as to the occupancy of such structure.

b. In the case of an interior alteration or a minor exterior alteration to an existing structure the filing of a lot diagram shall not be required unless the superintendent deems it to be necessary because of special conditions.

c. In the case of minor alterations which do not involve a structural change and which in the opinion of the superintendent do not require the filing of plans, a statement describing such minor alterations shall be submitted to the superintendent on such form as he may designate.

d. When plans are required to be filed, and such plans contemplate structural changes or structural work affecting public health or safety, they shall be accompanied by a signed statement of a licensed architect or a licensed professional engineer stating that he has supervised the preparation of the plans and that to the best of his knowledge and belief the structure if built in accordance with the plans, will conform to this title and to the rules of the board, and will not conflict with any provision of the charter, the multiple dwelling law, the labor law, the general city law, the building zone resolution, or any other provision of law applicable thereto, except as specifically noted otherwise.

e. If a licensed professional engineer has been employed in the preparation of the structural or mechanical design, the structural or mechanical plans shall be accompanied by his signed statement declaring that the structural or mechanical design drawings prepared under his supervision, to the best of his knowledge and belief, conform with the laws governing building construction, except as specifically noted otherwise.

f. If there are practical difficulties or unnecessary hardships in the way of carrying out the strict letter of the law, the signed statement of the licensed architect or licensed professional engineer shall state the nature of such difficulties or hardships.

g. Before a permit is issued, the owner, or his authorized agent, shall furnish the Commissioner with the name and address of the person who is to supervise the construction in accordance with the requirements of section C26-187.0, with power of substitution upon written notice to the Commissioner.

h. **Fees to accompany application.**—The superintendent shall collect a fee for each application filed and construction or alteration permit issued. Such fees are for the filing and processing of applications and plans, issuance of construction permits, and for construction work inspections. The prescribed fee shall be paid by the owner of the premises affected. Thirty per cent of the total fees, but not less than fifteen dollars, or the total fee where such fee is less than $15, shall accompany the application for an approval of plans or other description or indication of construction work and the remainder of the fee shall be paid before the construction permit may be issued. Plumbing work, standpipe work, automatic sprinkler work and elevator work are all included in the term "construction" whenever plans and applications for such work are filed with construction or alteration plans, otherwise they shall be treated as separate applications for which separate fees shall be applied and collected in accordance with the provisions of this subdivision. The provisions of this subdivision shall apply and no fee shall be payable hereunder if the owner of the premises affected be a corporation or association organized and operated exclusively for religious, charitable or educational purposes, or for one or more such purposes, no part of the net earnings of which enures to the benefit of any private shareholder or individual, and provided that the premises affected are to be used exclusively by such corporation or association for one or more of such purposes.

Fees shall be computed as hereinafter provided. The fees for new buildings, open air stadia, shall be as follows:

1. For the erection of structures:

(a) Two dollars per 1,000 cubic feet or fraction thereof of the volume of the structure for the first 100,000 cubic feet; one dollar per 1,000 cubic feet or fraction thereof of the volume of the structure for the next 500,000 cubic feet; and fifty cents per 1,000 cubic feet for each 1,000 cubic feet or fraction thereof in excess of 600,000 cubic feet of volume of the structure for all structures except office buildings, loft buildings, garage buildings, foundries, machine shops, factories and buildings for similar types of occupancy except as otherwise provided in items (e) and (f) herein but not less than fifteen dollars per structure.

(b) One dollar sixty cents per 1,000 cubic feet or fraction thereof of the volume of the structure for the first 100,000 cubic feet; eighty cents per 1,000 cubic feet or fraction thereof of the volume of the structure for the next 500,000 cubic feet; and forty cents per 1,000 cubic feet for each 1,000 cubic feet or fraction thereof in excess of 600,000 cubic feet of volume of the structure for office buildings, loft, garage, foundry, machine shop and factory buildings and buildings for similar type of occupancy, but not less than fifteen dollars per structure.

(c) Fifteen dollars plus one dollar fifty cents for each 1,000 square feet or fraction thereof of seating area and of each tier of seats and their appurtenant aisles, passageways, rest-rooms, sanitary facilities, spaces, etc., for open air places of assembly, whether for amusement, instruction, entertainment, religious services or any other purposes. For the purpose of determining areas for computing fees, the area shall be the projected horizontal area of each seating area and each tier.

(d) Five dollars for the lowest story of a structure when such lowest story is a basement or cellar not exceeding six hundred twenty-five square feet in area.

(e) Forty dollars for a single family dwelling not exceeding 800 square feet in area and not exceeding two stories, attic and basement or cellar in height.

(f) Sixty dollars for a two-family dwelling not exceeding 1,500 square feet in area and not exceeding two stories, attic and basement or cellar in height.

(g) Seventy-five cents for each 1,000 cubic feet of the volume of the structure or fraction thereof, but not less than fifteen dollars for a temporary frame structure.

(h) Fifteen dollars for a garage for not more than three cars when such garage is accessory to a one-, two- or three-family dwelling on the same plot when plans for such garage are filed with the application and plans for the one-, two- or three-family dwelling to which it is accessory.

(i) Fifteen dollars for the first one thousand dollars (or any fraction thereof) of the cost of the structure; ten dollars for each additional one thousand dollars or fraction thereof of cost of five thousand dollars of the structure; five dollars for each additional one thousand dollars or fraction thereof of the structure of cost over five thousand dollars; but not less than fifteen dollars for structures such as radio aerial towers and masts, tank structures, five escapes and other structures to which fees may not be readily applied under the foregoing provisions. Application for elevator work submitted separately, ten dollars.

2. For open spaces:

(a) Three dollars per each 2,000 square feet of area, but not less than fifteen dollars, for spaces without roof whether enclosed or unenclosed on sides, such as parking lots, gasoline or oil selling stations, storage yard, junk yards, sales or exhibition or show spaces and spaces used for generally similar purposes.

(b) For golf driving ranges, two dollars for each 20,000 square feet of area or fraction thereof but not less than fifteen dollars, plus fifteen dollars for an accessory structure not to exceed 144 square feet.

3. Required fees for permits for alterations and for the demolition of buildings and structures shall be:

(a) For the alteration of buildings and structures:

$15 for the first $1,000 or any fraction thereof of alteration, except for alterations to plumbing, the cost of which is less than $500, and which do not involve a structural change or a change of occupancy, the required minimum fee shall be as follows:

$5 for the first $250 or any fraction thereof, and

$10 when the cost is over $250 and less than $500.

$10 per $1,000 or fraction thereof of the cost of alteration for the next $4,000 of cost;

$5 per $1,000 or fraction thereof of the cost of alteration for the next $5,000 of cost; and

$3 per $1,000 or fraction thereof of cost of alteration in excess of $10,000.

(b) For the demolition of buildings and structures:

Fees for the demolition of buildings and structures shall be computed by multiplying the street frontage in feet by the number of stories times ten cents. In the case of a corner lot, the larger street frontage shall be used. The minimum fee shall be fifteen dollars.

4. After an application has been withdrawn by the owner, the owner on application to the comptroller of the city of New York, and upon verification of claim by the superintendent, may obtain a refund or a portion of the fee paid as follows:

(a) If application is withdrawn prior to the commencement of examination of the application, all but fifteen dollars of the fee paid shall be refunded.

(b) If the application is withdrawn during the progress of examination of the application, the comptroller shall retain a percentage of the deposit fee paid, which the (department) shall certify is the equivalent percentage of the examination completed, but not less than fifteen dollars. The remainder of the fee shall be refunded to the owner.

(c) If the application is withdrawn after examination of plans, and before construction is commenced, there shall be refunded such portion of the fee paid as will leave retained by the comptroller thirty per cent of the total computed fee, but not less than fifteen dollars.

5. The department shall adopt such rules and shall prescribe such forms as may be necessary to carry out the provision of this section.

6. The commissioner shall, when deemed necessary by him, require reasonable substantiation of alteration costs stated in any application for permit or any accompanying specification or other form that may be prescribed by the department.

7. An attic containing more than one living room shall be considered a story for the purpose of this section.

8. In the application of the foregoing methods of determining the amount of fees for permits, a vertical or a horizontal addition to any structure shall not be deemed to be an alteration but shall be deemed to be an erection, and fees shall be computed as prescribed in this section for permits for the erection of structures.

§ C26-161.1 Special requirements for certain structures on water front property.—Except as otherwise provided in section C26-6.0 herein, it shall be unlawful to construct or alter any structure on water front property not used in conjunction with and in furtherance of water front commerce and/or navigation without first securing from the commissioner of marine and aviation and filing with the department a statement in writing furnishing the following information:

1. A description of the property where the construction work is to be performed;

2. The name and address of the owner of such property; and

3. That the commissioner of marine and aviation approves the proposed construction work as being consistent with the plans for the water front of the city.

(2.1.1.2.). § C26-162.0 Elevations.—All elevations on plans accompanying applications for permits shall be referred to mean sea level at Sandy Hook established as the standard datum of the United States coast and geodetic survey, which is hereby established as the city datum.

(2.1.1.3). § C26-163.0 Information as to Subsoil Conditions.—Applications for permits shall contain such information concerning the subsoil as may be required by the rules of the board, but temporary permits for foundation work may be issued and work commenced before final plans, accompanied by such additional information and test data as may be required by the superintendent, are available.

(2.1.1.4.1). § C26-164.0 Special Requirements for Plumbing Plans.—a. Sewer and Water Supply Data.—Plans for new plumbing systems and, when required by the superintendent, plans for alterations to plumbing systems, shall be accompanied by a diagram approved by the borough president showing the relative elevation of the lowest fixture, referred to the city datum and the approximate inside top of the public sewer, and by a certificate from the department of water supply, gas and electricity, giving the minimum water pressure in the main in front of the structure. The plans shall also show the number, size and location of all proposed sewer connections.

(2.1.1.4.2). b. Plumber's Statement.—

1. It shall be unlawful to commence any plumbing or gas piping work, except as provided in section C26-171.0, until a registered plumber has signed the specifications and filed a signed statement with the superintendent containing the address of said plumber and stating that he is duly authorized to proceed with the work. It shall be unlawful to commence such work until a permit for such proposed work has been issued by the superintendent.

2. It shall be unlawful for any registered plumber to sign the specification and act as agent for a plumber who is without a certificate of competency from the commissioner of health as an employing or master plumber. Violation of this provision shall be sufficient reason for the superintendent to cancel a certificate of registration.

(2.1.1.4.3). c. Plumbing Plans and Specifications Covering Identical Adjoining Structures.—One set of plumbing or gas piping plans and specifications will be accepted for several structures which are to be exactly similar, if such structures are to be constructed on adjoining lots, are under the same ownership, and if the applications for permission to construct are filed simultaneously.

(2.1.1.4.4). d. Plumbing Plans to Include Water Supply Lines.—Where the installation of a water distribution or the replacement or alteration of a water supply distribution system is to be made, plumbing plans shall indicate all water distribution lines and branches involved, the size of each such line and branch, and the fixtures or devices to be supplied.

(2.1.1.4.5). e. Notice of Commencement of Plumbing and Readiness for Inspection.—The plumber shall notify the superintendent in writing when any plumbing or gas piping work is begun and when such work is ready for inspection.

(2.1.1.5.1). § C26-165.1 Special Requirements for Steam Boiler Installations and Operation.—a. It shall be unlawful to install any steam boiler with safety valve set to operate at a pressure exceeding fifteen pounds per square inch until there has been filed with the department a notice of such proposed installation stating the type, size and make of each such steam boiler.

b. No steam boiler hereafter installed with safety valve set to operate at a pressure exceeding fifteen pounds per square inch shall be operated until such time as a certificate of approval to permit the operation of such steam boiler has been issued by the department after test and inspection.

(2.1.1.6). § C26-166.0 Authorization of Owner to Perform Work.—If construction or plumbing or gas piping is to be performed by any person other than the owner in fee of the land, the person intending to make such construction or to construct such plumbing, either as lessee, or in any representative capacity, shall accompany his application for a permit with a statement in writing, sworn to as provided in section C26-161.0, giving the full name and residence of each of the owners of the land, structure or proposed structure, or premises, and reciting that he is duly authorized to perform the work described. Such statement may be made by the agent, licensed architect, or licensed professional engineer of the person hereinbefore required to make the statement.

(2.1.1.7). § C26-167.0 Permits for Elevator Installations.—a. It shall be unlawful to construct, install or alter any elevator or similar machine for which provision is made in article fourteen of this title, until the owner or lessee, or his agent, licensed architect or licensed professional engineer shall have submitted to the superintendent, in such form as the superintendent may prescribe, an application accompanied by plans and drawing showing the proposed construction, equipment, and mode of operation, and a permit has been issued by the superintendent.

b. Ordinary repairs and replacements to such machines may be made in accordance with the provisions of this title and with the rules of the board without filing such an application, except when such repairs or replacements involve a change in use, classification, operation, control, character of power supply, capacity, speed, type of car or type of counter-weight safety devices. Notice of such repairs, however, shall be given to the superintendent before work is commenced.

(2.1.1.8). § C26-168.0 Notice to Demolish.—Before any structure or part of a structure is demolished, a statement in writing, on appropriate blanks to be furnished by the department, which shall constitute a notice to demolish, shall be submitted to the superintendent by the owner or any person authorized by the owner, giving the full name and residence of each of the owners of the structure to be demolished, the name and business address of the person who is to do the work and such other information respecting the structure as the superintendent may require. Such notice shall be submitted before the work of demolition is commenced and the superintendent shall issue a permit upon approval of such notice, provided, however, that such owner has secured a certificate from the department that such structure has been effectively treated for the extermination of rats. The requirements of such certificate shall not apply in the case of a structure deemed by the borough superintendent to be unsafe and a hazard to persons and property.

(2.1.1.8.1). § C26-168.1 Penalty for failure to demolish or to comply with state rent control eviction certificate.—Any person who shall have filed and received approval of plans for a new building from the department and thereafter caused any residential tenant in a building on the site of the proposed new building to move or be evicted therefrom pursuant to a certificate of eviction issued by the temporary state housing rent commission and who after obtaining such certificate of eviction shall offer such building or the land on which it stands for sale or shall fail to demolish such structure within six months after removal of the tenants therefrom or who after such demolition shall fail to commence the erection of a structure pursuant to such plans within ninety days after the completion of such demolition or who shall fail to continue or complete construction within a reasonable time shall be guilty of a misdemeanor; and in addition to all other liabilities and penalties imposed by law, shall forfeit and pay for each housing accommodation in a building which was vacated as a result of the issuance of a certificate of eviction by the temporary state housing rent commission, a penalty of not more than five hundred dollars, as may be fixed by the court awarding judgment therefor. An action may be brought by the city for the recovery of any such penalty or penalties in the municipal court or any other court of record in the city. It shall be a defense to any prosecution or action to recover a penalty under this section that (1) the act or omission was done in good faith and with no intent to violate any of the provisions of this section; or (2) if the prosecution or action be based on a sale of the property, that the purchaser has demolished the structure and commenced the erection of the new building within the time limits herein provided for or, if such time limits have not expired that the purchaser has unconditionally undertaken to do so, within such time limits.

(2.1.1.9). § C26-169.0 Place of Filing Applications, Notices and Statements.—All applications, notices and sworn statements required by this title, and copies of the approved plans shall be kept on file in the department. Applications shall be promptly docketed as received. For purposes of identification and reference all such papers shall be marked with the block and lot number of the property to which they apply, and with the street and house number when possible, and the distance to the nearest street intersection. In outlying sections this requirement may be waived by the superintendent.

(2.1.1.10). § C26-170.0 Amendments to Applications.—Amendments to any application or permit may be filed at any time before the completion of the work for which the permit was sought. Such amendments, after approval, shall be made part of the application and filed as such.

(2.1.1.11). § C26-171.0 Ordinary Repairs Excepted from Permit Requirements.—a. Ordinary repairs to structures may be made without application or notice to the superintendent, but such repairs shall not include the cutting away of any wall or any portion thereof, the removal or cutting of any beams or supports or the removal, change or closing of any stairway or required means of exit

b. Ordinary repairs to the plumbing system may be made without application or notice to the superintendent, but such repairs shall not include addition to, or alteration, replacement or relocation of any standpipe piping, water distribution piping, house sewer, private sewer, or drainage system including leaders, or any soil, waste or vent pipe, or any gas distribution.

(2.1.1.13). § C26-173.0 Electrical Workers Qualifications.—It shall be unlawful to construct any electrical work or electrical devices in connection with signal systems, alarms, or other electrical apparatus or devices of sprinkler systems or standpipe systems until an application is made to perform such work by a person, partnership or corporation holding a license or a special license from the department of water supply, gas and electricity, as provided in sections B30-2.0 through B30-17.0 of the code.

GROUP 2

Issuance of Permits

(2.1.2.1). § C26-174.0 Approval of Applications.—It shall be unlawful to construct any structure, or any part thereof, or any plumbing, until the application required by sections C26-161.0 through C26-188.0, shall have been approved by the superintendent and a written permit issued by him. The superintendent shall approve or reject any application or plan, or amendment thereto, filed with him pursuant to the provisions of this title, within a reasonable time and, if he approves, shall promptly issue a notice of such approval, and shall upon the compliance with all provisions of law relating thereto promptly issue a permit therefor.

(2.1.2.2). § C26-175.0 Approval of Applications in Part.—The superintendent may approve and issue a permit for the construction of part of a structure, including foundations, when plans and detailed statements have been presented for such part, before the entire plans and detailed statements of such structure have been submitted or approved.

(2.1.2.3). § C26-176.0 Signature to Permit.—Every permit issued by the superintendent under the provisions of this title shall have his signature affixed thereto, but the superintendent may authorize any subordinate to affix such signature.

(2.1.2.3.1). § C26-176.1 Posting of Permit—a. Wherever there is any construction, alteration, or demolition in progress, for which a permit is required, on any premises, a permit card bearing the permit number, application number and the location of the premises for which issued, shall be posted in a conspicuous location on the exterior of the structure or premises where the work is in progress, so as to be visible to public inspection.

b. The commissioner may make rules concerning the information to appear on the card, the size of card, the method, location and period of display and any other related matters so as to carry out the intent of this section.

c. It shall be unlawful to display a permit card at any location other than the location for which it was issued.

(2.1.2.4). § C26-177.0 Expiration of Applications and Permits by Limitation.—a. Any permit issued by the superintendent under the provisions of this title, but under which no work is commenced within one year from the date of issuance, shall expire by limitation.

b. Any application for an approval which has been disapproved in part and upon which no further action has been taken by the applicant within two years after the notice of partial disapproval was given shall be considered as automatically withdrawn, but may be reinstated by the superintendent provided it complies with all provisions of the law in effect at the time application for reinstatement is made.

c. Any such application upon which no action has been taken by the applicant within thirty months after the date of partial disapproval shall, with its accompanying plans, be removed from the file and destroyed.

(2.1.2.5). § C26-178.0 Compliance with Plans, Laws and Regulations.—a. It shall be unlawful to construct any structure, or any plumbing, except in accordance with the approved detailed statement of specifications and plans, for which the permit was issued, or any approved amendment thereof. A certified copy of the approved plans shall be kept at all times on the premises from the commencement of the work to the completion thereof, except that this requirement may be waived by the superintendent where he deems compliance with it is unnecessary.

b. Permits for construction or equipment of a structure issued by the superintendent shall be deemed to incorporate the proviso that the applicant, his agent, employees or contractors shall use only approved materials, appliances and methods of construction and shall carry out the proposed work in accordance with the approved plans and with all requirements of this title and any other laws or regulations applicable thereto, whether specified or not.

(2.1.2.6). § C26-179.0 Adherence to Diagrams.—It shall be unlawful to fail to adhere strictly to the location of any new structure, or of an extension to an existing structure, as shown on the diagram filed as required by section C26-161.0 or on any approved amendment of such diagram. A survey by a duly licensed surveyor showing the location of the new structure or extension shall be filed before completion of the structure. His survey shall show the location of the structure, the elevation of the first tier of beams or of the first floor, the finished grades of the open spaces on the plot, the established curb level and the location of all other structures on the plot, together with the location and boundaries of the lot or plot upon which the structure is constructed. It shall be unlawful to reduce or diminish the area of any lot, a diagram of which has been filed with an application to construct and has been used as basis for a permit, unless the structure for which the permit was issued complies in all respects with the requirements of this title for structures located on plots of such diminished area; provided that this requirement shall not apply to any lot the area of which is reduced by reason of any street opening or widening or other public improvement.

Where minor extensions of existing structures, or small sheds, stands, watchmen's shelters, signs and similar small structures are erected, the superintendent may waive the requirement that a survey be filed.

(2.1.2.7). § C26-180.0 Revocation of Permits.—The superintendent may revoke any permit or approval issued under the provisions of this title, whenever there has been any false statement, or any misrepresentation as to a material fact in the application on which the permit or approval was based, or whenever any permit or approval has been issued in error and conditions are such that a permit or approval should not have been issued.

GROUP 3
Certificates of Occupancy

(2.1.3.1). § C26-181.0 Certificates of Occupancy for New Structures.—a. It shall be unlawful to occupy or use any structure erected after January first, nineteen hundred thirty-eight, in violation of section six hundred forty-six, subdivision a of the charter. The superintendent shall issue a certificate of occupancy, in such form as may be authorized by the board, certifying that such structure conforms substantially to the approved plans and specifications and the requirements of the laws governing building construction applicable to structures of the class and kind of such structure.

b. A certificate of occupancy shall be issued in conformity with section six hundred forty-six, subdivision e of the charter.

(2.1.3.2). § C26-182.0 Temporary Certificates of Occupancy.—The superintendent may issue a temporary certificate of occupancy for part of a structure, pursuant to section six hundred forty-six, subdivision g of the charter. Original temporary certificates of occupancy may be granted for periods of not more than ninety days and be subject to renewal by the superintendent for similar periods of not more than ninety days at his discretion.

(2.1.3.3). § C26-183.0 Occupancy of Altered Structures.—a. It shall be unlawful to occupy or use in whole or in part, for any purpose whatever, any structure altered after January first, nineteen hundred thirty-eight, which was vacant during the progress of the work of alteration until a certificate of occupancy shall have been issued by the superintendent certifying that the work for which the permit was issued has been completed substantially in accordance with the approved plans and specifications and the provisions of the laws governing building construction applying to such an alteration.

b. In case such structure has been substantially altered so as to affect any existing means of egress or has been converted or altered from one class to another class or has been converted or altered so as to increase the number of living rooms or apartments in the building and such alteration does not necessitate the vacation of the building during the progress of the work, the occupancy or use of the building shall not continue more than thirty days after the completion of such alteration, unless a certificate of occupancy has been issued by the superintendent. The term "class" as used herein refers to the classification of buildings in this title and also to the terms "class and kind" as used in the multiple dwelling law when such law is affected. (L. 1942.)

2. This local law shall take effect immediately.

(2.1.3.4). § C26-184.0 Occupancy of Existing Structures.—The legal occupancy and use of any structure existing on January first, nineteen hundred thirty-eight, may continue, except as may be specifically prescribed by this title or as may be necessary for the safety of life, health or property. Upon written request from the owner, the commissioner shall issue a certificate of occupancy for any structure existing on January first, nineteen hundred thirty-eight, certifying, after verification by inspection, such occupancy or use of such structure, provided that at the time of issuing such

certificate there are no notices of violation, or other notices or orders, pending in the department. The occupancy and use of any structure on water front property not used in conjunction with and in furtherance of water front commerce and/or navigation, and for which a certificate of completion has been or is issued pursuant to law by the commissioner of marine and aviation, may continue, except as may be specifically prescribed by section C26-276.0 of this title. Except, as otherwise provided in this section the commissioner of buildings shall honor such certificates of completion for the uses and purposes certified to therein.

(2.1.3.5). § C26-185.0. Change of Occupancy. a. It shall be unlawful to make any changes of occupancy or use of any structure if such change is inconsistent with the last issued certificate of occupancy. It shall be unlawful to make any change of occupancy in a structure, existing on January first, nineteen hundred thirty-eight, which would bring it under some special provision of the laws governing building construction, unless a certificate is issued by the commissioner certifying that such structure conforms to the provisions of the laws governing building construction for the proposed new occupancy and use and that the proposed use will not be in conflict with any provisions of the labor law, multiple dwelling law or the building zone resolution.

b. Except as herein provided, a new certificate of occupancy shall not be required where the change of use is within the same use group as listed in the amended zoning resolutions. Where a portion of a building exceeding three stories in height is changed to a different use, and this portion of the building does not exceed twenty per cent of the the total floor area, an amendment to the existing certificate of occupancy for such new use shall be issued by the commissioner certifying that the proposed new occupancy and use conforms to the provisions of the laws governing building construction and that the proposed use will not be in conflict with any provisions of the labor law, multiple dwelling law or the building zone resolution.

(2.1.3.6). § C26-186.0 Contents of Certificates of Occupancy.—In addition to the certification, required by this article, of compliance with the approved plans and application and with the provisions of laws governing building construction, each certificate of occupancy shall state the purposes for which the structure may be used in its several parts, the maximum permissible live loads on the several floors, the number of persons which may be accommodated in the several stories and any special stipulations of the permit.

(2.1.3.7). § C26-187.0 Affidavits Accompanying Applications for Certificates of Occupancy.—a. Applications to the superintendent for a certificate of occupancy for a structure, the plans for which were accompanied by an affidavit as required by section C26-161.0, may be accompanied by an affidavit of the licensed architect or licensed professional engineer who filed the original plans or of the licensed architect or licensed professional engineer who supervised the construction of the work.

b. In case the application for the certificate of occupancy is not accompanied by the affidavit of the licensed architect or licensed professional engineer who filed the original plans or who supervised the construction work, it shall be accompanied by the affidavit of a superintendent of construction who supervised the construction work and who has had at least ten years' experience in supervising building construction work.

c. The affidavit of a licensed architect, licensed professional engineer or superintendent of construction who supervised the construction, shall state that the deponent has examined the approved plans of the structure for which a certificate of occupancy is sought, and that to the best of his knowledge and belief the structure has been erected in accordance with the approved plans, and as erected complies with the laws governing building construction, except in so far as variations therefrom have been legally authorized. Such variations shall be specified in the affidavit.

(2.1.3.8). § C26-188.0 Issuance and Filing of Certificates of Occupancy.—a. The superintendent shall issue certificates of occupancy for a structure within ten days after written application therefor, if at the date of such application such structure shall be entitled thereto. A record of all certificates shall be kept in the department and copies shall be furnished on request and on the payment of a fee of one dollar per copy, to any person having a proprietary interest in the structure affected.

b. Certificates of occupancy for structures erected after January first, nineteen hundred thirty-eight, shall be issued only after the floor load signs, required by section C26-343.0 have been installed.

Sub-Article 2. Enforcement
GROUP 1
Rules

(2.2.1.1). § C26-189.0 Authority to Adopt Rules.—a. The board shall have power to adopt rules to secure the intent and purposes of this title and a proper enforcement

of its provisions. The board shall also have power to make rules and regulations respecting the approval of materials and methods of construction. Such rules shall be uniform in all the boroughs.

b. Where not inconsistent with specific provisions of this title, the rules adopted by the board before January first, nineteen hundred thirty-eight, by the former superintendent of buildings, and by the former board of buildings are hereby confirmed and they shall remain effective until amended or repealed.

c. Wherever in this title A. S. T. M. specifications or other standard specifications are prescribed such specifications shall govern until such time as they may be amended, modified or superseded by the board.

GROUP 2

Right of Entry of Officers and Employees

(2.2.2). § C26-190.0 Right of Entry of Officers and Employees.—Any officer or employee of the department, so far as may be necessary for the performance of his duties, under section six hundred forty-nine of the charter, shall have the right upon showing his badge of office to enter any structure or premises in the city.

GROUP 3

Approval of Materials, Appliances and Methods of Construction

(2.2.3). § C26-191.0 Approval of Materials, Appliances and Methods of Construction.—a. Except as otherwise provided in section six hundred forty-five of the New York city charter and in section C26-4.0 of this Code, the sole authority to test and approve materials and appliances is vested in the board.

b. Whenever any materials, appliances or methods of construction have been approved by the superintendent, a record of such approval shall be kept on file in the department and shall be open to public inspection during business hours.

c. Any material, appliance or form of construction coming under the provisions of this title and approved before January first, nineteen hundred thirty-eight, may be used for the purposes for which it was approved, except so far as may be inconsistent with specific provisions of this title.

d. The use of any material already fabricated or of any construction already erected, which conforms to statutes passed prior to January first, nineteen hundred thirty-eight, shall be permitted, but the continuance of any construction erected in violation of any statute previously in force, shall be unlawful and any penalty incurred before January first, nineteen hundred thirty-eight, may be collected.

(2.2.3.1). § C26-192.0 Identification Marks.—Identification marks, such as grade marks, trade-marks and manufacturers' marks, for which official recognition is desired, shall be filed with the board and acceptance by it shall constitute official recognition of such marks, after the board shall have filed with the Commissioner of Housing and Buildings six certified copies of the approved trademark.

GROUP 4

Care of Unsafe or Dangerous Structures

(2.2.4.1) [redacted] C26-193.0 Removal or repair of structures.—Any structure or part of a structure or premises that from any cause may at any time become dangerous or unsafe, structurally or as a fire hazard, or dangerous or detrimental to human life, health or morals, shall be taken down and removed or made safe and secure. A **vacant building** which is not continuously guarded shall have all openings sealed in a manner approved by the commissioner, and it shall be the duty of the owner thereof promptly to make any repairs that may be necessary for the purpose of keeping such building sealed. Any vacant **building** not continuously guarded or not **sealed** and kept secure against unauthorized entry as hereinbefore provided shall be deemed dangerous and unsafe as a fire hazard **and** dangerous **and** detrimental to human life, health **and** morals within the meaning of this article.

(2.2.4.2). § C26-194.0 Record and notice of unsafe structures or premises.

a. Docket, order and notice. Immediately upon the receipt of a report by any officer or employee of the department that a structure or part of a structure or premises is unsafe or dangerous, structurally or as a fire hazard, or is dangerous or detrimental to human life, health or morals, the superintendent shall cause the report to be entered upon a docket of unsafe structures and premises. Such docket shall be kept in the department. The owner, or one of the owners, executors, administrators, agents, lessees or any other person who may have a vested or contingent interest in the structure or premises, shall be served with a printed or written notice containing a description of the structure or premises deemed unsafe or dangerous, or detrimental to human life, health or morals, and an order requiring such structure or premises to be made safe and secure, or removed, or to be vacated and made safe and secure as may be deemed necessary by the superintendent. Such notice shall require the person thus served immediately to certify to the superintendent his acceptance or rejection of the order. The notice shall further notify said person that upon his refusal or neglect to comply with any of the requirements of this section or of section C26-195.0, a survey of the premises named in such notice will be made at a time and place therein named, in accordance with section C26-196.0. The notice shall also set forth that, if the premises referred to therein are reported unsafe or dangerous by the surveyors, their report will be placed before the supreme court and that a trial upon the allegations and statements contained therein, whether such report contain more or less than the notice of survey, will be had before such court at a time and place named in such notice, to determine whether the unsafe or dangerous structure or premises shall be vacated and repaired and secured, or repaired and secured, or taken down and removed, and that a report of such survey, reduced to writing, shall constitute the issue to be placed before the court for trial.

b. Manner of service of order and notice. The order and notice pursuant to this section shall be served by delivering to and leaving a copy of the order and notice with the person to whom the order and notice is addressed, if such person can be found within the city after diligent search. In the event that such service cannot be made, service shall be made in accordance with the provisions of subdivision d of section C26-202.0.

(2.2.4.3). § C26-195.0 Voluntary Abatement of Unsafe or Dangerous Conditions.—If the person served with a notice as specified in section C26-194.0, shall immediately certify his assent to the securing or removal of such unsafe or dangerous structure or premises, or such structure which is dangerous or unsafe as a fire hazard or detrimental to human life, health or morals, he shall be allowed twenty-four hours, running from the time of service of such notice, within which to commence the abatement of the unsafe, dangerous or detrimental condition. Such person shall employ sufficient labor and assistance to secure or remove such conditions as expeditiously as possible.

(2.2.4.4.1). § C26-196.0 Disregard of Notice; Survey.—a. Identity of Surveyors. The survey referred to in section C26-194.0 shall be made by three competent persons, of whom one shall be the superintendent, or an engineer or an inspector designated in writing by him; another shall be a licensed architect, appointed either by the county chapter of the American Institute of Architects of the borough in which the survey is to be made or by the New York Society of Architects, Brooklyn Society of Architects, or a licensed professional engineer appointed by the New York Association of Consulting Engineers or by the county chapter of the New York Society of Professional Engineers of the borough in which the survey is to be made; and the third shall be a practical builder, a licensed professional engineer or a licensed architect appointed by the person served with a notice pursuant to section C26-194.0. In case the person served with such notice shall neglect or refuse to appoint such surveyor, the other two surveyors shall make the survey. In case they disagree, they shall appoint a third person to take part in such survey, who shall be a practical builder, licensed professional engineer or an architect of at least ten years' practice, whose decision shall be final.

b. Posting Report of Survey.—A copy of the report of the survey shall be posted on the structure that is the subject thereof by the persons holding the survey, immediately on their signing such report.

c. Compensation of Surveyors.—The architect appointed by the county chapter of the American Institute of Architects of the borough in which the survey is to be made, or by New York Society of Architects, the Brooklyn Society of Architects, or the engineer appointed by the New York Association of Consulting Engineers, or by a chapter of the New York Society of Professional Engineers located in New York city, as hereinbefore provided, who may act on any survey called in accordance with the provisions of this article, and the third surveyor who may have been called in the case of disagreement provided for in subdivision a of the section C26-196.0, shall each be paid the sum of fifty dollars by the finance department upon the voucher of the superintendent. The city is hereby given a cause of action against the owner of the structure surveyed, and of the lot or parcel of land on which the structure is situated, for such sum with interest. The amount so collected shall be paid over to the finance department in reimbursement of the amounts paid as aforesaid.

(2.2.4.5.1). § C26-197.0 Judicial Review of Survey.—a. Institution of Proceeding. Whenever the report of any such survey, had as aforesaid, shall recite that the **structure or premises thus surveyed is unsafe or dangerous, structurally or as a fire** hazard, or dangerous or detrimental to human life, health or morals, the corporation counsel shall, at the time specified in the notice, place such notice and report before the justice holding a special term of the court named in the notice.

(2.2.4.5.2). b. Precedence of Proceeding.—The determination of the issue in an unsafe structure proceeding shall have precedence over every other business of such

supreme court. A trial of the issue shall be held without delay, at the time specified in the notice, and shall be held by the justice holding such court or by a referee, whose decision or report in the matter shall be final, unless a jury trial is demanded, in which case the verdict of such jury shall be final.

(2.2.4.5.3). c. Postponement of Trial.—If, for any reason, the issue shall be tried at a time other than that specified in such notice, or to which the trial may be adjourned, the issue may be brought into trial at any time thereafter by the superintendent without a new survey, upon at least three days' notice of trial to the person upon whom the original notice was served, or to his attorney. Such notice of trial may be served in the same manner as the original notice.

(2.2.4.5.4). d. Precept to Abate.—Upon the rendition of a verdict of the court or decision of the referee, if such verdict or decision shall find the structure or premises to be unsafe or dangerous, structurally or as a fire hazard, or dangerous or detrimental to human life, health or morals, the justice trying the case, or to whom the report of the referee trying the case shall be presented, shall immediately issue a precept directed to the superintendent, reciting such verdict or decision, and commanding him forthwith to vacate and repair and secure, or to repair and secure, or take down or remove the structure or part thereof or other premises that shall have been named in the report, in accordance with such verdict or decision.

(2.2.4.6.1.). § C26-198.0 Repair or Removal Under Precept.—a. Execution of Precept. Upon receiving a precept under the provisions of section C26-197.0, the superintendent referred to therein shall immediately proceed to execute such precept, as therein directed, and may employ such labor and assistance and furnish such materials as may be necessary for that purpose. Whenever the demolition of any structure or part of a structure is to be carried out pursuant to any such precept, and the superintendent, upon authorization by the commissioner, requests of the commissioner of real estate that such structure or part thereof be demolished, such demolition work, as so requested, shall be performed by or under the direction of the commissioner of real estate in accordance with the provisions of subdivisions b and c of section 1082c-2.0 of the code. The owner of such structure, or part thereof, or premises, or any party interested therein, if he applies to the superintendent immediately upon the issuing of such precept and pays all costs and expenses incurred by the city up to that time, shall be allowed to perform the requirements of the precept at his own proper cost and expense, if the performance shall be done immediately and in accordance with the requirements of such precept. The superintendent shall have authority to modify the requirements of any precept upon application to him in writing by the owner of such structure, or part thereof, or premises, or his representative, when such superintendent shall be satisfied that such change will secure the safety of such structure or premises equally well.

b. Interference prohibited.

1. It shall be unlawful for any person to interfere, obstruct or hinder the superintendent or commissioner of real estate or the representative of either, or any person who, acting under the authority conferred on him by such superintendent or commissioner, is performing the work directed by a precept issued out of any court as in this article provided, or the work ordered by the superintendent in accordance with such precept under the provisions of this title.

2. The police commissioner shall enforce such orders or requirements when requested by the superintendent, and shall likewise enforce same at the request of the commissioner of real estate with respect to demolition work performed by or under the direction of such commissioner pursuant to the provisions of this section.

(2.2.4.7). § C26-199.0 Provision for Expense of Executing Precept.—The superintendent may make requisition upon the comptroller for such amount of money as shall be necessary to meet the expenses of any preliminary proceedings or the execution of any order or precept issued by any court. Upon the approval of the statement of expenses thereof by any justice of the court from which such order or precept was issued, the finance department shall pay such expenses as provided in section one hundred seventeen, subdivision five c of the charter.

(2.2.4.8). § C26-200.0 Return of Precept; Reimbursement of City.—Upon compliance with any precept issued to him in a proceeding under this article, the superintendent shall make return thereof, with an endorsement of the action thereunder and the cost and expenses thereby incurred, to the justice then holding the special term of the court from which such precept issued. Such justice shall then tax and adjust the amount endorsed upon such precept, and shall adjust and allow the disbursements of the proceeding, together with the preliminary expenses of searches and surveys thereof, which shall be inserted in the judgment in such action or proceeding, and shall then render judgment for such amount and for the sale of the premises named in such notice, together with all the right, title and interest that the person named in such notice had in the lot, ground or land upon which such structure was placed, at

the time of the filing of a notice of lis pendens in such proceedings, or at the time of the entry of judgment therein, to satisfy such judgment. Such sale shall take place in the same manner and with the same effect as sales under judgment in foreclosure of mortgages. The notice of lis pendens provided for in section C26-193.0 through C26-205.0 shall consist of a copy of the notice of survey, and shall be filed in the office of the clerk of the county where the property affected by such action, suit or proceeding is located.

(2.2.4.9.1). § C26-201.0 Fallen Structures and Structures Imminently Dangerous.—a. Recovery of Bodies from Wrecked Structures.—Where any persons are known or believed to be buried under the ruins of any fallen structure or part thereof in the city, the superintendent shall cause an examination of the premises to be made for the recovery of the bodies of the killed and injured. Whenever, in making such examination, it shall be necessary to remove any debris from the premises, the commissioners of docks, parks, police and sanitation and the borough president, respectively, when called upon by the superintendent, shall cooperate with the superintendent in carrying out the purposes of this article, and shall provide suitable and convenient places for the deposit of such debris.

(2.2.4.9.2). b. Temporary Safeguards for Dangerous Structures.—In case there shall be, in the opinion of the superintendent, actual and immediate danger that any structure or part thereof will fall, so as to endanger life or property, he shall request the commissioner of real estate to cause the necessary work to be done to render such structure or part thereof temporarily safe until the proper proceedings provided for unsafe structures by this title are instituted.

(2.2.4.9.3). c. Vacating Structures; Closing Streets and Sidewalks.—Where, in the opinion of the superintendent, there shall be actual and immediate danger that any structure or part thereof will fall so as to endanger life or property, or where any structure or part thereof has fallen and life is endangered by the occupation thereof, the superintendent is hereby authorized and empowered to order and require the inmates and occupants of such structure or part thereof to vacate the structure forthwith. The police commissioner shall enforce such orders or requirements when so requested by the superintendent.

(2.2.4.9.4). d. Laborers and Materials.—For the purposes of this article, the superintendent shall employ such laborers and materials as may be necessary to perform such work as expeditiously as possible.

GROUP 5

Violations and Punishments

(2.2.5.1.1). § C26-202.0 Notices of Requirements or of Violations.—a. Issue of Notices or Orders.—All notices of the violation of any of the provisions of this title, and all notices or orders required or authorized by this title, directing anything to be done, including notices or orders that any structure, premises, or any part thereof, is deemed to be unsafe or dangerous, shall be issued by the superintendent and shall have his name affixed thereto

(2.2.5.1.2). b. Contents of Notices or Orders.—Each such notice or order, in addition to the statement of requirements, shall contain a description of the structure, premises or property affected.

(2.2.5.1.3). c. Services of Notices or Orders.—Notices or orders issued by any court in any proceeding, instituted pursuant to this title to restrain or remove any violation or to enforce compliance with any provision or requirement of this title, may be served by delivering to and leaving a copy of the notice or order with any person violating, or who may be liable under any provision of this title, or who may be designated as provided in subdivision d of section C26-205.0. Notices or orders to restrain or remove any violation issued by the superintendent or commissioner pursuant to this title may be served by regular mail. Such notices may be served by any officer or employee of the department, or by any person authorized by the superintendent.

(2.2.5.1.4). d. Notice or Order by Posting.—If the person to whom such order or notice is addressed cannot be found within the city after diligent search, such notice or order may be served by posting it in a conspicuous place upon the premises where such violation is alleged to have been placed or to exist, or to which such notice or order may refer, or which may be deemed unsafe or dangerous, and also depositing a copy thereof in a post office in the city enclosed in a sealed, postpaid wrapper addressed to such person at his last known place of residence, which shall be equivalent to a personal service of such notice order or upon all parties for whom such search shall have been made.

(2.2.5.2.1). § C26-203.0 Emergency Measures.—a. Stopping Work and Vacating

and Securing Structures.—In case, in the opinion of the superintendent, any defective or illegal work in violation of or not in compliance with any of the provisions or requirements of this title shall endanger life or property, the superintendent, or such person as may be designated by him, shall have the right and is hereby authorized and empowered to order all further work to be stopped in and about such structure or premises, and to require all persons in and about such structure or premises forthwith to vacate it, and also to cause such work to be done in and about the structure as in his judgment may be necessary to remove any danger therefrom.

(2.2.5.2.2). b. Violations of Protective Measures During Construction or Demolition.—During the construction or demolition of a structure, the superintendent shall notify the owner of the structure affected of any failure to comply with any of the provisions of this title that concern the protection of the public and workmen during construction or demolition. Unless the owner so notified proceeds within twenty-four hours to comply with the orders of the superintendent, the superintendent shall have full power to correct the violation. All expenses incurred therefor shall become a lien on the property which may be enforced as provided in section C26-204.0.

(2.2.5.2.3). c. Closing Streets Temporarily.—The superintendent may, when necessary for the public safety, temporarily close the sidewalks, streets, structures or places adjacent to a structure or part thereof, and the police commissioner, or any of his subordinates shall enforce all orders or requirements made under this article, when so requested by the superintendent.

(2.2.5.3.1). **§ C26-204.0 Judicial Remedies.**—a. Action or Proceeding, Generally.—Whenever the superintendent believes that any structure, or any portion thereof, or any plumbing or other mechanical equipment, the construction, removal or demolition of which is regulated, permitted or forbidden by this title is being constructed, removed or demolished, or has been constructed, in violation of, or not in compliance with any of the provisions or requirements of this title, or in violation of any detailed statement of specifications or plans submitted and approved thereunder, or of any certificate or permit issued thereunder; or that any provision or requirement of this title, or any order or direction made thereunder has not been complied with, or that plans and specifications for plumbing and other mechanical equipment have not been submitted or filed as required by this title; the superintendent may, in his discretion, through the corporation counsel, institute any appropriate action or proceeding at law or in equity to restrain, correct or remove such violation, or the execution of any work thereon, or to restrain or correct the erection or alteration of, or to require the removal of, or to prevent the occupation or use of, such structure. Any person who shall maintain or continue any structure, or any portion thereof, or the occupancy or use thereof, or any plumbing or mechanical equipment in violation of any of the provisions of this title, after having been duly notified as provided in this title that such structure, or any portion thereof, or the occupancy or use thereof, or that such plumbing or any mechanical equipment is in violation of any provision of this title, shall be subject to any action or proceeding and any punishment that is provided in this article for the commission of the violation, except that any person shall be subject to any action or proceeding and any punishment that is provided in this article for the commission of the violation, without prior notification that a violation exists, where the violation is any of the following types:

1. A violation which produces an imminent hazard to persons or property by reason of a change of occupancy or use without a permit, or because of the obstruction of exits or unlawful change of exits, or by reason of permitting in a place of assembly more than the approved number of persons.

2. A violation due to the omission of protective equipment or construction which would safeguard persons or property during construction or demolition.

3. A violation that is due to work being done by an unlicensed or non-qualified person, when the law requires that such work be done only by persons licensed or possessed of a certificate of qualification to do such work.

4. A violation that consists of doing work without a permit and the worker refuses to discontinue the work.

(2.2.5.3.2). b. Corporation Counsel to Act.—The corporation counsel shall institute any and all actions and proceedings, either legal or equitable, that may be appropriate or necessary for the enforcement of the provisions of this title.

(2.2.5.3.3). c. Courts Having Jurisdiction.—All courts of civil jurisdiction in the city shall have full legal and equitable jurisdiction over any and all suits and proceedings authorized by this title to be brought for the recovery of any fine or the enforcement of any provision of this title, and to make appropriate orders and render judgment therein according to law, so as to give force and effect to the provisions of this title. Such courts shall give preference to such suits and proceedings over all others. No court shall lose jurisdiction of any action hereunder by reason of a plea

that the title to real estate is involved if the object of the action is to recover a fine for the violation of any of the provisions of this title.

(2.2.5.3.4). d. Restraining Order.—In any such action or proceeding the city may, in the discretion of the superintendent and on his affidavit setting forth the facts, apply to any court of record in the city or to a judge or justice therof, for an order enjoining and restraining all persons from occupying or using for any purpose whatever or doing, or causing or permitting to be done, any work in or upon such structure, or in or upon such part thereof as may be designated in such affidavit, until the hearing and determination of such action and the entry of final judgment therein. The court, or judge or justice thereof, to whom such application is made, is hereby authorized forthwith to make any or all of the orders above specified, as may be required in such application, with or without notice, and to make such other or further orders or directions as may be necessary to render the same effectual. No undertaking shall be required as a condition to the granting or issuing of such injunction order, or by reason thereof.

(2.2.5.3.5). e. Judgment.—All courts in which any action or proceeding is instituted under this title shall, upon the rendition of a verdict, report of a referee, or decision of a judge or justice, render judgment in accordance therewith.

(2.2.5.3.6). f. Lien of Judgment.—Any judgment rendered in an action or proceeding instituted under this title shall be and become a lien upon the premises named in the complaint in such action, such lien to date from the time of filing a notice of lis pendens in the office of the clerk of the county wherein the property affected by such action, suit or proceeding is located. Every such lien shall have priority before any mortgage or other lien as may exist prior to such filing except tax and assessment liens.

(2.2.5.3.7). g. Lis Pendens.—The notice of lis pendens referred to in this article shall consist of a copy of the notice issued by the superintendent, requiring the removal of the violation, and a notice of the suit or proceedings instituted, or to be instituted thereon. Such notice of lis pendens may be filed at any time after the service of the notice issued by the superintendent as aforesaid; provided he may deem such action to be necessary. Any notice of lis pendens filed pursuant to the provisions of this title may be vacated and cancelled of record upon an order of a justice of the court in which such suit or proceeding was instituted or is pending, or upon the consent in writing of the corporation counsel. The clerk of the county where the notice is filed is hereby directed and required to mark any such notice of lis pendens, and any record or docket thereof, as vacated and cancelled of record, upon the presentation and filing of a certified copy of such order or consent.

(2.2.5.3.8). h. Costs.—In no case shall a department, or any officer thereof, be liable for costs in any action, suit or proceeding that may have been, or may hereafter be, instituted or commenced in pursuance of this title.

(2.2.5.3.9). i. Officers Not Liable for Damages.—An officer of a department, acting in good faith and without malice, shall be free from liability for acts done in any action or proceeding instituted under any provision of this title, or by reason of any act or omission in the performance of his official duties.

(2.2.5.4.1). **§ C26-205.0 Judicial Orders.**—a. Judicial Orders to Comply with Notices or Orders.—In case any notice or direction authorized to be issued by this title is not complied with within the time designated therein, the city, by the corporation counsel, may, at the request of the superintendent, apply to the supreme court, at a special term thereof, for an order directing the superintendent to proced to make the alterations or remove the violation, as may be specified in such notice or direction.

(2.2.5.4.2). b. Judicial Orders to Vacate for Violations.—Whenever any notice or direction so authorized shall have been served as provided in this article, and shall not have been complied with within the time designated therein, the corporation counsel shall, at the request of the superintendent, in addition to, or in lieu of any other remedy provided for by this title, apply to the supreme court, at a special term thereof, for an order directing the superintendent to vacate such structure or premises, or so much thereof as he may deem necessary, and prohibiting the use or occupancy of such structure or premises for any purpose specified in such order until such notice shall have been complied with.

(2.2.5.4.3). c. Responsibility of Lessees or Occupants.—In case any of the notices or orders of the court herein mentioned shall be served upon any lessee or party in possession of the structure or premises therein described, it shall be the duty of the person upon whom such service is made, if such person know the address of the owner or agent of the structure or premises named in the notice, to give immediate notice to such owner or agent if such owner or agent shall be within the city, and his residence be known to such person, and, if such owner or agent shall be outside the city, by depositing such notice in any post office in the city, properly enclosed in a

postpaid wrapper addressed to such owner or agent at his then known place of residence.

(2.2.5.4.4). d. Designation of Agent by an Owner of a Structure.—Any owner of real estate or of a structure thereon may execute and acknowledge a written designation of a resident of the city upon whom may be served any notice of violation, notice to make safe, notice of survey, summons, mandate, or any paper or process, issued under a provision of this title, and may file such designation, with the written consent of the person so designated, duly acknowledged in the office of the superintendent. Such designation must specify the location of the property with respect to which the designation is made, the residence and place of business of the person making it and of the person designated. Such designation shall remain in force during the period specified therein, if any, or until revoked by the death or legal incompetency of either of the parties, or until the filing of a revocation by either of the parties, duly acknowledged and endorsed, with the consent of the superintendent. The superintendent shall file and index each designation and shall note, upon the original designation and index, the filing of a revocation. While the designation remains in force, as prescribed in this article, a notice of violation, notice to make safe, notice of survey, summons, mandate, or any paper or process under any provision of this title, shall be served upon the person so designated, in like manner and with like effect, as if it were served personally upon the person making the designation, even if such person be present in the city.

(2.2.5.4.5). e. Reimbursement of City for Expenses.—The expenses and disbursements incurred in the carrying out of any order issued as provided in subdivisions a and b of section C26-205.0, shall become a lien upon the structure or premises named in the order, from the time of filing of a copy of the order, with a notice of lis pendens as provided in this title, in the office of the clerk of the county where the property affected by such action, suit or proceeding is located; and the supreme court, to whom application shall be made, is hereby authorized and directed to grant any of the orders above named, and to take such proceedings as shall be necessary to make them effectual, and any justice to whom application shall be made is hereby authorized and directed to enforce such lien in accordance with the mechanics' lien laws applicable to the city.

(2.2.5.5.1). § C26-206.0 Punishments.—a. General Punishments.—Except as hereinafter provided with respect to the amount of the fine, the owner of any structure, or part thereof, or land, where any violation of this title shall be placed, or shall exist, and any person who may be employed or assist in the commission of any such violation, and any and all persons who shall violate any of the provisions of this title or fail to comply therewith, or any requirement thereof, or who shall violate or fail to comply with any detailed order or rule made thereunder, or who shall build in violation of any detailed statement of specifications or plans, submitted and approved thereunder, shall severally, for each and every such violation and non-compliance, respectively, be punished by a fine of not less than ten dollars and not more than fifty dollars.

(2.2.5.5.2). b. Heating Plant and Fire Prevention Violations.—Any person who shall violate any of the provisions of this title, as to the construction of chimneys, fireplaces, flues, warm-air pipes or furnaces or who shall violate any of the provisions of this title relating to the framing or trimming of timbers, girders, beams, or other woodwork in proximity to chimney flues or fireplaces, shall be punished by a fine of one hundred dollars.

(2.2.5.5.3). c. Violations of the Provisions for the Registration of Plumbers.—Any person, corporation or co-partnership that shall violate any of the provisions of section C-26-210.0, shall be punished by a fine of not more than two hundred fifty dollars or by imprisonment not exceeding three months, or by both, and in addition, shall forfeit any certificate of registration that may be held at the time of such conviction, provided that when such violation is of the provision relating to the posting of a metal plate, no punishment of imprisonment shall be imposed, and the fine shall not be more than fifty dollars for the first offense, but shall be not less than one hundred dollars and not more than five hundred dollars for a subsequent offense.

(2.2.5.5.4). d. Continuing Violations After Notice.—Any person who, having been served with a notice as prescribed in this title to remove any violation or comply with any requirement of this title, or with any order or rule made thereunder, shall fail to comply with such notice within ten days after such service or shall continue to violate any requirement of this title in the respect named in such notice shall be, upon conviction, guilty of an offense punishable by a fine of not more than five hundred dollars or imprisonment for not more than sixty days or both.

(2.2.5.5.5). e. Jurisdiction of Actions to Recover Fines.—For the recovery of any such fine, an action may be brought in the name of the city in any municipal court, or court of record, in the city; and whenever any judgment shall be rendered in such action, it shall be collected and enforced as prescribed and directed by the civil practice act.

(2.2.5.5.6). f. Discontinuance of Action Upon Removal of Violation.—If any violation shall be removed or be in process of removal within ten days after the service of a notice as prescribed in this title, liability shall cease, and the corporation counsel, on request of the superintendent, shall discontinue any prosecution or action pending to recover any fine, upon such removal or the completion thereof within a reasonable time.

(2.2.5.6). § C-26-207.0 Violations of Peremptory Orders.—Any person who shall receive and fail to comply with any written peremptory order of the superintendent issued when an immediate compliance with such order is essential to the public peace or safety, within the time specified in such order, in addition to any other punishment prescribed by law shall be punished by a fine of not more than five hundred dollars or by imprisonment not exceeding six months, or by both.

(2.2.5.7). § C26-208.0 Appeal.—An appeal from any decision of the superintendent may be taken to the board.

Sub-Article 3. Registration; Certificate of Qualifications

(2.3). § C26-209.0 Registration; Certificate of Qualification.—a. The superintendents of all five boroughs sitting as a body shall formulate rules for the examination of applicants for certificates of qualification as required under sections C-26-211.0 through C-26-213.0. Examinations in each borough shall be based on the rules so adopted.

b. The superintendent shall designate one or more competent persons of his department to conduct examinations, rate applicants and perform any other duties incidental thereto. The examiners for each class of certificate of qualification shall have had the experience, training and knowledge necessary properly to determine the fitness of the applicants for the performance of the duties for which such applicants seek certificates of qualification.

c. Certificates shall be issued to persons whose right to such certificates is established.

(2.3.1.1) § C26-210.0 Registration of Plumbers.—a. Annual registration of employing or master plumbers required. —Every employing or master plumber carrying on his trade, business or calling in the city shall annually register his name and address at the office of the department in the borough in which he performs work, under such rules as that department may prescribe. Such registration may be cancelled by the superintendent after a hearing before the superintendent upon prior notice of at least ten days, for a violation of the duly adopted rules and regulations for plumbing or drainage, or whenever the person so registered ceases to hold a certificate from the commissioner of health, or ceases actually to be engaged in the business of an employing or master plumber.

(2.3.1.2). b. Registration of Persons, Corporations and Co-partnerships Engaged in Plumbing.—It shall be unlawful for any person, corporation or co-partnership to carry on or engage in the trade, business or calling of employing or master plumber in the city unless the name and address of such person, or of the president, secretary, or treasurer of such corporation, or of all members of the co-partnership, shall have been registered as provided in subdivision a of this section.

(2.3.1.3). c. Illegal Representation as Plumber Unlawful.—It shall be unlawful for any person, corporation or co-partnership that has failed to comply with the requirements of this section to represent himself or themselves to the public as a master or employing plumber by use of the word "plumber" or "plumbing", or any words of similar import or meaning.

(2.3.1.4). d. Metal Plate or Sign to be Posted.—It shall be unlawful for any person, corporation or co-partnership to engage in or carry on the trade, business or calling of master plumber, unless such person, corporation or co-partnership has conspicuously posted in the window of the place where such business is conducted a plate or sign reading "Licensed Plumber" in accordance with rules adopted by the commissioner of health.

(2.3.1.5). e. Improper Use of Registration or Certificate Forbidden.—It shall be unlawful for any person, corporation or co-partnership registered as provided in this section or holding a certificate from the commissioner of health to apply for, receive, or make use of any permit granted to him by reason of being so registered or to hold such certificate for the benefit of any person engaged in the plumbing business who is not so registered.

(2.3.2). § C26-211.0 Welders to be Qualified.—a. It shall be unlawful for any

person to perform welding work on any structural member of a structure without having obtained a certificate of qualification from the superintendent.

b. Before a certificate of qualification may be issued authorizing a person to perform welding work on any structural member of a structure, the person applying for such certificate shall have been qualified as provided in subdivision b of section C26-381.0. A certificate of qualification shall be issued to each applicant upon proof of his qualifications, and upon the payment of a fee of five dollars. The annual renewal fee shall be two dollars.

c. No person shall be eligible for a certificate of qualification to perform welding work as provided in this section unless he is a citizen of the United States of America, or unless he is a North American Indian by birth.

d. The superintendent may revoke or suspend the certificate of qualification of any person whose workmanship on any structural welding is such as to indicate incompetency or negligence which might endanger a structure or result in injury to any person.

(2.3.3). § C26-212.0—Standpipe Operators; Certificate of Qualification.—a. It shall be unlawful for any person to operate a standpipe system unless he shall have obtained a certificate of qualification from the fire commissioner.

(2.3.4). § C26-213.0 Steam Boiler Operators; Certificate of Qualification.—a. It shall be unlawful for any engineer or other person to operate a steam boiler for any purpose whatsoever unless he shall obtain a certificate of qualification from the superintendent, if such boiler carry a pressure of more than fifteen pounds of steam per square inch and of more than ten horsepower to generate steam. Such boiler shall be known as a high pressure boiler.

b. It shall also be unlawful for any engineer or fireman to operate any steam boiler in any vessel on the waters in and around the city which are not under the jurisdiction of the United States government without obtaining a certificate of qualification from the superintendent.

c. Before such certificate of qualification may be issued the person applying for such certificate shall have submitted to and satisfactorily passed an examination to determine his qualifications. Such examination shall be conducted by examiners to be appointed by the superintendent. A certificate of qualification shall be issued to each applicant who shall have proved his qualifications, upon the payment of a fee of five dollars. The annual renewal fee shall be two dollars. Any such certificate may be revoked or suspended for cause at any time by the commissioner.

d. No person shall be eligible for such certificate of qualification as provided in this section, unless he shall

1. Be at least twenty-one years of age; and
2. Be a citizen of the United States; and
3. Be able to read and write the English language; and
4. Have been employed as a fireman, oiler or general assistant to a duly certificated operating engineer on high pressure boilers in a building or buildings in the city of New York for a period of five years, of the seven years, immediately preceding the date of his application; or
5. Have served as a journeyman boiler maker or machinist engaged in the construction or repair of steam boilers or steam engines for a period of five years within the seven years immediately preceding the date of application at least one of which shall have been under the supervision of a duly certificated operating engineer on high pressure boilers in the city of New York; or
6. Have received the degree of mechanical engineer from a school or college recognized by the university of the state of New York and have had one year's experience in the operation and maintenance of stationary plants under the supervision of a duly certificated engineer on high pressure boilers in the city of New York within the seven years immediately preceding the date of his application at least one of which the seven years immediately preceding the date of his application; or
7. Be a holder for a period of at least four years of a certificate as engineer issued by a board of examining engineers duly established and qualified pursuant to the laws of the United States or any state or territory thereof, or a certificate as a marine engineer issued by the United States coast guard and have had one year's experience in the city of New York in the operation and maintenance of stationary plants under the supervision of a duly certificated operating engineer on high pressure boilers within the seven years immediately preceding the date of his application; provided that the applicant shall have filed with his application his own signed statement that he is the person named in said certificate together with supporting signed statements by three duly certificated operating engineers employed in the city of New York at the time of making of such signed statements; or
8. Have had direct supervision, care, operation and maintenance of a steam generating plant of a governmental building, having boilers of 150 or more horsepower, for a period of 5 years immediately preceding the date of his application and have had in addition one year's experience under the direct supervision of a duly certificated operating engineer on high pressure boilers in the city of New York, within the seven years immediately preceding the date of his application.

§ C26-213.1 Issuance of Certificates; Scope of Examination.—A certificate of qualification shall be issued to each eligible applicant who shall successfully pass a written examination consisting of practical questions on the operation and maintenance of steam boilers, engines, pumps and their appurtenances.

§ C26-214.0. OMITTED as per local law number seventy-six for the year 1957.

§ C26-215.0 Hoisting Machine Operators; Certificate of Qualification.—It shall be unlawful for any person other than a duly licensed engineer or a holder of the requisite certificate of qualification to take charge of or operate any machine used for hoisting purposes or cableways, irrespective of power, or which is used for construction or excavation work. Upon filing an application for such license or certificate the applicant shall pay a fee of five dollars, and for the annual renewal of such license or certificate, the sum of two dollars. Any such certificate may be revoked or suspended for cause by the commissioner.

It shall be unlawful for a duly licensed engineer or a holder of a certificate of qualification to operate any such machine which is unprovided with a positive means for preventing the operation of such machine by an unauthorized person. The means whereby such machines may be made inoperative by an unauthorized person shall be subject to the approval of the commissioner.

The authorized operator of any such machine shall be responsible for making the machine inoperative before he leaves the machine and failure to do so shall constitute a violation.

Any person who shall violate any provision of this section shall be punished by a fine of not more than twenty-five dollars or by imprisonment of not more than twenty-five days, or both.

§ C26-215.1 Duration and Renewal of Certificates of Qualification.—All certificates of qualification provided for by sections C26-211.0, C26-213.0 and C26-215.0 shall expire one year after date of issuance and may be renewed each year provided application for such renewal is made within thirty days prior to expiration. Unless application is made within the prescribed time the sum of one dollar shall be added to the renewal fee.

§ C26-215.2. Certification and qualification of concrete testing laboratories.

a. It shall be unlawful for any person, partnership or corporation to carry on or engage in the business or calling of a concrete testing laboratory in the city without having first obtained a certificate of qualification from the commissioner.

b. Before a certificate of qualification may be issued, the concrete testing laboratory shall adopt such procedures, safety requirements and professional standards as are set forth in rules and regulations promulgated by the commissioner. Such rules and regulations shall be effective when filed in the office of the city clerk. Each concrete testing laboratory seeking a certificate of qualification shall be investigated by the department of buildings both as to equipment and qualifications of its staff. A certificate of qualification shall be issued to each applicant upon proof of his qualifications and upon payment of a fee of one hundred dollars ($100). The annual renewal fee shall be fifty dollars ($50).

c. A violation of any rule or regulations promulgated pursuant to subdivision b. of this section shall constitute cause for revocation or suspension of the certificates of qualification by the commissioner, after a hearing upon prior notice of at least ten days.

d. If a concrete testing laboratory shall have failed to obtain a certificate of qualification and shall carry on or engage in such business or calling, or shall carry on or engage in such business or calling during the suspension of or after the revocation of its certificate of qualification, then such persons shall be guilty of a misdemeanor and upon conviction thereof shall be punishable by a fine of not more than five hundred dollars ($500) or imprisonment by a term of not more than six months or both.

e. All reports to be filed with the department of buildings by the concrete testing laboratory shall be certified to by the laboratory as to the truth and accuracy of said reports.

f. Any person who shall knowingly make a false statement or who shall knowingly falsify any statement or report required under the provisions of this code shall be guilty of a misdemeanor and upon conviction thereof shall be punishable by a fine of not more than five hundred dollars ($500) or imprisonment by a term of not more than six months or both.

Sub-Article 4. Projections and Construction Beyond the Building Line and Within the Curb Line

GROUP 1

Restrictions on Projections Beyond the Building Line

(2.4.1.1). § C26-216.0 General Restrictions on Projections Beyond the Building Line.—It shall be unlawful to permit the projection of any part of any structure erected after January first, nineteen hundred thirty-eight, or of any enlargement of a structure built before January first, nineteen hundred thirty-eight, beyond the building line so as to encroach upon a public street or public space, except as otherwise specifically provided in this article.

(2.4.1.2). § C26-217.0 Projections Beyond the Building Line to be Removable.—Any part of a structure permitted to project beyond the building line under the provisions of section C26-219.0, shall be so constructed that it may be removed at any time without causing such structure to become structurally unsafe in whole or in part.

(2.4.1.3). § C26-218.0 Structural Support of Projections Beyond the Building Line.—An encroachment beyond the building line for at most twelve inches of the footings of street walls shall be permitted provided such projecting parts of footings are at least eight feet below the sidewalk level.

(2.4.1.4.2). § C26-219.0 Permissible Projections Beyond the Building Line.—a. Columns, pilaster and ornamental projections beyond the building line.—Columns, pilasters, and ornamental projections, including their moulding and bases, erected purely for the enhancement of the beauty of the structure from an artistic standpoint, may project beyond the building line two and one-half per cent or less of the width of the street, but in no case more than eighteen inches, however when such ornamental projections consist of a veneer covering the entire facade of an existing building or part thereof, then the projection shall not exceed more than four inches beyond the building line.

(2.4.1.4.3). b. Ornamental Balustrades Projecting Beyond the Building Line.—Ornamental balustrades, including the sills and brackets on which they rest may project beyond the building line five percent or less of the width of the street, but in no case more than twenty-two inches, provided every part of such balustrade is at least ten feet above the sidewalk.

(2.4.1.4.4). c. Mouldings, Belt Courses, Cornices, Lintels, Sills, Pediments and Similar Projections Beyond the Building Line.—Mouldings, belt courses, cornices, lintels, sills, pediments and similar decorative projections may project beyond the building line one and one-quarter per cent or less of the width of the street, but in no case more than ten inches.

(2.4.1.4.5). d. Main Cornices Projecting Beyond the Building Line.—Main cornices, meaning thereby moulded projections at or near the top of the street wall, may project beyond the building line two and one-half per cent or less of the width of the street or a maximum of three feet in any case, provided such main cornices are at least twelve feet above the sidewalk at every point.

(2.4.1.4.6). e. Base Courses Projected Beyond the Building Line.—Base courses may project beyond the building line one and one-quarter percent or less of the width of the street, but in no case more than ten inches; provided their maximum height above the highest point of the sidewalk is five feet.

(2.4.1.4.7). f. Rustications and Quoins Projecting Beyond the Building Line.—Rustications and quoins may project beyond the building line maximum of four inches.

(2.4.1.4.8). g. Awnings and Marquees Projecting Beyond the Building Line.—

1. Awnings and marquees may extend over the sidewalk in connection with entrances to public buildings, theatres, hotels, multiple dwellings, large department stores and similar structures of an essentially public nature, except where forbidden by section 82d6-8.0 of the code, provided such awnings or marquees are constructed of iron and glass or other incombustible materials, securely supported from the structure and properly drained.

2. All parts of such awnings or marquees shall be at least ten feet above the sidewalk, shall not extend within two feet of the curb line nor more than two and one-half feet beyond either side of an entrance. The aggregate length of all awnings or marquees on any single street front shall not exceed seventy-five percent of the length of wall on that front nor shall any single marquee exceed fifty feet in length. There shall be a clear distance of at least four feet between any two awnings or marquees on the same structure. The requirements as to length and width of awnings shall not apply on streets designated by law as "market streets."

3. The maximum overall dimensions between top and bottom of such awnings or marquees shall be twenty-four inches.

4. Where unusual conditions are encountered, the superintendent may, at his discretion, vary the above requirements as to size and location.

5. It shall be unlawful to maintain such awning or marquee without a permit therefor issued by the superintendent. The annual fee for such permit shall be five dollars for each one hundred square feet or fraction thereof.

6. Where the occupancy or use of a building for which occupancy or use a marquee was permitted is changed or has been changed to an occupancy or use other than one of those stated in paragraph one of subdivision g of this section, the marquee shall be removed. This provision shall apply to all existing marquees, except those existing marquees on warehouses and markets in the established market areas of the city, as well as to all marquees hereafter erected. The commissioner may determine which areas are established market areas.

(2.4.1.4.9). h. Fire Escapes and Balconies to Required Exits.—Fire escapes and balconies to fire towers or other required exits, constructed of incombustible material, when required on the fronts of structures may project beyond the building line four and one-half feet or less, but every part of such fire escapes or balconies shall be at least ten feet above the sidewalk, except that the use of movable ladders or stairs to the sidewalk shall be permitted when they are so arranged as to be within ten feet of the sidewalk only when in actual use.

Letter Boxes.—

1. The post office authorities and property owners are hereby given permission to attach temporarily small mail boxes, known as letter boxes, to any building or part thereof, subject to the approval of the superintendent of buildings having jurisdiction, provided that the written consent of the property owner be filed with such superintendent and that the work be done without cost to the city.

2. Application for permission to attach any such letter box must be made in writing on a form prescribed by such superintendent.

(2.4.1.4.10). Steps. j. In existing structures (except where prohibited in section 82d6-8.0 of the administrative code), steps leading up or down at entrances may project beyond the building line a distance equal to not more than two and one-half percent of the width of the street, but in no case more than eighteen inches, provided that such steps are included between ornamental columns, pilasters, or cheek pieces at least three feet high, and the aggregate width of such steps does not exceed twenty percent of that street frontage of the building where such steps are located when such frontage is twenty-five or more feet in length, and not more than five feet in width when such frontage is less than twenty-five feet in length.

(2.4.1.5). § C26-220.0 Rules Governing Projections Beyond the Building Line.—The powers and duties of the superintendent, the commissioner of parks, or the borough president, within their respective jurisdictions to adopt additional rules as may be necessary with respect to the construction or disposition of parts of structures projecting beyond the building line shall remain unimpaired by the provisions of this article, except that it shall be the duty of the superintendent to adopt additional rules as may be necessary with respect to the construction of all sub-surface constructions within the curb line and all curb-cuts and driveways, the coverings thereof and entrances thereto and the issuance of all permits in reference thereto. The superintendent or the commissioner of parks may, when deemed necessary or desirable, fix further restrictions as to the extent of projections beyond the building line, except surface and sub-surface constructions and the coverings thereof within the curb line, but the authorization of projections greater than those specified in this article, is unlawful.

GROUP 2

Construction Outside Building Line and Within Curb Line

(2.4.2.1). § C26-221.0 General Provisions.—All construction between the building line and the curb line, otherwise unprovided for by law, shall conform to the provisions of this article.

(2.4.2.2). § C26-222.0 Building Construction; Sidewalk Bridges.—In connection with the erection of any large building, a bridge or bridges not to exceed seven feet in height above the sidewalk and six feet in width extending the entire length of the proposed building may be erected and maintained upon obtaining a permit from the superintendent. Where any such bridge is erected, steps leading from the sidewalk to the bridge may rest on the sidewalk of the adjoining premises.

(2.4.2.5). § C26-223.0 Hoistway Openings in Sidewalks.—No opening in the sidewalk area on the street side of the building line, shall be constructed after July first,

nineteen hundred fifty-seven, for the accommodation of any elevator or lift, whether manually or power operated, nor for any part thereof. Existing hoistway openings in the sidewalk may be continued but shall not be enlarged, provided such openings are equipped with approved type doors located flush with the sidewalk when closed. Sidewalk elevators in buildings erected before July first, nineteen hundred fifty-seven, may be relocated provided the total number of sidewalk elevators serving the building is not increased. Relocated sidewalk elevators may not project more than five feet from the building line into the sidewalk area.

(2.4.2.6). § 26-224.0 Storm-doors.—Storm-doors not exceeding ten feet in height, nor more than two feet wider than the doorway or entrance of any building, may be temporarily erected within the building line; providing a permit therefor shall have been obtained from the borough president having jurisdiction; but in no case shall any storm-door extend more than eighteen inches outside the building line. Such structure shall be unlawful if it is practically an extension of the building front or house front, within the building line, or an enlargement of the ground floor of any premises.

(2.4.2.8). § C26-225.0 Areas; Special Restrictions.—a. Every area, existing on January first, nineteen hundred thirty-eight, that is open at the top, shall be enclosed with an iron railing in front, and on the sides where there is an opening used for the purposes of ingress and egress. Such a railing shall be at least three feet high measured from the base and capable of sustaining a lateral weight of three hundred pounds at any part thereof; its gates, if any, shall be so constructed as to open inwardly.

b. The borough president shall have exclusive power to enforce the provisions of this section.

(2.4.2.9). § C26-226.0 Cellar Steps, Cellar Doors.—Every entrance or flight of steps, existing on January first, nineteen hundred thirty-eight, and projecting beyond the line of the street and descending into any cellar or basement story of any house or other building, where such entrance or flight of steps shall not be covered, shall be enclosed with a railing on each side, permanently put up, from three to three and one-half feet high, with a gate to open inwardly, or with two iron chains across the front of the entranceway, one near the top and one in the center of the railing, to be closed during the night, unless there be a burning light over the steps, to prevent accidents. Where such entrance is covered by a cellar door, such door shall be kept in good repair, and shall not be permitted to remain open, except when in actual use for ingress or egress of persons or for the loading or unloading of things out of or into such cellar or basement story.

(2.4.2.12). § C26-227.0 Drains Across Sidewalks.—a. It shall be unlawful to construct any drain from any building, structure, enclosure or lot of ground through or under a sidewalk, unless the material or materials, dimensions and construction thereof shall fully conform to standard specifications for such work, all of which shall be prescribed by the superintendent having jurisdiction and kept on file in his office.

b. It shall be unlawful to construct any such drain across the surface of a sidewalk, unless the material or materials, dimensions and construction thereof shall fully conform to standard specifications for such work, all of which shall be prescribed by the borough president having jurisdiction and kept on file in his office.

(2.4.2.13.1). § C26-228.0 Driveways Across Sidewalks.—a. General requirements.

1. It shall be unlawful to lower any curb or change the grade of any sidewalk, for the purpose of providing a driveway across such sidewalk, except upon complying with the following conditions, and upon being granted a permit by the superintendent of the borough within which the curb or sidewalk is located.

2. Application shall be made in writing by the owner of the abutting premises to the superintendent of the borough within which such premises are located. Such application shall set forth the points at which such driveway shall begin and end, as measured from the building line of the first street intersecting such curb or sidewalk.

3. In consideration of the granting of such permit, the superintendent having jurisdiction is hereby authorized to charge a fee of three dollars per linear foot of curb cut, including splay with one-half such fee for private dwelling for the privilege based on the length of curb cut to cover all expenses in connection with the inspection of the alteration of the sidewalk, and its ultimate restoration to original grade.

4. Every such driveway shall be constructed under the supervision and subject to the direction of the superintendent having jurisdiction, and on condition that, upon failure to comply with all the terms of the permit, the privilege may be revoked and the sidewalk be restored to its original grade, at the expense of the person to whom the permit was granted, or his successor in title to the abutting property.

5. Should the vehicular or other use of such driveway, in the opinion of the superintendent having jurisdiction thereof be or become dangerous to pedestrians, such superintendent shall give notice in writing to the owner of record of the abutting premises to discontinue such use of such driveway and to restore, within ten days, such curb and sidewalk to their original or proper condition.

6. The superintendent shall refuse a permit to lower any curb or to change the grade of any sidewalk for the purpose of providing a driveway across such curb or sidewalk, when, in his opinion, the actual or intended use of such driveway would endanger pedestrians.

(2.4.2.13.2). b. Construction—All private driveways crossing sidewalks shall be paved with concrete or other approved materials.

(2.4.2.13.3). c. Maintenance—In case of failure properly to maintain any part of a private driveway that shall not be paved, repaved, or repaired according to the provisions of subdivision b of this section, the superintendent may order in writing that such work be done within the time mentioned in the order. At the expiration of such time the work may be done under the direction of the superintendent and the expenses thereof shall be a lien upon the lot fronting thereon.

(2.4.2.17). § C26-229.0 Violations.—Any person who shall violate any of the provisions of this article, sections C26-220.0 through C26-228.0, shall be punished by a fine of fifty dollars for each offense. Any person who shall continue any such violation shall be punished by an additional fine of five dollars for each day such violation shall continue. Any person who shall wilfully violate, or neglect or refuse to comply with any provision of this title, or any lawful regulation, order or special direction made thereunder, shall be punished by a fine of not more than fifty dollars, or by imprisonment for not exceeding thirty days, or both.

(2.4.2.18.2). § C26-230.0 Vaults.—a. Jurisdiction.—Each superintendent is empowered to issue permits for the construction, maintenance or repair of vaults under sidewalks within his jurisdiction.

(2.4.2.18.3). b. Permits and Restrictions.

1. It shall be unlawful to construct any vault under any sidewalk between the curb and the building line until a permit for such construction has been issued by the superintendent. The superintendent shall not issue any such permit until a license for such vault has been issued by the borough president.

2. Openings in the roofs of vaults between the building line and curb shall be provided with substantial covers flush in all parts with the sidewalk, of incombustible material, and so constructed and maintained as normally to be kept closed, and to prevent persons from slipping on them. When such openings are uncovered they shall be thoroughly safeguarded.

3. The repair of any wall, or the roof of any vault, or any portion thereof, to make such vault or portion thereof safe shall be permitted in cases where the removal of such vault or such portion thereof has not been ordered by the administrative authority having jurisdiction.

(2.4.2.18.4). c. Responsibility.—The contractor, who shall complete or begin the construction of a vault, and the owner or person for whom the same shall be excavated or constructed shall be severally liable to the provisions, payments and punishments of this article.

d. Construction.

(2.4.2.18.5). 1. All vaults shall be constructed with either brick or other approved masonry walls.

2. All grates of vaults shall be made of iron, the bars of which shall be three-fourths of an inch wide and one-half of an inch thick, and three-fourths of an inch or less apart.

(2.4.2.18.7). e. Violations.—Any person who shall violate any provision of this section, or any notice or special direction issued thereunder, shall be punished by a fine of one hundred dollars.

GROUP 3

Projection Permits Revocable

(2.4.3). § C26-231.0 Projection Permits Revocable.—Any permission, expressed or implied, to construct part of a structure so as to project beyond the building line under the provisions of sections C26-216.0 through C26-234.0 is revocable at will by the council or the board of estimate.

GROUP 4

Alterations to Projections Beyond the Building Line

(2.4.4). § C26-232.0 Alterations to Projections Beyond the Building Line.—a. Any alteration or enlargement made to any existing part of a structure, projecting beyond the building line on January first, nineteen hundred thirty-eight, shall conform with

the provisions of section C26-216.0 through C26-234.0, so far as such provisions affect new construction.

b. Nothing herein contained shall prohibit the removal of any portion of a single projection beyond the building line without removal of all projections, provided the removal of all projections has not been directed by the council or the board of estimate or their predecessors, nor shall anything herein contained prohibit the repair of any portion of such projection necessary to make it safe.

GROUP 5

Existing Encroachments Beyond the Building Line

(2.4.5). § C26-233.0 Existing Encroachments Beyond the Building Line.—a. Such parts of structures as project beyond the building line on January first, nineteen hundred thirty-eight, may be maintained as constructed until their removal is directed by the council or the board of estimate, provided the right of the city or any of its officers to continue an action for the removal of any unauthorized projection beyond the building line or for the collection of any penalty, incurred before January first, nineteen hundred thirty-eight, in connection therewith remains unabridged.

b. With the concurrence of the borough president having jurisdiction, the commissioner of housing and buildings, and/or each superintendent having jurisdiction, may, in his discretion, permit rearrangement or reconstruction of such parts of structures as project beyond the building line provided such rearrangement or reconstruction is within the limits of existing projection and provided further that the right of the city or any of its officers to continue an action for the removal of any unauthorized projection beyond the building line or for the collection of any penalty incurred before January 1st, nineteen hundred thirty-eight, in connection therewith remains unabridged.

GROUP 6

Effect of Action by the Board of Estimate on Projections Beyond the Building Line

(2.4.6). § C26-234.0 Effect of Action by the Board of Estimate on Projections Beyond the Building Line.—The provisions of sections C26-216.0 through C26-234.0, do not authorize any projection beyond the building line on those streets where the removal of projections has been or may be directed by the board of estimate, except in conformity to resolutions by such board of estimate, or has been previously directed by the former board of estimate and apportionment.

ARTICLE 4. CLASSIFICATIONS

Sub-Article 1. Classification by Occupancy

(3.1). § C26-235.0 General.—For the purposes of this title all structures shall be classified, with respect to occupancy, as follows:

(3.1.1). a. Public Buildings.—Public buildings are structures or parts of structures in which persons congregate for civic, politioal, educational, religious or recreational purposes, or in which persons are harbored to receive medical, charitable or other care of treatment, or in which persons are held or detained by reason of public or civic duty, or for correctional purposes, including among others, court houses, schools, colleges, libraries, museums, exhibition buildings, lecture halls, churches, assembly halls, lodge rooms, club houses with more than five sleeping rooms, dance halls, theatres, bath houses, hospitals, asylums, armories, fire houses, police stations, jails and passenger depots.

(3.1.2). b. Residence Buildings.—Residence buildings are structures or parts of structures in which sleeping accommodations are provided, except such as may for other reasons be classed as public buildings, including multiple dwellings as defined in the multiple dwelling law.

(3.1.3). c. Commercial Buildings.—

1. Commercial buildings are structures or parts of structures which are not public buildings or residence buildings, including among others, office buildings, factory buildings, salesrooms (stores), markets, restaurants, warehouses, freight depots, car barns, stables, garages, motor vehicle repair shops, factories, laboratories, smoke houses, grain elevators, coal pockets, central station power plants and electric sub-stations.

2. Nothing in this section shall be interpreted in any manner in conflict with the building zone resolution in so far as permitted occupancies in the various use districts are concerned.

(3.1.4). § C26-236.0 Doubtful Classification.—In case any structure is not specifically provided for, or where there is any uncertainty as to its classification, its status shall be determined by the superintendent.

(3.1.5). § C26-237.0 Mixed Occupancy.—In case a structure is occupied or used for different purposes in different parts, the provisions of this title applying to each class of occupancy shall apply to such parts of the structure as come within that class; and if there should be conflicting provisions, the requirements securing the greater safety shall apply as may be determined by the superintendent.

Sub-Article 2. Classification of Structures by Type of Construction

(3.2). § C26-238.0 General.—For the purposes of this title all structures shall be classified, with respect to type of construction, as follows:

Class 1—Fireproof Structures;
Class 2—Fire-protected Structures;
Class 3—Non-fireproofed Structures;
Class 4—Wood Frame Structures;
Class 5—Metal Structures;
Class 6—Heavy Timber Structures.

(3.2.1). § C26-239.0 Class 1—Fireproof Structures.—Class 1—Fireproof structures are those in which the walls and structural members are made of incombustible material or assemblies with the following minimum fire resistive ratings: four hours for exterior walls (except panel walls, and exterior bearing walls in private dwellings thirty-five feet or less in height), fire walls, party walls, piers, columns, other structural members which carry walls (except lintels) and girders carrying columns; three hours for other girders, fire partitions, floors including thei beams and girders, beams, roofs and floor fillings, and required stairway enclosures other than in schools and schools and structures less than one hundred feet in height; two hours for exterior panel walls in all structures and exterior bearing walls in private dwellings thirty-five feet or less in height and required stairway enclosures in schools and structures less than one hundred feet in height. Permanent interior partitions shall be constructed of incombustible materials. The degree of fire resistance of other construction features in fireproof structures and the materials acceptable for the purpose shall be in accordance with the provisions of article eleven of this title.

(3.2.2). § C26-240.0 Class 2.—Fire-protected structures are those in which the walls and structural members are made of incombustible materials or assemblies with the following minimum fire resistive ratings: three hours for bearing walls and exterior walls (except panel walls and bearing walls in residence structures not exceeding 35 feet in height), structural members in walls or which support walls or columns, interior columns in public and commercial structures, shafts (except as otherwise provided in this section and section C26-646.0), and the floor above the cellar or basement (except in residence structures not exceeding 35 feet in height); two hours for all required stairway enclosures, for interior columns in residence structures, for shaft enclosures in residence structures less than 50 feet in height (except as otherwise provided in section C26-646.0) and for bearing walls in residence structures not exceeding 35 feet in height; one and one-half hours for the roof and all floors other than that above the cellar or basement, except that in residence structures not exceeding 35 feet in height all floors and the roof may be one hour; one hour for exterior panel walls, except that in structures other than private dwellings where openings are required to be protected, the fire resistive rating of exterior panel walls shall be two hours. Permanent interior partitions shall be constructed of materials or assemblies having a fire resistive rating of one hour. The degree of fire resistance of other construction features in fire-protected structures and the materials acceptable for the purpose shall be in accordance with article eleven, fire resistive construction.

(3.2.3). § C26-241.0 Class 3—Non-fireproof Structures.—a. Class 3, non-fireproof structures are those which are made of incombustible materials or assemblies of materials inadequate to meet the fire resistive rating requirements of class 1 or class 2 structures, or in which the exterior walls are of masonry or reinforced concrete and the interior framing is partly or wholly of wood or unprotected iron or steel. The exterior walls of such structures shall be made of incombustible materials or assemblies of materials with a fire resistive rating of at least one hour when walls are non-bearing, two hours when walls are non-bearing and protection of openings is required and three hours when they are bearing walls; the floor above the cellar or basement and columns below such floors shall be constructed of incombustible materials or assemblies of materials having a fire resistive rating of three hours (except in residence structures three stories and basement or less in height and in other structures not over four stories or forty feet in height); shafts and required stairway enclosures shall be made of incombustible materials or assemblies having a fire resistive rating of at least two hours (except that in structures not over four stories or forty feet in height such shafts and required stairway enclosures may be made of incombustible materials or assemblies having a fire resistive rating of at least one hour). The exterior walls if of masonry shall be as provided in sections C26-412.0 through C26-467.0.

b. This section shall not be construed as applying to private dwellings of forty feet and four stories or less in height (except as to exterior walls).

c. Exterior walls of private dwellings of class 3, non-fireproof construction may be

constructed of incombustible material having a fire resistive rating of at least one hour, provided, the building does not exceed one story in height and that the building is separated by at least four feet from any lot line and from any other building.

Exterior walls of central station power generating plants where located at least 30 feet distant from common lot line may be of incombustible materials without specified fire resistive rating and may have interior steel without fireproofing.

(3.2.4). § C26-242.0 Class 4—Wood Frame Structures.—Class 4—Wood frame structures are those structures in which the structural parts and materials are of wood, or other combustible materials, or are dependent upon a wood frame for support, including construction having an incombustible veneer or an incombustible covering such as corrugated iron or corrugated asbestos cement composition sheets. All columns, footings or other supports of the first floor framing shall be of incombustible materials.

(3.2.5). § C26--243.0 Class 5—Metal or Fireproofed (fireretardant pressure impregnated) Wood Structures.—Class 5—Metal or fireproofed (fireretardant pressure impregnated) wood structures are those structures in which the structural frame work is of metal or fireproofed (fireretardant pressure impregnated) wood and in which the walls are of metal, flat or corrugated cement asbestos composition sheets or of incombustible material other than masonry, and which are without sufficient fire resistive protection to withstand the fire tests required for the other classes of structures, and in which the roofs are of incombustible material or of fireproofed (fireretardant pressure impregnated) wood.

Fireproofed (fireretardant pressure impregnated) wood must meet the performance test requirements as specified in paragraph C26-331.0 to C26-339.0 inclusive.

All fireproofed (fireretardant pressure impregnated) wood shall be clearly identified by impressing on both faces the type and grade of treatment and name of manufacturer.

The thickness of fireproofed structural lumber shall be the same as that specified for untreated lumber. Fireproofed wood shall not be exposed to the weather.

(3.2.6). § C26-244.0 Class 6—Heavy Timber Construction.—a. Class 6—Heavy timber construction structures are those structures in which: the exterior walls are of masonry or reinforced concrete with a fire resistive rating of at least three hours and the interior framing above grade floor is of wood structural members having no beam or girder less than six inches in the least dimension and not less than ten inches in depth and wood posts or columns not less than eight inches in any dimension; floors are of splined or tongued and grooved plank not less than three inches in thickness covered with one inch flooring laid crosswise or diagonal or of planks at least four inches thick set on edge close together with broken joints and spiked at intervals of not more than eighteen inches.

b. Shafts and required stairways shall be enclosed in materials or assemblies having a fire resistive rating of at least two hours.

c. Wherever structural steel is used, it shall be protected as prescribed for similar uses under section C26-240.0.

d. The construction of the floor immediately over the basement or cellar and all floor construction below it, including columns, shall be as prescribed in section C26-240.0.

e. Wooden structural members supported by masonry or reinforced concrete walls shall have at least eight inches of masonry between the end of the member and the outer face of the wall or, in the case of two wood structural members from opposite sides, at least eight inches of masonry between the ends of the beams.

f. Roofs shall be the same as floors, except that planks shall be at least two and one-half inches thick and beams supporting the roof shall be at least six inches in smallest dimension.

(3.2.7). § C26-245.0 Mixed Construction.—No building nor portion thereof shall be required to conform to the details of a type of construction higher than that type which meets the requirements of this title based upon occupancy, size and location even though portions of the construction materials or assemblies in the building conform to a higher type of construction.

ARTICLE 5. GENERAL BUILDING RESTRICTIONS

Sub-Article 1. Restrictions as to Location

(4.1.1). § C26-246.0 Fire Limits Established.—a. All of the city shall be inside the fire limits; except those portions of D, E, F and G area districts restricted to uses permitted in residence districts, as fixed by the building zone resolution and amendments thereto prior to January first, nineteen hundred thirty-eight, and such D, E, F and G area districts restricted to uses permitted in residence districts as may thereafter be established; and except those portions of the borough of The Bronx included within a line running one hundred feet south of Eastern Boulevard from the junction

of Eastern Boulevard and the Bronx River easterly and northerly to one hundred feet north of Pelham Parkway, thence one hundred feet north of Pelham Parkway to one hundred feet east of Boston Post Road, thence one hundred feet east of Boston Post Road to the city line and thence by the city line, the bulkhead line and the Bronx River to the point of beginning, and within a line running one hundred feet west of Broadway from the Yonkers city line to the Harlem River, thence by the Harlem River, the Hudson River, and the Yonkers city line to the point of beginning; and except the borough of Richmond.

b. Nothing herein contained shall place outside the fire limits any area which was within the limits on January first, nineteen hundred thirty-eight.

(4.1.2). § C26-247.0 Construction Within the Fire Limits.—Within the fire limits it shall be unlawful to construct frame structures of wood or other combustible materials, except as otherwise specifically provided in this title.

(4.1.3). § C26-248.0 Frame Construction Outside of the Fire Limits.—Outside of the fire limits the only frame structures of wood or other combustible materials which may be constructed after January first, nineteen hundred thirty-eight, shall be such as are otherwise specifically provided for in this title and the following:

1. (a). A structure to be occupied exclusively for residence purposes by not more than two families and having—

(1). A maximum of eight livable rooms per family when such structure covers eighty percent or less of the area of the plot on which is erected and is so located that the combined distances from side lot lines is at least six feet and the distance from a side lot line is at least two feet, except that where a building is contiguous to another the distance from the opposite side lot line shall be at least four feet; and except when the width of the plot is thirty feet or less, the superintendent may permit a single family dwelling to be erected three feet or more from the lot line on one side and two feet or more on the other side if the latter side is not contiguous with the building on the adjoining lot.

(2). A maximum of ten livable rooms per family when such structure covers more than fifty percent and not more than sixty percent of the width of the plot on which it is erected and is located at least twenty-five feet distant from the nearest lot line.

(3). A maximum of twelve livable rooms per family when such structure covers not more than fifty percent of the width of the plot on which it is erected and is located at least fifty feet from the nearest lot line.

1. (b). The exterior wall or walls of any frame structure distance less than three feet from a lot line shall be of masonary or veneered in accordance with the rules of the board, or of stud construction with the space between studs filled with four inches of masonry laid in cement mortar or with four inches of concrete and covered on the exterior with metal lath and Portland cement plaster at least seven-eighths of an inch thick and on the interior with materials as approved for one side of one-hour fire-resistive construction. Cement plaster, where used on the exterior surface of a structure, shall be of a one to three mixture. If veneered with masonry, such exterior walls shall be fire-stopped in accordance with the rules of the board. Openings in such exterior walls shall be protected with protective assemblies having a fire-resistive rating of three-quarters of an hour, except that glazing of windows and doors may be one-quarter of an inch thick plate glass with no light exceeding three hundred sixty square inches in area.

2. (a). Two frame structures such as are permitted in clause one of paragraph a of subdivision one of this section may be erected contiguously, but if so erected the exterior walls of the structure shall be separated from the lot line by a space of at least four feet on each side, and the party wall shall be an unpierced masonry wall, or an unpierced stud partition with studs at least four inches by two inches with beams staggered so as to provide at least four inches of approved masonry between beams for the full thickness of all and with the space between studs filled with masonry laid in cement mortar or with concrete, and covered on both sides with incombustible materials as approved for one hour fire-resistive construction.

(b). Such party walls shall extend through the roof at least two feet, except that in roofs pitched at an angle of twenty degrees or more from the horizontal, such party walls may stop at the top of the roof boards provided no combustible material passes through the party wall and the junction of roof and wall is thoroughly fire-stopped.

3. One-story stables or garages on the same plot with a one or two family residence structure, provided such stables or garages are six hundred square feet or less in area and fifteen feet or less in height, and their exterior walls are distant at least three feet from the lot lines, except that their exterior walls may be located less than three feet from the lot lines if built of approved masonry or masonry veneered in

accordance with rules of the board or spaces between studs are solidly filled with approved masonry materials.

4. In the borough of Richmond, a frame structure erected to be used for business purposes other than garages, motor vehicle repair shops or gasoline service stations, provided that such structure shall not exceed two stories in height or more than three thousand square feet in area, and provided further that such structure shall not cover more than eighty percent of the width of the plot on which it is erected and that it is located at least four feet from the lot line on either side.

5. A frame structure other than one of those previously described, if approved by the superintendent, provided that:

(a). Such structure shall not be used for commercial or industrial purposes;

(b). Such structure shall not be used as a place of assembly;

(c). Such structure be forty feet or less and three stories and basement or less in height and of not more than fifty-five hundred square feet in area, occupied by a club, association or other social or non-profit recreational-use structure, having no sleeping rooms, except those in the living quarters of the resident custodian and his immediate family and except sleeping rooms for not more than four employees, located below the third story;

(d). Every wall and other part of such structure be located thirty feet or more from the nearest boundary line of the plot on which it is erected and there be no other structure between such structure and the nearest boundary line unless such other structure is at least thirty feet distant from the subject structure.

(4.1.4). § C26-249.0 Separation of Frame Structures.—Except as otherwise specifically provided in this article, frame structures of wood or other combustible materials shall have clearance of at least six feet from all other such frame structures upon the same plot.

(4.1.5). § C26-250.0 Enlargement of Wood Frame Structures.—a. Any wood frame residence structure erected before January first, nineteen hundred thirty-eight may be altered or enlarged without changing the class of construction and in accordance with sections C26-248.0, C26-249.0, C26-255.0 and C26-256.0, if such structure is to be occupied after such alteration or enlargement, exclusively as a one- or two-family residence and contains at most eight livable rooms per family. The requirements of this section shall apply to all buildings where central heating equipment or approved gas or electric space heaters are or are to be installed. The requirements of this section affecting the installation of a heating system shall not apply where all year occupancy has been established before April twenty-fourth, nineteen hundred fifty-nine, as evidenced by the owner's affidavit and by the existence of a masonry chimney, and where exterior walls are of dry wall construction, or plastered in good condition, or are properly fire-retarded prior to the installation of a heating system.

b. Other wood frame structures erected before January first, nineteen hundred thirty-eight, when located outside of the fire limits, may be enlarged provided that after enlargement they are within the limitation as to size and occupancy prescribed in sections C26-248.0 and C26-254.0.

c. Any wood frame structure erected before January first, nineteen hundred thirty-eight, may be enlarged provided the new extensions are all Class 1, 2 or 3 construction, and provided further that the structures after alteration are within the limits of height and area prescribed in section C26-254.0, for Class 1, 2 or 3 structures, respectively.

d. Nothing in this section shall be construed to permit the enlargement of any wood frame structure erected before January first, nineteen hundred thirty-eight, within the fire limits, occupied exclusively as a private dwelling, to exceed the limits authorized as follows:

1. For the purpose of erecting a flat roof thereon, any structure already exceeding twenty-five feet in height may be raised to a height of thirty-five feet or less.

2. A one-story and basement structure may be increased one additional story in height.

3. Any such structure may be extended either on the front or rear to a depth of fifteen feet or less and not more than the width of the structure and not more than two stories and basement in height.

4. If any such structure has an extension of less width than the main structure, the extension may be increased in width to the full width and height of the main structure.

5. Any such structure may have bay windows of wood placed on any story, except when such bay windows would increase the width of the structure to more than eighty-five per cent of the width of the lot.

6. The size of such structure after alteration shall be within the limitation specified in sections C26-248.0 and C26-254.0.

(4.1.6). § C26-251.0 Repair of Damaged Structures.—a. Within the fire limits a frame structure of wood or other combustible materials erected before January first, nineteen hundred thirty-eight, which in the judgment of the superintendent is damaged from any cause to an amount more than one-half its value exclusive of foundations or is in need of structural repairs to an amount greater than one-half its value exclusive of foundations, shall be demolished.

b. All other structures which in the judgment of the superintendent have been damaged from any cause to an amount one-half of their value, or less, exclusive of foundations, may be restored to their previous condition; if damaged more than one-half of such value the structure shall be completely demolished or reconstructed in accordance with the requirements of this title.

c. If the owner of the structure damaged or in need of repairs is dissatisfied with the decision of the superintendent as to the amount of such damage or the need for repairs, the amount of such damage or repairs shall be determined by competent surveyors. One surveyor shall be appointed by the superintendent, one by the owner, and, in case these two disagree, one shall be selected by them jointly. Each surveyor appointed by either the superintendent or the owner shall be a licensed professional engineer or a licensed architect, and if a third is appointed, he shall be a licensed professional engineer, licensed architect, or a builder of at least ten years' experience. The owner of the property surveyed shall pay a fee of twenty-five dollars each for the services of the surveyor appointed by him and for the third surveyor, if any. The report of the survey shall be reduced to writing and, when signed by any two of the surveyors, shall be conclusive. Any construction upon a structure, that is the subject of survey, shall be unlawful until after the decision of the surveyors has been rendered.

d. If the owner of the structure damaged or in need of repairs is dissatisfied and elects to proceed under the provisions of subdivision c of this section, he may do so only within ninety days of the date of notice of the superintendent's decision.

(4.1.7). § C26-252.0 Moving of Structures.—It shall be unlawful to move a frame structure of wood or other combustible materials from outside the fire limits to any point within such limits.

(4.1.8). § C26-253.0 Unlawful Maintenance, Occupation or Use.—It shall be unlawful to maintain, occupy or use any wood frame structure erected after January first, nineteen hundred thirty-eight, in violation of any provision of this title.

(4.1.9). § C26-253.1 Combining One-family Dwellings.—Where two separate, existing one-family dwellings of any class of construction are combined into one two-family dwelling, the street wall of the building shall include the entire width of at least one livable room of each dwelling unit.

SUB-ARTICLE 2

Restrictions as to Height and Area

(4.2.1). § C26-254.0 Heights and Area Limits.—a. The maximum heights and areas of structures between exterior walls or between exterior walls and fire walls shall be within the limits fixed by the following table, according to the kind of occupancy to be provided for. Exterior wall thicknesses shall be included in calculating gross area. [EDITOR'S NOTE—See Table on Next Page].

b. The limits of area for business and garage structures, except Class 5 metal structures, may be increased one hundred percent when approved sprinkler systems are installed.

c. Class 2, Class 3 and Class 6 business and garage structures of greater total area may be constructed provided they are divided by fire walls into areas within the tabular limits.

d. Public buildings of Class 3 construction, whose tabular height limitation is twenty feet, may be erected to a height of thirty-five feet if having only one occupied story.

e. Class 3 residence structures of greater area than three thousand square feet may be constructed provided they are divided into units of area of three thousand square feet or less, by walls or partitions having a fire resistive rating of at least three hours.

f. Class 5 business structures when used for manufacturing purposes or for the storage of materials of an inflammable or highly combustible nature shall be separated by at least fifteen feet from any lot line. In other cases the building shall be located at least four feet from the nearest lot line.

g. Coal pockets and grain elevators, within the fire limits, shall be Class 1 or Class 2 structures.

h. Class 6 structures exclusively for the storage or handling of building con-

CONSTRUCTION CLASSIFICATION

Use Classification	Class 1 Fireproof		Class 2 Fire Protected			Class 3 Non-Fireproof			Class 4 Wood Frame			Class 5 Metal			Class 6 Heavy Timber		
	Height	Area in sq. ft.	Height	Area in sq. ft.	No. of Street Fronts	Height	Area in sq. ft.	Street No. of Fronts	Height	Area in sq. ft.		Height	Area in sq. ft.		Height	Area in sq. ft.	No. of Street Fronts
(1) Public buildings—churches (only)	Unlimited		40 ft. and not more than 3 occupied stories	7,500 12,000 15,000	1 2 3	30 ft. not more than 2 stories	5,000 6,000	1 2 or 3	1 story	600		1 story	2,500		40 ft. not more than 2 stories	6,000 8,000	1 2 or 3
(2) Public buildings—other than churches, hospitals, asylums and places of incarceration and amusement.	Unlimited		Same as above			30 ft. not more than 2 stories	5,000 6,000	1 2 or 3	1 story except as provided in Section C26-248.0 subdivision 5	600		1 story	2,500		35 ft. not more than 2 stories	6,000 8,000	1 2 or 3
(3) Public buildings—other than (1) and (2). Hospitals, asylums and places of incarceration and amusement only.	Unlimited		Same as above			20 ft. not more than 1 story	5,000	1, 2 or 3	1 story	600		1 story	600		20 ft. not more than 1 story	6,000	1 2 or 3
(4) Commercial buildings—other than garages, motor vehicle repair shops and gasoline stations.	Unlimited		75 ft. and not more than 6 stories	7,500 12,000 15,000	1 2 3	50 ft. not more than 4 story	7,500 12,000 15,000	1 2 3	2 stories only as provided in Section C26-248.0 subdivision 4	as provided in Section C26-248.0 subdivision 4		30 ft. 1 story	15,000		65 ft. 5 stories	7,500 12,000 15,000	1 2 3
			50 ft. and not more than 4 stories	10,000 14,500 17,500	1 2 3	30 ft. not more than 2 story	10,000 14,500 17,500	1 2 3	1 story only as permitted in Section C26-248.0 subdivision 4	as permitted in Section C26-248.0 subdivision 4					40 ft. 3 stories	10,000 14,500 17,500	1 2 3
(5) Commercial buildings—Garages, motor vehicle repair shops and gasoline selling stations.	Unlimited		2-story	7,500 12,000 15,000	1 2 3	1-story	7,500 12,000 15,000	1 2 3				20 ft. 1 story	5,000		1 story	10,000 15,000 18,000	1 2 3
(6) Residence buildings.	Unlimited		100 ft. and not more than 9 stories	12,000 15,000 20,000	1 2 3	75 ft. not more than 6 stories	3,000	1, 2 or 3	35 ft., 2 story and attic without human occupancy except that single family dwellings may be 40 ft. 3 stories and except as otherwise provided in section C26-248.0	2,500		1 story	2,500		75 ft. 6 stories	3,000	1 2 or 3

struction materials may, in the discretion of the superintendent, exceed forty feet. three stories in height.

i. For the application of tabular restrictions on Class 4 residence structures erected on ground whose elevation is three or more feet above the curb level, the height of a building shall be measured from the average level of such elevated ground minus three feet when such building is situated on a lot or plot not more than fifteen feet above the legal curb level, and has not less than ten feet on all sides or at least ten feet at front and at rear and to the limits of the lot or plot on the two sides.

j. Central station power generating plants of entirely incombustible construction shall not be limited as to height and area.

(4.2.2). § C26-255.0 Increase in Height of Existing Structures.—a. It shall be unlawful to increase the height of any structure erected before January first, nineteen hundred thirty-eight, the height of which is equal to or less than the tabular height for like occupancy, so as to exceed the corresponding tabular height.

b. It shall be unlawful to increase the height of any structure erected before January first, nineteen hundred thirty-eight, the height of which exceeds the tabular height for like occupancy.

(4.2.3). § C26-256.0 Increase in Area of Existing Structures.—a. It shall be unlawful to increase the area of a structure so as to exceed the corresponding tabular area, unless the enlarged structure is divided by fire walls into areas within the tabular limits.

b. It shall be unlawful to increase the area of any structure erected before January first, nineteen hundred thirty-eight, the area of which exceeds the tabular area for like occupancy, unless the existing and additional areas are separated by fire walls and the additional area is within the tabular limits or is subdivided by fire walls into areas within the tabular limits.

(4.2.4). § C26-257.0 Fire Protection in Structures Other Than Those of Class 1 and Class 2 Construction.—Structures erected after January first, nineteen hundred thirty-eight, altered or converted to be used as garages, motor vehicle repair shops, or gasoline service stations, shall have the partitions, columns and girders, unless of fireproof construction, and all wood floor and roof construction covered and protected on all sides with fire retarding materials or assemblies having a fire resistive rating of at least one hour and in such manner as may be prescribed by the rules of the board, except that when such buildings are one story or less in height, and are without basement or cellar, such protection shall be unnecessary for the roof construction.

(4.2.4.1). § C26-257.1 Open Type Parking Garage Structures.—a. Structures which are used exclusively as garages for the commercial parking or storage of passenger motor vehicles having a capacity not exceeding nine persons per vehicle, except for the sale of gasoline and oil, as herein provided, on the street level and which when completed are without enclosure walls for fifty per cent or more of the area on at least two sides of the garage at each parking level, may be constructed according to the provisions of this section. Each of the two sides that are without enclosure walls for fifty per cent or more of the area, shall have a minimum length of fifty feet.

b. Open type parking structures in which the cars are parked mechanically by means of a parking machine in such manner that no person other than the operator of the parking machine, and the parking mechanism is permitted above the street level shall herein be referred to as mechanized parking garages.

c. No parking shall be permitted more than four feet below curb level in open type parking garages unless that portion of the building below grade meets the requirements for class 1 or class 2 construction.

d. Automobile repairs for sale of automobile accessories shall be unlawful in open type parking garages.

e. The enclosure and spandrel walls of such structures may be omitted, except on any side which faces and is located within fifteen feet of a lot line other than a street line or within fifteen feet of another building. Where enclosure or spandrel walls are required by the provisions of this section, they shall be of incombustible construction having a fire resistive rating of at least two hours and the structural supports of such walls exclusive of bracing, shall be constructed or enclosed in material having a fire resistive rating of at least two hours. Spandrel walls that are not required by the provisions of this section shall be constructed of incombustible materials. Enclosure walls that are not required by the provisions of this section shall comply with the requirements for enclosure walls according to the class of construction. Where enclosure and spandrel walls are omitted, no glass, tarpaulins or other enclosing material shall be permitted, except that adequate curbs and guard rails, acceptable to the superintendent, shall be provided at such opening in exterior walls.

f. Open type parking structures shall conform to the requirements for class 1.

fireproof or class 2 fire protected structures, or class 3 non-fireproof structures, except as otherwise provided in this section.

g. Open type parking garage structures of class 3, non-fireproof construction, in addition to complying with the requirements for that class of structure, except as otherwise permitted in this section, shall also comply with the following requirements:

1. All construction, including structural members, partitions, stairs, floors and roof construction, including flooring, shall be of metal, concrete masonry, or a combination thereof, or other incombustible materials acceptable to the superintendent, except that floors and roofs may be surfaced with materials meeting the requirements of section C26-605.0 to section C26-608.0, inclusive.

2. Open type parking garages of class 3 non-fireproof construction, meeting the requirements of this section may be erected to a height not exceeding eight parking levels nor more than 60 feet and to an area not exceeding 30,000 square feet on each level. In no case shall the building extend more than two hundred feet in depth from the nearest lot line bordering on a street.

3. Open type parking garages may be constructed to an area if divided by fire walls into areas not exceeding those specified herein and if conforming to the specified heights.

4. When the floor or roof deck is constructed of steel and is used for parking, the minimum thickness of steel shall be 3/16 inch, except that those portions of the floor or roof deck not subject to vehicular loads may have a minimum thickness of no. 12 Birmingham wire gage unless adequately reinforced to support the design loads. Gratings or openings in the floor or roof shall not be permitted except for stairs, piping, manlifts, or parking machines and in the ramp flooring.

h. Open type parking garages of class 1, fireproof construction, and class 2, fire protected construction, meeting the requirements of this section may be erected to a height not exceeding ten parking levels, nor more than 75 feet, and to an area not exceeding 30,000 square feet on each level.

i. All floor areas and all structural parts shall be designed for a minimum uniformly distributed live load of 75 pounds per square foot, except that the secondary members of those spaces where vehicular loads cannot be applied shall be capable of supporting a uniformly distributed live load of not less than 50 pounds per square foot and such members shall be relieved from the requirements for concentrated loadings as provided in section C26-345.0. All other floor areas accessible to vehicular loading shall be designed for the concentrated loads specified in section C26-345.0; except that in mechanized parking garages in which the car is not operated under its own power, that portion of the floor area which supports wheel loads may be designed for minimum concentrated loads of 1,500 pounds, provided the car is parked in such manner as to prevent impact and the size and arrangement of such floor area prohibits jacking of the car for removal or repair of tires or any other operation that would cause an impact load or load concentration in excess of 1,500 pounds.

j. Open type parking garage structures of class 2, fire protected construction, may be erected to areas not exceeding twice those specified herein for class 3 structures of corresponding height.

k. Open type parking garages in which cars are parked under their own power by a person in the car, but no passengers other than the car operators are permitted above the street parking level shall be constructed with at least two stairways remote from each other and the distance from any point of a level to a stairway shall not exceed 150 feet. Where no persons other than garage personnel are permitted above the street level, no stair enclosures shall be required, except as provided herein for the roof level in buildings not exceeding ten parking levels or 75 feet in height. Where fire walls are provided to avoid exceeding the areas herein specified, at least one stairway shall be provided on each side of the fire wall or walls. All required stairs shall continue to the roof and where not otherwise required to be enclosed, shall be enclosed at the roof with a bulkhead constructed of metal, concrete or masonry or a combination thereof, or other incombustible materials acceptable to the superintendent, and the well openings shall be adequately protected by railings and toe boards or equivalent safeguards.

l. Mechanized parking garages as defined in the section, not exceeding ten parking levels or 75 feet in height, in which cars do not operate under their own power above the street parking level, shall be provided with fire access stairs so located that at least two stairs shall be accessible from any point in every parking area and every point of a parking area shall be within a distance of 150 feet from a stair. The fire access stairs shall be not less than 22 inches wide, constructed of incombustible materials, having an inclination of not more than 60 degrees to the horizontal. Such stairs shall extend from the street parking level to the roof with an unobstructed landing at each parking level and with a rise of not more than 15 feet between landings. The fire access stairs shall be protected throughout to a height of not less than

three feet with a wire mesh screen of not less than no. 10 U. S. gage, having openings of not more than one and one-quarter inches in any dimension, or with other rigid, incombustible guards. Hand rails shall be provided on the stairs and floor openings in every tier shall be protected with adequate railings and toe guards acceptable to the superintendent.

m. In the open type parking garages where no passengers other than car operators are permitted above the street level, if the building does not exceed ten parking levels or 75 feet in height and in other opn typ parking garages not exceeding two parking levels in height, shafts may be open and unenclosed, but a roof of incombustible material at least three feet above the adjoining roof level shall be placed over shafts, other than over fire access stairs and parking machine areaways in mechanized parking garages.

n. In all other garage structures, the number, location and enclosure of stairs, ramps and elevators shall be as required for buildings of that use, height and class of construction.

o. The sale of gasoline and oil shall be permitted only on the street floor of open type parking garages, provided that sales are made only for cars using the parking facilities of the garage. The area for the sale of gasoline and oil shall be located at a car entrance or exit from the garage and shall be arranged and limited in size so as to serve only those cars using the parking facilities of the building. The area used for such purpose shall be completely separated from the garage area by a partition having a fire resistive rating of at least two hours, extending in class 3 structures from the lowest floor level to the underside of the floor above the area used for the sale of gasoline and oil, and in class 3 structures a ceiling having a fire resistive rating of at least one hour shall be constructed over such area. The openings between such area and the area used for garage shall be protected by automatic shutters or fireproof self-closing doors having a fire resistive rating of at least one hour, and the floor of such area shall be pitched to the sidewalk with a slope of not less than one-quarter inch per foot. The gasoline dispensing pumps shall be located at least nine feet from the street line and the use of portable pumps is prohibited.

p. In open type parking garages not exceeding ten parking levels or 75 feet in height and not more than 30,000 square feet in area no standpipe shall be required, but the following first aid fire extinguishing equipment shall be provided:

In other than mechanized parking garages, for each 2,500 square feet of parking level area, and in addition, in the area used for the sale of gasoline and oil:

One 2½ gal. unit of fire protection for Class "A" fires, and

One 2½ gal. unit or equivalent of fire protection for Class "B" fires.

Such first aid fire extinguishing equipment shall be located as required by the fire commissioner on each parking level. In mechanized parking parages one 2½ gal. unit of fire protection for Class "A" fires, and one 2½ gal. or equivalent unit of fire protection for Class "B" fires shall be located on each parking level near the fire access stairs and on each parking machine. When necessary to prevent freezing extinguishers shall be enclosed in approved heated cabinets constructed of steel or other incombustible materials acceptable to the superintendent and the location of the cabinet shall be indicated by a red electric light of not less than 50 watts.

q. The provisions of section C26-649.0 and C26.651.0 shall not apply to open type parking garages not exceeding ten parking levels or 75 feet in height.

r. Open type parking garages shall comply with all pertinent provisions of this code except as otherwise provided by this section.

(4.2.4.2). § C26-257.2 Height of Fences.—In other than residence use districts as established by the zoning resolution, fences may be erected throughout the city to a maximum height of ten feet. In residence use districts, it shall be unlawful to erect any fences, whether of masonry, steel, wood or any other material, to a height of more than six feet above the ground except that fences used in conjunction with non-residence buildings and public playgrounds excluding buildings accessory to dwellings, may be erected to a height of fifteen feet. Higher fences may be approved by the superintendent where required for the enclosure of public playgrounds, school yards, parks and similar public facilities.

ARTICLE 6. VENTILATION

(5.1.1). § C26-258.0 Ventilation Required.—a. Structures or parts of structures, including those portions of multiple dwellings used for business purposes, constructed after January first, nineteen hundred thirty-eight, shall be provided with ventilation in rooms and spaces as prescribed in this article and in accordance with rules of the board.

b. In the application of these provisions, any room or space or portion of which more than fifty percent of its story height, between floor and ceiling, is below the

level of the nearest point of the nearest curb, shall be considered as having insufficient ventilation for use as living quarters where any person or persons may sleep or be domiciled and such use shall be unlawful.

c. Systems of mechanical ventilation installed to comply with the provisions of this article shall be kept in continuous operation at all times during the normal occupancy of the structure.

d. In the application of this article, stationary windows and stationary sash shall be construed as wall area and shall be given no credit as means of ventilation.

(5.1.2). § C26-259.0 Design and Installation of Means of Ventilation.—a. Design and installation. The design and installation of the means for ventilation or air conditioning shall be as required by this article and as prescribed in the rules of the department.

b. Fire protection. Where a mechanical ventilating system is installed to ventilate the business or public portions of a structure other than water closet compartments and the ventilating system is used to ventilate spaces on more than one floor by means of recirculation of air whether or not the system of ventilation is required by law, the fans of the system shall be arranged to shut down automatically by means of an approved thermostatic device or other adequate fire detecting devices approved by the board, whenever the temperature of the air in the system exceeds 125 degrees Fahrenheit. For this purpose, an approved thermostatic device which cannot be set to operate at a temperature in excess of 125 degrees Fahrenheit, shall be located in the system at a suitable point in the return air duct, ahead of the fresh air intake. The thermostatic device shall be either of a type that is manually reset, or the control system shall be so arranged that some manual operation is required to restart the fan after the thermostat has operated. Where such ventilating systems are installed in buildings equipped with automatic sprinklers or manual or automatic fire alarm systems located on the same floor or floors as the ventilating system, provision shall be made to stop the fans automatically when the sprinkler or fire alarm systems operate.

c. Where a mechanical ventilating or air conditioning system with recirculation of air from one space to another is used to ventilate a lobby or passageway from the stairs or elevators leading to a street or leading to the exterior of a building, an effective means of detecting and controlling the spread of smoke in the ventilating or air conditioning system shall be provided. Smoke detecting equipment shall not be required where a separate ventilating system is provided for the lobby, so constructed that no air is recirculated from the lobby to spaces outside of the lobby. Also, in any public building or part of a public building as defined in section C26-235.0, except schools in which regular, supervised fire drills are held, where a ventilating system or air conditioning system with recirculation of air from one space to another is used to ventilate spaces on more than one story, means of detecting and controlling the spread of smoke shall be provided. The installation of the smoke detecting equipment shall be in accordance with the rules of the board, or in the absence of such rules, in accordance with the rules of the department.

Smoke detecting devices shall be located in the main supply duct on the down stream side of the filters, so located as to operate reliably in case of smoke in any part of the air stream. The sensitivity of the smoke detecting device shall be such that a reduction of less than four per cent in light beam intensity will not result in operation. The device shall operate whenever there is a reduction in the clear beam light intensity not exceeding two per cent per foot of length of the light beam, or a maximum of thirty-six per cent total light cut-off. Devices shall be of a type and be so installed as to minimize the possibility of operation due to accumulation of dust, deterioration of the equipment, fluctuation in electric current supply or to any other condition in system operation not associated with fire or smoke. Smoke detection equipment shall be arranged so that audible or visual signals will indicate any condition which would interfere with proper operation of the smoke detecting equipment. The owner shall have such equipment inspected at least semi-annually and maintained in proper operative condition. Smoke detector devices shall be approved by the board. Where the requirements of this section as to sensitivity are not applicable as a standard for a type of smoke detecting device, the board shall establish other adequate standards for such devices. Other smoke detecting or fire detecting equipment may be used when approved by the board. The smoke detecting devices shall control the spread of smoke by stopping the ventilating fans.

(5.1.3). § C26-260.0 Where Special Ventilation is Required.—Where excessive heat may be created to the detriment of the occupants, or where steam, gases, vapor, dust or other impurities in the air, which may be injurious to health, may be generated in the course of commercial or other activities, rooms shall be ventilated in such manner as to prevent harm to any person therein.

(5.1.4.1). § C26-261.0 Rooms in Residence Structures Constructed After January First, Nineteen Hundred Thirty-eight.—a. Windows required.—

1. Living rooms shall have one or more windows opening directly upon a street or other public space, or upon a court located upon the same lot or plot as the structure and conforming to the requirements of section C26-269.0, provided that the width of such street or open space shall be at least the minimum required by section C26-269.0, except as otherwise specifically stated in this section.

2. Windows in each room shall have an area between stop beads of at least one-tenth the floor area of the room. At least fifty percent of the required window area shall be available as clear ventilating area.

b. Minimum Dimensions of Rooms—Living rooms shall have a minimum clear width of six feet in any part, a minimum clear floor area of sixty square feet, and a minimum clear ceiling height of eight feet for the minimum area; except that in any alteration to a building, which building was completed before January 1, 1948, the minimum clear ceiling height of seven feet for a minimum area shall be permitted provided, however, that the alteration shall have been completed prior to July 1, 1965.

(5.1.4.3). c. Alcove Rooms.—Residence buildings occupied by two families or less, may have living rooms without windows as prescribed in subdivision a of this section, provided that every such room opens, without obstruction, directly into another room which has one or more windows opening directly to the outer air as prescribed in subdivision a of this section, of at least one-tenth of the combined area of the two rooms, and that the opening between such rooms is sixty square feet or more in area.

(5.1.5). § C26-262.0 Ventilation of Toilets.—Every bathroom, toilet room or other room containing one or more water-closets or urinals, placed in any structure after January first, nineteen hundred thirty-eight, shall be ventilated in at least one of the following ways:

(5.1.5.1). 1. Windows Opening to Outer Air.—By one or more windows, opening to a street or to a yard or court of lawful dimensions on the same lot or plot. Such window or windows shall have a clear area between stop beads of at least ten percent of the floor area. At least fifty percent of the required area shall be clear ventilating area but every window shall be at least three square feet in area and at least one foot in width.

(5.1.5.2). 2. Windows Opening on Vent Shafts or Courts.—a. By a window of the size specified in paragraph one of this section, opening on a vent shaft which extends to and through the roof, or into a court of lawful dimensions and which has a cross-sectional area of at least one-fifth of a square foot for every foot of height, but at least nine square feet and, unless such shaft opens to the outer air at the top, there shall be a net area of fixed louvre openings in the skylight equal to the required shaft area.

b. A shaft or court as referred to in this section shall mean a shaft or court on the same lot or plot with the structure.

(5.1.5.3). 3. Individual Vent Flues or Ducts.—

a. By an individual vent flue or duct extending independently of any other flue or duct to and above the roof and having a cross-sectional area of at least one square foot for one or two water-closets or urinal fixtures and one-third of a square foot additional for each additional water-closet or urinal fixture.

b. Vent flues or ducts passing through two or more successive floors or through one or more floors and the roof shall run in a shaft or shafts constructed as prescribed in sections C26-638.0 through C26-647.0.

c. Each flue or duct shall be equipped with an automatic closing fire damper where such flue or duct enters the shaft enclosure and, such flue or duct shall be equipped at its upper termination, with a wind-blown ventilator cap. Such damper and cap shall be designed in accordance with the rules of the board.

d. When two or more such flues or ducts are enclosed in a single shaft, each shall be covered with fire-retarding materials as prescribed by the rules of the board.

(5.1.5..4). 4. Skylights.—By a skylight in the ceiling, having a glazed surface of at least three square feet and arranged so as to provide fixed ventilating openings of at least one and one-half square feet to the outer air above the roof of the structure or into a court or yard of lawful dimensions, for one or two water-closets or urinal fixtures and one square foot additional for each additional water-closet or urinal fixture.

(5.1.5.5). 5. Mechanical Exhaust Ventilation.—

a. By some approved system of mechanical exhaust ventilation of sufficient capacity to exhaust at least forty cubic feet of air per minute per water-closet and

per urinal for public toilet rooms, and at least twenty-five cubic feet per minute per private interior bathroom.

b. Separate exhaust flues shall be provided for every two hundred fifty feet of height of structures, and such flues shall be of approved construction.

(5.1.5.6). 6. Openings into Interior Bathrooms and Water-closet Compartments.—Interior bathrooms and water-closet compartments shall have fixed openings from adjacent rooms or corridors, or from other approved sources, ample to provide a sufficient inflow of air to make exhaust ventilation effective.

(5.1.5.7). 7. Use of Pipe Shafts for Ventilation.—It shall be unlawful to use pipe shafts as ventilating shafts.

(5.1.6). § C26-263.0 Ventilation of Inside Locker Rooms.—Inside locker rooms and other similar inside rooms shall be provided with exhaust ventilation giving at least two changes of air per hour.

(5.1.7). § C26-264.0 Ventilation of Refrigerating Plants.—Refrigerating plants shall be ventilated in accordance with the provisions of title C of chapter nineteen of the code.

(5.1.8). § C26-265.0 Ventilation of Inside Cooking spaces.—a. Inside spaces where cooking of any kind is done shall have a mechanical exhaust ventilation of three cubic feet of air per minute for each square foot of floor area, but in any case at least one hundred fifty cubic feet of air per minute. Such exhaust shall be collected in a sheet metal flue connected to an independent common flue in a fireproof shaft. Such flues shall be of No. 16, U. S. gage sheet steel, or terra cotta, and shall be connected to a separate fan.

b. When two or more such flues are enclosed in a single shaft, each shall be covered with fire-retarding materials as prescribed by the rules of the board.

(5.1.9). § C26-266.0 Index For Ventilation.—Spaces above or below grade, with or without windows, designed for human occupancy only, except for special occupancy structures provided for in section C26-749.0, or as otherwise prescribed in sections C26-261.0 or C26-262.0 shall have ventilation either from windows or from mechanical means, or from both, in accordance with the following index and requirements:

1. Cubic foot contents per person plus ten times floor area per person in square feet plus one hundred times the entire masonry window openings per person in square feet equals index.

(5.1.9.1). 2. Rooms With Windows.—In rooms with windows:

a. If the index is less than 300, there shall be supplied an amount of fresh air equal to two and one-half cubic feet per minute per square foot of floor area, and an air exhaust of two cubic feet per minute per square foot of floor area.

b. If the index is between 300 and 520, there shall be supplied an amount of fresh air equal to two cubic feet per minute per square foot of floor area, and an air exhaust of one and one-half cubic feet per minute per square foot of floor area.

c. If the index is between 520 and 850, there shall be supplied an amount of fresh air equal to one and one-half cubic feet per minute per square foot of floor area and an air exhaust of one and one-quarter cubic feet per minute per square foot of floor area.

d. If the index is between 850 and 1,650, there shall be required an air exhaust of one cubic foot per minute per square foot of floor area.

e. If the index is above 1,650, mechanical ventilation shall be unnecessary.

f. In order to be credited as such under the provisions of this article, a window shall open directly upon a street or other open public space or upon a court, located on the same lot or plot, and conforming to the requirements of section C26-269.0 for courts.

g. Show windows and other stationary windows shall be considered as wall area in calculating the index.

(5.1.9.2). 3. Rooms Without Windows.—In rooms without windows:

a. If the index is below 850, the requirements shall be the same as for rooms with windows.

b. If the index is between 850 and 1,650, there shall be supplied an amount of fresh air equal to one cubic foot per minute per square foot of floor area and an air exhaust of one cubic foot per minute per square foot of floor area.

c. If the index is over 1,650, there shall be supplied an amount of fresh air equal to one-third cubic foot per minute per square foot of floor area, and an air exhaust of one-third cubic foot per minute per square foot of floor area.

d. Interior partitions shall have transoms or equivalent openings, and when partitions occur thirty feet or more away from a window or similar opening, the room so formed shall have ventilation based upon the index without windows.

(5.1.9.3.) 4. Ventilation for School Structures.—School structures shall be ventilated in accordance with the following requirements:

a. In classrooms and other rooms of instruction, and administrative rooms, where the index is above 1,650, no mechanical ventilation is required. Classrooms and other rooms of instruction and administrative rooms, where the index is below 1,650, shall have a supply of outdoor air of fifteen cubic feet per minute per occupant and mechanical exhaust. Where windows are used as the source of supply air, mechanical exhaust shall be fifteen cubic feet per minute per occupant. When outdoor air is supplied by mechanical means, the exhaust shall be at least 80 per cent of the supply.

b. Lockers, wardrobes or wardrobe rooms shall be ventilated, as specified in section C26-263.0 of the administrative code and where these spaces are included in or are adjacent to a classroom, the exhaust air from the classroom under regulation jointly determined by the Board of Education and the Commissioner of Health may be used for such ventilation.

c. Auditoriums, assembly rooms, and other rooms where there are more than 75 occupants, shall have a supply of outdoor air of not less than fifteen cubic feet per minute per occupant, and mechanical exhaust. Where windows are used as the source of the supply air, mechanical exhaust shall be at least fifteen cubic feet per minute per occupant. When outdoor air is supplied by mechanical means, the exhaust shall be at least 80 per cent of the supply.

d. In rooms where there is danger of large concentrations of toxic substances, or where strong odors or overheating is likely to occur, special ventilating systems, with mechanical exhaust adequate to relieve these conditions, shall be provided. The exhaust from these rooms shall be independent of the exhaust systems serving other parts of the building.

(5.1.10). § C26-267.0 Ventilation of Garages.—a. Spaces below grade with or without windows, designed for live storage of five or more vehicles propelled by gasoline engines or other internal combustion engines and operated within the storage space under their own power, shall have provision for at least four changes of air exhaust per hour by mechanical means, with provision for a corresponding air inflow from an uncontaminated source. Two changes of the four shall be taken from near the floor.

b. Spaces above grade with or without windows, designed for the same purpose, shall have provision for at least four changes of air per hour by mechanical means or, shall have adjustable openings near the floor on all outside and court walls. Adjustable openings shall measure at least six inches by four inches and be within six inches above the floor. Such openings shall be placed between wall columns, and shall be placed sixteen feet or less apart where the columns do not occur. Such spaces shall also be subject to the requirements of section C26-260.0.

c. Elevator pits below floor levels shall have mechanical exhaust ventilation taken from near the bottom of the pits.

RULES FOR THE VENTILATION OF GARAGE SPACES BELOW GRADE

In order to secure the intent and purpose of Section C26-267.0 of the Administrative Code of The City of New York and in the absence of rules of the Board of Standards and Appeals and pursuant to the provisions of Section 885 of the New York City Charter, the following rules are hereby promulgated to become effective February 15, 1954:

1. *Wherever the floor of a garage designed for the live storage of five (5) or more motor vehicles is more than two (2) feet below curb, ventilation shall be provided as required by the provisions of subdivision a of Section C26-267.0 of the Administrative Code.*

2. *Air exhaust ducts shall terminate above the roof of the garage or the roof of the building or shall terminate at least ten (10) feet above the curb in an exterior wall adjoining a legal street, yard or court. No air exhaust duct shall terminate within fifteen (15) feet of a window in another building, nor within fifteen (15) feet of a window in the residence portion of the same building.*

3. *The ventilating system shall comply with the "RULES RELATING TO REQUIRED VENTILATING SYSTEMS" of the Department of Housing and Buildings.*

(5.1.11). § C26-268.0 Human Occupancy.—Plans for structures, designed for human occupancy, and filed with the department, shall have designed thereon the number of persons which the rooms and various spaces are planned to accommodate

and shall contain a simple description of the system of mechanical ventilation, if any, to be installed in the structure. One and two family dwellings are exempted from the requirements of this section.

(5.1.12). § C26-269.0 Courts.—a. In structures erected after January first, nineteen hundred thirty-eight, a court required by subdivision a of section C26-261.0, shall have a width at every point of at least one inch for each foot that such point is distant from the lowest part of such court, and in no case shall such width be less than three feet, except that in structures of not more than 30 feet in width the minimum width of a court shall be not less than three feet and, except as otherwise specifically provided herein for one-family dwellings. Such a court shall be open and unobstructed to the sky for the required widths from its lowest point, except for ordinary projections such as window sills, belt courses and similar ornamental projections to a maximum extent of four inches. When a court is located on the side of a lot or plot, the lot line shall be deemed an enclosure of such court, but when a court opens on a street or open public space, such street or open public space may be considered as part of that court.

b. In one-family structures, erected after January first, nineteen hundred thirty-eight to a height of not more than two stories and twenty-seven feet the court required by sub-division a of section C26-261.0 may be less than four feet in width but shall in any case be two feet or more in width, provided there is a public space or street or a court of at least two feet in width on the opposite side and cross-ventilation from one side to the other is provided for by windows on both sides.

(5.1.13). § C26-270.0 Structures on the Same Lot or Plot.—If more than one structure is placed on any lot or plot after January first, nineteen hundred thirty-eight, or, if any structure is placed on the same lot or plot with a previously existing structure, the several structures, may, for the purposes of this article, be considered as a single structure.

(5.1.14). § C26-271.0 Effect of Alterations Upon Structure Ventilation.—It shall be unlawful to alter any structure in a manner which would reduce the size of any room or the amount of window space below the requirements of section C26-261.0, or which would create any additional room unless such additional room is made to conform to the requirements of section C26-261.0, except that such rooms may be of the same height as existing rooms in the same story. It shall be unlawful to enlarge any structure or to diminish the lot or plot on which such structure is located so as to reduce the dimensions of any court below the requirements of section C26-269.0.

RULES RELATING TO THE INSTALLATION OF VENTILATING AND AIR CONDITIONING SYSTEMS

(Filed with City Clerk June 1, 1959)

By virtue of the authority vested in the Commissioner of Buildings, pursuant to the provisions of Section 885 of the New York City Charter and Section C26-259.0-a of the Administrative Code and in order to provide for the enforcement of the provisions of the Administrative Code, the Multiple Dwelling Law and the Labor Law in relation to ventilation, the following rules are hereby promulgated to become effective June 1, 1959. The Rules Relating to Required Ventilating Systems, filed with the City Clerk July 8, 1957, are hereby rescinded.

A. PURPOSE

1. *These rules set forth some of the requirements for the installation, operation and maintenance of ventilating and air conditioning systems. They shall apply to any required system of ventilation or air conditioning hereafter installed or altered, to the installation of any voluntary ventilating or air conditioning system or air conditioning unit, and to the alteration of an existing voluntary ventilating system, air conditioning system, or air conditioning unit which will subject any part of a structure to heavier loads than it was designed to carry, or will create new openings in floors and roofs, or in walls or partitions required to have a fire resistive rating. Rules 45 and 48 shall not apply to a separately ventilated individual bathroom or a cooking space. Other rules shall be applicable to such installations to the extent required by the borough superintendent.*

2. *APPLICABLE LAWS AND RULES. It is required that every installation of ventilating and air conditioning equipment, and the operation and maintenance of same, and all work in connection therewith, shall comply with the provisions of laws which prescribe the structural requirements, the laws relating to protection of structures against the spread of fire, the laws relating to egress, as well as laws and rules governing ventilation and air conditioning.*

B. DEFINITIONS

3. *A REQUIRED VENTILATING SYSTEM is one installed to provide ventilation where required by law. Those parts of a voluntary ventilating or air conditioning system which are connected to or may affect the functioning of a required ventilating system shall be deemed to be a required ventilating system.*

4. *A VOLUNTARY VENTILATING SYSTEM OR AIR CONDITIONING SYSTEM OR AIR CONDITIONING UNIT is one installed voluntarily and is not required to provide ventilation in compliance with the requirements of the law.*

5. *AN ALTERED VENTILATING SYSTEM OR AIR CONDITIONING SYSTEM is one in which duct work is relocated or in which additional duct work is installed to service additional space.*

6. *THE INDEX OF VENTILATION. Cubic foot contents per person plus ten times floor area per person in square feet plus one hundred times the entire masonry window openings per person in square feet equals index (Section C26 266.0-1 Administrative Code).*

Where interior partitions with transoms or equivalent openings occur less than thirty feet from a window, one index of ventilation may be figured for both rooms based on the window area, total floor area, and the total number of occupants of both rooms, provided that transoms or equivalent openings in the partitions, when substituted for window areas, are sufficient to give the same index number based on the area of the inner room and the number of its occupants,

7. *PLENUM CHAMBER, An air compartment or chamber to which one or more ducts are connected and which forms part of an air distribution system.*

8. *The term "HALLWAY" shall mean an enclosed hall or corridor leading to a stairway, fire tower, or other required exit, (Section C26 81.0 Administrative Code).*

9. *The term "PUBLIC HALLWAY" shall mean a corridor or hallway leading directly to a stairway, fire tower or other required exit, within a story of a structure which is occupied by more than one tenant or lessee or within a structure defined as a public building by, and included in, Section C26-235.0-a of the Administrative Code (Section C26-81.0 Administrative Code).*

10. *The term "PASSAGEWAY" shall mean an enclosed passage or corridor connecting a stairway, fire tower or elevator with a street or open space communicating with a street (Section C26-110.0 Administrative Code).*

11. *A "STAIR ENCLOSURE" is the fire resistive or fireproof partition required by the Administrative Code to be built around stairways and fire towers and passages or corridors used to reach the street after entering a stairway or fire tower.*

12. *A "FIRE DAMPER" is a damper arranged to automatically seal off air flow through a part of an air duct system, so as to prevent the passage of heat and smoke.*

13. *A "FIRE PARTITION" is a partition provided for the purpose of protecting life by furnishing an area of exit or refuge, and having a fire resistive rating of at least three hours (Section C26-64.0 Administrative Code).*

14. *A "FIREPROOF PARTITION" is a partition, other than a fire partition, provided for the purpose of restricting the spread of fire, and having fire resistive rating of at least one hour (Section C26-70.0 Administrative Code).*

15. *A "FIRE WALL" is a wall provided primarily for the purpose of resisting the passage of fire from one structure to another or from one area of a structure to another, and having a fire resistive rating of at least four hours (Section C26-68.0 Administrative Code).*

C. APPLICATION AND PERMIT

16. *APPLICATION AND PERMIT REQUIRED. No ventilating or air conditioning system shall be installed or altered until an application has been filed and approved by the Borough Superintendent and a permit to do the work has been obtained, except that:*

I. Voluntary installation of air conditioning units without ducts, where no part of a structure will receive a greater load than is legally permissible.

II. Voluntary ventilating systems or air conditioning systems which serve only one story of a building, and which do not reduce the existing ventilation of any room or space below that required by law,

—may be installed without a permit provided such installations are not made within public hallways, passageways or stairways, that floors, roofs, walls or fire resistive

partitions will not be pierced, and that lot line windows are not used for ventilation or air conditioning.

17. *INSTALLATION IN CONNECTION WITH ACTIVE NEW BUILDING OR ALTERATION APPLICATION. The plans for any ventilating system or air conditioning system may be filed as part of and be included in any new building or alteration application or as a subsequent amendment to such application while it is still active. Where a ventilating or air conditioning system is a required system and the plans are to be filed as an amendment, the plans and the application filed with the new building or alteration application shall bear a prominent note, "Plans of ventilating or air conditioning system will be filed as an amendment and approval obtained before work on such system is started."*

18. *INSTALLATION IN EXISTING BUILDING. A separate alteration application shall be filed for the installation or alteration of a ventilating system or air conditioning system in an existing building not in process of alteration.*

19. *FIGURING COST OF ALTERATION. In estimating the cost of an alteration which requires a permit to install, the fee to be paid to the department shall include the cost of all ventilating and air conditioning equipment called for in the application and plans filed in the department, and the cost of the installation thereof.*

20. *SCOPE OF PLANS. The plans filed shall show the location and dimensions of all ducts, location of fire dampers, motors, fans, filters, or where such equipment is in an assembled unit, the type, capacity, approximate size of the unit and maximum weight, the methods of supports of ducts, fans and motors, locations of smoke detecting devices and all other pertinent data. The materials of ducts, duct lining, duct insulation and enclosure, and fire retarding materials shall also be shown on plans except where such data is furnished by filing copies of the pertinent clauses of the specifications. For required ventilating systems, the plans shall also show the fresh air intake, the location, size and openable area of all windows, the size of yards and courts on which windows open, the index for ventilation including the basis of computation, and the amount of air to be exhausted or provided for each room or space, the capacity in cubic feet per minute at a specified static pressure of each fan and the horse-power of each fan motor, and such additional matter as the superintendent may require. Where any device is required to be of an approved type, the type and the manufacturer's name shall be given.*

21. *FILING APPLICATIONS. Applications for the approval of ventilating and air conditioning installations shall be filed by registered architects or licensed professional engineers. Where no structural work is involved such applications may be filed by a person qualified to design ventilating and air conditioning systems acceptable to the borough superintendent. Such person shall file Statement, Form B (Form No. 18) and state his qualifications. Under the term "structural work" shall be included the piercing of any wall or partition that is required by law to have a fire resistive rating. Application for the approval of a minor alteration may be made on a building notice provided that, if the applicant is not a registered architect or professional engineer, he shall state his qualifications on Statement, Form B, as required above.*

22. *AMENDMENTS TO PLANS. Before any departure from approved plans are made in the construction of any building, amendments and plans shall be filed and their approval obtained as required by Section C26-178.0 of the Administrative Code. This requirement applies to the ventilating and air conditioning work, as well as to structural and architectural.*

23. *CERTIFICATION OF PLANS. The applicant who filed the ventilating and air conditioning application or amendment shall certify:*

I. that if the work is carried out in accordance with the plans and specifications filed by him, it will comply with the requirements of all applicable laws and rules.

II. that the plans filed by him agree as to the arrangement of rooms and windows with the layout of the building or, in the case of a new building or alteration, with the architectural plans.

Unless time permits a more complete examination, the examiners shall check the plans to make certain that all fire protection devices are shown or called for, and then place the approval stamp on the plans. The final approval will be issued only after the system has been installed, inspected and tested, as required by Rules 45 and 47, and the report required by Rule 48 has been filed.

D. CONSTRUCTION DETAILS

24. *MATERIALS OF DUCTS. a. Ducts shall be constructed entirely of incombustible materials such as iron, steel, aluminum, or other material approved*

by the Board of Standards and Appeals. Their construction shall comply with the "Standards of the National Board of Fire Underwriters for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type" (NBFU Pamphlet No. 90-A), or the "Standards of the National Board of Fire Underwriters for the Installation of Residence Type Warm Air Heating and Air Conditioning Systems" (NBFU Pamphlet No. 90-B), whichever is applicable. Ducts may be part of the building structure if their construction consists of not less than three-quarter inch thick cement or gypsum plaster on metal lath applied to incombustible supports, except where combustible supports are permitted by the Administrative Code.

b. Ducts used to exhaust interior cooking spaces shall comply with Section C26-265.0-b of the Administrative Code.

c. Vibration isolation connectors shall be made of woven asbestos, but connectors not exceeding ten inches in length may be of approved flameproof fabric, except in kitchen exhausts where they shall be woven mineral fibre having a smooth, cleanable surface.

25. *LININGS FOR DUCTS, Only fire resistive materials approved by the Board of Standards and Appeals shall be used to line ducts. Pending the approval of such materials by the Board, such materials listed in the Fire Underwriters' Laboratories, Inc., Fire Protection Equipment List, under the heading "Building Materials, Hazard Classification (Fire)" may be used.*

26. *SUPPORTS OF DUCTS. a. Except as otherwise hereinafter provided ducts shall be supported from the sides of concrete beams by expansion bolts or hung from the steel reinforcement of concrete floor and roof construction, or from concrete slabs by devices approved by the Board of Standards and Appeals. The use of expansion bolts in cinder concrete slabs is prohibited. Where supported from wood beams, duct supports shall be secured to their sides by lag screws, except that nails may be used where the cross-sectional area of the duct does not exceed two square feet.*

b. Ducts shall not be hung from or supported by suspended ceilings except that ducts whose cross-sectional area does not exceed two square feet may be hung directly from or be directly supported by the purlins of a suspended ceiling provided such purlins are hot rolled one-and-one-half inch by one-and-one-half inch by one-eighth inch angles or one-and-one-half inch hot rolled channels weighing 0.85 pounds per foot.

c. For ducts not exceeding two square feet in area, hangers shall be metal not less than one-sixteenth inch in thickness. For larger ducts, hangers shall be metal not less than one inch by one-eighth inch or its equivalent area. Hangers shall be fastened to the sides of the duct and for ducts over forty-eight inches wide, the hangers shall be brought down the sides and turned under and fastened to the bottom of the duct also. Where the cross-sectional area of a duct exceeds eight square feet, it shall be braced by angles or other adequate reinforcement around all four sides of the duct, spaced not more than four feet apart. Where the cross-sectional area of a duct exceeds ten square feet, hangers shall be spaced not more than four feet apart along the length of the duct. A vertical duct shall be supported at each floor level by angles not less than one inch by one inch by one-eighth inch fastened to opposite sides of the duct. Sections of ducts containing filters, coils, or fans shall be provided with metal framing and hangers of adequate strength to support such equipment. Provision for such support shall be shown on the plans.

27. *ENCLOSURE OF DUCTS. a. Ducts passing through two or more floors, or through a floor and a roof, and having a cross-sectional area of more than two square feet shall be enclosed in shafts complying with the requirements of subarticle 5 of Article 11, Chapter 26 of the Administrative Code. Where the cross-sectional area is two square feet or less, such ducts may be fire-retarded with metal or gypsum lath and one inch of cement or gypsum plaster, or with other material of equivalent fire resistance, placed as close as possible to the duct with a close fitting sleeve in the floor and the space between the duct and the sleeve filled solidly with inert incombustible material for the full depth of the floor. In multiple dwellings, the enclosures of ducts shall comply with the requirements of the Multiple Dwelling Law where such requirements are more restrictive.*

b. Ducts installed for the ventilation of new water-closets or kitchenettes in old-law tenements or converted dwellings shall be enclosed as follows: Any side of a duct exposed in a room or in a shaft shall be covered with one inch thick cement mortar on ribbed metal lath. Any side of a duct placed against an existing wood lath and plaster partition shall be protected at such partition by plaster boards one-half inch thick with joints pointed. Any side of a duct which will be enclosed by a new stud partition shall be covered either with one-inch thick cement mortar on metal lath or two one-half inch thick layers of plaster board with joints pointed

or staggered. Ducts installed within shafts having a one hour fire resistance rating need not be separately enclosed. No fire retarding required between the adjacent sides of ducts, Where the ducts pass through the floor or roof construction they shall be protected with not less than two layers of one-half inch thick plaster boards or one-inch thick cement mortar. All the spaces between a duct and any adjacent floor beams or roof beams must be filled with either of the above materials. The details of the enclosure of such ducts are shown on drawing of departmental standards dated May 11, 1938.

c. Ducts which pass through a boiler room and which serve other parts of a building shall be made smoke-proof and shall be enclosed in materials having a one-hour fire resistive rating where they are located within the boiler room.

28. *OPENINGS IN VENTILATING SHAFTS. Where a duct serves two or more floors, approved fire dampers shall be provided at each direct outlet from a shaft on a supply system or on each direct inlet to a shaft on an exhaust system and in each branch duct at its junction with a shaft or a vertical duct in a shaft, except that fire dampers shall be not be required in branch ducts having a cross-sectional area of less than twenty square inches, which supply only air conditioning units discharging air at not over four feet above the floor. Where a duct enters a shaft in which the flow of air exhaust is upward and the air flow and the shaft run directly to the roof, if the cross-sectional area of the branch duct is not more than fifty square inches, and it is carried up inside of the shaft for a distance not less than twenty-two inches, no damper shall be required. A duct which pierces the first floor only and which is not enclosed in a shaft shall be provided with an approved fire damper at the floor opening.*

29. *OPENINGS FOR VENTILATION IN WALLS AND PARTITIONS. a. Openings in Fire Walls. No duct shall pierce a fire wall in which there is an opening used as a horizontal exit. An opening for ducts in a fire wall through which there is no horizontal exit shall not exceed forty-eight inches in greatest dimension. The distance between any two openings shall be not less than three feet. The duct through the fire wall shall be constructed, and the openings shall be protected by approved fire dampers on each side of the wall, as shown on Figures No.* 2 *and No.* 3 *of the National Board of Fire Underwriters' Pamphlet No.* 90-A, *published June,* 1957.

b. Openings in Fire Partitions. In a fire partition an opening not exceeding fifty square inches is permitted without fire dampers when required for the passage of ventilating ducts, provided such ducts convey air for ventilation or air conditioning by means of forced circulation. In such a partition there may be openings for ventilating ducts, each not exceeding forty-eight inches in greatest dimensions, provided the openings are protected by approved fire dampers. The distance between any two openings shall be not less than three feet, unless special permission is secured from the superintendent. The ducts shall be constructed according to the standards of the National Board of Fire Underwriters for ducts passing through fire walls as contained in National Board of Fire Underwriters Pamphlet No. 90 *of August,* 1952 (*Section* C26-661.0 *of the Administrative Code*). *Such standards are also shown on Figures No.* 2 *and* 3 *of Pamphlet No.* 90-A *published by the same organization in June,* 1957, *except that only one damper will be required at each opening.*

c. Openings in Partitions Enclosing Public Hallways. In a partition enclosing a public hallway, openings for ventilating ducts shall not exceed three square feet in area and each such opening shall be provided with an approved automatic fire damper. This requirement shall not aply to structures used exclusively as schools in which regular supervised fire drills are held (*Section* C26-662.0 *of the Administrative Code*).

d. Ducts Passing Through Walls. Where a duct passes through any fire wall or fire partition it shall be provided with a properly constructed sleeve and the space between the sleeve and the masonry shall be tightly caulked with asbestos rope and finished with fire clay.

30. *VENTILATING DUCTS AT STAIRWAY EXITS. a. At Fire Tower. No duct shall penetrate a fire tower.*

b. Openings at Passageways. No duct shall open on a required stair enclosure except in the lobby or passageway from the stairs to the street or other exterior exit, where openings not exceeding three square feet in area are permitted provided each opening is protected by an approved fire damper. The distance between any two openings shall not be less than three feet (*Section* C26 664.1 *of the Administrative Code*).

c. Enclosure at Passageways. A duct opening on a lobby or passageway shall be enclosed in material having the same fire resistive rating as the stair enclosure for

a distance of at least ten feet from the stair enclosure, or to a partition having at least a one-hour fire resistive rating with a fusible link damper where the duct passes through such partition. The thickness and fire resistive rating of the material used to enclose the ducts shall be the same as that required for the protection of structural steel as specified in Section C-26-575.0 *of the Administrative Code and as contained in the rules and approvals of the Board of Standards and Appeals. No openings shall be permitted in the fireproofing material enclosing the ducts within such distance. Branches entering the duct within this distance shall also be covered with material having a fire resistive rating the same as that required for the stair enclosures and as specified for the ducts opening on the passageway or lobby* (*Section* C26-664.1 *Administrative Code.*)

d. Crossing Exit Passages. A duct which crosses a public hallway, stair enclosure or passageway from stair to the outside of the building shall be completely separated from such hallway, stair enclosure or passageway by ceiling construction, or completely enclosed with materials, each having the same fire resistive rating as the enclosure of the hallway, stairway or passageway.

Note: The fire resistive ratings of stair enclosures to which reference is made in this Rule No. 30 *are those prescribed by subdivision h of Section* C26-292.0 *of the Administrative Code, and the materials protecting such ducts shall have the same fire resistance as the stair enclosures for the various classes and uses of the buildings.*

31. *DUCTS IN CEILINGS AND FIREPROOFING. a. Ducts within Fireproofing of Steel. Ducts shall not be installed in such a way as to impair the effectiveness of the fireproofing around steel or iron structural members. Ducts shall not be placed between the fireproofing and the members protected but they may be placed between beams or joists protected by a fire resistive ceiling.*

b. Openings in Ceilings. Openings for ventilation or air conditioning may be made in ceilings which are required to have a fire resistive rating, or in ceilings which form part of an approved floor or roof assembly, only if the following conditions are complied with: the openings are provided with fusible link dampers, they do not exceed one hundred and forty-four square inches in area, and the combined area of such openings for ventilation does not exceed two per cent of the area of the ceiling in which the openings are placed. A space of at least twelve inches shall be provided between openings. Ducts located in concealed roof spaces in Class 3 *buildings shall be provided with an approved damper at each point of entry and exit and at each fire stop of such concealed roof space. Exhaust openings from such spaces shall be provided with fusible link registers.*

c. Openings for Fire Dampers. Necessary openings in ceilings giving access to fire dampers shall be not greater in area than four hundred square inches and shall be protected by self-closing doors having a fire resistance equivalent to the ceilings in which the openings occur.

32. *FIRE DAMPERS. a. Approved Dampers. Until such time as the Board of Standards and Appeals approves fire dampers it shall be permissible to install fire dampers manufactured in accordance with the standards of the National Board of Fire Underwriters (NBFU Pamphlets* 90-A *and* 90-B*) on condition that the installer of the system certifies that the damper conforms to such standards. Such certificate shall be filed at the completion of the installation. Dampers shall close in the direction of air flow. Suitable access doors shall be provided to make all fire dampers in ducts accessible for inspection and servicing.*

b. Dampers in Kitchen Ducts. In ducts serving kitchen volume dampers may be located only at the range hood.

c. Installation of Dampers. Fire dampers shall be so arranged that the disruption of the duct will not cause failure to protect the openings through the partitions or walls.

33. *TERMINATION OF DUCTS. a. Exhaust Ducts. An exhaust duct to the outer air shall terminate in an exterior wall adjoining street, yard or court, at least ten feet above the sidewalk or ground or above the roof, except that this requirement shall not apply to exhaust ducts serving only the cellars in buildings existing on the day these rules become effective. An exhaust duct shall terminate at least ten feet from any window in another building or from any window in a residential portion of the same building, or from any fire escape, exterior stair, or from a fire tower balcony. No exhaust duct or fresh air intake shall open into a fire tower court which is an inner court, or into an adjoining property.*

b. Opening Protectives. A duct opening in an exterior wall which is so located that it is required to be protected by an opening protective having a three-quarter hour fire resistive rating by Section C26-649.0 *of the Administrative Code shall be provided with an approved fire damper.*

c. Fresh Air Intakes. Fire dampers shall be provided at fresh air intakes except where in the opinion of the borough superintendent the fire hazard is slight.

34. *FANS, MOTORS AND OTHER EQUIPMENT. Proper support shall be provided for all heavy equipment such as individual air conditioning units, coils, fans and motors. The present structural parts of a building shall be used to carry such equipment only if the total load carried by each support will not produce stresses in such support exceeding those permitted by the Building Code. When attached to wood beams, suspended fans or motors shall be supported by steel angles or channels attached to the wood beams by lag screws or bolts.*

35. *WATER RISERS. Water risers may be placed within stair enclosures, provided the risers do not encroach upon or reduce the dimensions of the required stair platforms or landings. No water risers are permitted in elevator shafts.*

36. *CLEARANCE FOR EXITS. No air conditioning unit, duct, duct enclosure, motor, fan, water riser or any other part of any ventilating system or air conditioning system shall be placed or installed so as to obstruct an exit to a fire escape, nor shall such equipment be placed in a fire tower or on balcony or vestibule leading to same, or obstruct or reduce below legal width or height any hallway, passageway, stairway or any other means of egress or the access thereto. No self-contained air conditioning unit, nor any part of an air conditioning system containing a refrigerant shall be placed within any entrance hall, public hallway, passageway or stairway, or public vestibule in violation of Article 18 of Chapter 19 of the Administrative Code which governs refrigerating systems.*

37. *AIR FILTERS. Air filters shall be of approved type that will not burn freely or emit large volumes of smoke or other objectionable products of combustion when attacked by flames. Liquid adhesive coatings used on air filters shall have a flash point not lower than 325 degrees Fahrenheit, as determined by Cleveland open cup tested. Air filters and their cleaning and maintenance shall conform to the standards of the National Board of Fire Underwriters for the Installation of Air Conditioning, Warm Air Heating and Cooling and Ventilating Systems (NBFU Pamphlets Nos. 90A and 90B.)*

38. *FIRE PROTECTION.*

a. Manual shut-off. Each installation shall be equipped with a manual emergency stop, located at a conveniently accessible point, for quick shutting down of all fans in case of fire.

b. Thermostatic shut-off. Where a mechanical ventilating system is installed to ventilate the business or public portions of a structure, other than water closet compartments, and the ventilating system is used to ventilate spaces on more than one floor by means of recirculation of air whether or not the system of ventilation is required by law, the fans of the system shall be arranged to shut down automatically by means of an approved thermostatic device or other adequate fire detecting device approved by the Board, whenever the temperature of the air in the system exceeds 125 degrees Fahrenheit. For this purpose an approved thermostatic device which cannot be set to operate at a temperature in excess of 125 degrees Fahrenheit shall be located in the system at a suitable point in the return air duct, ahead of the fresh air intake. The thermostatic device shall be either of a type that is manually reset, or the control system shall be so arranged that some manual operation is required to restart the fan after the thermostat has operated. Where such ventilating systems are installed in buildings equipped with automatic sprinklers or manual or automatic fire alarm systems located on the same floor or floors as the ventilating system, provision shall be made to stop the fans automatically when the sprinkler or fire alarm systems operate (see Section C26-259.0-b of the Administrative Code).

39. *SMOKE DETECTORS.*

a. Where required. Effective means for detecting and controlling the spread of smoke in a ventilating or air conditioning system by stopping the fans of the ventilating system shall be provided under the following conditions:

I. *Where a mechanical ventilating or air conditioning system with recirculation of air from one space to another is used to ventilate an entrance hall, lobby or passageway from the stairs or elevators leading to a street or to the exterior of a building, except where a separate ventilating system is provided for the lobby, so constructed that no air is recirculated from the lobby to spaces outside of the lobby (see Sections C26 259.0-c and C26-644.1 of the Administrative Code).*

II. *In a public building, as defined in Section C26-235.0 of the Administrative Code, except schools in which regular, supervised fire drills are held, where a ventilating system or an air conditioning system with recirculation of air from one space to another is used to ventilate spaces on more than one story (see Section C26-259.0-c of the Administrative Code).*

III. *Where there is an opening in a fire partition to serve a ventilating or air conditioning system whether or not protected by a fire damper (see Section C26-661-c of the Administrative Code).*

IV. *Where a duct used for ventilating or air conditioning passes through a fire wall.*

b. Where located. Photo-electric smoke detecting devices shall be located in the main supply duct on the down stream side of the filters, so located as to operate reliably in case of smoke in any part of the air stream. The sensitivity of the smoke detecting device shall be such that a reduction of less than four percent in light beam intensity will not result in operation. The device shall operate whenever there is a reduction in the clear beam light intensity not exceeding two per cent per foot of length of the light beam, or a maximum of thirty-six percent total light cut-off. Devices shall be so installed as to minimize the possibility of operation due to accumulation of dust, deterioration of the equipment, fluctuation in electric current supply or to any other condition in system operation not associated with fire or smoke (see Section C26-259.0-c of the Administrative Code).

Smoke detecting devices not actuated by photo-electric cells shall be placed in locations prescribed by the Board of Standards and Appeals and, in the absence of a ruling by the board, the locations recommended by the manufacturer.

c. Alarm signals required. Smoke detection equipment shall be arranged so that audible or visual signals will indicate any condition which would interfere with proper operation of the smoke detecting equipment. The smoke detecting devices shall control the spread of smoke by stopping the ventilating fans and when actuated shall set off an audible alarm and a visible signal indicating the location of the device (see Section C26-259.0-c of the Administrative Code).

d. Approved types required. All smoke detecting devices shall be of types approved by the Board of Standards and Appeals and shall be installed in accordance with the conditions of the approval and rules of the board. In the absence of such rules promulgated by the board these rules shall govern (see Section C26-259.0-c of the Administrative Code).

e. Number of devices required. The smoke detecting devices installed shall be of sufficient number or capacity to adequately scan the cross-section of the duct at the point where they are installed. Measuring screens by means of which they can be adjusted to the required sensitivity and their adjustment frequently tested shall be made available.

40. *LOCAL SUPERVISORY ALARM SYSTEM. Wherever smoke detectors are required by these rules, arrangements shall be made to give a distinctive visual or audible signal at a local supervisory control board when any condition arises which would interfere with the proper operation of any smoke detecting or fan shut-off device, or when any defect occurs in the detector, wiring or connections, and shall show the location of any such device whose proper functioning has been interfered with by any cause. Such control board may be included in a control board serving another alarm system in the building. It shall be located in the office of the engineer of the building, or in similar location where it can be under the surveillance of an employee, who shall be trained to take proper action on the receipt of a trouble signal at all times while the building is occupied.*

41. *Wiring. Thermostatic shut-offs for fans, smoke detectors, signal apparatus, actuating devices and the local supervisory control board shall be connected and operated on 120 volt closed electric circuits, and be installed in accordance with the Interior Fire Alarm Rules of the Board of Standards and Appeals and with the Requirements in Relation to the Installation of Automatic Thermostatic Fire Alarm Systems of the Fire Department insofar as such rules and requirements are applicable.*

The thermostatic shut-offs and smoke detecting system, including the fan actuating devices, signals and alarms shall be installed in strict accordance with the manufacturer's wiring diagrams and instructions. All wiring shall be in rigid steel conduits, except that not more than three feet of flexible metallic conduit may be used between a rigid conduit and a detecting device or other apparatus. Conductors shall be not less than No. 16 B. and S. gauge copper wires having rubber insulation.

42. *ENCLOSURES OF MACHINERY. a. Machinery Rooms inside Buildings. Where, for purposes of ventilation or air conditioning, air is being conveyed from one floor to another floor in any building, or the system serves more than a single room in public buildings, including schools, libraries, exhibition buildings, assembly halls,*

dance halls, theatres, hospitals, asylums, sanitariums and jails, the fans and air handling equipment connected thereto, such as washers, filters and heating and cooling units, shall be located in rooms cut off from other portions of the building by partitions having a fire resistive rating of not less than one hour with fireproof self-closing doors having a fire resistive rating of three-quarter hour at all openings. This requirement shall not apply to fan assemblies and their accessories used in connection with heating or chilled water coils, nor to packaged air conditioning units unless their enclosure is required by Article 18 of Chapter 19 of the Administrative Code or the rules of the Fire Department.

b. Machinery on Roofs. The housing of all ventilating equipment on the roof of any structure shall be constructed of incombustible materials. The enclosure of any ventilating or air conditioning apparatus, including assembled units, exceeding five feet in any dimension, shall have one hour fire resistive rating as required by Section C26-671.0 of the Administrative Code.

E. REQUIRED VENTILATING OR AIR CONDITIONING SYSTEMS EXHAUST AND RECIRCULATION

43. REQUIRED EXHAUST. Required exhaust may be accomplished by raising the pressure within an air conditioned space with consequent leakage through doors and windows or by drawing the vitiated air from conditioned spaces into the return air duct system of an air conditioning unit.

44. RECIRCULATION OF AIR. Air which has been exhausted may be reconditioned by air conditioning apparatus and recirculated as equivalent fresh air, except where drawn from a mortuary or room or space where an objectionable quantity of flammable vapors, flyings, dust or objectionable odors are present. The recirculated air must be supplemented by fresh air which is at least twenty per cent of the air required by the ventilation index. Air drawn from an operating room shall not be recirculated to other parts of a building. A ventilating or air conditioning system designed for recirculating air shall be so designed and operated that when the air conditioning process is not in operation, the amounts of air required by the ventilation index for exhaust and for fresh air shall be provided,

F. TESTS OF AND REPORTS ON VENTILATING SYSTEMS.

45. INSPECTIONS AND TESTS AT COMPLETION. Upon the completion of a required ventilating and air conditioning system a registered architect or professional engineer or other person having not less than five years experience supervising the installation of ventilating and air conditioning systems shall inspect the system as installed in any building to check its compliance with all applicable laws and rules. Tests of the equipment shall also be conducted in the presence of such person to ascertain the amount of intake and exhaust for each room and to check the proper functioning of all devices.

46. INSPECTIONS AND TESTS OF FIRE DETECTION DEVICES. The owner shall maintain the thermostatic shut-offs, smoke detecting devices and the local supervisory alarm system in proper operating condition at all times. He shall have such equipment tested at least monthly, employing a competent person or agency to perform this work and shall require that any defect discovered shall be immediately corrected. He shall order the engineer or other person in the building to test the alarm and trouble bells daily, and to keep a written record of such tests.

47. POWER OF SUPERINTENDENT TO ORDER TESTS. The borough superintendent is empowered to order a test of a ventilating or air conditioning system, or any part thereof, when there is any doubt that the system or any of its component parts operate as required by applicable laws and rules. Such tests shall be conducted in the presence of representatives of the borough superintendent and under the direction of a person having qualifications prescribed in above Rule No. 45, who shall make a report of the results of the test to the borough superintendents. All tests and reports thereof shall be made at the expense of the owner.

48. REPORT ON COMPLETION OF TESTS. The registered architect or professional engineer or other qualified person in whose presence the tests of ventilating and air conditioning systems are made, upon completion shall file a certificate that the ventilating and air conditioning system, including fire dampers, has been inspected by him and meets the requirements of all applicable rules and laws. His report shall also state whether or not the test shows that the amount of supply and exhaust of air complies with such laws and rules and that all smoke and fire detection devices are operating as required by these rules and the law.

49. OWNER'S STATEMENT. A statement shall be filed by the owner of the structure that the system of ventilation will be kept in continuous operation at all times during the normal occupancy of the structure and that if any smoke or fire detection devices have been installed he will employ a competent person or agency to frequently inspect and test such devices and the fan shut-offs actuated by them, and that he will promptly make any necessary adjustments and repairs to keep the ventilating system and all its smoke and fire detection devices and fan shut-offs in propers operating condition.

G. ISSUANCE OF CERTIFICATE OF OCCUPANCY

50. Any application in connection with which a required ventilating or air conditioning system has been installed shall not be signed off as completed and no certificate of occupancy shall be issued unless such system has been installed and tested in accordance with these rules and the required certificate of inspection and test, and owner's statement have been filed. However, a temporary certificate of occupancy for a part of a building may be issued if a report of satisfactory tests relating to that part of the building is filed and the owner's statement has been submitted.

H. SPECIFIC APPLICATIONS

51. VENTILATION OF WATERCLOSET COMPARTMENTS. Hereafter, the use of any device which returns exhausted air after passing through activated carbon filters is not acceptable as providing required ventilation for a watercloset compartment for which a mechanical system of ventilation is required by either the Administrative Code or the Multiple Dwelling Law.

I. EXCEPTIONS

52. Where there is a practical difficulty in carrying out the strict letter of the provisions of these rules, the Borough Superintendent may vary such provisions for a specific installation, provided the necessary safety is secured and the variance is not in conflict with the Administrative Code.

ARTICLE 7. MEANS OF EGRESS

Sub-Article 1. General Egress Requirements

(6.1.1). § C26-272.0. Application of Means of Egress Requirements.—a. Unless specifically stated, the provisions of this article shall apply to all structures erected after January first, nineteen hundred thirty-eight; except factories coming under the provisions of the labor law, provided such factories comply with the requirements for exit lights and lighting of stairs and exit passages as specified in subdivision f of section C26-279.0, residence structures three stories or less above any basement in height and occupied by two families or less, and structures included under Section C26-715.0, except vertical extension to any structure erected before January first, nineteen hundred thirty-eight; provided: first, that such structure is capable of sustaining the live and dead loads of the additional stories; second, that such structure was approved as conforming to such laws governing exits as were in effect at the time such structure was erected; third, that such structure, after the addition of the vertical exension, will conform to such laws as were in effect at the time of the erection of such original structure; and fourth, that such auxiliary fire protection as the superintendent may deem necessary is provided. Also the provisions of this article shall not apply to the exits from those parts of class A multiple dwellings which are used or occupied, or which are arranged, intended or designed to be occupied for residence purposes, when the exits from such parts come under the provisions of the multiple dwelling law; but where the exits serve parts of the building used for other than residence purposes, the provisions of the multiple dwelling law and of this article whichever are most restrictive shall apply. The exits from cellars of multiple dwellings shall comply with this article. Notwithstanding the foregoing provisions of this section, nothing herein contained shall impose any additional requirements or any occupancy or use in an existing class A dwelling where such occupancy or use conforms with present law on October first, nineteen hundred fifty-six, unless such occupancy or use is changed or extended thereafter.

b. Notwithstanding the provisions of subdivision (a) of this section, the provisions of subdivision (a) and (b) of section C26-279.0 shall apply to all buildings, existing or hereafter erected, with the exception of exits from the residential portions of class A multiple dwellings, private dwellings and mixed occupancy structures occupied on the first floor for commercial purposes and by one or two families above the first floor.

Except where otherwise permitted by the provisions of any law, the lettering of exit signs shall be of letters of at least 8-inches high.

In those buildings which maintain one or more auxiliary systems for emergency exit lighting in the event of a public utility failure, in those buildings for which the

installation of one or more such auxiliary systems is commenced within sixty days after the effective date of this law, and in all new buildings hereafter constructed incorporating one or more such auxiliary systems, the signs need not be phosphorescent but shall otherwise conform to the requirements of law.

(6.1.2.1). § C26-273.0 Required Exits.—a. Kinds of required exits.—

1. Every structure erected after January first, nineteen hundred thirty-eight, shall have such means of egress, consisting of interior stairways, fire towers, horizontal exits, ramps, escalators or party wall balconies, including the necessary hallways and doorways, as may be otherwise required.

2. Structures exceeding three stories above any basement in height, occupied as dwellings by one or two families, shall be provided with one stairway at least three feet in width. Such stairway shall be enclosed in fire-retarding partitions with a fire resistive rating of at least one hour, and all openings shall be protected by fireproof self-closing doors or stationary sash with a fire resistive rating of at least three quarters of an hour. Such stairway shall lead directly to the street and to the roof. In lieu of an enclosed stairway as described herein, a regulation fire escape may be erected on the front or rear of the structure, provided such fire escape meets the requirements of this article for fire escapes.

3. Ramps may be used in place of stairways provided such ramps are constructed with level platforms or landings where a ramp changes direction, and also provided that such ramps conform to section C26-290.0 as to the width and to subdivision h of section C26-292.0 as to enclosure. When the entrance doors are electrically operated or are provided with a wicket door, ramps in lieu of required stairways may also be used in two-story structures used exclusively for garage purposes, provided that such ramps are separated by fireproof partitions from the floor space through which such ramps pass, and provided that such ramps are located in conformity with subdivision d of section C26-273.0.

4. All ramps shall have a maximum pitch of one foot in eight and shall be provided with non-slip surfaces.

5. A stairway escalator moving only in the direction of egress from the structure may be considered as a means of egress provided that the following requirements are met:

(a). Enclosed stairways or fire towers complying with the provisions of this article shall be so located that every point in any floor area above the grade or one story below the grade shall be within a distance of one hundred feet from such a stairway or fire tower;

(b). The width of the stairway escalator shall be at least forty-eight inches between balustrades and the moving tread shall be at least forty inches in width;

(c). The stairway escalator shall be enclosed in accordance with the provisions of this article applying to interior stairways or fire towers;

(d). The stairway escalator shall comply with the provisions of section C26-291.0;

(e). The materials entering into the construction of the stairway escalator shall be incombustible except;

(1). Wheels, which may be of slow burning material,

(2). The hand-rail, which may be of flexible material, including rubber,

(3). A veneer of one-tenth inch of wood when attached directly to and backed up by metal or other incombustible material;

(f). Any mechanical or electrical equipment required for the operation of the stairway escalator and located within its enclosure shall be arranged and protected to the satisfaction of the superintendent to prevent the escape of fire or smoke into the stairway enclosure;

(g). The capacity of a stairway escalator shall be computed in accordance with subdivision a of section C26-292;

(h). An electric switch, which will arrest the movement of the escalator, shall be provided at each such escalator.

(6.1.2.2.1). b. Number of Exits Required.— 1. Required exits from rooms.—

(a). Every room having an occupancy of more than seventy five persons shall have at least two doorways. Such doorways shall be remote from each other, and shall lead to an exit or exits.

(6.1.2.2.2). 2. Required Exits from the Ground Floor.—Unless otherwise provided, every ground floor area having direct exit by doorways to a street and having an aggregate area exceeding twenty-five hundred square feet or an occupancy of more than seventy-five persons shall have at least two means of egress. Every point in such area shall be within one hundred fifty feet of a means of egress, but one of such means of egress from stores may be by way of a basement passageway connecting with the main hallway of the structure. In structures used exclusively for school purposes and in which regular supervised fire drills are held, the maximum distance of any point in a ground floor area from a means of egress shall be one hundred eighty feet.

(6.1.2.2.3). 3. Required Exits from Floor Areas.—

(a). Every floor area above or below the ground floor shall have at least two required means of egress available to all the occupants of such area, except as provided in paragraph four of subdivision b of this section, and except;

(1). That in structures over seventy-five feet high and with a floor area of twenty-five hundred square feet or less, at least one fire tower shall be provided;

(2). That in structures with a floor area of twenty-five hundred square feet or less and seventy-five feet or less in height, only one required stairway need be provided when the occupancy on any floor above grade is one person for each fifty square feet or more of floor area and the egress facilities conform to the provisions of section C26-292.0.

(3). That in structures two stories in height with four thousand square feet or less of floor area in the second story, only one exit shall be required, when the maximum distance of travel to such exit is one hundred feet and the second floor level is seventeen feet or less above the sidewalk level and the egress facilities conform to the provisions of section C26-292.0, and the occupancy of the second floor does not exceed fifty persons.

(b). One of the required stairways shall be an interior stairway. A fire tower may be substituted for one of the required stairways where more than one such stairway is required.

(c). When a floor area receives the discharge from an intermediate or mezzanine floor, such floor area shall have sufficient means of egress to provide for the total occupancy of such floor area and the mezzanine area.

(d). Where floor levels are occupied by more than one tenant, each tenant shall have direct access, to at least two means of egress properly located and adequate for the occupancy served.

(6.1.2.2.4). 4. Required Exits from Intermediate or Mezzanine Floors.—

(a). When the area of an intermediate or mezzanine floor exceeds twenty-five hundred square feet or fifty per cent of the area of the floor immediately below, and such floor below is utilized in conjunction with and connects with such intermediate or mezzanine floor, such intermediate or mezzanine floor shall be treated as a separate floor area.

(b). When the area of an intermediate or mezzanine floor is less than twenty-five hundred square feet or less than fifty percent of the area of the floor immediately below, and such floor below is utilized in conjunction with and connects with such intermediate or mezzanine floor, the means of egress shall either comply with subdivision d of section C26-273.0, or be such that any point on such floor shall be within fifty feet of a stairway.

(6.1.2.2.5). 5. Required Exits from Mixed Occupancy Structures.—

(a). In structures two or three stories in height, occupied on the first floor for commercial purposes and by one or two families above the first floor, which structures do not require a combustible occupancy permit from the fire department, the required means of egress may be a single stairway enclosed in the first story in partitions having a fire resistive rating of at least one hour and without any opening to the commercial occupancy on the first floor. Where a combustible occupancy permit is required, a single stairway, similarly enclosed, shall be permitted, provided that the commercial occupancy is also separated from the residence occupancy by ceilings having a fire resistive rating of at least one hour.

(b). In case of failure to meet such conditions, a second means of egress shall be required. Such means may be a fire escape, and in the discretion of the superintendent such a fire escape may be located on the rear of the structure.

(c). When any part of a building occupied as a dwelling is used for garage purposes, the means of egress shall comply with the foregoing requirements and the building shall conform in all other respects with the provisions of section C19-67.0 of the code.

(6.1.2.3). c. Number of Occupants.—

1. The minimum number of persons to be provided for in any floor area shall be the number which can be accommodated within the net floor area at the rate of one person:

(a) For every ten square feet in dance halls, restaurants, lodge rooms and places of assembly, and floor area used for restaurant purposes in a club provided forty per cent or less of the net floor area of such club is used for such purposes;

(b) For every ten square feet in rooms used for dining purposes, three hundred

square feet in area or less, comprising twenty-five per cent or less of the net area of any floor in hotels or clubs;

(c) For every fifteen square feet in court rooms, classrooms and lecture rooms in schools and colleges;

(d) For every twenty-five square feet in reading rooms, markets, first floor and basement sales areas in stores and laboratories and studios, in schools and colleges;

(e) For every fifty square feet in billiard rooms, bowling alleys, golf schools, archery ranges and rooms put to similar uses;

(f) For every sixty square feet in work rooms, and in store sales areas above the first story.

(g) For every one hundred square feet in show rooms, office buildings, hospitals and preparation rooms of laboratories in schools and colleges;

(h) For uses specifically provided for and also for uses other than those specifically provided for in this section, the number of occupants on any floor shall be within the capacity of the minimum requirements for the means of egress. The exits from each floor shall be adequate in all cases for the maximum number of persons occupying a floor.

2. The net floor area for the purposes of this article shall be determined in accordance with section C26-73.0.

3. The requirements for means of egress from any floor area more than one story below the grade level, except areas used exclusively for mechanical equipment, shall be double the requirements based on the above occupancy factors for areas above grade.

4. Prior to the occupation of any structure erected or altered after January first, nineteen hundred thirty-eight, the authorized occupancy for each floor of such structure, as stated in the certificate of occupancy, shall be permanently posted under glass and maintained in the main entrance hall of such structure.

(6.1.2.4). d. Location of Required Means of Egress.—

1. The required means of egress shall be so located that every point in any floor area above the grade shall be within a distance of one hundred twenty-five feet of an exit door opening on an enclosed stairway or fire tower, except as otherwise provided for in this subdivision. When approved by the superintendent, floors in which at least ninety-five percent of the floor area lies within the areas described by radii of one hundred twenty-five feet from the stair or fire tower doors serving such floors, shall be exempted from this limitation, except that the travel distance and radii of one hundred twenty-five feet noted in this subdivision may be increased to one hundred fifty feet in buildings fully equipped with an approved automatic sprinkler system.

2. The required means of egress shall be so located that every point on any floor which is one or more stories below grade shall be within a distance of one hundred feet of an enclosed stairway.

3. In any floor area, whether subdivided or not, the maximum distance from any point along the natural and unobstructed line of travel to an enclosed stairway or fire tower shall be one hundred fifty feet. When approved by the superintendent, gymnasium, locker rooms, cafeterias, swimming pools, and libraries, in structures used exclusively for school purposes in which regular supervised fire drills are held, shall be exempted from this limitation. Corridors, hallways or aisles shall be provided to give reasonably direct and unobstructed travel to the exit doorways opening on the enclosed stairway and fire tower.

It shall be unlawful to pass through more than one adjoining room to reach such a corridor, passageway, or aisle.

4. Exits shall be remote from one another.

5. The means of egress serving any floor shall be located in such a manner as to further the rapid exit of the occupants.

6. Places of public assembly and dance halls, located in structures coming under the classification of section C26-237.0 shall have means of egress separate from any other parts of such structures.

7. It shall be unlawful to erect a fire escape on the rear of any structure as a required means of egress, unless there shall be access from the lower termination of such fire escape to the street through a fireproof passage or to the yard or court of an adjoining building from whence there is egress through such building to the street. Access to such yard or court of such adjoining building may be by a gate or door through an intervening fence, or if this is impractible the superintendent may accept access by a ladder to the top of such fence or by such other means as he may deem adequate. Egress to an adjoining property by means of a gate or door through a fence shall be inacceptable unless the written consent of the owner of such property is obtained and filed with the superintendent. Where any fire escape is over the roof of a structure or any portion of a structure, or where such roof is used as a means of egress from a fire escape, such roof shall be of fireproof construction except that in the case of a roof constructed before January first, nineteen hundred thirty-eight, the under side of such roof need only be fire retarded with metal lath and three-quarter inch cement plaster.

8. Storage garages and other spaces having a gasoline pump, shall have a minimum of two exits remote from each other. These exits shall be so arranged that one exit is located at the street wall, and the second exit is located not less than two-thirds the depth of such storage garage or space away from the street wall. The second exit shall lead directly to the street, or to the street by either a fire passage having a four hour fire rating with one and one-half hour fireproof self-closing doors at all interior openings, or open yard or court not less than ten feet wide with all openings at passage level protected by a fireproof, self-closing assembly.

(6.1.2.5). e. Boiler Room Ladders Required.—

1. Every structure, except private residences, in which steam boilers or apparatus using or producing steam, gas or vapor are placed below the curb level, in addition to the primary interior stairway readily available from the areas containing such equipment, shall have stationary iron ladders or stairs from such areas leading directly to a manhole through the sidewalk or other outside exit, unless a second separate and available exit is provided by an enclosed stair or horizontal exit. Such manhole shall be arranged in such manner as to be readily opened from the inside.

2. A primary stairway shall be unnecessary when the room containing such boiler and mechanical equipment is less than three hundred square feet in area and such room is completely separated from the structure by unpierced fire walls, fire partitions or fireproof partitions, provided that such boiler is a low pressure boiler.

3. Required exit doors from high pressure boiler rooms shall open outwardly.

(6.1.3). § C26-274.0 Width and Arrangement of Aisles.—a. Where more than three hundred chairs are temporarily employed in a place of assembly, such chairs shall be secured together as units of at least five chairs so as to maintain at all times minimum aisle widths of three feet where the aisle begins and increasing in width toward the exits in a ratio of one and one-half inches to five running feet. There shall be fourteen or less seats in any row between aisles, and seven or less seats in any row between an aisle and the wall, partition or railing. Where exits, corridors, passages and crossover aisles are provided at both ends of any aisle, such aisle shall be uniform in width; such uniform width shall be at least three feet plus three-quarters of an inch for each five running feet in such aisle.

b. Where an exit opens directly from a floor area without an intervening enclosed hallway, there shall be provided an aisle, adjacent to such exit, at least twice the required width of the exit doorway and extending to the nearest cross-aisles with a minimum length of ten feet from such doorway in each direction.

(6.1.4). § C26-275.0 Minimum Head Room In Required Stairways and Crossover Passages.—The minimum head room in stairways and crossover passages shall be eighty-three inches in the clear between the floor, landing or tread, and any projection below the general ceiling level.

(6.1.5). § C26-276.0 Inadequate Exits For Existing Structures.—Except as otherwise provided in Article 19 of this title, every structure erected before January first, nineteen hundred thirty-eight, which is unprovided with exit facilities as prescribed in section C26-273.0, and in which the exit facilities are, in the opinion of the superintendent, inadequate for the safety of the occupants, shall be provided with such means of egress, consisting of fire-escapes or such other means of egress or fire protection, as such superintendent shall direct. If the owner or agent of any structure affected by an order issued under this section shall, after service has been made upon him, and within seven days, Sundays and holidays excluded, file a written appeal with such superintendent, such superintendent shall appoint a board of survey as provided for in section C26-196.0, upon whose findings a new order shall be based and issued.

(6.1.6). § C26-277.0 Reduction of Required Means of Egress by Alterations Forbidden.—It shall be unlawful to alter any structure, whenever erected, in such a manner as to reduce the means of egress to less than is required under the provisions of section C26-273.0. Additional means of egress installed in any structure erected before January first, nineteen hundred thirty-eight, shall conform to the requirements of section C26-273.0, unless such means of egress are installed in conformity with the requirements of section C26-276.0 or sections C26-302.0 through C26-304.0.

(6.1.7). § C26-278.0 Effect of Change in Occupancy or Use Upon Means of Egress.—Structures changed from one class of use or occupancy to another shall comply with the requirements for means of egress, which apply to the new use or occupancy. When strict compliance with the provisions of this article is impractical, the superintendent may, in his discretion, approve such other means of egress as in his judgment will accomplish the same purpose.

(6.1.8). § C26-279.0 Designation of required means of egress.—a. The location of each required means of egress on every floor of every structure shall be clearly indicated by exit signs. Such signs shall be placed at an angle with the exit doorway if such placement shall be required for such signs to serve their purpose adequately. These signs shall be of a phosphorescent material, approved by the Board of Standards and Appeals, which after exposure to normal lighting conditions shall be capable of remaining visible in total darkness for a period of at least eight hours. They shall also be washable, non-toxic, non-radioactive, and if subjected to fire must be self-extinguishing when the flame is removed. Except for illuminated signs, these signs shall have a phosphorescent background and opaque text.

Where means of egress are required to be indicated by an illuminated sign, there shall be either (1) an illuminated exit sign with the lettering thereon made of the aforesaid phosphorescent material, or (2) a supplemental exit sign made of the aforesaid phosphorescent material with an opaque text, and placed adjacent to or as possible to such illuminated sign.

b. In long corridors, in open floor areas and in all other situations where the location of the means of egress may not be readily discernible or understood by the occupants, directional signs shall be provided and maintained to serve as guides from all portions of the floor or corridor. These signs shall be of a phosphorescent material, approved by the Board of Standards and Appeals, which after exposure to normal lighting conditions shall be capable of remaining visible in total darkness for a period of at least eight hours. They shall also be washable, non-toxic, non-radioactive, and if subjected to fire must be self-extinguishing when the flame is removed. Except for illuminated signs these signs shall have a phosphorescent background and opaque text.

Where a directional sign is required to be illuminated there shall be either (1) an illuminated directional sign with the lettering, indicator, symbol or other device thereon made of the aforesaid phosphorescent material, or (2) a supplemental directional sign with the same lettering, indicator, symbol or device as appears on the illuminated sign, but opaque, on a background made of the aforesaid phosphorescent material and placed adjacent to or as close as possible to such illuminated sign.

c. When more than four lights are required, exit and directional signs shall be illuminated through circuits separated from the general lighting and power service and such circuits shall be taken off ahead of the main switchboard.

d. The location, type, size and general character of such exit and directional signs shall be uniform and as approved by the superintendent.

e. Nothing herein contained shall be construed as requiring exit signs or lights over doorways of the main entrance or entrances to structures or parts of structures used exclusively for religious services.

f. The red exit lights required by the provisions of section 272 of the labor law, and lights for stairways and exit passages shall be kept lighted at all times when the building is occupied. Exit lights shall be not less than 75 watt bulbs, if incandescent, or made up of two bulbs each of 40 watts incandescent, or 20 watts in fluorescent lighting, or the equivalent in electro-luminescent panel lighting. Such lights shall be powered from an electric circuit separated from all other circuits and shall be taken off on the power supply side of the main switchboard ahead of all other circuits. The provisions of this subdivision f shall apply to all existing buildings or parts of buildings which are required to conform to the exit requirements of the labor law.

(6.1.9). § C26-280.0 Lighting of Required Means of Egress.—All stairways, fire towers, hallways, passageways and other required means of egress, together with all areas to which the public has access, shall be equipped with adequate artificial lighting facilities. Such lighting facilities shall be used when adequate natural light is unavailable. Emergency lighting facilities shall be provided subject to the approval of the superintendent. When more than four lights are required, the emergency lighting shall be provided through circuits separated from the general lighting and power service and such circuits shall be taken off ahead of the main switchboard.

(6.1.10). § C26-281.0 Repealed December 8, 1955 by L.L.111/55.

(6.1.11). § C26-282.0 Exits to be kept clear.—It shall be unlawful to obstruct or to reduce the clear width in any manner of any doorway, hallway, passageway, stairway or other means of egress required by this article except as may be otherwise specifically herein provided for.

Sub-Article 2. Exit Doors

(6.2.1). § C26-283.0 Width of Doorways From Required Means of Egress.—a. The minimum aggregate width of exit doorways from any room or floor area to a hallway, stair or other required means of egress and the minimum width of an exit doorway, leading from a floor to a stair shall be six inches for each twenty-five

persons or fraction thereof accommodated thereby, except that where only one exit is provided the minimum width of the exit doorway shall be thirty-six inches for fifty persons or less and forty-four inches for more than fifty persons but not less than six inches for each twenty-five persons, and except that in structures used exclusively for school purposes in which regular supervised fire drills are held, one doorway thirty-nine inches in width shall be permitted for each forty-four inches of required width of stairway, hallway or passageway on which such door opens.

b. The maximum clear width of a single exit doorway shall be forty-four inches, and the minimum thirty-six inches, except that exit doorways in structures used exclusively for school purposes in which regular supervised fire drills are held and from rooms or spaces occupied by not more than twenty persons shall be not less than twenty-eight inches in width. Also doors on the street floor, serving as exits from a stairway, hallway or passageway may be not less than twenty-eight inches in width. The minimum width of an exit doorway leading from a floor to a required stair shall be not less than the width determined by the stair capacity. The required width of doorways shall be divided into substantially equal units.

c. The minimum aggregate width of exit doorways from any stairway, hallway or passageway shall be the required width for such stairway, hallway or passageway, except as otherwise specifically stated in this section.

d. The width of the doorway shall be the clear width between stops.

(6.2.2). § C26-284.0 Hanging of Doors From Required Means of Egress.—a. Doors to stairs and fire tower enclosures, and doors from rooms and areas occupied by more than fifty persons, shall open in the direction of egress for the full width of such door.

b. Doors serving as required means of egress, except as may otherwise be provided for in this title, shall open outwardly and shall be so hung and arranged that when opening or opened such doors shall not reduce the widths of the hallways or passageways or the required widths of stairs or stair landings or other means of egress. In structures used exclusively for school purposes, doors of rooms for instruction may swing in either direction. The maximum projection beyond the building line for doors opening directly on the street shall be eighteen inches.

c. It shall be unlawful to allow the swing of a door opening on a stairway to overlap the top step.

(6.2.3). § C26-285.0 Door Fastenings on Required Means of Egress.—The fastenings on doors serving as required means of egress shall be such that the doors may be readily opened from the inside without the use of keys, except that it shall be unlawful to use draw bolts in places of assembly. Where draw bolts are used on required exit doors, the bolts shall be kept opened at all times when the building is occupied. The doors of rooms where persons are under legal restrain and the doors of rooms or floor areas unoccupied by human beings shall be exempted from the requirements of this provision.

(6.2.4). § C26-286.0 Operating Devices of Doors and Windows in Required Means of Egress.—a. Self-closing and automatic doors and windows on required means of egress shall be equipped with such devices as may be required under the conditions of operating to close, and maintain in a closed condition, the doors and windows to which such devices are attached, except that easily released door holders may be used elsewhere than in basement passageways located in structures used exclusively for school purposes, provided that regular supervised fire drills are held.

b. Self-closing and automatic doors and windows and their operating devices shall at all times be maintained in working order. It shall be unlawful to so obstruct, hold, or block open any such door or window as to interfere with or prevent its operating as a self-closing or automatic fire or smoke cut-off.

(6.2.5.1). § C26-287.0 Revolving Doors.—a. Classification of Revolving Doors.—Revolving doors shall be classified as follows:

1. Type A revolving doors are those in which the individual wings are maintained in the normal revolving position, and which are so designed and constructed that each wing is independently supported and such wing is provided with a safety release incorporated in such support, which safety release is so designed that simultaneous outward forces exerted by persons of ordinary strength on both sides of the door pivot will cause such wings instantly to fold back on themselves, like the leaves of a book, in the direction of egress and will provide two outside passageways, thereby permitting easy egress through the vestibule.

2. Type B revolving doors are those in which the individual wings are maintained in the normal revolving position by braces, or similar devices, and which doors are so designed and constructed that the braces which hold the wings in their normal position support two or more interconnected wings and may be released by simple

mechanical means, thereby permitting the individual wings to be collapsed so as to permit free egress through the vestibule.

b. General Requirements For Revolving Doors.—

(6.2.5.2.1). 1. Construction of Revolving Doors.—The requirements for the construction of revolving doors and their enclosure shall be at least equal in fire resisting qualities to the requirements applying to all other doors and frames similarly located. At least one push bar shall be provided on each wing of a revolving door.

(6.2.5.2.2). 2. Glazing of Revolving Doors.—Any glass installed in the wings or the enclosures of revolving doors shall be at least one-quarter inch thick plate glass.

(6.2.5.2.3). 3. Speed Regulation of Revolving Doors.—Every revolving door on a required means of egress shall be so constructed and maintained that the rate of its revolving speed during actual use shall be fifteen revolutions or less per minute. Any means for so regulating such speed shall not interfere with the normal operation and use of such doors, and the failure of such regulatory means shall not interfere with the normal operation and use of such doors.

(6.2.5.2.4). 4. Floor Covering Within Enclosures of Revolving Doors.—It shall be unlawful to place mats or other floor covering within the enclosure of revolving doors, unless such mat or other floor covering is permanently secured to the flooring, and unless such mat or other floor covering is at least one-half inch thick and is placed in the sinkage.

(6.2.5.3). c. Use of Revolving Doors Permitted.—Type A revolving doors may be used, except as provided in subdivision d of this section, as a required means of egress, in accordance with the following provisions:

1. Doors with a diameter of five feet six inches may be used to the total required width of exits serving a ground floor area only, when such area is twenty-five hundred square feet or less and when the occupancy is one hundred persons or less.

2. Doors with a diameter of six feet may be used to the total required width of exits when such doors serve a ground floor area only, and when the occupancy is two hundred persons or less.

3. Except as otherwise provided in paragraphs one and two of this section, doors with a diameter of six feet six inches or more shall be used.

4. Seventy-five per cent or less of the total required width of street exit doors may consist of revolving doors, except as otherwise provided in paragraphs one and two of this section; and except that where there are practical difficulties, the superintendent may approve in office building occupancy structures of Class 1, fireproof structures, or Class 2, fire-protected structures, such greater percentage of revolving door exits to total required exits as in his opinion will result in a safe condition without increasing interference with free egress from the structure.

5. Fifty per cent or less of the total required width of street exit doors may consist of revolving doors where any one or more of such doors is not in accordance with the description of type A revolving doors under subdivision a of this section, and is not in accordance with the provisions of subdivision b of this section.

6. Revolving doors shall be credited as a required means of egress only to an extent equal to the minimum clear unobstructed width of the passageway through the vestibule when the leaves are in a collapsed position.

(6.2.5.4). d. Use of Revolving Doors Forbidden.—It shall be unlawful to use revolving doors as required means of egress from assembly halls, asylums, auditoriums, churches, dance halls, motion picture theatres, schools, theatres, hospitals, or from any room or space within a building where more than three hundred persons congregate for purposes of amusement or worship.

(6.2.5.5). e. Existing Revolving Doors.

1. Type A revolving doors, installed before January first, nineteen hundred thirty-eight, in accordance with the requirements of the then existing laws, may be retained as required means of egress, except where otherwise prohibited.

2. Type B revolving doors installed before January first, nineteen hundred thirty-eight, may be retained as required means of egress, except where otherwise prohibited, when, in the opinion of the superintendent, no dangerous exit condition exists. If such a dangerous exit condition is deemed by the superintendent to exist, Type B doors shall either be replaced by Type A revolving doors, or be supplemented by one or more swinging doors at least two feet four inches wide located adjacent to the Type B revolving door, as such superintendent may direct.

(6.2.6). § C26-288.0 Special Locking of Exit Doors.—Nothing in this title shall prevent the superintendent, where conditions in his judgment warrant, from approving the installation on exit doors, from a bank trust company, jewelry store or any other store devoted to a single similar use where articles of unusual value or monies in large quantities are kept, of a locking device which may be operated electrically from the interior of the building and which shall be used only in an emergency.

Sub-Article 3. Passageways and Hallways

(6.3.1). § C26-289.0 Passageways in Required Means of Egress.—a. The minimum width of a passageway serving a single required stairway shall be equal to the minimum width of the stairway emptying into such passageway.

b. The minimum width of a passageway serving two or more required stairways, except as provided in subdivision b of section C26-292.0 shall be sixty-nine percent of the aggregate width of the stairways emptying into such passageway.

c. A maximum of five elevators may discharge into a passageway five feet one inch or more wide, but when the number of elevators exceeds five, the width of the passageway shall be increased in accordance with the following table:

Number of elevators.	Width of passageway in feet.
6 to 10 inclusive	7½
11 to 15 inclusive	9½
16 to 20 inclusive	10¾
21 to 25 inclusive	12
26 to 30 inclusive	13

Where the number of elevators exceeds thirty, the width of the passageway shall be increased one foot for each additional five elevators or fraction thereof.

d. Passageways shall be maintained the full width throughout without projections or obstructions of any kind.

e. It shall be unlawful to place show windows or openings to any store, office, subway or similar space, except show windows or doors entirely beyond any passageway doorway and extending at most eight feet in from the building line, in the enclosure walls surrounding corridors and passageways leading from any required stairs, fire tower or elevators to the street. Provided, however, except for passageways from fire towers, that stores, showrooms, or storage spaces adjoining such corridors or passageways when protected by an automatic wet sprinkler system and where the use of such spaces does not require a fire department combustible permit, and, provided further, that offices, banks, spaces not used for storage and such other space incidental to the main use of the building, including toilet rooms, whether or not protected by sprinklers, may open on such corridors or passageways with such openings as follows:

(1) Door openings three feet eight inches or less in width, when protected by fireproof self-closing doors having a fire resistive rating of at least one hour with glazing permitted as specified for doors in stair enclosures, except that door openings five feet six inches or less in width may be provided with self-closing doors of structural glass or other incombustible material when protected by automatic or self-closing fire door assemblies having a fire resistive rating of at least one and one-half hours and approved automatic sprinkler protection on the room side of such door openings, in front of and adjacent to the automatic door.

(2) Show windows three feet or less in depth when protected by automatic sprinklers, glazed with polished plate or wired glass one-quarter of an inch thick, and backed with fire partitions in which all door openings are three feet eight inches or less in width and are provided with and protected by fireproof self-closing doors having a fire resistive rating of at least one and one-half hours with glazing of such doors permitted as specified for doors in stair enclosures, except that openings eight feet or less in width and height may be provided in such partitions when protected by automatic fire protective assemblies having a fire resistive rating of three hours and approved automatic sprinkler protection in front theerof and adjacent thereto on the room side of such openings.

Any one length of show window shall not exceed eight feet and shall be separated from adjoining show windows or door openings by fire partitions. The minimum distance between any openings, except stairhall and elevator door openings, shall be three feet. Show windows and door openings, except stairhall and elevator door openings, in any one section of wall shall not exceed in total width fifty per cent of the length of such wall except where such length of wall does not exceed eight feet.

f. It shall be unlawful to use ground floor lobbies, corridors and passageways serving as required means of egress for the storage, display or sale of combustible merchandise, except that an area twenty-five square feet or less may be used for the sale of newspapers and magazines, and an area fifty square feet or less may be used for the sale of tobacco and candy, provided that the required clear width of such lobby, corridor or passageway is not in any way reduced.

g. A permanent information booth or desk constructed of incombustible material and which is incidental to the main use of a building may be provided in the lobby, corridor or passageway leading from any required stairs or elevators to the street but shall in no way obstruct or interfere with the required clear width of such lobby, corridor or passageway and shall not exceed thirty-six feet in area.

(6.3.2). § C26-290.0 Hallways in Required Means of Egress.—a. The minimum clear width of a hallway leading to an exit shall be forty-four inches for the first fifty persons to be accommodated, except as otherwise provided in this section, and such width shall be increased six inches for each additional fifty persons or fractions thereof to be accommodated.

b. Where the occupancy is less than fifty persons, the required minimum clear width may be reduced two inches for each ten persons less than fifty.

c. Public hallways shall be enclosed with fireproof partitions unless otherwise specifically provided in this chapter.

(6.3.3.) § C26-291.0 Outlets from Passageways and Exits on Required Means of Egress.—a. Outlets from exits at grade which do not open upon public streets, shall lead to a street through a passageway or open court enclosed in accordance with paragraph one of subdivision h of section C26-292.0.

b. The lowest level of a passageway leading to the street shall be three feet or less below the level of the sidewalk at the termination of such passageway, except that for occupancies of one hundred fifty or less, the lowest level of such passageways may be eight feet.

c. Exit passageways in school structures may be provided from open courts to the streets, if the level of such passageways is six inches or less below the level of the general floor immediately below the curb level, and if the side walls and roof of the passageway are of fire resistive construction having a four-hour rating, and if the openings from the passageway into the structure are limited to two exits with a maximum aggregate of ten feet of openings on each side measured between stops, and such exits are equipped with self-closing protective assemblies having a fire resistive rating of at least one hour, and if such exits are so arranged that the doors cannot swing into the clear area of the passageway. The difference in level between such passageways and the sidewalk shall be adjusted by stairways or ramps.

Sub-Article 4. Required Stairways

(6.4.1.1). § C26-292.0 Interior Required Stairs.—a. Width of interior required stairs.

1. Every required stairway shall have a minimum clear width of forty-four inches throughout its length, including hallways, landings and platforms within the stair enclosure, except that hand-rails may project a maximum of three and one-half inches, and strings may project on one or both sides a maximum of one inch to a height of six inches or less above the nosing, and except as provided in subdivision a of section C26-273.0, respecting escalators, and subdivision b of section C26-292.0.

2. The aggregate width of required stairs serving as exits from any story shall be sufficient to accommodate at one time the total number of persons occupying or permitted to occupy the story served by such stairs in accordance with the following limitations:

(a) Dance halls, ballrooms, banquet halls, cabarets, restaurants, exhibition halls, museums, meeting halls, assembly halls, bowling alleys, funeral parlors, passenger depots, court rooms, bath houses, auditoriums used for religious purposes as provided in section C26-719.0, auditoriums in school structures and in public museums conforming to section C26-720.0, gymnasiums in school structures, places of assembly as defined in section C26-116.0, except those included in subdivision b, television studios with audiences as defined in section C26-770.1 provided the floors used for such occupancies are thirty-two feet or less above the curb, or twenty feet or less below the curb—80 persons per unit of stair width. The unit of stair width for such uses or occupancies shall be 24 inches, except that an allowance of 40 persons may be made for twenty inches of stair width added to one or more 24-inch units of stair width. Where there are more than 720 occupants on any floor, at least three stairs shall be provided and where there are more than 1,280 occupants on any floor, at least four stairs shall be provided. The aggregate width of exits and stairs shall be divided into substantially equal units. Where there are two exits or stairways, they shall be on opposite sides of the space or floor. Where there are three exits or stairways, the third shall be remote from the other two.

(b) Hospitals, asylums, jails, libraries, class rooms and lecture rooms in schools, fire houses, police stations, offices, showrooms, stores, markets, warehouses or storage spaces, garages, laboratories, power stations, billiard rooms, swimming pools, studios, libraries, dwellings other than private dwellings, or multiple dwellings, or any other use not specified in item (a) hereof immediately preceding—30 persons per unit of stair

width. The unit of stair width for such uses or occupancies shall be 22 inches, except that an allowance of 15 persons may be made for 12 inches of stair width added to two or more 22-inch units of stair width.

(c) The provisions of this section shall not apply to special occupancy structures or parts of such structures coming under the provisions of article 13 of this title unless so provided in article 13. Where a story is occupied in part for uses or occupancies listed under subdivision a and in part for uses or occupancies listed under subdivision b, the width of stairs shall be computed separately for the uses not under the same subdivision but any excess stair capacity remaining from the use or occupancy specified in item (a), may be used for the use or occupancy coming under item (b). The width of a stair shall not be diminished between the floor served by such stair and the outlet of the stair at the street or grade level.

(d) When a horizontal exit, complying with the requirements of section C26-296.0, is provided, the stairs may be proportioned on the basis of one-half of the total number of persons to be accommodated; when the building is fully equipped with an approved automatic sprinkler system, the stairs may be proportioned on the basis of two-thirds of the total number of persons to be accommodated; and if both a horizontal exit and an approved sprinkler system are provided, the stairs may be proportioned on the basis of four-tenths of the total number of persons to be accommodated. The doors of horizontal exits shall have an adequate width as required by section C26-283.0 to accommodate the number of persons permitted in the area served by a horizontal exit, less those persons accommodated by the capacity of the stairs area. In school structures four stories or less in height, the stairs may be proportioned on the basis of one-third the total number of persons to be accommodated, provided that the floor areas are divided into at least three fire areas and are provided with two horizontal exits.

3. In computing the capacity of required stairways, the maximum depth of landings and platforms shall be deemed to be the width of a single run of the stairway which is attached to such landings or platforms.

4. Where the occupancy of a mezzanine floor, as determined in accordance with subdivision c of section C26-273.0, is twenty-five persons or less, the stairways serving such mezzanine, except stairways which also serve the floors of the structure generally, may be thirty inches in width.

(6.4.1.2). b. Width of required stairways in structures of limited area.

1. Where the gross ground area of a structure is four thousand square feet or less and the occupancy above the first floor in accordance with subdivision c of section C26-273.0, is fifty persons or less, the minimum width of required stairways shall be three feet, except as provided with respect to escalators in subdivision a of section C26-273.0.

2. If, in such structures, two stairways exit into a common passageway at the street level, and if the passageway between the stairway nearest the street and the sidewalk is without steps, the width of the corridor may be three feet eight inches.

(6.4.1.3). c. Limitation on stair passageway and landing dimensions.—The minimum width of stair passageways and stair dimensions shall be equal to the width of the required stair. The maximum width of any stair passageway shall be the width of the required stairs plus twelve inches; the maximum length of any landing at any floor level shall be the sum of the width of the required stair plus the width of the widest door opening on such landing plus twelve inches for each unit of stair width and the maximum length of any intermediate landing shall be the width of the required stair plus twelve inches for each unit of stair width. Where a stair of greater width than that required by subdivision a of this section is provided the minimum and maximum widths of the stair passageways shall be as though the provided width of stair were the required width. It shall be unlawful to increase the area enclosed by partitions surrounding required stairs so that any of the maximum dimensions of stair passageways or landings herein specified is exceeded.

(6.4.1.4). d. Dimensions of Treads and Risers for Required Means of Egress.—The treads and risers of required stairs shall be so proportioned that the product of the number of inches in the tread, exclusive of nosing, and the number of inches in the riser, shall be between seventy and seventy-five, but the maximum height of any riser shall be seven and three-quarter inches, and any tread, exclusive of nosing, shall be at least nine and one-half inches wide; provided that in schools the proportions and dimensions of treads and risers may, in the discretion of the superintendent, be adjusted to suit the age of the persons for whom the school is intended. Risers and treads, other than winding treads, shall be of uniform width and height in any one flight. It shall be unlawful to use winders, except that in the discretion of the superintendent, winders may be used for stairs of an ornamental character which have a minimum width of five feet, and are not required as a means of egress. The treads of winders, when permitted, exclusive of the nosings, shall have a minimum width of seven inches at any point and a maximum average width of ten inches. Steps or stairs

in lines of travel shall have at least two risers in any change of level.

(6.4.1.5). e. Spiral Stairs.—It shall be unlawful to use spiral stairs as required means of egress, except when such spiral stairs serve an intermediate or mezzanine floor having an area of two hundred square feet or less.

(6.4.1.6). f. Landings and Vertical Rise on Required Means of Egress.—

(1) The vertical rise of any flight of stairs serving as a required means of egress between floors, landings or platforms, shall be twelve feet or less, except that in places of public assembly such rise shall be eight feet.

(2) The distance between risers on landings, or platforms, in straight runs of stairs, shall be forty-eight inches or more, except that when stairs are permitted to be three feet wide in accordance with subdivision b of section C26-292.0, such distance shall be forty-two inches or more.

(6.4.1.7.1). g. Construction of Required Stairways.—

1. Materials for Required Stairways. — Stairs and stairways serving an exit shall be constructed of incombustible material or assemblies throughout, except in frame and non-fireproof structures forty feet or less in height and occupied by fifty or less persons above the first story. The treads and landings shall be constructed and maintained in such manner as to prevent persons from slipping thereon.

(6.4.1.7.2). 2. Strength of Required Stairways.—Stairs, platforms, landings and stair halls shall be of sufficient strength to sustain safely a live load of at least one hundred pounds per square foot.

(6.4.1.7.3). 3. Support for Treads, Landings and Platforms in Required Stairways. —When treads, landings or platforms in required stairways are of slate, marble, stone or composition, such treads, landings and platforms shall be supported for their entire length and width by a solid steel plate of suitable thickness, securely fastened.

(6.4.1.8.1). h. Enclosure of Required Stairways.—

1. Fire Resistive Ratings for Enclosures of Required Stairways.—

(a) Required stairways in public buildings, in structures used for film studios, in structures containing occupancies requiring fire department combustible occupancy permits, and in all Class 1, fireproof structures, except school structures, shall be enclosed with partitions or walls having a fire resistive rating of at least three hours.

(b) Required stairways in all Class 2, fire-protected structures, all Class 3, non-fireproof structures and all Class 6, heavy timber construction structures, except residence buildings three stories or less above any basement in height and in other structures at most four stories or forty feet in height, shall be enclosed with walls or partitions having a fire-resistive rating of at least two hours, except as otherwise prescribed in this section.

(c) Interior required stairways which are not required to be enclosed in walls having a minimum fire resistive rating of at least two hours, shall be enclosed with fire resistive partitions having a rating of at least one hour.

(d) All doors opening on required stairways shall have a fire resistive rating of at least three-quarters of an hour. Such doors shall be self-closing and shall be normally closed. It shall be unlawful to fasten open any such door.

(6.4.1.8.2). 2. Opening in Enclosures of Required Means of Egress.—

(a) It shall be unlawful to open any pipe, elevator or other shafts, chases, panel boards, toilet rooms, slop sinks, closets, or openings other than exit doorways with fireproof self-closing doors, into the enclosures of required stairways or cross-overs used in connection with such stairways, except as provided in subdivisions e and g of section C26-289.0 and except that, where approved, automatic fire windows may be installed in the exterior walls of such enclosures. Elevator shafts on the ground floor are exempted from this provision.

(b) Unless otherwise prescribed in this title, in structures having a maximum height of five stories or sixty-five feet, exterior window openings or exterior door openings in required stairways may be provided with non-fireproof windows or doors, provided that such stairways are located thirty feet or more from the nearest lot line.

(c) Nothing in this section shall be construed to prohibit other openings on stairhalls in multiple dwellings where such openings are permitted under the multiple dwelling law in structures six stories or less in height.

(d) Where a required stairway serving the upper floors of a structure is continued in the same enclosure to one or more floors below grade, the portion of such stairway above grade shall be separated from the portion below grade by a fireproof partition. Such partition shall have a fireproof self-closing door swinging in the direction of egress from the floors below grade, and such partition shall be so arranged as not to interfere with the platform serving the upper floors. Structures used exclusively as schools, in which the uses of the basement require frequent circulation, regular fire drills are held under supervision, and exit signs are provided, are exempted from the requirements of this provision.

(6.4.1.9). i. Service or Ornamental Stairways.—Unenclosed service or ornamental stairways may be constructed under the following conditions:

1. Such stairways shall be so placed as not to obstruct or interfere with the functions or use of the required means of egress nor to be a part of such means of egress.

2. Not more than two adjoining stories in any structure may be connected by an open well, unenclosed stairway or escalator.

(6.4.1.10). j. Exterior Stairways as Required Means of Egress.—

1. Exterior stairways, where permitted as required means of egress under section C26-276.0, shall be constructed of incombustible materials and shall conform in all other respects, except as to enclosures, to the requirements for interior stairs.

2. Such exterior stairs shall be connected to each story which they serve by means of self-closing fire doors or automatic fire windows with a clear minimum exit opening of three feet in height and thirty inches in width. The window and door openings on the course of, below or within ten feet horizontally of such exterior stairways, shall be equipped with self-closing fire doors or automatic fire windows. Such stairways shall be protected throughout to a height of five feet either with netting made of wire at least 0.135 inches in diameter, No. 10 U. S. steel wire gauge, such netting having a maximum mesh of one and one-quarter inches, or with other rigid guards.

(6.4.1.11). k. Termination of Required Stairways at Grade and Roof.—Every required stairway shall lead in a continuous enclosure to street level Such stairways serving the uppermost floor of a structure shall continue to the roof, except as hereinafter provided, as follows:

1. Every required stairway terminating at the level of a setback roof shall be extended to such setback roof through a bulkhead or fireproof passageway, or such stairway shall be carried to a required hallway or stairway provided with fire doors unequipped with locks, and such fire doors shall be arranged to open from either side.

2. When the roof of a structure has a slope exceeding one foot in ten, the required stairways shall be connected in the top story by a fireproof passageway enclosed in construction having a fire resistive rating at least equal to the fire resistive rating of the required stairway enclosures connected by such construction, except that in schools three stories or less in height with such roof slopes, such connection of stairways may be omitted.

3. All required stairways shall continue to the roof, except that in structures two stories or less in height, the stairways from the second floor to the roof may be omitted, provided that partitions enclosing stairhall are fire resistive and all openings from the stairhall to the interior of the structure are protected with one-hour self-closing fireproof doors, and a ladder from the head of each required stairway to a scuttle opening in the roof is furnished. Such ladders shall be of metal, with solid treads and hand-rails on each side and such ladders shall be set at an angle of seventy degrees or less.

4. In structures used exclusively for school purposes where pupils are trained in rapid dismissal by means of regular supervised fire drills, the number of stairways to the roof may be one-half of the above requirements, provided that such stairways to the roof are so distributed as to furnish access to the roof from different sections of the structure and are accessible from each side of a horizontal exit. Stairways leading to the roof may, in the discretion of the school authorities, be provided with locked wire mesh gates.

5. It shall be unlawful to terminate more than two required stairways in a common corridor or lobby on the ground floor, except as provided in section C26-294.0, and except that in structures used exclusively for school purposes where pupils are trained in rapid dismissal by means of regular supervised fire drills and in which eight or more stairways otherwise complying with the provisions of section C26-292.0, are provided, a maximum of four such stairways may terminate in a common corridor or lobby directly at an entrance on the ground floor, but the width of such common corridor or lobby shall be equal to the combined width of the stairways leading to such exits.

(6.4.1.12). l. Hand-Rails in Required Stairways.—

1. Required exit stairs shall have walls or well secured balustrades or guards on both sides with hand-rails on both sides. Required hand-rails on the rake of stairs shall be between thirty and thirty-four inches high from the tread to the top of the rail, measured in line with the riser. Balustrades on the level shall be at least thirty-four inches from the floor or landing level to the top of the rail.

2. A minimum unobstructed finger clearance of one inch shall be maintained at

all points. When the width of a flight of stairs serving as a means of egress is eighty-eight inches or more, an intermediate hand-rail shall be provided. Such hand-rail shall be continuous between landings. Such hand-rail shall be substantially supported and shall terminate at the upper end in a newel or standard at least six feet high. The ends of hand-rails shall be turned back against the walls or newels and such ends shall be finished without any projections which would act as obstructions.

(6.4.1.13). m. Space Under Required Stairs.—

1. Where the space between the soffit and the floor is less than five feet high, such space shall be enclosed without openings for the full width of the stairs.

2. Where stairs are built in whole or in part of combustible materials, it shall be unlawful to use any space under such stairs.

Sub-Article 5. Fire Towers

(6.5.1). § C26-293.0 Fire Towers Required.—At least one required means of egress in every public and business building seventy-five feet or more in height, shall be a fire tower, except in schools five stories or less in height where regular supervised fire drills are held and except in such schools more than five stories in height where a special fire department access stair is provided, as prescribed in Section C26-295.0.

The requirements of this section shall not apply to mixed occupancy buildings where not more than fifty percent of the building is used for public or business uses, and all such uses are located below the seventy-five foot level.

(6.5.2). § C26-294.0 Construction and Arrangement of Fire Towers.—a. The enclosing walls of fire towers shall be of incombustible materials or assemblies having a fire resistive rating of at least four hours. Such walls shall be without openings, except for doors serving as means of egress.

b. At each story served by a fire tower, access to the stairways of such fire tower shall be provided through outside balconies or fireproof vestibules. Such balconies or vestibules shall be at least three feet eight inches in width and shall have unpierced floors of incombustible materials and shall be provided with substantial guard railings at least four feet high, without any openings greater than eight inches in width.

c. Such balconies or vestibules of fire towers shall be level with the floors of the structure and the platforms of the stairs connected by such balconies. Such balconies or vestibules shall be separated from the structure and the stairs by self-closing fire doors capable of being opened from both sides without the use of a key.

d. Balconies or vestibules of fire towers shall open on a street or yard, or on a court open vertically to the sky for its full height, having a minimum net area of one hundred five square feet and a minimum dimension of seven feet. The opening from the vestibule to the street, yard or court shall have a minimum area of eighteen square feet and a minimum dimension of two feet six inches. It shall be unlawful to leave openings in the court walls surrounding an interior fire tower, other than the openings from the vestibules, within fifteen feet of the balcony, except that self-closing fire windows may be used if such windows are at least ten feet from the balcony, provided that the area of the court is at least twelve feet by twenty-four feet.

e. Fire towers shall terminate at the grade level and shall exit directly to the street independently of corridors serving other stairways, except when the fire tower terminates in the ground floor corridor outside of the inner vestibule and within ten feet of the building line.

f. Doors opening into fire towers may be constructed with observation panels made of polished plate or wire glass, one quarter of an inch thick, if such glass is set with a three-quarter inch rabbet. Such glass shall have a maximum area of sixteen square inches. Doors shall be capable of being opened from the occupied side without the use of a key. The following sign shall be posted on each such door on the side facing the occupied area, in letters at least two inches in height: "EXIT ONLY — NO ACCESS TO OTHER FLOORS."

g. Fire tower stairs shall comply in all other respects with the requirements of section C26-292.0.

(6.5.3). § C26-295.0 Special Fire Department Access Stair.—Where an omission of fire towers in school buildings of more than five stories in height is permitted under section C26-293.0, a special stairway shall be erected as follows: Such stairway shall be of incombustible material. Such stairway shall extend from the ground to the top story and roof, and such stairway shall have an opening to each floor, to the roof and to the street or open yard through a fireproof passageway, if such fireproof passageway is necessary. The stairway shall be thirty-six inches or more in width and shall be arranged to provide a continuous wellhole twelve inches wide through its

entire height. The stair enclosure construction shall be as required for exit stairways in similar buildings. The door assemblies at each floor and roof shall be of one hour rating and such assemblies shall be equipped with fireproof self-closing doors having dead locks operated by knobs on the stair side, and by a standard fire department key on the corridor side. A skylight, as required over stair enclosures extending to the roof, shall be provided and such skylight shall be equipped with ventilating louvres of a clear ventilating area of twenty-four square feet or more. An adequate lighting system on a separate circuit controlled by a switch immediately inside the entrance door at the ground level, shall be provided for the illumination of the entire stairway.

Sub-Article 6. Horizontal Exits

(6.6.1). § C26-296.0 General Requirements for Horizontal Exits.—A horizontal exit shall comply with the following requirements:

1. The spaces connected by a horizontal exit shall be either public spaces or spaces occupied by the same tenant.

2. The clear floor space on either side of the horizontal exit shall be sufficient to contain the total number of occupants of both of the connected spaces, allowing at least three and one-half square feet of floor space per occupant.

3. There shall be at least one interior enclosed stairway or fire tower on each side of the horizontal exit.

4. Every horizontal exit shall be equipped on one side with a fireproof self-closing door capable of being opened from either side without a key, and in addition an opening in a fire wall must be equipped on the opposite side, with an automatic fire door. Such automatic fire door shall be without a lock and shall be so arranged as to be held open with a fusible link device. In a public school structure, however, where regular supervised fire drills are conducted, the automatic fire door may be omitted and the fireproof self-closing door may be double-acting.

The proportioning of stairs in accordance with paragraph two of subdivision a of section C26-292.0 shall be permitted only when the self-closing door of the opening protective assembly opens in the direction of travel from the floor area which it serves, and an "EXIT" sign is placed only on the side served by such horizontal exit. Nothing in this subdivision shall be construed as prohibiting exits from areas on both sides of a fire wall or fire partition through separate horizontal exits, each serving only one side.

5. Vestibules or open air balconies, when used, shall conform to the requirements for vestibules and open air balconies of fire towers.

6. Bridges shall be constructed of incombustible material, shall have solid floors and shall have substantial railings at least four feet high.

7. Doorways or windows opening on vestibules, balconies or bridges and door or window openings on the course of, below or within ten feet horizontally of such bridges, shall be equipped with fireproof self-closing doors or automatic fire windows.

8. The maximum gradient to take up the difference in levels between connected floor areas shall be one foot in ten.

(6.6.2). § C26-297.0 Horizontal Exits on Floors Sixteen or More Stories Above the Ground.—a. When horizontal exits are provided on floors sixteen or more stories above the ground, at least one passenger elevator shall be provided on each side of the horizontal exit in addition to the required stairway or fire tower.

b. Required elevators shall be kept manned and ready for use at all times during the normal occupancy of the building.

Sub-Article 7. Fire Escapes

(6.7.1). § C26-298.0 Construction of Fire Escapes.—When fire escapes are used as a means of egress under the provisions of section C26-276.0, such fire escapes shall be constructed of incombustible materials and shall be of sufficient strength to sustain safely a superimposed load of one hundred pounds per square foot. Fire escapes used as a means of egress shall have balconies at each story. Such balconies shall be at least thirty-six inches wide in the clear and at least fifty-four inches long, and shall be provided with staircases extending to the ground level with a maximum riser of eight inches and a minimum width of treads of eight inches exclusive of nosings. Fire escape staircases shall be at least twenty-two inches in width. If fire escapes are located on a street front of a structure, the superintendent may permit the use of a drop ladder or a counterbalanced stair from the lowest balcony, provided that the height of such balcony above the sidewalk is sixteen feet or less.

(6.7.2). § C26-298.1 Fire Escapes; Certain Requirements.—Drop ladders where permitted shall be provided with guides and hooks of a type satisfactory to the department. All fire escapes unless of non-corrodible metal shall be painted and shall be maintained in good condition and free from rust and corrosion. Notice shall

be given to the superintendent by the owner prior to the painting of fire escapes whether or not such painting is done to remove a violation.

(6.7.2). § C26-299.0 Party Wall Balconies.—Party wall balconies may be used as an auxiliary means of egress on structures erected before January first, nineteen hundred thirty-eight, if the property on both sides of such party and fire wall is under the same ownership and the type of occupancy of both buildings is the same and such balcony is extending to pass a plain glass glazed opening accessible as an emergency exit on either side of such party and fire wall.

(6.7.3). § C26-300.0 Removal and Obstruction of Party Wall Balconies.—a. Each of the owners of adjoining structures, commonly served by party wall balconies serving as a required means of egress, shall maintain that portion of each such balcony which is on his property, and each such owner shall maintain egress normally unobstructed and unimpeded, from each such balcony to and through his structure, except as otherwise provided for in this section.

b. It shall be unlawful for the owner of a structure on which there is a party wall balcony serving as a required means of egress from an adjoining structure, to remove such party wall balcony or any portion thereof or to prevent, eliminate or obstruct egress from such party wall balcony to and through his structure, unless and until such owner has had erected or has obligated himself to erect on the structure deprived of such required means of egress, a legal fire escape or other means of egress approved by the superintendent.

Sub-Article 8. Obstruction of Means of Egress

(6.8). § C26-301.0 Obstruction of Means of Egress.—It shall be unlawful to place any obstruction in front of, in or on any required means of egress.

§ C26-301.1 Obstruction of Certain Means of Egress.—Fire escapes, exterior stairways, their drop ladders and counterbalanced stairs shall be kept entirely clear of flower boxes, flower pots, chairs, pails and other obstructions. No projecting sign or other projection shall be so placed as to interfere with the free operation or use of any fire-escape drop ladder or any counterbalanced stair, nor shall any projecting sign or other projection be placed within three feet of such drop ladder or counterbalanced stair. No duct shall terminate within ten feet of the course of a fire escape or outside iron stairway.

Sub-Article 9. Special Egress Requirements for Structures of a Public Character

(6.9.1). § C26-302.0 Provision for Public Safety Under Unusual Conditions Respecting Means of Egress.—a. Where unusual conditions occur in structures of a public character such as hotels, restaurants, railroad depots, public halls, club houses with more than eight sleeping rooms, churches, ball parks, stadia, opera houses, concert halls, theatres and other similar structures, used or intended to be used for public assembly, amusement or instruction, and business structures, including department stores, where large numbers of people congregate and where such conditions are not covered by the provisions of either article seven or article thirteen of this title, or where in theatres or opera houses or concert halls the auditorium including the balconies are separated from all public portions of the building by walls having a three hour fire resistive rating with openings protected by one and one half hour fireproof self-closing doors and where the public space provided is not less than four times that required by section C26-739.0 and so arranged as to provide for greater ease of exit, and where the capacity of the emergency stairs and passageway exceed that required in section C26-731.0 by twenty per cent, the passageway leading to the emergency stairs and the public space leading to the normal exits are separated by a partition constructed of wired glass and/or other incombustible materials so as to provide an effective smoke barrier and this partition is protected by two lines of sprinkler heads on the public space side, the commissioner shall have the power to require the provision of such halls, doors, stairways, seats, passageways, ventilation, lighting and heating as he shall deem necessary to facilitate egress in case of accident or fire and furnish adequate protection for the public in such cases.

b. In all places of public assembly for which a license is required, the fire commissioner shall enforce all provisions of law relating to protection against fire and panic, obstruction of aisles, passageways and means of egress, standees, fire prevention and fire extinguishing appliances, and fire prevention.

(6.9.2). § C26-303.0 Obstruction of Aisles and Passageways Unlawful.—Aisles, halls, foyers, promenades, vestibules and passageways and other parts of such structures of a public character which are used as means of egress, shall be kept free from camp stools, chairs, sofas and miscellaneous furniture or other obstructions. It shall be unlawful to allow any person to stand in or occupy any portion of such spaces

during any performances, service, exhibition, lecture, concert, banquet, dance or other public assembly, except when the number of such standees has been included in the number of persons for whom means of egress has been provided from such tiers, and when the space occupied by such standees is enclosed with tape or cord so erected and of such material that it can be easily broken by persons passing in a direct line of egress.

(6.9.3). § C26-304.0 Enforcement of Special Egress Requirements for Structures of a Public Character.—When unusual conditions exist, the superintendent may, at any time, serve a written or printed notice upon the owner, lessee or manager of any such structure of a public character, directing any act or thing to be done or provided in or about such structures and their appliances and facilities, such as halls, doors, stairs, passageways, windows, seats, aisles, fire walls, fire apparatus and fire escapes, as he may deem necessary to carry out the purposes of sections C26-302.0 and C26-303.0.

Sub-Article 10. Egress Requirements for Fireproof Multiple Dwellings Converted to Business Use

(6.10.1). § C26-304.1 Egress Requirements for Fireproof Multiple Dwellings Converted to Business Use.—a. Existing fireproof multiple dwellings as defined in the multiple dwelling law converted to business use in whole or in part, shall comply with all of the egress requirements of sections C26-272.0 through C26-304.0, where applicable for such business use, except that an interior enclosed stair, extending from the roof to the street, not less than thirty-six inches in width, may be substituted for a fire tower and except that the minimum width of a stair used as required means of egress shall not be less than twenty-eight inches. Access to at least two means of egress shall be provided from all parts of each floor above the street floor, by means of a public hallway. The number of occupants of any floor shall be limited to the capacity of the stairs to which such floor area has access. For each stair less than thirty-six inches in width not more than twenty-six persons shall be permitted to occupy a floor served by such a stair and for each stair thirty-six inches or more in width, but less than forty-four inches in width, not more than thirty-six persons shall be permitted to occupy a floor served by such a stair. The number of persons permitted on a floor served by a stair forty-four inches or more in width shall be determined as provided in section C26-292.0. Exterior fire-escapes shall not constitute required means of egress. Existing wood doors, wood flooring and wood trim may be retained in hallways leading to exits provided that the partition enclosing the hallways are constructed of incombustible material having a one hour fire resistive rating and all doors are made self-closing. Where wood is used in a hallway leading to an exit, the hallway shall be provided with a sprinkler system complying with the rules of the department.

b. Where only part of a fireproof multiple dwelling is converted to business use the egress from such business portions shall comply with the requirements set forth in this section. Any floor area used in part for business shall be considered as used entirely for business in determining the egress requirements under this section, unless the business area is separated from the residence portion of th floor by fireproof partitions with all openings in such partitions protected by fireproof self-closing doors. Where a stair is used jointly by both the business and residence parts of a floor and such parts are separated by fireproof partitions, the number of persons permitted on the business portion of a floor served by such a stair shall be one-half the number permitted for stairs serving an area used entirely for business.

c. In fireproof multiple dwellings converted to business use, only one handrail shall be required when the width of the stair is less than forty-four inches. Treads, risers and platforms that were lawful at the time of erection of such multiple dwellings may be retained without change.

d. The lighting of hallways leading to exits, and of stairs, shall be on an independent circuit taken off the main line ahead of the general lighting and power circuits.

e. Additional exit and directional signs shall be provided as required by the superintendent.

f. There shall be provided in the bulkhead roof over each stair extending into the uppermost story of the building and serving as required means of egress, a skylight complying with the requirements of section C26-641.0. Windows in the side of the bulkhead may be provided instead of a skylight as provided in such section.

g. Where the partitions, doors, use of combustible material, exits, and all other construction on any floor, except the stairs and fire towers comply with the requirements of this code for buildings occupied for business purposes, public hallways leading to exits shall be required only where a floor is occupied by more than one tenant.

h. In those fireproof hotels and other fireproof multiple dwellings coming under the provisions of section 67 of the multiple dwelling law, where part of the building is converted to business use, the sprinklers that may be required by the provisions of this section may be omitted, provided the building complies with the applicable provisions of section 67 of the multiple dwelling law. The number of occupants permitted in the business portions of such buildings shall be limited as provided in subdivisions a and b of this section. Access to at least two means of egress, remote from each other, shall be provided from those parts of a floor used for business, where the floor is above the street floor as well as where otherwise required by the exit provisions of this code. Such means of egress above the street floor, shall be interior enclosed stairs, fire towers, or exterior stairs complying with subdivision j of section C26-292.0 where permitted by the superintendent, or a horizontal exit complying with sections C26-296.0 and C26-297.0. An interior enclosed stair conforming to the requirements of section 67 of the multiple dwelling law may be substituted for an interior enclosed stair that would be required by the provisions of this code, provided the stair, lobby and passage from stair to street are used exclusively for egress or entrance purposes, except that spaces for uses accessory to the multiple dwelling use, such as registration, information and mail desks and similar accessory uses may be provided at the street floor level in the passage from the stair to the street. Spaces used for restaurant, florists, and similar purposes, shall not be permitted in or to open on lobbies or stair enclosures serving as required means of egress unless conforming to the requirements of section C26-289.0. An interior enclosed stair may be substituted for a fire tower as provided in subdivision a of this section. Exterior fire-escapes shall not constitute required means of egress from the business portions of such buildings and the occupants of the business parts shall not be required to pass through one means of egress to reach another means of egress.

i. The provisions of this section shall not apply to those fireproof multiple dwellings where the business use and occupancy were approved prior to the enactment of this law, provided no such use or occupancy is changed to another use, altered or extended. No such business use or occupancy shall be changed to another use, altered or extended unless the floor or floors on which such changes are made, comply with the provisions of this section.

j. Business as used in this section means any use which would make a structure or part of a structure a commercial building as defined in subdivision c of section C26-235.0.

ARTICLE 8. MATERIALS, LOADS AND STRESSES

Sub-Article 1. Quality of Materials

GROUP 1
Quality of Masonry Materials

(7.1.1). § C26-305.0 General.—Masonry materials when delivered for use shall comply with the requirements of this title and the rules of the board.

(7.1.1.1). § C26-306.0 Distinguishing Marks on Masonry Units.—a. Hollow masonry units and solid building blocks shall bear the distinguishing mark of the manufacturer. Such marks shall be as approved by the board to make easily possible the identification load bearing units. The board shall, immediately upon approval of an identification mark, forward to the Department of Housing and Buildings six certified copies of each approved identification mark.

b. A certified copy of each such mark shall be placed on file with the superintendent before the materials bearing such mark may be used.

(7.1.1.2.1). § C26-307.0 Solid Clay Units.—a. Brick.—

1. All brick when delivered for use shall comply with the standard specifications of the A. S. T. M., D., C 62-30 for "B" brick.

2. Second-hand brick may be used subject to the approval of the superintendent as to condition and quality, but in all cases such brick shall be thoroughly cleaned and be free from mortar, and shall be whole and good, hard, well-burnt brick. Light, hard brick may be used when required as a filler in walls of frame construction.

(7.1.1.2.2). b. Other Solid Clay Units.—Other solid structural units of clay shall meet the strength requirements of the standard specifications of the A. S. T. M., D., C 62-30 for "B" brick, when delivered for use.

(7.1.1.3). § C26-308.0 Structural Clay Tile.—a. Structural clay tile for bearing walls or for walls wholly or in part exposed to the weather shall at least comply with the standard specifications of the A.S.T.M., D., C34-36 for LBX tile.

b. When used in partitions, fire-proofing, furring, or exterior panel walls in accordance with section C26-446.0, structural clay tile which is not directly exposed to the weather shall comply with the standard specifications of the A.S.T.M., D., C56-41, and shall have exterior shells of at least five-eighths of an inch in over-all thickness and webs of at least one-half of an inch in over-all thickness.

(7.1.1.4). § C26-309.0 **Solid or Hollow Concrete Building Block or Tile.**—a. Hollow concrete block or tile when delivered for use shall have a minimum ultimate compressive strength of seven hundred pounds per square inch of gross area tested as laid in the wall.

b. Solid concrete building block when delivered for use shall have a minimum ultimate compressive strength of fifteen hundred pounds per square inch tested as laid in the wall.

c. Such block or tile shall comply with the following requirements for general properties under visual inspection:

1. They shall be sound, of compact structure, reasonably uniform in shape and free from cracks, warpage, or foreign substances which would affect their serviceability or strength.

2. If cinders form part or all of the aggregate, the cinders may contain a maximum of thirty-five percent by weight of unconsumed carbon and a maximum of one and one-half percent by weight of sulphur.

d. When used in partitions, fireproofing, furring, or exterior panel walls in accordance with section C26-446.0, solid or hollow concrete building block or tile which is not directly exposed to the weather and which has a minimum ultimate compressive strength of three hundred pounds per square inch of gross area tested as laid in the wall may be used. Hollow concrete blocks for panel walls where such blocks are not directly exposed to the weather shall comply with the standard specifications of the A.S.T.M., D., C129-39.

(7.1.1.5). § C26-310.0 **Gypsum Block or Tile.**—Gypsum block or tile shall comply with the standard specifications of the A. S. T. M., D., C 52-41, and may contain a maximum of twelve and one-half percent by weight of combustible matter, measured dry.

(7.1.1.6). § C26-311.0 *Repealed December*, 1962.

(7.1.1.7.1). § C26-312.0 **Mortar and Other Concrete Materials.**—a. Quick Lime.—Quick lime shall comply with the standard specifications of the A. S. T. M., D., C 5-34 T.

(7.1.1.7.2). b. Hydrated Lime.—Hydrated lime shall comply with the standard specifications of the A. S. T. M., D., C 6-31.

(7.1.1.7.3). c. Cement—

1. Cement shall comply with the standard specifications of the A.S.T.M: C150-62 for Portland cement or A.S.T.M. C175-61 for air entraining Portland cement.

2. The use of cements of other types which are approved by the board and are used in accordance with the rules of the board governing their use shall be permitted.

(7.1.1.7.4). d. Gypsum.—Gypsum shall comply with the standard specifications of the A. S. T. M., D., C 22-41.

(7.1.1.7.5). e. Sand.—Sand shall be clean, sharp, coarse and siliceous, free from salt, lime, clay or other foreign materials.

(7.1.1.7.6). f. Water.—Water shall be clean, free from all organic materials, strong acids or alkalis, or shall be the water used in the city for drinking purposes.

(7.1.1.7.7). g. Concrete Aggregates.—Aggregates for concrete masonry shall comply with the requirements of section C26-315.0.

h. Perlite.—Perlite shall be clean, free from salt, lime, clay or other foreign matters.

i. Vermiculite.—Vermiculite shall be clean, free from salt, lime, clay or other foreign matters.

(7.1.1.8.1). § C26-313.0 **Mortar Proportions.**—a. Measurements of Mortar Proportions.—Mortar proportions shall be measured by volume.

(7.1.1.8.2). b. Lime Mortar.

1. Lime mortar shall be composed of one part lime putty or hydrated lime and a maximum of three parts of sand.

2. Cement may replace equal volumes of lime in lime mortar, provided adequate methods of mixing are used so that the cement gauging will be uniformly distributed.

(7.1.1.8.3). c. Cement-Lime Mortar.—Cement-lime mortar shall be composed of one part cement, one part lime putty or hydrated lime and a maximum of six parts of sand.

(7.1.1.8.4). d. Cement Mortar.—Cement mortar shall be composed of one part of cement and a maximum of three parts of sand, to which may be added at most fifteen percent of the cement content in hydrated lime or lime putty. In cement mortar for panel walls the sand content may be increased to a maximum of ten parts to two of cement and one of hydrated lime.

(7.1.1.8.5). e. Maximum Proportion of Sand in Mortar.—The maximum proportion by volume of sand to cementing material in mortar to be used for masonry construction shall be three to one, except as provided in subdivision d of this section and in section C26-314.0.

(7.1.1.9). § C26-314.0 Other Mortars.—a. Other mortars may be used provided they comply with the following requirements and the use of each individual brand is approved in accordance with the rules of the board.

b. Such other mortars may be used in place of cement mortars when cement mortars are not specifically required and when such other mortars have, when tested in accordance with the rules of the board, a tensile strength of at least one hundred fifty pounds per square inch at the age of twenty-eight days.

c. Such mortars may be used in place of cement-lime mortars provided they have a tensile strength of at least one hundred twenty-five pounds per square inch at the age of twenty-eight days, when tested in accordance with the rules of the board. (L. 1942.)

(7.1.2.1). § C26-315.0 *Repealed December*, 1962.

(7.1.2.2). § C26-316.0 *Repealed December*, 1962.

(7.1.2.3). § C26-317.0 *Repealed December*, 1962.

(7.1.2.4). § C26-318.0 *Repealed December*, 1962.

(7.1.2.5). § C26-319.0 *Repealed December*, 1962.

GROUP 3

Quality of Materials for Iron and Steel

(7.1.3.1). § C26-320.0 Cast Iron.—Cast iron shall be of good foundry mixture, producing a clean, tough, gray iron. It shall conform to such specifications as may be promulgated by the board, or in the absence of such specifications, to the standard specifications of the A.S.T.M., D., A 48-60T, for medium, gray iron castings. Castings shall be free from serious blow holes, cinder spots and cold shuts.

(7.1.3.2). § C26-321.0 Cast Steel.—Steel castings for building construction shall be made of open hearth, electric furnace, converter or crucible steel, and shall be practically free from blow holes. They shall conform to such specifications as may be promulgated by the board, or in the absence of such specifications, to the standard specifications of the A.S.T.M., D., A27-60, Grade 65-35 or A.S.T.M., D., A148-60, Grade 80-50.

(7.1.3.3). § C26-322.0 Structural Steel.—a. Except as provided in paragraph b and c of this section all structural steel for structures shall conform to such specifications as may be promulgated by the board, or in the absence of such specifications, to the standard specifications of the A.S.T.M., D., A6-62T, A7-60T, A36-62T, A242-60, A440-59T, and A441-60T, as to physical and chemical properties, method of manufacture, inspection, marking, tests, and other requirements. Structural steel members furnished with a specified minimum yield point, greater than 36,000 psi, shall at all times be identified by suitable marking as to type or grade. The A.S.T.M. specification designation, under which the material was obtained, shall be painted over any shop coat at the fabricator's plant before shipment to the erection site.

b. Structural steel which is not known to conform to the requirements of paragraph a of this section as evidenced by the affidavit of the producer provided in section C26-368.0, b, or by mill test reports, or by the certification of an inspection bureau of known reputation, acceptable to the commissioner, may be erected as a structural member after the date upon which this law shall take effect, only upon the approval of, and under such conditions prescribed by the commissioner; but the working stresses in such a member shall not exceed ninety per cent of those provided in section C26-368.0 for A7-60T structural steel.

c. Structural rivet steel shall comply with one of the following appropriate standard specifications of the A.S.T.M., D., A141-58, A195-59 or A406-59T.

d. High strength bolts, with suitable nuts, and washers when required, shall comply with one of the following appropriate specifications of the A.S.T.M., D., A325-61T, or A354-58T Grade BC.

C26-323.0 **Use of special steels**—a. General.—Steels in addition to those listed in section C26-322.0 may be used in accordance with the rules of the board.

b. Special steel specifications.—Specifications for special steels shall be approved by the board.

c. Working stresses for special steel.—The maximum allowable working stresses for special steels shall be determined in accordance with the physical and chemical properties of the material and shall be approved by the board.

C26-324.0 Filler Metal.—

b. All mild steel electrodes shall conform to one of the classifications established by the specifications for mild steel arc-welding electrodes, 1958 edition, issued jointly by the American Society for Testing and Materials and the American Welding Society (ASTM designation A298-62T; AWS designation A5.4-62T), and shall be suitable for the condition of intended use.

c. All electrodes for the welding of steels covered by section C26-323.0 shall conform to one of the appropriate classifications established by the specification for low-alloy steel arc-welding electrodes, 1958 edition, issued jointly by the American Society for Testing and Materials and the American Welding Society (ASTM designation A316-58T; AWS designation A5.5-58T) or the specifications for corrosion, resisting chromium and chromium-nickel steel welding electrodes, 1962 edition, issued jointly by the American Society for Testing and Materials and the American Welding Society (ASTM designation A298-62T; AWS designation A5.4-62T), and shall be suitable for the conditions of intended use.

d. Bare electrodes and granular flux used in combinations for submerged arc-welding shall be capable of producing weld metal having the following sensile properties when deposited in a multiple pass weld:

	Grade SAW-1	Grade SAW-2
Tensile strength	62,000 to 80,000 psi	70,000 to 90,000 psi
Yield point, min.	45,000 psi	50,000 psi
Elongation in 2 in., min.	25%	22%
Reduction in area, min.	40%	40%

Welding equipment used to perform submerged arc-welding shall be approved by the board.

GROUP 4

Quality and Size of Lumber and Timbers

(7.1.4). § C26-325.0 Quality and Size of Lumber and Timbers.—The grades and quality of lumber and timbers used structurally shall conform to the commercial grades specified in the table of stresses contained in section C26-370.0, according to the rules specified in the table for the species and commercial grade, except that:

1. Load bearing studding shall be at least equal to the commercial grade of no. 2 common dimension. Studding that is not load bearing shall be at least equal to no. 3 common dimension.

2. Wood floor and roof beams, joists, rafters and framing lumbers shall be at least two inches in thickness, except that floor or roof beams of structures within the fire limits shall be at least three inches in thickness; the depths of beams, joists and girders shall be at most six times such thickness.

(7.1.5). § C26-325.1 Illegal Practices in the Sale or Use of Lumber for Construction Purposes Prohibited.—a. Any person, corporation or copartnership who, within the city of New York shall have in the possession, or who shall place, use or affix without authorization from the owner thereof a stamp, label, trade mark, grade mark, serial number or other distinguishing mark, which stamp, label, trade mark, grade mark, serial number or mark is the property of a recoguized association of lumber manufacturers or lumber grading bureau upon any lumber sold or intended to be sold, or used or intended to be used for or in the construction, repair or alteration of a building or other structure within the city of New York, or any person, corporation or co-partnership who shall knowingly sell or possess or offer for sale such lumber so marked, or who shall knowingly possess or use or prepare to use such lumber so marked for or in the construction, alteration or repair of a building or structure within the city of New York, shall be guilty of an offense punishable by a fine of not less than twenty-five dollars nor more than one hundred dollars for the first offense, and by a fine of not less than one hundred dollars nor more than five hundred dollars, or by imprisonment for not more than six months, or both, for a subsequent offense.

b. Possession of such lumber so marked, or of a colorable imitation of the principal features of a genuine stamp, label, trade mark, grade mark, serial number or mark as aforesaid, or unauthorized possession of a genuine stamp, label, trade mark,

grade mark, serial number or mark as aforesaid, by any lumber dealer, builder or contractor, or by any employee, partner, or officer thereof, shall be presumptive evidence of a violation of this section.

GROUP 5

Quality of Materials for Structural Aluminum

C26-325.2 Structural aluminum.—a. Structural aluminum of the alloys known commercially as 6061-T6 and 6062-T6, shall conform to such specifications as may be promulgated by the board, or in the absence of such specifications, to the following specifications of the ASTM, Nos. B221 (6061 and 6062), B211 (6061), B209 (6061), B247 (6061), B210 (6061 and 6062), B241 (6061 and 6062) and B308 (6061 and 6062). Alloys 6061-T6 and 6062-T6 have the following nominal chemical composition:

Composition	Percentage by weight 6061-T6	6062-T6
Copper	0.25	0.25
Silicon	0.6	0.6
Magnesium	1.0	1.0
Chromium	0.25	0.06
Aluminum	97.9	98.09
Total	100.00	100.00

b. The following shall be the lowest of the various specified minimum properties of the alloys known as 6061-T6 and 6062-T6 in kips per square inch:

Description	Stress
Tensile strength	38
Yield strength (offset 0.2%)	35

The following shall be accepted as the mechanical properties of the alloy 6061-T6 and 6062-T6:

Shear strength in kips per square inch	24
Modulus of elasticity in tension and compression in kips per square inch	10,000
Modulus of elasticity in shear, in kips per square inch	3,800
Poisson's ratio	1/3
Coefficient of expansion per degrees fahrenheit	0.000012
Weight, in pounds per cubic inch	0.098

Table of Alloys to be Used for Rivets

Designation before driving	Driving procedure	Designation after driving	Typical shear strength
6061-T6	Cold, as received	6061-T6	30
6061-T4	Hot, 990°F. to 1050°F.	6061-T43	24

Alloys 6061-T6 and 6062-T6 may be used interchangeably.

c. The alloy known commercially as 2014-T6 shall conform to the following ASTM specifications, nos. B221-60T(2014), B235-60T(2014), B211-60T(2014), B247-60T(2014), and B209-60T(alclad 2014), and has the following nominal chemical composition:

Composition	Percentage by weight
Copper	4.4
Silicon	0.8
Manganese	0.8
Magnesium	0.4
Aluminum	93.6
	100.0

The following shall be the lowest of the various specified minimum properties of the alloy known as 2014-T6 in kips per square inch:

Description	Stress
Tensile strength	60
Yield strength (offset 0.2%)	53

The following shall be accepted as the mechanical properties of the alloy 2014-T6:

Shear strength, in kips per square inch	41
Modulus of elasticity in tension and compression in kips per square inch	10,600
Modulus of elasticity in shear, in kips per square inch	4,000
Poisson's ratio	1/3
Coefficient of expansion per degree Fahrenheit	0.000012
Weight, in pounds per cubic inch	0.101

This alloy is heat treated for maximum strength and therefore cannot be welded without serious loss of strength.

Table of Alloys to be Used for Rivets

Designation before driving	Driving procedure	Designation after driving	Typical shear strength
2117-T4	Cold, as received	2117-T3	33
6061-T4	Hot, 990°F. to 1050°F.	6061-T43	24

d. The alloy known commercially as 6063-T5 and T6, in the absence of specifications of the board, shall conform to the following specifications of the ASTM, Nos. B210 (6063-T6), B221 (6063-T5 and T6), B235 (6063-T6), B241 (6063-T5 and T6).

This alloy has the following nominal chemical composition:

Composition	Percentage by weight
Silicon	0.4
Magnesium	0.7
Total other elements	1.0
Aluminum	97.9
Total	100.0

The following shall be the lowest of the various specified minimum properties of the alloy known of 6063-T5 and T6 in kips per square inch (thickness 0.500 inch and under):

Description	Stress
Tensile strength (6063-T6)	30
Yield strength (offset 0.2%) (6063-T6)	25
Tensile strength (6063-T5)	22
Yield strength (offset 0.2%) (6063-T5)	16

The following shall be accepted as the mechanical properties of alloy 6063-T5 and T6:

Modulus of elasticity in tention and compression in kips per square inch	10,000
Modulus of elasticity in shear, in kips per square inch	3,800
Poisson's ratio	1/3
Coefficient of expansion per degree Fahrenheit	0.000012
Weight, in pounds per cubic inch	0.098

The following shall be accepted as the minimum strength values in ksi for alloy 6063-T5 and T6 (thickness 0.500 inch and under):

	Unaffected Parent Material 6063-T5	6063-T6	Material affected by heat of welding 6063-T5 & 6063-T6
Tensile strength	22	30	17[a]
Tensile yield strength	16	25	11[b]
Compressive yield strength	16	25	11[b]
Shear strength	13	19	11
Bearing strength	46	63	36
Bearing yield strength	25	40	17
Shear yield strength	9	14	6.5

[a] A.S.M.E. weld qualification test value for tensile strength across a butt weld.

[b] These are the expected minimum values of the yield strength across a butt weld, corresponding to 0.2 per cent offset on a 10-inch gage length.

e. Evidence satisfactory to the commissioner of buildings shall be submitted to the department, showing that the alloy used agrees with that specified in design.

This evidence shall be submitted prior to the issuance of a certificate of occupancy or letter of completion.

Sub-Article 2. Tests

GROUP 1

Methods of Testing Masonry Materials

(7.2.1). § C26-326.0 Methods of Testing Masonry Materials.—a. Tests of all masonry material units shall be made in accordance with the standard methods of tests of the A.S.T.M., designations of which are as follows:

1. Solid Units—D., C 67-37.
2. Hollow Units—D., C 112-36.

b. Tests of concretes and all other monolithic construction shall be in accordance with the standard methods of test of the A.S.T.M., C39-61.

(7.2.2.1). § C26-327.0 *Repealed December*, 1962.
(7.2.2.2). § C26-328.0 *Repealed December*, 1962.
(7.2.2.3). § C26-329.0 *Repealed December*, 1962.
(7.2.2.4). § C26-330.0 *Repealed December*, 1962.

GROUP 3

Tests of "Fireproofed" Wood

(7.2.3.1.). § C26-331.0 Selection of "Fireproofed" Wood Test Samples.—Before any wood may be used where incombustible materials are required, the superintendent shall be notified promptly after a consignment of wood treated to render it fire-proofed is delivered at the job. Test samples shall then be selected promptly by an authorized representative of the department, from the consignment delivered. The provisions of this section shall not apply where plywood has been approved by the board of standards and appeals and certified by inspection at the factory as being in compliance with the approval of the board.

(7.2.3.2). § C26-332.0 Number of "Fireproofed" Wood Test Samples.—a. At least one sample of sufficient size to furnish pieces for each of the three required tests shall be selected from each three thousand board feet of lumber. The material represented by a test sample shall be so handled at the structure that its relation to the test sample can be established at any time.

b. The pieces from a single test sample shall all be given the same number.

(7.2.3.3). § C26-333.0 Moisture Content of "Fireproofed" Wood Test Samples.—Samples shall be oven dried at a temperature of one hundred forty degrees Fahrenheit, so that the wood contains a maximum of eight per cent of moisture, and shall then be tested.

(7.2.3.4). § C26-334.0 Methods and Procedure for Testing "Fireproofed" Wood.—a. The required tests shall be at the expense of the owner or contractor or other interested party.

b. Tests of treated wood shall be made in the presence of a representative of the department, in accordance with the methods prescribed in this title by a properly qualified person or testing laboratory, acceptable to the superintendent, on pieces made from test samples selected by such representative. Reports on all tests shall be kept on file in the department.

c. If the tests are satisfactory, the entire consignment may be taken into the structure and used. If the tests are unsatisfactory, the entire shipment shall be condemned and shall be removed from the premises.

d. In general, acceptance shall be predicated upon the existence of a complete plant in full working order from which the material is shipped, and each shipment or, where possible, each piece shall be trade-marked in a conspicuous place so that there may be no doubt as to its identity.

(7.2.3.5). § C26-335.0 Apparatus for Testing "Fireproofed" Wood.—a. Tests for "fireproofed" wood shall be conducted in a fume hood so regulated as to avoid any disturbance of the test flame.

b. The accuracy of the pyrometers used to determine temperatures in these tests shall be checked periodically.

(7.2.3.6). § C26-336.0 Crib Test for "Fireproofed" Wood.—A crib test for "fireproofed" wood shall be made in the following manner: Twelve test pieces each one-half of an inch square or less in cross-section and six inches long shall be built up in three layers of four samples each, spaced equidistant from each other to form a crib six inches square. The bottom of the crib shall be set six inches above a bunsen burner and subjected to a temperature of twelve hundred degrees Fahrenheit for one minute. The material shall be unacceptable if after removal of the burner the flame persists in any piece longer than twenty seconds and the glow longer than thirty seconds.

(7.2.3.7). § C26-337.0 Timber Test for "Fireproofed" Wood.—a. A timber test for "fireproofed" wood shall be made in the following manner: Two test pieces each three-quarters by one and one-half inches in cross-section and twelve inches long shall be laid flat, in contact, across the top of a gas crucible furnace and subjected for two minutes to a flame of seventeen hundred degrees Fahrenheit. At the expiration of that time the test pieces shall be removed from the furnace and the duration of the flame and glow recorded. The test pieces shall then be cross-cut at the point in the burned section where the unburned cross-sectional area is the least and that area shall be measured and recorded. Any piece shall be unacceptable in which the flame persists for longer than fifteen seconds and the glow for longer than twenty seconds. The unburned area of hard woods shall be at least fifty-five percent and of soft woods at least forty-five percent of the original cross-sectional area.

b. Where timber test samples of standard cross-sectional dimensions are unobtainable from the manufactured product, smaller sections shall be used in making timber tests, but if the cross-sectional area is less than the standard, the unburned area may be ignored.

c. In making this test, woods from deciduous trees, except poplar (white wood), basswood, red gum and tupelo, shall be considered hardwoods while all other woods including those specifically mentioned above shall be considered softwoods.

(7.2.3.8). § C26-338.0 Shavings Test for "Fireproofed" Wood.—a. A shaving test for "fireproofed" wood shall be made in the following manner: A mass of shavings shall be cut fairly thick by hand plane from the test sample and placed to a depth of two inches in a metal vessel twelve inches in diameter, the bottom of which consists of a wire screen of one-half inch mesh.

b. The shavings shall be packed down moderately to reduce the air spaces. A bunsen yellow flame shall then be placed beneath the vessel so that the flame is in contact with the shavings. After twenty-five seconds the flame shall be removed. The flame shall show a maximum height of six inches above the top of the bed of shavings and the shavings shall be consumed in five or more minutes.

(7.2.3.9). § C26-339.0 Determination of Results of "Fireproofed" Wood Tests.—The wood represented by any one test sample shall be considered to have passed the requirements of this title if any two of the three tests, prescribed in sections C26-336.0 through C26-338.0, are satisfactory.

Sub-Article 3. Loads

GROUP 1

General Load Requirements

(7.3.1). § C26-340.0 General.—Structures and all parts thereof shall be of sufficient strength to support safely their imposed live loads in addition to their own dead load; and, in any event, all structures shall be designed to support at least the minimum live loads specified in this title; the superintendent shall have authority to fix live loads for structures not covered by the provisions of this title.

(7.3.1.1). § C26-341.0 Allowance for Partition Loads.—a. Provision shall be made for a uniformly distributed load of twenty pounds per square foot to be added to the dead loads of floors in office and public buildings where partitions, other than light wood or metal partitions, are not definitely located in the design, and in other structures, subject to shifting of partitions without reference to arrangement of floor beams or girders; except that, in non-fireproof structures, the superintendent may reduce such added dead loads for partitions, to twelve or more pounds per square foot, where such partitions are not definitely located in the design.

b. In all cases, the added dead load provided for shall be stated on the plans filed with the superintendent. The weight of definitely located partitions shall be included in the calculation of dead loads.

(7.3.1.2). § C26-342.0 Allowance for Weight of Cinder Filling.—Cinder filling shall be assumed to weigh sixty pounds per cubic foot.

Live Loads

GROUP 2

(7.3.2.1). § C26-343.0 Live Loads to be Posted.—The live load for which each floor or part of a floor in a commercial or industrial structure is designed shall be

certified by the superintendent and shall be indicated on a small scale floor plan suitably framed under glass and permanently affixed to the structure in a conspicuous location in a public hall or corridor in each floor. The maximum wheel load of any vehicle, including its load, which may be stored, or brought into the structure shall be stated on the floor load signs posted in garages. The occupants of the structure shall be responsible for keeping the actual loads within the certified limits. Where areas of the same floors are posted for use with different loads, such areas shall be separated by partitions or by such definite physical divisions as may be required by the superintendent, except in cases where the major portion of the floor loading consists of fixed, permanent equipment, and when an easily legible plan of at least one-eighth inch to the foot scale and indicating clearly the various load areas is framed under glass and posted in a conspicuous location in each story affected, partitions or other definite physical divisions shall not be required. The superintendent may require additional indication of load area boundaries by means of signs suspended from the ceiling if deemed necessary.

(7.3.2.2.1). **§ C26-344.0 Live Loads for Human Occupancies.**—a. Live Loads for Residences and Sleeping Quarters.—For private dwellings, multiple dwellings, bedroom floors in hotels and club houses, private and ward room floors in hospitals, dormitories, and for similar occupancies, including corridors, the minimum live load shall be taken as forty pounds per square foot uniformly distributed.

(7.3.2.2.2). b. Live Loads for Office Space.—For office floors, including corridors, the minimum live load shall be taken as fifty pounds per square foot uniformly distributed.

(7.3.2.2.3.) c. Live loads for places of assembly other than theatres and halls.—For classrooms with fixed seats, including aisles and passageways between seats, for churches with fixed seats, for reading rooms, and for classrooms not exceeding nine hundred square feet of floor area with movable seats, the minimum live load uniformly distributed shall be taken as sixty pounds per square foot, provided that such movable furniture consists, in addition to the instructor's equipment, of individual seatings with or without attached desks arranged as required under Section C26-273.0, subdivision c, paragraph 1, item (c).

(7.3.2.2.4). d. Live Loads for Theatres and Assembly Halls.—For the seating space in theatres and assembly halls with fixed seats, including the passageways between seats, except as provided in subdivision e of this section, the minimum live load shall be taken as seventy-five pounds per square foot uniformly distributed.

(7.3.2.2.5). e. Live Loads for Public Spaces and Congested Areas.—The minimum live load shall be taken as one hundred pounds per square foot, uniformly distributed, for corridors unless otherwise provided for in this section, and for halls, lobbies, public spaces in hotels and public structures, assembly halls without fixed seats, theatre stages, cabarets, barrooms, art galleries and museums, for the ground floors and basement of all hotels, stores, restaurant, shops and office buildings, for skating rinks, grand stands, gymnasiums, dance halls, lodge rooms, stairways, fire escapes and exit passageways, and other spaces where groups of people are likely to assemble. This requirement shall be inapplicable to such spaces in private dwellings, for which the minimum live load shall be taken as in subdivision a of this section.

(7.3.2.3). **§ C26-345.0 Live Loads for Industrial or Commercial Occupancies and for Garages.**—In designing floors for industrial or commercial purposes and for all garages other than those previously mentioned, the live load shall be assumed to be the maximum caused by the use which the structure or part of the structure is to serve. The following loads in pounds per square foot uniformly distributed, shall be taken as the minimum live loads permissible for the occupancies listed, and loads at least equal shall be assumed for uses similar in nature to those listed in this section.

Floors to be used for:

1. The display and sale of light merchandise; incidental factory work in not more than twenty-five per cent of the floor area..... 75
2. Factory work, wholesale stores, storage, and stack rooms in libraries..... 120
3. Stables 75
4. Garages for private passenger cars only..... 75
   When there is floor area sufficient for the accommodation of two or more cars, the design of floors for such garages shall make provision for a concentrated load of two thousand pounds at any one point.
5. Garages for all types of vehicles, other than garages used exclusively for private passenger cars, and for mixed car usage:
   For floor construction..... 175
   For beams, columns and girders..... 120
   The design of floors for such garages shall also make provision for the heaviest concentrated loads to which the floors may be subjected, but in all cases these loads shall be assumed to be at least six thousand pounds concentrated at any point.
6. Trucking spaces and driveways within the limits of a structure..... 175
   The design of floors for such trucking spaces or driveways shall also make provision for the heaviest concentrated loads to which they may be subjected, but in all cases these loads shall be assumed as at least twelve thousand pounds concentrated at any point.

(7.3.2.4). **§ C26-346.0 Live Loads for Sidewalks.**—The minimum live load for sidewalks shall be assumed to be three hundred pounds per square foot uniformly distributed. Driveways over sidewalks shall be designed for the heaviest concentrated loads to which they may be subjected, but in all cases these loads shall be assumed as at least twelve thousand pounds concentrated at any point.

(7.3.2.5). **§ C26-347.0 Roof Loads.**—Roofs having a rise of three inches or less per foot of horizontal projection shall be proportioned for a vertical live load of forty pounds per square foot of horizontal projection applied to any or all slopes. With a rise of between three inches and twelve inches per foot, inclusive, a vertical live load of thirty pounds on the horizontal projection shall be assumed. If the rise exceeds twelve inches per foot, no vertical live load need be assumed, but provision shall be made for a wind force of twenty pounds per square foot of roof surface acting normal to such surface on one slope at a time.

(7.3.2.6). **§ C26-347.1 Roof loads for awnings, canopies, patio covers marquees and other similar structures.** Awnings, canopies and patio covers, when constructed of aluminum alloy, steel or other approved structural materials, shall be so designed and constructed as to withstand a superimposed vertical live load of twenty pounds per square foot distributed uniformly over the area of the horizontal projection of the minor structural covering.

Where access for workmen is provided the structures shall be designed to support the weight of a man 250 pounds.

Marquees shall be designed for a 30 lb. per square foot live load.

(7.3.2.6). **§ C26-348.0 Reduction of live loads.**—a. In structures intended for storage purposes all columns, piers or walls and foundations may be designed for eighty-five per cent of the full assumed live load. In structures intended for other uses the assumed live load used in designing all columns, piers or walls and foundations may be as follows:

one hundred per cent of the live load on the roof,
eighty-five per cent of the live load on the top floor,
eighty per cent of the live load on the next floor,
seventy-five per cent of the live load on the floor next below.

On each successive lower floor, there shall be a corresponding decrease in the percentage, provided that in all cases at least fifty per cent of the live load shall be assumed.

b. Girder members, except in roofs and as specified in the following subdivision, carrying a designed floor load the equivalent of two hundred square feet or more of floor area may be designed for eighty-five per cent of the specified live loads.

c. In designing trusses and girders which support columns and in determining the area of footings, the full dead loads plus the live loads may be taken with the reductions figured as permitted above.

GROUP 3

Wind Pressure

(7.3.3.1). **§ C26-349.0 General Requirements For Wind Pressure.**—All structures or parts of structures, signs and other exposed structures shall be designed, in accordance with the requirements of this title and the rules of the board, to resist, in the structural frame, horizontal wind pressure from any direction.

(7.3.3.2). **§ C26-350.0 Wind Pressure in Structures Over One Hundred Feet in Height.**—When the height of a structure is over one hundred feet, the assumed wind pressure shall be twenty pounds per square foot of exposed surface from the top of the structure down to the one-hundred-foot level.

(7.3.3.3.). **§ C26-351.0 Wind Pressure in Structures One Hundred Feet High or Less, Narrow Structures and Special Types of Structures.**—All structures one hundred feet high or less, shall be investigated as to the need for wind bracing, but, in general, wind pressure in such structures may be neglected. All structures, two hundred feet or less in height, in which the height is more than two and one-half times the least width, mill buildings, shops, roofs over auditoriums or drill sheds, and structures of similar character, shall be designed to withstand an assumed wind pressure of twenty pounds per square foot on the upper fifty percent of their height.

(7.3.3.4). § C26-352.0 Wind Pressure in Tank Towers, Stacks and Other Exposed Structures.—Tank towers, stacks and other exposed structures on the tops of buildings shall be designed to withstand an assumed wind pressure of thirty pounds per square foot of gross exposed projected area except as provided in section C26-352.1.

(7.3.3.4.1) § C26-352.1 Wind Pressure on Isolated Chimneys.—Isolated chimneys shall be designed to withstand an assumed wind pressure of thirty pounds per square foot of area. The area to be used in calculating total wind pressure shall be considered as two-thirds of the projected area for round chimneys and five-sixths of the projected area for octagonal chimneys, and the full projected area for square chimneys. The projected area shall in all cases be the diameter of the circumscribed circle multiplied by the height of the chimney, or section of chimney, under consideration.

(7.3.3.5). § C26-353.0 Stability.—The overturning moment due to wind pressure shall not exceed seventy percent of the moment of stability of the structure as measured by the dead loads in the columns, unless the structure is securely anchored to the foundation. Anchors shall be of sufficient strength to carry safely the excess overturning moment without exceeding the working stresses prescribed in sections C26-354.0 through C26-375.0 and in sections C26-510.0 through C26-527.0.

Sub-Article 4. Allowable Working Stresses

GROUP 1

General Requirements for Allowable Working Stresses

(7.4.1). § C26-354.0 General Requirements For Allowable Working Stresses.—The allowable working stresses for all materials shall be in accordance with the requirements of this article and the rules of the board.

GROUP 2

Masonry Stresses

(7.4.2.1). § C26-355.0 Calculation of Strength of Hollow Units.—The ultimate compressive strengths of all hollow units shall be calculated on the gross cross-sectional areas, with the exception of structural clay tile for partitions, which shall conform to the requirements of section C26-308.0.

(7.4.2.2.). § C26-356.0 Working Stresses For Brick Masonry.—a. The maximum allowable compressive stresses in brick masonry, due to combined live and dead loads, expressed in pounds per square inch of gross-cross-sectional area, shall be as given in the following table:

Solid wall			Hollow walls		
Lime Mortar	Cement-lime mortar	Cement mortar	Lime mortar	Cement-lime mortar	Cement mortar
100	250	325	50	125	150

b. When the average compressive strength of brick is in excess of forty-five hundred pounds per square inch, the stresses given above may be increased to ten percent of the average strength of the unit when laid in cement mortar or to eight and one-third percent when laid in cement-lime mortar, but the maximum allowable stress shall be five hundred pounds per square inch.

(c) In the design of tall chimneys the following shall be considered as the maximum fibre stresses based on the gross cross sectional area of the walls, constructed of perforated radial brick with perforations not to exceed thirty-three per cent (33%) of gross area of the brick, applying the cantilever beam formulae:

Compression—two hundred fifty pounds per square inch.

Tension—twenty-five pounds per square inch.

For the purpose of determining the stability of a chimney, the weight of the brick masonry shall be assumed to be not more than 120 pounds per cubic foot. The weight of the lining shall not be considered when calculations are made for the compression or tension stresses in the brickwork of the chimney.

(7.4.2.3). § C26-357.0 Working Stresses For Structural Clay Tile Masonry.—a. The maximum allowable compressive stress in masonry of structural clay tile, when laid in cement mortar with cells vertical, shall be one hundred twenty-five pounds per square inch of gross cross-sectional area; and when laid in cement-lime mortar with cells vertical, shall be one hundred pounds per square inch of gross cross-sectional area.

b. When such tile is laid in cement mortar with cells horizontal, the maximum allowable compressive stress shall be seventy pounds per square inch of gross cross-sectional area, and when laid in cement-lime mortar with cells horizontal, the maximum allowable compressive stress shall be sixty pounds per square inch of gross cross-sectional area.

c. Hollow building units for load bearing walls or piers shall be laid either in cement or cement-lime mortar.

(7.4.2.4). § C26-358.0 Working Stresses For Concrete Block or Tile Masonry.—a. The maximum allowable compressive stress in masonry of concrete block or tile or of solid concrete units, due to combined live and dead loads, shall be one-tenth of the ultimate compressive strength of the units prescribed in section C26-309.0, where cement mortar is used and one-twelfth where cement-lime mortar is used.

b. Concrete block or tile building units for load bearing walls or piers shall be laid in cement or cement-lime mortar.

(7.4.2.5). § C26-359.0 Requirements For Other Structural Units.—Structural units other than those specified in sections C26-307.0 through C26-310.0, shall meet the requirements of subdivision a of section C26-307.0, if classified as solid; if classified as hollow, such structural units shall meet the requirements of section C26-308.0 or section C26-309.0

(7.4.2.6). § C26-360.0 Working Stresses For Natural Stone Masonry.—The maximum allowable compressive stresses for masonry of natural stone with dressed or cut beds, due to combined live and dead loads, expressed in pounds per square inch of gross cross-sectional area, shall be as given in the following table:

Kind	Cement-lime mortar	Cement mortar
Granite	640	800
Gneiss	600	750
Limestone	400	500
Marble	400	500
Sandstone	250	300
Bluestone	300	400

The maximum allowable compressive stress for other natural cut stone masonry and for all uncut stone masonry shall be one hundred forty pounds per square inch of gross cross-sectional area in cement mortar and one hundred ten pounds in cement-lime mortar.

(7.4.2.7). § C26-361.0 *Repealed December, 1962.*

(7.4.2.8). § C26-362.0 Allowable Working Stress Requirements For Other Types of Construction.—The maximum allowable working stresses for any new masonry material or for masonry material not specified in this article, due to combined live and dead loads, shall be thirty percent of the minimum ultimate compressive strength of at least three full size wall panels, each at least nine feet high.

(7.4.3.1). § C26-363.0 *Repealed December, 1962.*

(7.4.3.2). § C26-364.0 *Repealed December, 1962.*

(7.4.3.3.). § C26-365.0 *Repealed December, 1962.*

(7.4.3.4). § C26-366.0 *Repealed December, 1962.*

GROUP 4

Allowable Working Stresses for Cast Iron

(7.4.4). § C26-367.0 Allowable Working Stresses For Cast Iron.—a. All structural members of cast iron shall be so proportioned that the sum of the maximum static stresses in pounds per square inch shall be within the following:

Tension	3,000
Shear	3,000
Bending:	
Extreme fibre compression side	16,000
Extreme fibre tension side	3,000
Compression on columns	$9{,}000 \text{ minus } 40 \frac{L}{r}$

b. The ratio of L/r shall at most be seventy, where L is the length in inches and r is the least radius of gyration.

GROUP 5

Allowable Working Stresses for Structural and Alloy Steel

C26-368.0 Allowable working stresses for structural steel.—a. It shall be unlawful to use special steel for structural members except in accordance with section C26-323.0a.

b. If the calculated stress in a structural steel member exceeds ninety per cent of the allowable stress specified in this section, for A7-60T steel, an affidavit of the producer of the steel used in the member, certifying that the steel meets the minimum requirements for structural steel as defined in section C26-322.0a, shall be filed with

the commissioner, as a condition for the issuance of the certificate of occupancy required under section C26-181.0. The calculated stresses in a structural steel member installed in a structure prior to December 13, 1948 shall not exceed ninety per cent of the allowable stress specified in this section for A7-60T steel except that the compressive stress in columns, or other compression members, installed before December 13, 1948 shall be within the value

$$\frac{18{,}000}{1 + \frac{L^2}{18{,}000r^2}}$$ but not more than

15,000 pounds per square inch and, for columns, the value L/r shall not be greater than 120.

c. Except as specifically provided in this section or sections C26-517.0, C26-520.0 and C26-521.0, all components of structures shall be so proportioned that the unit stress, in pounds per square inch, shall not exceed the following values except to the extent they are rounded off in the American Institute of Steel Construction's Specification for the Design, Fabrication and Erection of Structural Steel for Buildings adopted April 17, 1963.

1. Nomenclature

The following symbols shall carry the below designated meaning when used in this section.

A_b Nominal body area of a bolt
A_c Actual area of effective concrete flange in composite design
A_f Area of compression flange
A_s Area of steel beam in composite design
A_{st} Cross-sectional area of stiffener or pair of stiffeners
A_w Area of girder web
C_b Bending Coefficient dependent upon moment gradient; equal to

$$1.75 - 1.05\left(\frac{M_1}{M_2}\right) + 0.3\left(\frac{M_1}{M_2}\right)^2$$

C_c Column slenderness ratio dividing elastic and inelastic buckling; equal to

$$\sqrt{\frac{2\pi^2 E}{F_y}}$$

C_m Coefficient applied to bending term in interaction formula and dependent upon column curvature caused by applied moments
C_v Ratio of "critical" web stress, according to the linear buckling theory, to the shear yield point of web material
D Factor depending upon type of transverse stiffeners
E Modulus of elasticity of steel (29,000,000 pounds per square inch)
E_c Modulus of elasticity of concrete
F_a Axial compressive stress permitted in the absence of bending stress
F_{as} Axial compressive stress, permitted in the absence of bending stress, for bracing and other secondary members
F_b Bending stress permitted in the absence of axial stress
F'_b Allowable bending stress in compression flange of plate girders as reduced because of large web depth-to-thickness ratio
F'_e Euler stress divided by factor of safety; equal to

$$\frac{149{,}000{,}000}{(K\,l_b/r_b)^2}$$

F_p Allowable bearing stress
F_t Allowable tensile stress
F_v Allowable shear stress
F_y Specified minimum yield point of the type of steel being used (pounds per square inch unless otherwise noted)
I_{tr} Moment of inertia of transformed composite section
K Effective length factor as determined in the American Institute of Steel Construction's Steel Construction Manual, Sixth Edition
L Span length, in feet
L_u Maximum unbraced length of compression flange in feet for which full bending stress is permitted
M Moment
M_1 Smaller end moment on unbraced length of beam-column
M_2 Larger end moment on unbraced length of beam-column
M_D Moment produced by dead load
M_L Moment produced by live load
N Length of bearing of applied load
P Applied load
R Reaction or concentrated transverse load applied to beam or girder
S_s Section modulus of steel beam used in composite design, referred to the tension flange
S_{tr} Section modulus of transformed composite cross-section, referred to the tension flange
T_b Proof load of a high strength bolt
V Statical shear on beam
V_h Total horizontal shear to be resisted by connectors
Y Ratio of yield point of web steel to yield point of stiffener steel
a Clear distance between transverse stiffeners
a' Distance required at ends of welded partial length cover plate to develop stress
b Effective width of concrete slab
b_f Flange width of rolled beam or plate girder
c Distance from neutral axis to top of concrete slab
d Depth of beam or girder. Also diameter of roller or rocker bearing
e Horizontal displacement, in the direction of the span, between top and bottom of simply supported beam at its ends
f_a Computed axial stress
f_b Computed bending stress
f'_c Specified compression strength of concrete at 28 days
f_t Computed tensile stress
f_v Computed shear stress in pounds per square inch
f_{vs} Shear between girder web and transverse stiffener, in pounds per linear inch or single stiffener or pair of stiffeners
g Transverse spacing between fastener gage lines
h Clear distance between flanges of a beam or girder
k Coefficient relating linear buckling strength of a plate to its dimensions and condition of edge support. Also distance from outer face of flange to web toe of fillet
l Actual unbraced length, in inches
l_b Actual unbraced length in plane of bending, in inches
n Modular ratio; equal to E/E_c
q Allowable horizontal shear to be resisted by a connector
r Governing radius of gyration
r_b Radius of gyration about axis of concurrent bending
r_y Lesser radius of gyration
s Spacing (pitch) between successive holes in line of stress
t Girder or beam web thickness
t_f Flange thickness
t_t Thickness of thinner part joined by partial penetration groove weld
w Length of channel shear connectors
v Poisson's ratio

2. Tension

(1) On the net section, except at pin holes

$0.60\ F_y$

(2) On the net section at pin holes in eye bars, pin-connected plates or built-up members

$0.45\ F_y$

3. Shear

(1) On the gross section, including beam and plate girder webs

$0.40\ F_y$

4. Compression

(1) On the gross section axially loaded compression members when Kl/r, the largest effective slenderness ratio of any unbraced segment as defined in section C26-515.0 i is less than C_c.

$$F_a = \frac{\left[1 - \frac{(Kl/r)^2}{2C_c^2}\right] F_y}{F.S.}$$ Formula (1)

ADMINISTRATIVE BUILDING CODE

where

$$\text{F.S.} = \text{factor of safety} = \frac{5}{3} + \frac{3(Kl/r)}{8C_c} - \frac{(Kl/r)^3}{8C_c^3}$$

(2) On the gross section of axially loaded columns when Kl/r exceeds C_c

$$F_a = \frac{149{,}000{,}000}{(Kl/r)^2} \qquad \text{Formula (2)}$$

(3) On the gross section of axially loaded bracing and secondary members, when l/r exceeds 120, and K is taken as unity

$$F_{as} = \frac{F_a \text{ (by Formula 1 or 2)}}{1.6 - \frac{1}{200r}} \qquad \text{Formula (3)}$$

(4) On the gross area of plate girder stiffeners

$$F_a = 0.60F_y$$

(5) On the web of rolled shapes at the toe of the fillet (crippling, see section C26-517.0 a10)

$$F_a = 0.75F_y$$

5. Bending

(1) Tension and compression on extreme fibers of laterally supported compact rolled shapes and compact built-up members having an axis of symmetry in the plane of loading.

$$F_b = 0.66F_y$$

To qualify as a compact rolled shape or built-up member, the width to thickness ratio of projecting elements of the compression flange shall not exceed $1600/\sqrt{F_y}$, except that for rolled shapes, an upward variation of 3 per cent may be tolerated. The width to thickness ratio of flange plates in box sections and flange cover plates included between longitudinal lines of rivets, high strength bolts or welds, shall not exceed $6000/\sqrt{F_y}$. The depth to thickness ratio of the web shall not exceed $13{,}300/\sqrt{F_y}$. When the compact member is subjected to combined axial load and bending, the depth to thickness ratio of the web shall not exceed $13{,}300\ (1-1.43f_a/F_a)/\sqrt{F_y}$ except that it need not be less than $8000/\sqrt{F_y}$. Flanges of compact built-up sections shall be continuously connected to the web or webs. Such members shall be deemed to be supported laterally when the distance between points of support of the compression flange does not exceed 2400 $b_f/\sqrt{F_y}$, nor 20,000,000 A_f/dF_y. Beams and girders which meet the requirements of the preceding sentence and are continuous over supports or are rigidly framed to columns by means of rivets, high strength bolts or welds, may be propotioned for 9/10 of the negative moments produced by gravity loading which are maximum at points of support, provided that, for such members, the maximum positive moment shall be increased by 1/10 of the average negative moments. This reduction shall not apply to moments produced by loading on cantilevers. If the negative moment is resisted by a column rigidly framed to the beam or girder, the 1/10 reduction may be used in proportioning the column for the combined axial and bending loading, provided that the unit stress f_a, due to any concurrent axial load on the member, does not exceed $0.15F_a$.

(2) Tension and compression on extreme fibers of unsymmetrical members, except channels, supported in the region of compression stress as in section C26-368.0 c,5(1)

$$F_b = 0.60F_y$$

(3 Tension and compression on extreme fibers of box-type members whose proportions do not meet the requirements of a compact section but do conform to the provisions of section C26-515.0 j, 1 and 2

$$F_b = 0.60F_y$$

(4) Tension on extreme fibers of other rolled shapes, built-up members and plate girders

$$F_b = 0.60F_y$$

(5) Compression on extreme fibers of rolled shapes, plate girders and built-up members having an axis of symmetry in the plane of their web (other than box-type

beams and girders), the larger value computed by Formulas (4) and (5), but not more than $0.60F_y$.

$$F_b = \left[1.0 - \frac{(l/r)^2}{2C_c^2C_b}\right] 0.60F_y \qquad \text{Formula (4)}$$

$$F_b = \frac{12{,}000{,}000}{ld/A_f} \qquad \text{Formula (5)}$$

Where l/r is less than 40, stress reduction according to Formula (4) may be neglected. r is the radius of gyration of a tee section comprising the compression flange plus one-sixth of the web area, about an axis in the plane of the web; C_b, which can conservatively be taken as unity, is equal to

$$C_b = 1.75 - 1.05\left(\frac{M_1}{M_2}\right) + 0.3\left(\frac{M_1}{M_2}\right)^2, \text{ but not more than 2.3}$$

When the bending moment at any point within an unbraced length is larger than that at both ends of this length of the ratio M_1/M_2 shall be taken as unity.

(6) Compression on extreme fibers of channels, the value computed by Formula (5), but not more than

$$F_b = 0.60F_y$$

(7) Tension and compression on extreme fibers of pins

$$F_b = 0.90F_y$$

(8) Tension and compression on extreme fibers of rectangular bearing plates

$$F_b = 0.75F_y$$

6. Bearing (on contact area)

(1) Milled surfaces including bearing stiffeners and pins in reamed, drilled or bored holes

$$F_p = 0.90F_y$$

(2) Expansion rollers and rockers, pounds per linear inch

$$F_p = \left(\frac{F_y - 13{,}000}{20{,}000}\right) 660d$$

where d is the diameter of roller or rocker in inches.

(3) When parts in contact have different yield ponts F_y shall be the smaller value.

7. Combined Stresses

(1) Members subject to both axial compression and bending stresses shall be proportioned to satisfy the following requirements:

1. When $f_a/F_a \leq 0.15$

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1.0 \qquad \text{Formula (6)}$$

2. When $f_a/F_a > 0.15$

$$\frac{f_a}{F_a} + \frac{C_m f_b}{\left(1 - \frac{f_a}{F'_e}\right)F_b} \leq 1.0 \qquad \text{Formula (7a)}$$

and in addition, at points braced in the plane of bending,

$$\frac{f_a}{0.6F_y} + \frac{f_b}{F_b} \leq 1.0 \qquad \text{Formula (7b)}$$

C_m = a coefficient whose value shall be as follows:

1. For compression members in frames subject to joint translation (sideway), $C_m = 0.85$.

2. For restrained compression members in frames braced against joint translation and not subject to transverse loading between their supports in the plane of bending.

$$C_m = 0.6 + 0.4\frac{M_1}{M_2}, \text{ but not less than } 0.4$$

where M_1/M_2 is the ratio of the smaller to larger moments at the ends of that portion of the member, unbraced in the plane of bending, under consideration. M_1/M_2 is positive when the member is bent in single curvature and negative when it is bent in reverse curvature.

3. For compression members in frames braced against joint translation in the plane of loading and subtracted to transverse loading between their supports, the value of C_m may be determined by rational analysis. However, in lieu of such analysis, the following values may be used: (a) for members whose ends are restrained, $C_m = 0.85$, (b) for members whose ends are unrestrained, $C_m = 1$.

(2) Members subject to both axial tension and bending stresses shall be proportioned to satisfy the requirements of formula (7b), of subsection (1) above when f_a and F_a are taken, respectively, as the computed and permitted bending tensile stress. However, the computed bending compressive stress taken alone, shall not exceed the value permitted by Formulas (4) and (5).

(3) Rivets and bolts subject to combined shear and tension due to force applied to the connected parts, shall be so proportioned that the tension stress produced by the force shall not exceed the following:

For A141 rivets	$F_t = 28{,}000 - 1.6f_v \leq 20{,}000$
For A195 and A406 rivets	$F_t = 38{,}000 - 1.6f_v \leq 27{,}000$
For A307 bolts	$F_t = 20{,}000 - 1.6f_v \leq 14{,}000$
For A325 bolts in bearing-type joints	$F_t = 50{,}000 - 1.6f_v \leq 40{,}000$
For A354, Grade BC, bolts in bearing-type joints	$F_t = 60{,}000 - 1.6f_v \leq 50{,}000$

where f_v, the shear stress produced by the same force, shall not exceed the value for shear given in section C26-368.0 c, 8.

For bolts used in friction-type joints, the shear stress allowed in section C26-368.0 c, 8 shall be reduced so that:

For A325 bolts	$F_v \leq 15{,}000\ (1 - f_t A_b/T_b)$
For 354, Grade BC, bolts	$F_v \leq 20{,}000\ (1 - f_t A_b/T_b)$

where f_t is the tensile stress due to applied load and T_b is the proof load of the bolt.

8. Rivets and Bolts

(1) Allowable unit tension and shear stresses on rivets, bolts and threaded parts (in pounds per square inch of area, of rivets before driving, or the unthreaded body area of bolts and threaded parts) shall be as given in the following table:

Description of Fastener	Tension (F_t)	Shear (F_v)	
		Friction Type Connection	Bearing Type Connection
A141 hot-driven rivets	20,000		15,000
A195 and A406 hot-driven rivets	27,000		20,000
A307 bolts and threaded parts of A7 and A373 steel	14,000		10,000
Threaded parts of other steels	$0.40F_y$		$0.30F_y$
A325 bolts when threading is not excluded from shear planes	40,000	15,000	15,000
A325 bolts when threading is excluded from shear planes	40,000	15,000	22,000
A354, Grade BC, bolts when threading is not excluded from shear planes	50,000	20,000	20,000
A354, Grade BC, when threading is excluded from shear planes	50,000	20,000	24,000

(2) Allowable bearing stress on projected area of bolts in bearing-type connections and on rivets

$$F_p = 1.35F_y$$

where F_y is the yield point of the connected part.

(3) Bearing stress not restricted in friction-type connections assembled with A325 and A354 Grade BC, bolts.

9. Welds

(1) Stress in fillet, plug, and slot welds, tension stress transverse to the axis of partial penetration groove welds and shear in such welds, when made with A233 Class E60 series electrodes or by submerged arc welding Grade SAW-1 on all steels, or with A233 Class E70 series electrodes or by submerged arc welding Grade SAW-2 on A7 and A373 steels 13,600

(2) Stress in fillet, plug, and slot welds, tension stress transverse to the axis of partial penetration groove welds and shear in such welds, when made with A233 Class E70 series electrodes or by submerged arc welding Grade SAW-2 on A36, A242 and A441 steels 15,800

(3) The full stresses allowed by section C26-368.0 c for the connected material shall apply to complete penetration groove welds stressed in tension, compression, bending, shear and bearing or in tension parallel to the axis of the weld.

d. Members and connections subject to repeated variation of stress due to moving loads.

1. Up to 10,000 Complete Stress Reversals.—The stress carrying area of members, connection material and fasteners need not be increased because of repeated variation or reversal of stress unless the maximum stress allowed by Section C26-368.0 c is expected to occur over 10,000 times in the life of the structure (10,000 is approxmiately equivalent to one application per day for 25 years).

2. 10,000 to 100,000 Cycles of Maximum Load.—Members, connection material and fasteners (except high strength bolts in friction-type joints) subject to more than 10,000 but not over 100,000 applications of maximum design loading shall be proportioned, at unit stresses allowed in section C26-368.0 c for the kind of steel and fasteners used, to support the algebraic difference (tensile stress is designated as positive and compression stress as negative) of the maximum computed stress and two-thirds of the minimum computed stress, but the stress-carrying area shall not be less than that required in proportioning the member, connection material and fasteners to support either the maximum or minimum computed stress at the values allowed in section C26-368.0 c. for the kind of steel and fasteners used (100,000 is approximately equivalent to ten applications per day for 25 years).

3. 100,000 to 2,000,000 Cycles of Maximum Load.—Members, connection material and fasteners (except high tensile strength bolts in friction-type joints) subject to more than 100,000 but not more than 2,000,000 applications of maximum design loading shall be proportioned at unit stresses allowed in section C26-368.0 c for A7 steel, A141 rivet steel, and E60 series and submerged arc Grade SAW-1 welds to support the algebraic difference of the maximum computed stress and 2/3 of the minimum computed stress, but the stress-carrying area shall not be less than that required in proportioning the member, connection material and fasteners to support either the maximum or minimum computed stress at the values allowed in section C26-368.0 c for the kind of steel and fasteners used (2,000,000 is approximately equivalent to 200 applications per day for 25 years).

4. Over 2,000,000 Cycles of Maximum Load.—Members, connection material and fasteners (except high strength bolts in friction-type joints) subject to more than 2,000,000 applications of maximum design loading shall be proportioned at two-thirds of the unit stress allowed in section C26-368.0 c for A7 steel, A141 rivet steel, and E60 series and submerged arc Grade SAW-1 welds to support the algebraic difference of the maximum computed stress and three-quarters of the minimum computed stress, but the stress-carrying area shall not be less than that required in proportioning the member, connection material and fastener to support either the maximum or minimum computer stress at the values allowed in section C26-368.0 c for the kind of steel and fasteners used.

5. Details—Members subject to the provisions of section C26-368.0 d2, d3, and d4 shall have no sharp notches, sharp copes or attachment of clips, brackets or similar details, at locations where the stress exceeds 75 per cent of that allowed in this section.

6. High Strength Bolted Connections—High strength bolts in friction-type joints shall be proporioned at the unit stresses allowed in section C26-368.0 c7 and 8 to resist the largest static stress on the joint produced by any single application of the design loads.

GROUP 6

Allowable Working Stresses for Cast Steel

C26-369.0 Allowable Working Stresses for Cast Steel and Steel Forgings.—All structural members of cast or forged steel shall be so proportioned that the sum of the maximum unit stresses in pounds per square inch shall not be more than the applicable allowable stresses permitted for structural steel under section C26-368.0 c.

GROUP 7

Allowable Working Stresses of Lumber and Timber

§ C26-370.0 General.—a. The quality and design of wood members and their fastenings used for load supporting purposes shall conform to the standards hereinafter specified.

b. All members shall be framed, anchored, tied and braced so as to develop the strength and rigidity necessary for the purposes for which they are used.

c. Preparation, fabrication and installation of wood members and the glues, connectors and mechanical devices for the fastening thereof, shall conform to good engineering practices.

d. Except as otherwise specifically provided in this code, the "National Design Specification for Stress-grade Lumber and its Fastenings," National Lumber Manufacturers Association, 1944, Revised 1953, shall be accepted as good engineering practice covering design with and use of stress-grade lumber, of glued laminated lumber and of their fastenings.

e. All lumber and timber used as structural members of any structure and the studs of bearing partitions and non-bearing partitions of any structure, shall bear the official mark and trade mark, or such other authentication as may be approved by the superintendent, of the association under whose grade rules such lumber or timber was manufactured, or representative of such independent inspection agencies that have been certified by the Board of Review of the American Lumber Standards Committee and approved by the commissioner. The official grade marks and trade marks or other authentication acceptable to the superintendent shall be placed upon the lumber before it is delivered to the site where it is to be used. Structural lumber or studs of partitions that do not bear such marks shall not be placed upon a site of a building under construction or alteration and shall not be placed within such buildings.

§ C26-370.1. Definitions.—a. "Nominal size lumber" is the commercial size designation of width, and depth, in standard lumber grades, somewhat larger than the standard net size of dressed lumber.

b. "Stress grade lumber" is a lumber grade defined in such terms that a definite working stress may be assigned to it.

c. "Structural glued laminated lumber" shall mean any member comprising an assembly of laminations of lumber in which the grain of all laminations is approximately parallel longitudinally and in which the laminations are bonded with adhesives and which conforms to the standards applicable thereto.

d. "National Design Specification for Stress-grade Lumber and its Fastenings" shall mean the design specifications for stress grade lumber and its fastening recommended by the National Lumber Manufacturers Association, as established in 1944 and as revised in 1953.

§ C26-370.2 Sizes of Structural Members.—a. Wood structural members shall be of sufficient size to carry the dead and required live loads without exceeding the allowable working stresses hereinafter specified.

b. Minimum sizes of wood members required by this code refer to nominal sizes The dressed sizes established for sawn lumber in American lumber standards, SPR 16-53, and for structural glued laminated lumber in the national design specification for stress-grade lumber and its fastenings shall be accepted as the minimum net sizes conforming to nominal sizes. Computations to determine the required sizes of members shall be based on their actual sizes and not the nominal sizes. Nominal sizes may be shown on the plans except that if rough sizes or dressed sizes other than those provided in the aforementioned standards are to be used, the actual sizes shall be shown on the plans.

c. Where structures are designed for use of stress-grade lumber, or structural glued laminated lumber, the sizes and the allowable unit stress and the species and the grade shall be shown on the plans.

§ C26-370.3 Allowable Stresses.—a. Except as hereinafter provided, induced stresses shall not exceed the allowable working stresses in pounds per square inch for the respective species and stress-grades of sawn lumber given in the following tables; provided further, that other grades may be approved, and the allowable stresses therefor shall be established by the superintendent in accordance with the principles set forth in the national design specification for stress-grade lumber and its fastenings.

Stresses allowed for joint and plank grades apply to members with the load applied to either the narrow or wide face.

b. Stresses that exceed those given in the tables for the lowest stress-grade of any species shall be used only when the higher grade of that species is identified by

1 Species and commercial grade[1]	2 Rules under which graded	Allowable Unit Stresses in Pounds per Square Inch: 3 Extreme fiber in bending "f" and tension parallel to grain "t"	4 Horizontal shear "H"	5 Compression perpendicular to grain "cT"	6 Modulus of elasticity "E"	7 Compression parallel to grain "c"
Cypress, Southern:						
1700 f Grade	J&P.—B&S.	1700	145			1425
1300 f Grade	J&P.—B&S.	1300	120			1125
1450 c Grade	P&T.	....	....	360	1,200,000	1450
1200 c Grade	P&T.	....	....			1200
Cypress, Tidewater Red:						
1700 f Grade	J&P.—B&S.	1700	145			1425
1300 f Grade	J&P.—B&S.	1300	120			1125
1450 c Grade	P&T.	....	....	360	1,200,000	1450
1200 c Grade	P&T.	....	....			1200
Douglas Fir, Coast Region:						
Dense Select Structural	J&P[2]—B&S[2]	2150	145	455		1550
Select Structural	J&P[2]—B&S[2]	1900	120	415		1450
1700 f.—Dense No. 1[6]	J&P[2]—B&S[2]	1700	145	455		1325
1450 f.—No. 1	J&P[2]—B&S[2]	1450	120	390		1200
1100 f.—No. 2	J&P.	1100	110	390	1,600,000	1057
Dense Select Structural[6]	P&T.	....	....	455		1550
Select Structural	P&T.	....	....	415		1450
Dense No. 1[6]	P&T.	....	....	455		1400
No. 1	P&T.	....	....	390		1200
Douglas Fir, Inland Region:						
Select Structural[6]	J&P[2]	2150	145	455	1,600,000	1750

1 Species and commercial grade [1]		2 Rules under which graded	Allowable Unit Stresses in Pounds per Square Inch: 3 Extreme fiber in bending "f" and tension parallel to grain "t"	4 Horizontal shear "H"	5 Compression perpendicular to grain "cT"	6 Modulus of elasticity "E"	7 Compression parallel to grain "c"
Structural	J.&P.[2]	Western Pine Association, 1953	1900	100	400	1,500,000	1400
Common Structural	J.&P.[2]		1450	95	380	1,500,000	1250
Select Structural [5]	P.&T.		....	....	455	1,600,000	1750
Structural	P.&T.		....	....	400	1,500,000	1400
Common Structural	P.&T.		....	....	380	1,500,000	1250
Hemlock, Eastern:							
Select Structural	J.&P.[2]—B.&S.[2]	Northern Hemlock and Hardwood Manufacturers Association, 1950	1300	85	360	1,100,000	850
Prime Structural	J.&P.[2-8]		1200	60			775
Common Structural	J.&P.[2-8]		1100	60			650
Utility Structural	J.&P.[2-8]		950	60			600
Select Structural	P.&T.		....	....			850
Hemlock, West Coast:							
1600 f.—Select Structural	J.&P.[2]	West Coast Bureau of Lumber Grades and Inspection, 1948	1600	100	360	1,400,000	1100
1450 f.—No. 1	J.&P.[2]—B.&S.[2]		1450	100			1075
1100 f.—No. 2	J.&P.[2]		1100	90			850
No. 1 Hemlock Timbers	P.&T.		....	....			1075
Maple, Hard:							
2150 f Grade	J.&P.	National Hardwood Lumber	2150	145	600	1,600,000	1750
1900 f Grade	J.&P.—B.&S.		1900	145			1525
1700 f Grade	J.&P.—B.&S.		1700	145			1350
1450 f Grade	J.&P.—B.&S.		1450	120			1150

1 Species and commercial grade [1]		2 Rules under which graded	Allowable Unit Stresses in Pounds per Square Inch: 3 Extreme fiber in bending "f" and tension parallel to grain "t"	4 Horizontal shear "H"	5 Compression perpendicular to grain "cT"	6 Modulus of elasticity "E"	7 Compression parallel to grain "c"
1550 c Grade	P.&T.	Association, 1943	....	....			1550
1450 c Grade	P.&T.		....	....			1450
1200 c Grade	P.&T.		....	....			1200
Oak, Red and White:							
2150 f Grade	J.&P.	National Hardwood Lumber Association, 1943	2150	145	600	1,500,000	1550
1900 f Grade	J.&P.—B.&S.		1900	145			1375
1700 f Grade	J.&P.—B.&S.		1700	145			1200
1450 f Grade	J.&P.—B.&S.		1450	120			1050
1300 f Grade	B.&S.		1300	120			950
1325 c Grade	P.&T.		....	....			1325
1200 c Grade	P.&T.		....	....			1200
1075 c Grade	P.&T.		....	....			1075
Pine, Norway:							
Prime Structural	J.&P.[2-8]	Northern Hemlock and Hardwood Manufacturers Assn., 1947	1200	75	360	1,200,000	900
Common Structural	J.&P.[2-8]		1100	75			775
Utility Structural	J.&P.[2-8]		950	75			650
Pine, Southern: [6]							
Dense Select Structural [5]	J.&P.—B.&S.		2400	120[7]	455		1750
Dense Structural [5]	J.&P.—B.&S.		2000	120[7]	455		1400
Dense Structural S.E.&S.[5]	J.&P.—B.&S.		1800	120[7]	455		1300
Dense No. 1 Structural [5]	J.&P.—B.&S.		1600	120[7]	455		1150

1 Species and commercial grade [1]	2 Rules under which graded	—Allowable Unit Stresses in Pounds per Square Inch— 3 Extreme fiber in bending "f" and tension parallel to grain "t"	4 Horizontal shear "H"	5 Compression perpendicular to grain "cT"	6 Modulus of elasticity "E"	7 Compression parallel to grain "c"
No. 1 Dense 1400f [9-5]	J.&P.—B.&S.	1400	140	455		1400
No. 1 1200F [5]	J.&P.—B.&S.	1200	120	390		1200
No. 1 Dense [5]	J.&P.[8]	1700	150	455		1400
No. 1	J.&P.[8]	1450	125	390		1200
No. 2 Dense [5]	J.&P.[8]	1250	100	455	1,600,000	1025
No. 2	J.&P.[8]	1100	85	390		875
Dense Select Structural [5]	P.&T.			455		1750
Dense Structural [5]	P.&T.			455		1400
Dense Structural S.E.&S. [5]	P.&T.			455		1300
Dense No. 1 Structural [5]	P.&T.			455		1150
No. 1 Dense 1400f [9-5]	P.&T.	1400	140	455		1400
No. 1 1200F [9]	P.&T.	1200	120	390		1200
Pine, Southern Longleaf: [4]						
Select Structural Longleaf [5-6]	J.&P.—B.&S.	2400	120[7]			1750
Prime Structural Longleaf [5-6]	J.&P.—B.&S.	2000	120[7]			1400
Merchantable Structural Longleaf [5-6]	J.&P.—B.&S.	1800	120[7]			1300
Structural S.E.&S. Longleaf [5]	J.&P.—B.&S.	1800	120[7]			1300
No. 1 Structural Longleaf [5]	J.&P.—B.&S.	1600	120[7]			1150
No. 1 Longleaf 1400f [9-5]	J.&P.—B.&S.	1400	140			1400
No. 1 Longleaf [5]	J.&P.[8]	1700	150	455	1,600,000	1400
No. 2 Longleaf [5]	J.&P.[8]	1250	100			1025

1 Species and commercial grade [1]	2 Rules under which graded	—Allowable Unit Stresses in Pounds per Square Inch— 3 Extreme fiber in bending "f" and tension parallel to grain "t"	4 Horizontal shear "H"	5 Compression perpendicular to grain "cT"	6 Modulus of elasticity "E"	7 Compression parallel to grain "c"
Select Structural Longleaf [5-6]	P.&T.	....	....			1750
Prime Structural Longleaf [5-6]	P.&T.	....	....			1400
Merchantable Structural Longleaf [5-6]	P.&T.	....	....			1300
Structural S.E.&S. Longleaf [5]	P.&T.	....	....			1300
No. 1 Structural Longleaf [5]	J.&P.—B.&S.*	....	....			1150
No. 1 Longleaf 1400f [9-5]	P.&T.	1400	140			1400
Poplar, Yellow:						
1500 f Grade	J.&P.	1500	110			1200
1250 f Grade	J.&P.—B.&S.	1250	110	300	1,100,000	950
1075 c Grade	P.&T.	....	....			1075
Redwood:						
Dense Structural [5]	J.&P.[2]—B.&S.[2]	1700	110			1450
Heart Structural	J.&P.[2]—B.&S.[2]	1300	95			1100
Dense Structural [5]	P.&T.	....	....	320	1,200,000	1450
Heart Structural	P.&T.	....	....			1100

* Intended to read "P.&T."

STRESSES FOR JOISTS AND PLANKS, BEAMS AND STRINGERS, POSTS AND TIMBERS—Continued

1 Species and commercial grade [1]	2 Rules under which graded	—Allowable Unit Stresses in Pounds per Square Inch— 3 Extreme fiber in bending "f" and tension parallel to grain "t"	4 Horizontal shear "H"	5 Compression perpendicular to grain "cT"	6 Modulus of elasticity "E"	7 Compression parallel to grain "c"
Spruce, Eastern:						
1450 f Structural Grade	J.&P.[2]	Northeastern Lumber Manufacturers Association, Inc., 1950	1450	110	300	1,200,000	1050
1300 f Structural Grade	J.&P.[2]		1300	95			975
1200 f Structural Grade	J.&P.[2]		1200	95			900

[1] Abbreviations: J.&P., Joists and Planks; B.&S., Beams and Stringers; P.&T., Posts and Timbers; S.E.&S., Square Edge and Sound.
[2] The allowable stresses for tension and compression parallel to gain given for these Joist and Plank and Beam and Stringer grades are applicable when graded according to Par. 310 of Misc. Pub. 185, U. S. Dept. of Agr.
[4] According to 1948 Standard Grading Rules, including Supplement No. 1 thereto.
[5] These grades meet the requirements for density.
[6] These grades are based on requirements for heartwood.
[7] The grading rules provide a basis for obtaining higher shearing stresses of 140,160 and 180 pounds per square inch when specified.
[8] These grades are applicable to 2 inch thickness only.
[9] These grades are applicable only in sizes 3 inches and thicker.

the grade mark of, or certificate of inspection by, a lumber grading or inspection bureau or agency recognized as being competent.

c. The allowable stresses herein also apply to lumber that has been pressure impregnated by an approved process and preservative.

§ C26-370.4 Adjustment of Allowable Stresses.—a. Allowable unit stresses given in the tables may be used without regard to impact if the stress induced by impact does not exceed the allowable unit stress given therein.

Where a member is to be fully stressed to the maximum allowable stress for many years, either continuously or cumulatively under the condition of maximum design load, the allowable working stresses shall not exceed 90 per cent of those in the tables. The provisions of this paragraph apply to modulus of elasticity only when used to determine the allowable loads for columns or other members in compression parallel to grain. They also apply to mechanical fastenings unless otherwise noted.

b. The allowable unit stresses given in the tables and the adjustments thereof apply to stress-grade lumber used under conditions continuously dry, as in most covered structures. When used under other conditions the provisions in the national design specification for stress-grade lumber and its fastenings therefor shall apply.

The allowable unit stress apply to stress-grade lumber that has been pressure impregnated by an approved process and preservative and to the heartwood of a durable species under dry conditions of use. They also apply thereto under other conditions of use except as provided in the national design specification.

c. Horizontal shear. The maximum allowable unit stress in horizontal shear in beams and other members in flexure shall be computed by use of the following formula:

$$H = \frac{3\,R}{2\,b\,h} \text{ in which}$$

R = reaction, pounds, under the following conditions:

Distribution of load to adjacent beams through flooring or other members shall be considered;

All loads uniform or concentrated, within a distance of the height of the beam from the nearest support shall be neglected;

All concentrated loads located at a distance from the support of one to three times the height of the beam shall be considered as placed at three times the height of the beam from the support.

d. Joint details, compression. In joists supported on a ribbon or ledger board and spiked to the studs, the allowable stress in compression perpendicular to the grain shall be increased fifty per cent (50%).

For bearings less than six (6) inches in length and located three (3) inches or more from the end of a timber the allowable compression stresses perpendicular to grain shall be increased in accordance with the following factors:

Length of bearing (inches)	½	1	1½	2	3	4	6 or more
Factor	1.75	1.38	1.25	1.19	1.13	1.10	1.00

For stress under a washer or small plate the same factor may be taken as for a bearing, the length of which equals the diameter of the washer.

e. Shear allowable unit stresses in shear for joint details shall be one hundred fifty per cent (150%) of the horizontal shear values otherwise permitted.

In computing the horizontal shear in eccentric joints the effective depth of the member shall be assumed as its actual depth less the distance from the unloaded edge to the nearest edge of the nearest connector. Where bolts alone are used subtract the distance from the unloaded edge to the center of the nearest bolt.

f. Notches. Where girders, beams or joists are notched they shall meet design requirements for net section in bending and in shear. Beams notched upward in the face at their bearing on supports shall be limited to the maximum end reaction "V" as determined by the formula:

$$V = \frac{2\,bd^2\,H}{3\,h} \text{ in which}$$

"V" is the vertical shear at the section under consideration, "b" is the breadth

and "h" is the total depth of the member, "d" is the height of the member above the notch, and "H" is the allowable stress in horizontal shear.

§ C26-370.5 Timber Column Design.—a. Simple solid wood columns consist of a single piece.

The safe load, in pounds per square inch, of net cross-sectional area for single solid columns, and other solid members stressed in compression parallel to the grain shall be determined by the following formula:

$$P/A = \frac{0.30\ E}{(l/d)^2}$$

—but the maximum unit load (P/A) shall not exceed the allowable unit stress in compression parallel to grain "c" as set forth in the tables adjusted as otherwise provided.

Simple solid columns shall be limited in maximum length to $l/d = 50$.

A = area in square inches of net cross-section.
d = least dimension, of columns, in inches.
E = modulus of elasticity, "E", in tables adjusted as provided.
l = laterally unsupported length of column, in inches.
P = total load, in pounds.
P/A = maximum axial load, in pounds per square inch.

b. Spaced Member Columns. Columns formed of two or more individual members separated by blocking at the ends and middle points of their length and joined at the ends by approved timber connectors shall be designed in accordance with the national design specification for stress-grade lumber and its fastenings.

The individual members of spaced columns shall be limited in maximum length to $l/d = 80$.

c Round Columns. The allowable load for a column of round cross-section shall not exceed that permitted for a square column of the same cross-sectional area.

d. Built-up columns. Built-up columns composed of two or more members spiked or bolted together shall be designed in accordance with the principles set forth in the National Design Specifications for Stress-Grade Lumber and Its Fastenings.

§ C26-370.6 Timber Connectors and Fastenings.—Except as otherwise provided, the design with, allowable loads for, and installation of timber connectors and other mechanical fastenings of wood members shall be in accordance with the National Design Specification for Stress-Grade Lumber and its Fastenings.

(7 4.7.1). § C26-371.0 Grade-Marked Timbers.—Grade-marked timbers of higher structural qualities and grades may be approved by the superintendent for use with higher stresses based on authoritative test data.

GROUP 8

Allowable Working Stresses for Wind Loads

(7.4.8.1). § C-26-372.0 Maximum Negligible Wind Stress.—When the stress in any member due to wind is less than thirty-three and one-third per cent of the stress due to live and dead loads, such stress due to wind may be neglected.

(7.4.8.2). § C26-373.0 Combined Stresses.—For combined stresses due to wind and other loads the permissible working stress may be increased by thirty-three and one-third per cent, provided the section thus found is at least that required by the dead and live loads alone.

(7.4.8.3). § C26-374.0 Stresses From Wind Only.—For stresses due to wind only, the permissible working stress shall be the same as for live and dead loads, with the exception of rivets, bolts and welds, where the permissible working stress may be increased by thirty-three and one-third per cent.

(7.4.8 4). § C26-375.0 Wind Loads When Special Steels Are Used.—If the use of any special steel shall be contemplated, with higher unit stresses for live and dead loads corresponding with the greater strength of such steel, it shall be permissible to increase materially the stresses imposed by assumed wind pressure alone, over those specified for low carbon steels only after a careful consideration of the effect of such increase on the general rigidity of the structure contemplated.

GROUP 9

Allowable Working Stresses for Structural Aluminum

§ C26-375.1 Allowable Working Stresses for Different Aluminum Alloys.—a. It shall be unlawful to use aluminum alloy structural members except as provided in section C26-325.2.

b. Allowable working stresses for structural aluminum of alloys 6061-T6 and 6062-T6.

1. The allowable stresses to be used in proportioning the parts of a structure where the alloys known commercially as 6061-T6 and 6062-T6 are used shall be determined from tables 1 through 4. The terms appearing in the formulas shown in the tables are defined as follows:

a_1 = shorter span of rectangular shear panel, in.
a_2 = longer span of rectangular shear panel, in.
a_e = equivalent span of rectangular shear panel, in.
b = clear width of outstanding flange or of flat plate supported on both unloaded edges, in.
d = depth of beam, in.
d_1 = distance from toe of compression flange to neutral axis, in.
h = clear height of shear web, in.
I_y = moment of inertia of a beam (about axis parallell to web), $in.^4$
L = length of compression member between points of lateral support or twice the length of a cantilever column (except where analysis shows that a shorter length can be used), in.
L_b = length of beam between points at which the compression flange is supported against lateral movement or length of cantilever beam from free end to point at which the compression flange is supported against lateral movement, in.
R = outside radius of a round tube or maximum outside radius for an oval tube, in.
R_b = outside radius of a round tube in bending or outside radius at the location of the critical compressive stress for an oval tube in bending, in. (The location of the critical compressive stress is at the extreme fiber for an oval tube bent about the major axis. For an oval tube bent about the minor axis, the location of the critical stress can be determined by calculating the allowable stress at several points with R_b equal to the outside radius at each point. Bending moments corresponding to the allowable stresses at the various points are calculated, and the point resulting in the smallest bending moment is the location of the critical compressive stress.)
r = least radius of gyration of a column, in.
r_y = radius of gyration of a beam about axis parallel to web, in. (For beams that are unsymmetrical about the horizontal axis, r_y should be calculated as though both flanges were the same as the compression flange.)
S_e = section modulus of a beam (compression side), $in.^3$
t = thickness of flange, plate, web or tube, in. (For tapered flanges, t is the average thickness.)

2. Limiting slenderness ratio for columns.

The slenderness ratio L/r for columns shall not exceed 120.

3. Combined compression and bending.

The allowable stress in a member subjected to both compression and bending shall be determined from one of the following three formulas:

If the bending moment at the center of the span is equal to or greater than 0.9 of the maximum bending moment in the span,

$$\frac{f_a}{F_a} + \frac{f_b}{F_b(1-f_a/F_e)} \leq 1 \qquad (1)$$

where f_a = average compressive stress on cross section of member produced by compressive load, ksi.

f_b = maximum bending stress (compression) caused by transverse loads or end moments in the absence of axial load, ksi.

F_a = allowable compressive stress for member considered as an axially loaded column, ksi.

F_b = allowable compressive stress for member considered as a beam, ksi.

$F_e = 51{,}000/(L/r)^2$
in which L/r = slenderness ratio for member considered as a column tending to fail in the plane of the applied bending forces.

If the bending moment at the center of the span is not more than one-half the maximum bending moment in the span,

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1 \qquad (2)$$

If the moment at the center of the span is between 0.5 and 0.9 of the maximum moment,

$$\frac{f_a}{F_a} + \frac{f_b}{F_b\,[1-(2M_c/M_m-1)\,f_a/F_e]} \leq 1 \qquad (3)$$

where M_c = bending moment at center of span resulting from applied bending loads, in-kips.

M_m = maximum bending moment in span resulting from applied bending loads, in-kips.

4. Cross sections with part of an area affected by heat of welding.
If less than 15 per cent of the area of a given cross section lies within one inch of a weld, the effect of the welds can be neglected and allowable stress for that cross section can be calculated by the formulas in table 1. If the area of a cross section that lies within one inch of a weld is between 15 per cent and 100 per cent of the total area of the cross section, the allowable stress shall be calculated by the following formula;

$$f_{pw} = f_a - \frac{A_w}{A}(f_a - f_w) \qquad (4)$$

where f_{pw} = allowable stress on cross section, part of whose area lies within one inch of a weld, ksi.

f_a = allowable stress for same cross section if there were no welds present (see table 1), ksi.

f_w = allowable stress for same cross section if entire area lies within one inch of a weld (see table 2), ksi.

A = net area of cross section of a tension member or tension flange of a beam, or gross area of cross section of a compression member or compression flange of a beam, sq. in. (A beam flange is considered to consist of that portion of the member farther than 2c/3 from the neutral axis, where c is the distance from the neutral axis to the extreme fiber).

A_w = area within area A that lies within one inch of weld, sq. in.

5. Columns and single web beams with welds at locations other than ends and cantilever columns and single web beams.

The allowable stresses in specifications I-7b and I-8b (see table 2) apply to members supported at both ends with welds at the ends only (not farther from the supports than 0.05 of the length of the column or beam).

For cantilever columns or beams and for columns and beams having welds at locations other than the ends, the allowable stress shall be determined from the following:

Members with welds affecting the entire cross section:

$$f_a > 18.4, \qquad f_w = 11$$

$$18.4 \geq f_a > 3.8, \qquad f_w = \frac{15.5}{\sqrt{20.4-f_a}} \qquad (5)$$

$$f_a \leq 3.8, \qquad f_w = f_a$$

where f_a and f_w are as previously defined.

Members with welds affecting less than the entire cross section:

The allowable stress shall be determined from Eq. 4, where the value of f_w is given by Eq. 5.

6. Single web beams and girders.

The simplified formulas of table 1 give very conservative values of allowable stress of values of L_b/r_y exceeding about 50. If the designer wishes to compute more precise values of allowable compressive stress for single web beams and girders, the value of r_y in specification A-11b may be replaced by an "effective r_y" given by the following formula:

$$\text{Effective } r_y = \frac{1}{1.7}\sqrt{\frac{I_y d}{S_c}}\sqrt{1 + 0.152\,\frac{J}{I_y}\left(\frac{L_b}{d}\right)^2} \qquad (6)$$

where d = depth of beam, in.

I_y = moment of inertia of beam about axis parallel to web, in.^{4}

J = torsion constant of beam, in.^{4}

S_c = section modulus of beam for compression flange, in.^{3}

7. In applications where it is conventional practice to increase allowable stresses for certain type of loads, such as wind loads, the allowable stresses in these specifications should be increased in the same proportion as are the allowable stresses in accepted specifications for steel structures.

(See Tables 1 on pages 204 and 205 and 2 on pages 206 and 207.)

Table 3

ALLOWABLE SHEAR STRESSES IN RIVETS AND BOLTS
(BUILDING STRUCTURES)

Specification Number	Description of Rivets or Bolts	Allowable Stress, ksi: Shear on Effective Shear Area	Allowable Stress, ksi: Tension on Root Area
A-22b	6061-T6 rivets, cold driven	11	..
A-23b	6061-T43 rivets, driven at temperatures of from 900°F to 1,050°F	9	..
A-24b	2024-T4 bolts	16[a]	26
A-25b	6061-T6 pins	11	..

[a] This allowable shear stress applies to either turned bolts in reamed holes or unfinished bolts in 1/16-in. oversize holes.

Table 4

ALLOWABLE SHEAR STRESSES IN FILLET WELDS
(BUILDING STRUCTURES)

Specification Number	Filler Alloy	Allowable Shear Stress, ksi: Transverse Shear in Single Fillet Welds or Longitudinal Shear[b]	Allowable Shear Stress, ksi: Transverse Shear in Double Fillet Welds[b]
I-22b	5556	8.5	9[c]
I-23b	5356	7	9[c]
I-24b	4043	5	7

[a] Shear stress is considered to be equal to the load divided by the throat area, regardless of the direction of loading.

[b] Single fillet welds in transverse shear may be treated as double fillet welds in joints so designed as to prevent local bending of the parts adjacent to the fillet weld.

[c] These values are controlled by the shear strength of the parent material; all other values are controlled by the strength of the filler metal.

c. All parts of the structures shall be so proportioned that the sum of the maximum static stresses for the aluminum alloy known commercially as 2014-T6 shall be within the following:

	Kips per square inch
1. Tension stresses.	
(1) Axial tension	22
(2) Tension in extreme fibers of shapes subject to bending, net section	22

2. Axial compression.

(1) Allowable compression stress on the gross section of axially loaded columns shall be determined from curves in Graph, in Figure 1a and Figure 4a, whichever is smaller.

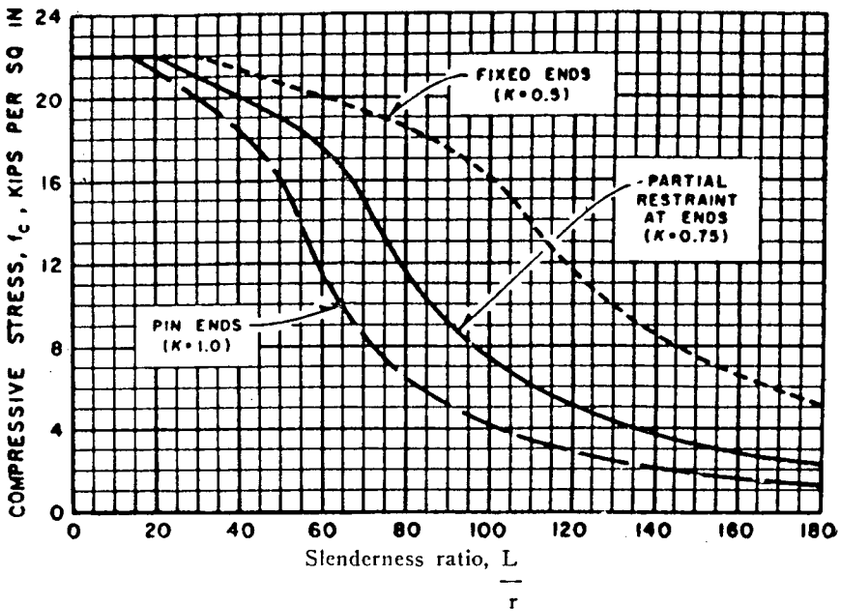


Figure 1a. Allowable compressive stresses for axially loaded columns (gross section)

The value of K in graph, in figure 1a, describes the end restraint of the column. Values smaller than 0.75 shall not be used unless a detailed analysis of the structure justifies complete fixed assumption for the column ends. The slenderness ratio $\frac{L}{r}$ for columns shall not exceed 120.

The formulas for the three curves in graph, in figure 1a, can be written as follows:

$$f_c = \frac{\pi^2 \quad E_t}{2.5 \quad \left(\frac{kL}{r}\right)^2}$$ in which

f_c is the allowable compressive stress on the gross cross-sectional area in kips per square inch.

E_t is the tangent modulus taken from figure 2a, using a stress of 2.5 times f_c in kips per square inch.

r is the least radius of gyration of the column in inches.

K is the factor for end restraint.

For values of $\frac{L}{r}$ greater than 72, and K equal to .75, the formula $f_c = \frac{74{,}000}{\left(\frac{L}{r}\right)^2}$ can be used.

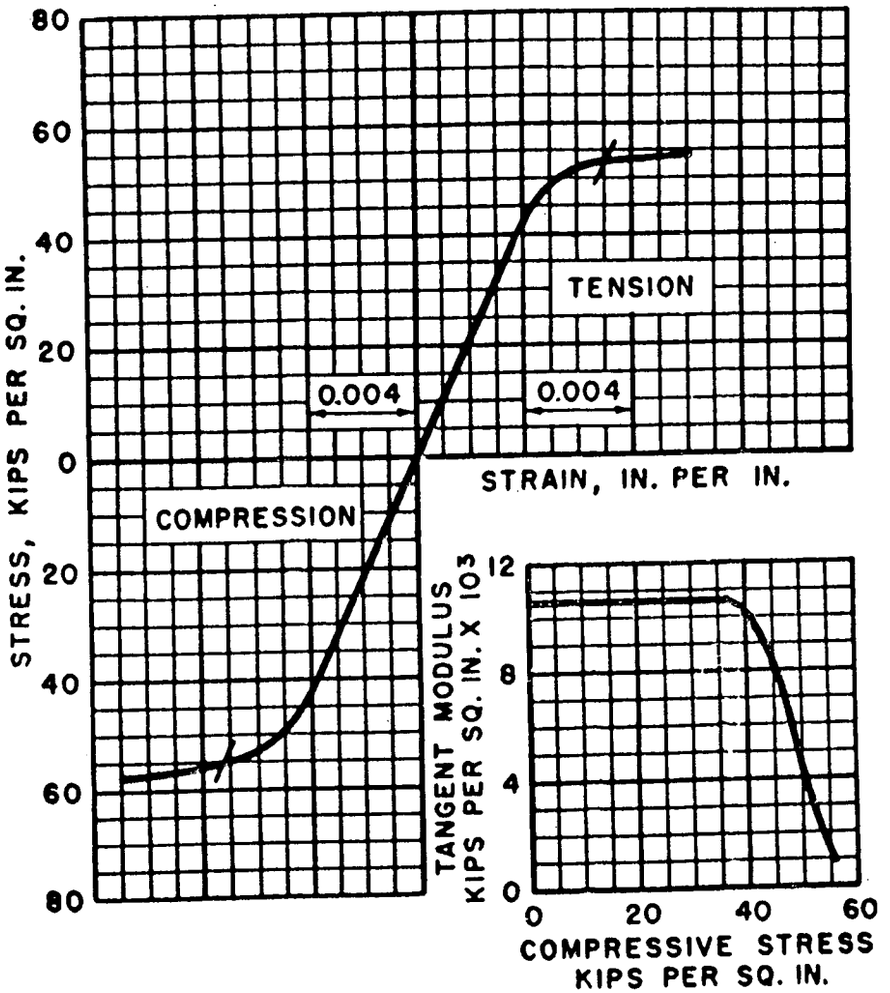


Figure 2a.—Stress strain and tangent modulus curves.

3. Compression in the extreme fibers of shapes subject to bending. Note: (Built-up sections are not included)

The allowable compressive stress in the extreme fiber of single-web rolled shapes, or extruded shapes shall be determined from graphs in figure 3a, or figure 4a, whichever is smaller.

Table 1

ALLOWABLE STRESSES IN RIVETED OR BOLTED STRUCTURES AT LOCATIONS FARTHER THAN 1.0 INCH FROM ANY WELD (6061-T6 AND 6062-T6 BUILDING STRUCTURES NONWELDED)

Type of Stress	Specification No.	Type of Member or Component	Allowable Stress, ksi
TENSION, axial, net section	A-1b	Any tension member	19
TENSION in extreme fibers of beams, net section	A-2b	Structural shapes, rectangular tubes, built-up members bent about X-axis	19
	A-3b	Round or oval tubes	24
	A-4b	Rectangular bars and plates, and outstanding flanges of shapes bent about Y-axis	26
BEARING	A-5b	On rivets and bolts	34(a)
	A-6b	On milled surfaces and pins	23

				Allowable Stress for Slenderness Less Than S_1, ksi	Slenderness Limit, S_1	Allowable Stress for Slenderness Between S_1 and S_2 ksi	Slenderness Limit, S_2	Allowable Stress for Slenderness Greater Than S_2, ksi
COMPRESSION in Columns Subjected to Axial Load, Gross Section	COMPRESSION, gross section (Also see Specs A-8b to A-10b)	A-7b	Columns	19	$\frac{L}{r} = 10$	$20.4 - 0.135\frac{L}{r}$	$\frac{L}{r} = 67$	$\frac{51,000}{(L/r)^2}$
	COMPRESSION in components of columns (Also see Spec. A-7b)	A-8b	Outstanding flanges and legs	19	$\frac{b}{t} = 6.6$	$23.7 - 0.86\frac{b}{t}$	$\frac{b}{t} = 12$	$\frac{1,940}{(b/t)^2}$
		A-9b	Flat plates with both edges supported	19	$\frac{b}{t} = 17$	$23.7 - 0.27\frac{b}{t}$	$\frac{b}{t} = 38$	$\frac{18,200}{(b/t)^2}$
		A-10b	Curved plates supported on both edges and walls of round or oval tubes	19	$\frac{R}{t} = 22$	$22.6 - 0.76\sqrt{\frac{R}{t}}$	$\frac{R}{t} = 125$	- - - -
COMPRESSION in Members Subjected to Bending, Gross Section	COMPRESSION (a) in extreme fibers of beams, gross section (Also see Specs. I-15b to I-19b)	I-11b	Single-web structural shapes and built-up sections bent about X-axis (a)	11(b)	- - - -	11(b)	$\frac{L_b}{r_y} = 82$(c)	$\frac{74,000}{(L_b/r_y)^2}$
		I-12b	Round or oval tubes	13(b)	$\frac{R_b}{t} = 13$(c)	$\frac{24.7}{(R_b/t)^{1.4}}$	$\frac{R_b}{t} = 135$	- - - -
		I-13b	Solid rectangular beams bent about X-axis	13(b)	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 11$(c)	$\frac{42.3}{[(d/t)^2 L_b/d]^{1/4}}$	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 38$	$\frac{9,800}{(\frac{d}{t})^2\frac{L_b}{d}}$
		I-14b	Rectangular tubes and box sections (a)	11(b)	- - - -	11(b)	$\frac{L_b S_c}{I_y} = 1820$(c)	$\frac{20,000}{L_b S_c / I_y}$
	COMPRESSION in components of beams, where component is under uniform compression (Also see Specs. I-11b to I-14b)	I-15b	Flat plates with one edge free and one edge supported	11(b)	$\frac{b}{t} = 5.3$(c)	$\frac{25.4}{\sqrt{b/t}}$	$\frac{b}{t} = 21$	$\frac{2,500}{(b/t)^2}$
		I-16b	Flat plates with both edges supported	11(b)	- - - -	11(b)	$\frac{b}{t} = 44$(c)	$\frac{19,200}{(b/t)^2}$
	COMPRESSION in components of beams where component is under bending in its own plane, (Also see Specs. I-11b to I-14b)	I-17b	Flat plates with compression edge free and tension edge supported, bent about X-axis	13(b)	$\frac{b}{t} = 6.8$(c)	$\frac{34.0}{\sqrt{b/t}}$	$\frac{b}{t} = 25$	$\frac{4,200}{(b/t)^2}$
		I-18b	Flat plates with both edges supported, bent about X-axis	11(b)	- - - -	11(b)	$\frac{h}{t} = 144$(c)	$\frac{230,000}{(h/t)^2}$
		I-19b	Flat plates with both edges supported, bent about X-axis with horizontal stiffener	11(b)	- - - -	11(b)	$\frac{h}{t} = 300$(c)	$\frac{990,000}{(h/t)^2}$
SHEAR in webs of beams, and also in members subjected to torsion, gross section		I-20b	Unstiffened flat webs	7(b)	- - - -	7(b)	$\frac{h}{t} = 69$(c)	$\frac{33,000}{(h/t)^2}$
		I-21b	Stiffened flat webs	7(b)	- - - -	7(b)	$\frac{a_e}{t} = 87$(c)	$\frac{53,000}{(a_e/t)^2}$

$a_e = a_1 / \sqrt{1 + 0.7\,(a_1/a_2)^2}$

(a) The allowable stresses for columns, single web beams and rectangular tubes and box sections apply to members supported at both ends and welded at the ends only. See Specification I-26 for allowable stresses in these members with welds at locations other than the ends and in cantilever columns and beams.

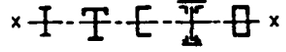
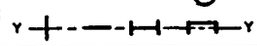
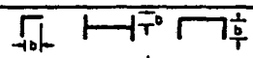
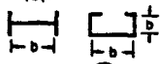
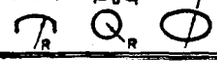
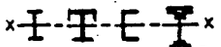
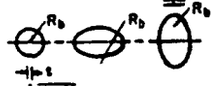
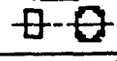
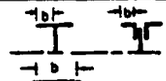
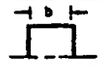
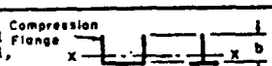
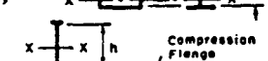
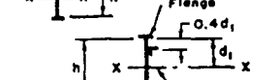
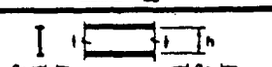
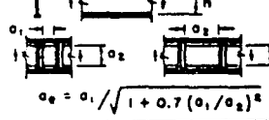
(b) These allowable stresses apply to all material welded with 5556 or 5356 filler alloy and to material 3/8-in. or less in thickness welded with 4043 filler alloy. For thicker material welded with 4043 filler alloy, these allowable stresses shall be reduced by multiplying them by 0.8. Allowable stresses not marked with a superscript apply to material welded with either 4043, 5556 or 5356 filler alloy.

(c) These slenderness limits apply to all material welded with 5556 or 5356 filler alloy and to material 3/8-in. or less in thickness welded with 4043 filler alloy. For thicker material welded with 4043 filler alloy, these slenderness limits must be adjusted to correspond to the reduced values of maximum allowable stresses indicated in Note (b) above.

(d) This value applies for a ratio of edge distance to rivet or bolt diameter of 2 or more. For smaller ratios, multiply this allowable stress by the ratio, (edge distance)/(twice the rivet or bolt diameter)

Table 2

ALLOWABLE STRESSES ON SECTIONS WITHIN 1.0 INCH OF A WELD (6061-T6 AND 6062-T6 BUILDING STRUCTURES WELDED)

Type of Stress		Specification No.	Type of Member or Component	Allowable Stress, ksi				
TENSION, axial, net section		I-1b	Any tension member	11(b)				
TENSION in extreme fibers of beams, net section		I-2b	Structural shapes, rectangular tubes, built-up members bent about X-axis 	11(b)				
		I-3b	Round or oval tubes 	13(b)				
		I-4b	Rectangular bars and plates, and outstanding flanges of shapes bent about Y-axis 	13(b)				
BEARING		I-5b	On rivets and bolts	18(b)(d)				
		I-6b	On milled surfaces and pins	12(b)				
				Allowable Stress for Slenderness Less Than S_1, ksi	Slenderness Limit, S_1	Allowable Stress for Slenderness Between S_1 and S_2 ksi	Slenderness Limit, S_2	Allowable Stress for Slenderness Greater Than S_2, ksi
COMPRESSION in Columns Subjected to Axial Load, Gross Section	COMPRESSION, gross section (a) (Also see Specs I-8b to I-10b)	I-7b	Columns (a)	11(b)	- - - -	11(b)	$\frac{L}{r} = 68$(c)	$\frac{51,000}{(L/r)^2}$
	COMPRESSION in components of columns (Also see Spec. I-7b)	I-8b	Outstanding flanges and legs 	11(b)	$\frac{b}{t} = 4.9$(c)	$\frac{24.4}{\sqrt{b/t}}$	$\frac{b}{t} = 19$	$\frac{1,940}{(b/t)^2}$
		I-9b	Flat plates with both edges supported 	11(b)	- - - -	11(b)	$\frac{b}{t} = 44$(c)	$\frac{19,200}{(b/t)^2}$
		I-10b	Curved plates supported on both edges and walls of round or oval tubes 	11(b)	$\frac{R}{t} = 14$(c)	$\frac{21.3}{(R/t)^{1/4}}$	$\frac{R}{t} = 200$	- - - -
COMPRESSION in Members Subjected to Bending, Gross Section	COMPRESSION in extreme fibers of beams, gross section (Also see Specs. A-15b to A-19b)	A-11b	Single-web structural shapes and built-up sections bent about X-axis 	19	$\frac{L_b}{r_y} = 12$	$20.4 - 0.113\frac{L_b}{r_y}$	$\frac{L_b}{r_y} = 81$	$\frac{74,000}{(L_b/r_y)^2}$
		A-12b	Round or oval tubes 	24	$\frac{R_b}{t} = 19$	$28.2 - 0.22\frac{R_b}{t}$	$\frac{R_b}{t} = 60$	- - - -
		A-13b	Solid rectangular beams bent about X-axis 	26	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 11$	$34.9 - 0.80\frac{d}{t}\sqrt{\frac{L_b}{d}}$	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 29$	$\frac{9,900}{(\frac{d}{t})^2\frac{L_b}{d}}$
		A-14b	Rectangular tubes and box sections 	19	$\frac{L_b S_c}{I_y} = 40$	$20.4 - 0.22\sqrt{\frac{L_b S_c}{I_y}}$	$\frac{L_b S_c}{I_y} = 1810$	$\frac{20,000}{L_b S_c / I_y}$
	COMPRESSION in components of beams, where component is under uniform compression (Also see Specs A-11b to A-14b)	A-15b	Flat plates with one edge free and one edge supported 	19	$\frac{b}{t} = 6.2$	$23.7 - 0.76\frac{b}{t}$	$\frac{b}{t} = 14$	$\frac{2,500}{(b/t)^2}$
		A-16b	Flat plates with both edges supported 	19	$\frac{b}{t} = 17$	$23.7 - 0.27\frac{b}{t}$	$\frac{b}{t} = 38$	$\frac{19,200}{(b/t)^2}$
	COMPRESSION in components of beams where component is under bending in its own plane. (Also see Specs. A-11b to A-14b)	A-17b	Flat plates with compression edge free and tension edge supported, bent about X-axis 	26	$\frac{b}{t} = 7.3$	$34.9 - 1.24\frac{b}{t}$	$\frac{b}{t} = 19$	$\frac{4,200}{(b/t)^2}$
		A-18b	Flat plates with both edges supported, bent about X-axis 	19	- - - -	19	$\frac{h}{t} = 110$	$\frac{230,000}{(h/t)^2}$
		A-19b	Flat plates with both edges supported, bent about X-axis with horizontal stiffener 	19	- - - -	19	$\frac{h}{t} = 228$	$\frac{990,000}{(h/t)^2}$
SHEAR in webs of beams, and also in members subjected to torsion, gross section		A-20b	Unstiffened flat webs 	12	$h/t = 18$	$13.7 - 0.092\frac{h}{t}$	$\frac{h}{t} = 66$	$\frac{33,000}{(h/t)^2}$
		A-21b	Stiffened flat webs  $a_e = a_1/\sqrt{1 + 0.7(a_1/a_2)^2}$	12	- - - -	12	$\frac{a_e}{t} = 66$	$\frac{53,000}{(a_e/t)^2}$

(a) This value applies for a ratio of edge distance to rivet or bolt diameter of 2 or greater. For smaller ratios, multiply this allowable stress by the ratio, (edge distance)/(twice the rivet or bolt diameter).

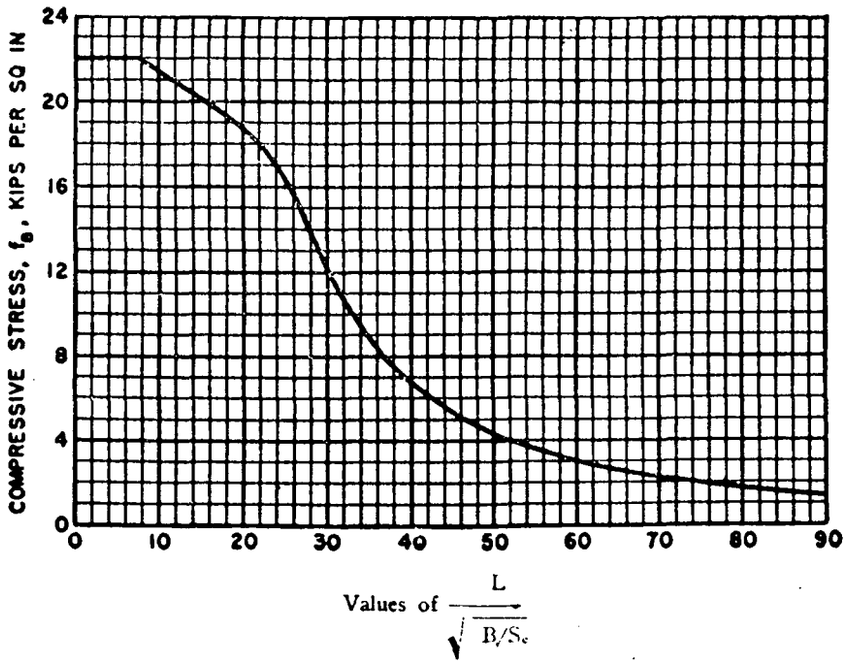


Figure 3a.—Allowable compressive stresses in beam and girder flanges (gross section)

The terms used in figure 3a, are defined as follows:

L is the laterally unsupported length of beam (clear distance between supports at which beam is prevented from lateral displacement.)

In the case of a cantilever beam with one end free, L is four-thirds $\left(\frac{4}{3}\right)$ of the laterally unsupported length in inches.

S_c is the section modulus for the beam about the axis normal to the web compression side) in inches cubed.

B is defined by the formula $B = I_1 d \sqrt{11.7 + \frac{J}{I_1}\left(\frac{L}{d}\right)^2}$

I_1 is the moment of inertia about axis parallel to the web in inches fourth.

J is the torsion factor in inches to the fourth power.

d is the depth of beam in inches.

For values of $\frac{L}{\sqrt{B/S_c}}$ greater than 27.5, the curve in Figure 3a, may be represented by the formula $f_B = \frac{10{,}900}{\left(\sqrt{\frac{L}{B/S_c}}\right)^2}$

The permitted maximum compression stress shall not exceed the allowable values for local buckling.

4. Compression in plates, legs, and webs when limited by local buckling.

(1) The allowable compressive stress in outstanding legs shall be determined from curves in graph in figure 4a, and the requirements of subdivision 2 of this section, whichever is smaller.

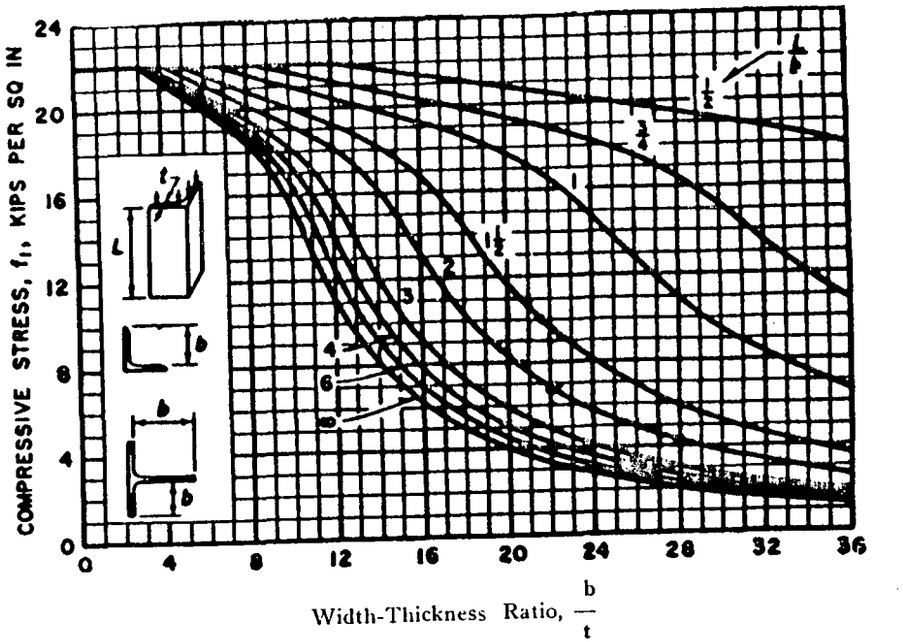


Figure 4a.—Allowable compressive stresses in outstanding legs of single-angle and T-section struts (gross section)

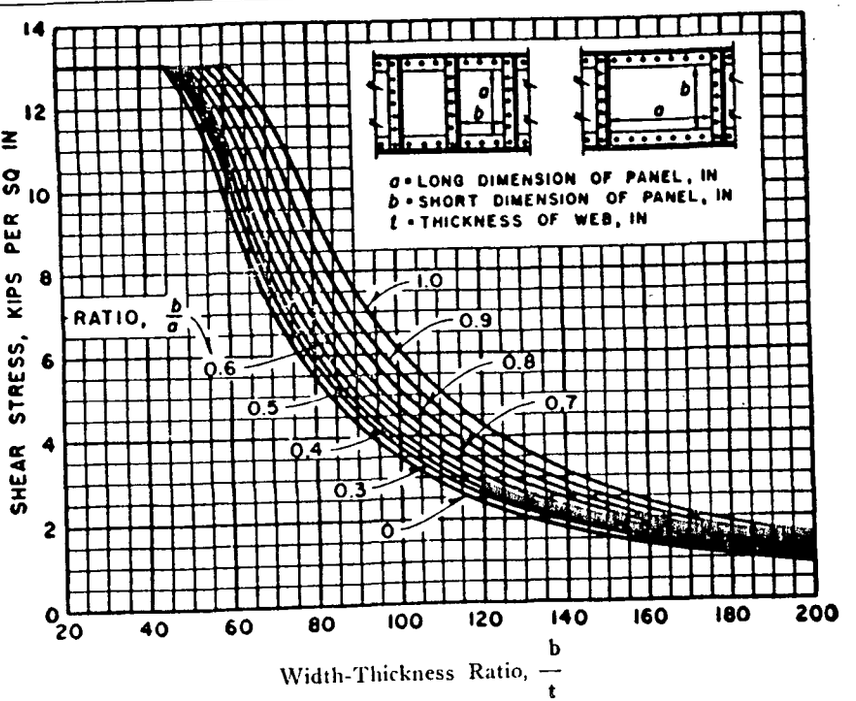


Figure 5a.—Allowable shear stresses on webs; partial restraint assumed at edges of rectangular panels (gross section)

		Stress in kips per square inch
5.	Stresses in extreme fibers of pins	34
6.	Shear in aluminum alloy 2117-T3 rivets cold-driven	10
7.	Shear in aluminum alloy 6061-T43 rivets driven at temperatures from 990°F. to 1,050°F.	8
8.	Shear in turned bolts of aluminum alloy 2014-T4 in reamed holes	12
9.	Shear in pins	16
10.	Allowable shear in plates and webs on net area shall be determined from curves in graph in Figure 5a.	
11.	Bearing on pins	30
12.	Bearing on hot-driven or cold-driven rivets, milled stiffeners, turned bolts in reamed holes. This value shall be reduced for thin plates and shapes as provided in Table 1a.	36

Table 1a.—Percentage Reduction in Shear Strength of Aluminum Alloy Rivets Resulting From Their Use in Thin Plates and Shapes.

Ratio.[a] $\frac{D}{t}$	Loss in double shear[b]	Ratio.[a] $\frac{D}{t}$	Loss in double shear[b]	Ratio.[a] $\frac{D}{t}$	Loss in: Single shear	Loss in: Double shear	Ratio.[a] $\frac{D}{t}$	Loss in: Single shear	Loss in: Double shear
(1)	(3)	(1)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
1.5	0	2.2	9.1	2.9	0	18.2	3.5	2.0	26.0
1.6	1.3	2.3	10.4	3.0	0	19.5	3.6	2.4	27.3
1.7	2.6	2.4	11.7	3.1	0.4	20.8	3.7	2.8	28.6
1.8	3.9	2.5	13.0	3.2	0.8	22.1	3.8	3.2	29.9
1.9	5.2	2.6	14.3	3.3	1.2	23.4	3.9	3.6	31.2
2.0	6.5	2.7	15.6	3.4	1.6	24.7	4.0	4.0	32.5
2.1	7.8	2.8	16.9	....	....	....	.	....	....

[a]Ratio of the rivet diameter, D, to the plate thickness, t. The thickness used is that of the thinnest plate in a single shear joint or of the middle plate in a double shear joint.

[b]The percentage loss of strength in single shear is zero for D/t less than 3.0.

13. Combined compression and bending.

(1) The allowable stress in a member having both compression and bending shall be determined as follows:

$$f_b = f_B \left(1 - \frac{P/A}{f_c}\right)\left(1 - \frac{P/A}{f_{CE}}\right)$$

All stresses are in kips per square inch.

f_b is the maximum bending compressive stress at center of unsupported length, in addition to the compressive stress P/A.

P/A is the average compressive stress on the gross cross-section, A, of the member, produced by a column load, P.

f_b is the allowable compressive working stress for the member considered as a beam.

f_c is the allowable working stress for the member considered as an axially loaded column, and

$f_{CE} = \frac{74{,}000}{\left(\frac{L}{r}\right)^2}$ in which $\frac{L}{r}$ is the slenderness ratio for the member considered as a column tending to fail in the plane of the bending force.

§C26-375.2 Allowable working stresses for structural aluminum of alloy 6063-T6 and 6063-T5.—a. The allowable stresses to be used in proportioning the parts of a structure where the aluminum alloy known commercially as 6063-T6 and 6063-T5 is used shall be determined from tables 3C to 6C and 3D to 6D. Specifications A1-c to A-22c and I-1c to I-21c in tables 3C to 6C shall apply to alloy 6063-T6. The terms

appearing in the formulas shown in the tables are defined as follows:

b= clear width of outstanding flange or of flat plate supported on both unloaded edges, in.

d= depth of beam, in.

d_c= distance from toe of compression flange to neutral axis, in.

h= clear height of shear web, in.

I_y= moment of inertia of a beam (about axis parallel to web), in.^{4}

L= length of compression member between points of lateral support or twice the the length of a cantilever column (except where analysis shows that a shorter length can be used), in.

L_b= length of beam between points at which the compression flange is supported against lateral movement or length of cantilever beam from free end to point at which the comprsssion flange is supported against lateral movement, in.

R= outside radius of round tube or maximum outside radius for an oval tube, in.

R_b= outside radius of a round tube in bending or outside radius at the location of the critical compressive stress for an oval tube in bending, in. (The location of the critical compressive stress is at the extreme fiber for an oval tube bent about the major axis. For an oval tube bent about the minor axis, the location of the critical stress can be determined by calculating the allowable stress at several points with R_b equal to the outside radius at each point. Bending moments corresponding to the allowable stresses at the various points are calculated, and the point resulting in the smallest bending moment is the location of the critical stress.)

r= least radius of gyration of a column, in.

r_y= radius of gyration of a beam (about axis parallel to web), in. (For beams that are unsymmetrical about the horizontal axis, r_y should be calculated as though both flanges were the same as the compression flange.)

S_c= section modulus of a beam (compression side), in.^{3}

t= thickness of flange, plate, web or tube, in. (For tapered flanges, t is the average thickness.)

b. Limiting slenderness ratio for columns.

The slenderness ratio L/r for columns shall not exceed 120.

c. Combined compression and bending.

The allowable stress in a member subjected to both compression and bending shall be determined from one of the following three formulas:

If the bending moment at the center of the span is equal to or greater than 0.9 of the maximum bending moment in the span,

$$\frac{f_a}{F_a} + \frac{f_b}{F_b\,(1 - f_a/F_e} \leq 1 \qquad (1)$$

where f_a= average compressive stress on cross section of member produced by axial compressive load, ksi

f_b= maximum bending stress (compression) caused by transverse loads or end moments in the absence of axial load, ksi

F_a= allowable compressive stress for member considered as an axially loaded column ksi

F_b= allowable compressive stress for member considered as a beam, ksi

F_e= $51{,}000/(L/r)^2$ in which L/r=slenderness ratio for member considered as a column tending to fail in the plane of the applied bending forces

If the bending moment at the center of the span is not more than one-half the maximum bending moment in the span,

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} \leq 1 \qquad (2)$$

If the moment at the center of the span is between 0.5 and 0.9 of the maximum moment,

$$\frac{f_a}{F_a} + \frac{f_b}{F_b\,[1 - (2M_c/M_m - 1)\,f_a/F_a]} \leq 1 \qquad (3)$$

TABLE 3C

6063-T6

ALLOWABLE STRESSES IN RIVETED OR BOLTED STRUCTURES OR IN WELDED STRUCTURES AT LOCATIONS FARTHER THAN 1.0 INCH FROM ANY WELD
(Building Structures)

BUILDING STRUCTURES

NONWELDED

Type of Stress		Specification No.	Type of Member or Component	Allowable Stress, ksi				
TENSION, axial, net section		A-1c	Any tension member	15				
TENSION in extreme fibers of beams, net section		A-2c	Structural shapes, rectangular tubes, built-up members bent about X-axis	15				
		A-3c	Round or oval tubes	17				
		A-4c	Rectangular bars and plates, and outstanding flanges of shapes bent about Y-axis	19				
BEARING		A-5c	On rivets and bolts	24(a)				
		A-6c	On milled surfaces and pins	16				
				Allowable Stress for Slenderness Less Than S_1 ksi	Slenderness Limit, S_1	Allowable Stress for Slenderness Between S_1 and S_2 ksi	Slenderness Limit, S_2	Allowable Stress for Slenderness Greater Than S_2, ksi
COMPRESSION in Columns Subjected to Axial Load, Gross Section	COMPRESSION, gross section (Also see Specs. A-8c to A-10c)	A-7c	Columns	13.5	$L/r = 11$	$14.4 - 0.080\ L/r$	$L/r = 80$	$\frac{51,000}{(L/r)^2}$
	COMPRESSION in components of columns (Also see Spec. A-7c)	A-8c	Outstanding flanges and legs	13.5	$b/t = 8.0$	$16.5 - 0.50\ b/t$	$b/t = 15$	$\frac{1,940}{(b/t)^2}$
		A-9c	Flat plates with both edges supported	13.5	$b/t = 19$	$16.5 - 0.160\ b/t$	$b/t = 46$	$\frac{19,200}{(b/t)^2}$
		A-10c	Curved plates supported on both edges and walls of round or oval tubes	13.5	$R/t = 16$	$15.4 - 0.47\sqrt{R/t}$	$R/t = 140$	- - - -
COMPRESSION in Members Subjected to Bending, Gross Section	COMPRESSION in extreme fibers of beams, gross section (Also see Specs. A-15c to A-18c)	A-11c	Single-web structural shapes and built-up sections bent about X-axis	13.5	$L_b/r_y = 14$	$14.4 - 0.066\ L_b/r_y$	$L_b/r_y = 96$	$\frac{74,000}{(L_b/r_y)^2}$
		A-12c	Round or oval tubes	17	$R_b/t = 16$	$16.0 - 0.064\ R_b/t$	$R_b/t = 120$	- - - -
		A-13c	Solid rectangular beams bent about X-axis	19	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 18$	$24.8 - 0.48\ \frac{d}{t}\sqrt{\frac{L_b}{d}}$	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 33$	$\frac{9,900}{(d/t)^2 L_b/d}$
		A-14c	Rectangular tubes and box sections	13.5	$\frac{L_b s_o}{I_y} = 49$	$14.4 - 0.128\sqrt{\frac{L_b s_o}{I_y}}$	$\frac{L_b s_o}{I_y} = 2,510$	$\frac{20,000}{L_b s_o / I_y}$
	COMPRESSION in components of beams, where component is under uniform compression (Also see Specs. A-11c to A-14c)	A-15c	Flat plates with one edge free and one edge supported	13.5	$b/t = 8.8$	$16.5 - 0.44\ b/t$	$b/t = 16$	$\frac{2,600}{(b/t)^2}$
		A-16c	Flat plates with both edges supported	13.5	$b/t = 19$	$16.5 - 0.160\ b/t$	$b/t = 46$	$\frac{19,200}{(b/t)^2}$
	COMPRESSION in components of beams where component is under bending in its own plane, (Also see Specs. A-11c to A-14c)	A-17c	Flat plates with compression edge free and tension edge supported, bent about X-axis	19	$b/t = 7.6$	$24.8 - 0.74\ b/t$	$b/t = 22$	$\frac{4,200}{(b/t)^2}$
		A-18c	Flat plates with both edges supported, bent about X-axis	13.5	- - - -	13.5	$h/t = 130$	$\frac{230,000}{(h/t)^2}$
SHEAR in webs of beams, and also in members subjected to torsion, gross section		A-19c	Unstiffened flat webs	8.5	$h/t = 19$	$9.5 - 0.064\ h/t$	$h/t = 79$	$\frac{33,000}{(h/t)^2}$

(a) This value applies for a ratio of edge distance to rivet or bolt diameter of 2 or more. For smaller ratios, multiply this allowable stress by the ratio, (edge distance)/(twice the rivet or bolt diameter).

TABLE 3D

ALLOWABLE STRESSES IN RIVETED OR BOLTED STRUCTURES OR IN WELDED STRUCTURES AT LOCATIONS FARTHER THAN 1.0 INCH FROM ANY WELD
(Building Structures)

Type of Stress		Specification No.	Type of Member or Component	Allowable Stress, ksi				
TENSION, axial, net section		A-1d	Any tension member	9.5				
TENSION in extreme fibers of forms, net section		A-2d	Structural shapes, rectangular tubes, built-up members bent about X-axis	9.5				
		A-3d	Round or oval tubes	11				
		A-4d	Rectangular bars and plates, and outstanding flanges of shapes bent about Y-axis	13.5				
BEARING		A-5d	On rivets and bolts	15(a)				
		A-6d	On milled surfaces and pins	10				
				Allowable Stress for Slenderness Less Than S_1, ksi	Slenderness Limit, S_1	Allowable Stress for Slenderness Between S_1 and S_2 ksi	Slenderness Limit, S_2	Allowable Stress for Slenderness Greater Than S_2, ksi
COMPRESSION in Columns Subjected to Axial Load, Gross Section	COMPRESSION, gross section (Also see Specs. A-8d to A-10d)	A-7d	Columns	8.5	$L/r = 13$	$9.0 - 0.039\ L/r$	$L/r = 100$	$\frac{51,000}{(L/r)^2}$
	COMPRESSION in components of columns (Also see Spec. A-7d)	A-8d	Outstanding flanges and legs	8.5	$b/t = 6.8$	$10.2 - 0.25\ b/t$	$b/t = 19$	$\frac{1,940}{(b/t)^2}$
		A-9d	Flat plates with both edges supported	8.5	$b/t = 22$	$10.2 - 0.079\ b/t$	$b/t = 58$	$\frac{19,200}{(b/t)^2}$
		A-10d	Curved plates supported on both edges and walls of round or oval tubes	8.5	$R/t = 12$	$9.2 - 0.198\ \sqrt{R/t}$	$R/t = 200$	- - - -
COMPRESSION in Members Subjected to Bending, Gross Section	COMPRESSION in extreme fibers of beams, gross section (Also see Specs. A-15d to A-18d)	A-11d	Single-web structural shapes and built-up sections bent about X-axis	8.5	$L_b/r_y = 16$	$9.0 - 0.032\ L_b/r_y$	$L_b/r_y = 120$	$\frac{74,000}{(L_b/r_y)^2}$
		A-12d	Round or oval tubes	11	$R_b/t = 9.4$	$11.3 - 0.032\ R_b/t$	$R_b/t = 140$	- - - -
		A-13d	Solid rectangular beams bent about X-axis	13.5	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 8.8$	$15.6 - 0.24\ \frac{d}{t}\sqrt{\frac{L_b}{d}}$	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 44$	$\frac{9,900}{(d/t)^2 L_b/d}$
		A-14d	Rectangular tubes and box sections	8.5	$\frac{L_b s_c}{I_y} = 65$	$9.0 - 0.062\ \sqrt{\frac{L_b s_c}{I_y}}$	$\frac{L_b s_c}{I_y} = 3920$	$\frac{20,000}{L_b s_c / I_y}$
	COMPRESSION in components of beams, where component is under uniform compression (Also see Specs. A-11d to A-14d)	A-15d	Flat plates with one edge free and one edge supported	8.5	$b/t = 7.7$	$10.2 - 0.22\ b/t$	$b/t = 22$	$\frac{2,500}{(b/t)^2}$
		A-16d	Flat plates with both edges supported	8.5	$b/t = 22$	$10.2 - 0.079\ b/t$	$b/t = 58$	$\frac{19,200}{(b/t)^2}$
	COMPRESSION in components of beams where component is under bending in its own plane, (Also see Specs. A-11d to A-14d)	A-17d	Flat plates with compression edge free and tension edge supported, bent about X-axis	13.5	$b/t = 5.7$	$15.6 - 0.37\ b/t$	$b/t = 28$	$\frac{4,200}{(b/t)^2}$
		A-18d	Flat plates with both edges supported, bent about X-axis	8.5	- - - -	8.5	$h/t = 164$	$\frac{230,000}{(h/t)^2}$
SHEAR in webs of beams, and also in members subjected to torsion, gross section		A-19d	Unstiffened flat webs	5.5	$h/t = 15$	$5.9 - 0.027\ h/t$	$h/t = 103$	$\frac{33,000}{(h/t)^2}$

(a) This value applies for a ratio of edge distance to rivet or bolt diameter of 2 or more. For smaller ratios, multiply this allowable stress by the ratio, (edge distance)/(twice the rivet or bolt diameter).

TABLE 5C

ALLOWABLE STRESSES ON SECTIONS WITHIN 1.0 INCH OF A WELD

(Building Structures)

6063-T6 BUILDING STRUCTURES WELDED

Type of Stress	Specification No.	Type of Member or Component	Allowable Stress, ksi
TENSION, axial, net section	I-1c	Any tension member	6.5
TENSION in extreme fibers of beams, net section	I-2c	Structural shapes, rectangular tubes, built-up members bent about X-axis	6.5
	I-3c	Round or oval tubes	7.5
	I-4c	Rectangular bars and plates, and outstanding flanges of shapes bent about Y-axis	7.5
BEARING	I-5c	On rivets and bolts	10(b)
	I-6c	On milled surfaces and pins	7

				Allowable Stress for Slenderness Less Than S_1, ksi	Slenderness Limit, S_1	Allowable Stress for Slenderness Between S_1 and S_2 ksi	Slenderness Limit, S_2	Allowable Stress for Slenderness Greater Than S_2, ksi
COMPRESSION in Columns Subjected to Axial Load, Gross Section	COMPRESSION,(a) gross section (Also see Specs. I-8c to I-10c)	I-7c	Columns(a)	6.5	- - - -	6.5	$L/r = 88$	$\frac{51,000}{(L/r)^2}$
	COMPRESSION in components of columns (Also see Spec. I-7c)	I-8c	Outstanding flanges and legs	6.5	$b/t = 4.4$	$\frac{13.6}{\sqrt{b/t}}$	$b/t = 27$	$\frac{1,940}{(b/t)^2}$
		I-9c	Flat plates with both edges supported	6.5	- - - -	6.5	$b/t = 54$	$\frac{19,200}{(b/t)^2}$
		I-10c	Curved plates supported on both edges and walls of round or oval tubes	6.5	$R/t = 12$	$\frac{12.0}{(R/t)^{1/4}}$	$R/t = 125$	- - - -
COMPRESSION in Members Subjected to Bending, Gross Section	COMPRESSION(a) in extreme fibers of beams, gross section (Also see Specs. I-15c to I-18c)	I-11c	Single-web structural shapes and built-up sections bent about X-axis(d)	6.5	- - - -	6.5	$L_b/r_y = 107$	$\frac{74,000}{(L_b/r_y)^2}$
		I-12c	Round or oval tubes	7.5	$R_b/t = 12$	$\frac{13.9}{(R_b/t)^{1/4}}$	$R_b/t = 125$	- - - -
		I-13c	Solid rectangular beams bent about X-axis	7.5	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 11$	$\frac{24.3}{[(d/t)^2 L_b/d]^{1/4}}$	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 55$	$\frac{9,900}{(d/t)^2 L_b/d}$
		I-14c	Rectangular tubes and box sections(d)	6.5	- - - -	6.5	$\frac{L_b S_c}{I_y} = 3060$	$\frac{20,000}{L_b S_c / I_y}$
	COMPRESSION in components of beams, where component is under uniform compression (Also see Specs. I-11c to I-14c)	I-15c	Flat plates with one edge free and one edge supported	6.5	$b/t = 4.8$	$\frac{14.2}{\sqrt{b/t}}$	$b/t = 31$	$\frac{2,500}{(b/t)^2}$
		I-16c	Flat plates with both edges supported	6.5	- - - -	6.5	$b/t = 64$	$\frac{19,200}{(b/t)^2}$
	COMPRESSION in components of beams where component is under bending in its own plane, (Also see Specs. I-11c to I-14c)	I-17c	Flat plates with compression edge free and tension edge supported, bent about X-axis	7.5	$b/t = 6.9$	$\frac{19.6}{\sqrt{b/t}}$	$b/t = 36$	$\frac{4,200}{(b/t)^2}$
		I-18c	Flat plates with both edges supported, bent about X-axis	6.5	- - - -	6.5	$h/t = 188$	$\frac{230,000}{(h/t)^2}$
SHEAR in webs of beams, and also in members subjected to torsion, gross section		I-19c	Unstiffened flat webs	4	- - - -	4	$h/t = 91$	$\frac{33,000}{(h/t)^2}$

(a) The allowable stresses for columns, single web beams and rectangular tubes and box sections apply to members supported at both ends and welded at the ends only. See Specification I-26 for allowable stresses in these members with welds at locations other than the ends and in cantilever columns and beams.

(b) This value applies for a ratio of edge distance to rivet or bolt diameter of 2 or more. For smaller ratios, multiply this allowable stress by the ratio, (edge distance)/(twice the rivet or bolt diameter).

ADMINISTRATIVE BUILDING CODE

TABLE 5D
ALLOWABLE STRESSES ON SECTIONS WITHIN 1.0 INCH OF A WELD
(Building Structures)

Type of Stress		Specification No.	Type of Member or Component	Allowable Stress, ksi				
TENSION, axial, net section		I-1d	Any tension member	6.5				
TENSION in extreme fibers of beams, net section		I-2d	Structural shapes, rectangular tubes, built-up members bent about X-axis	6.5				
		I-3d	Round or oval tubes	7.5				
		I-4d	Rectangular bars and plates, and outstanding flanges of shapes bent about Y-axis	7.5				
BEARING		I-5d	On rivets and bolts	10(b)				
		I-6d	On milled surfaces and pins	7				
				Allowable Stress for Slenderness Less Than S_1, ksi	Slenderness Limit, S_1	Allowable Stress for Slenderness Between S_1 and S_2 ksi	Slenderness Limit, S_2	Allowable Stress for Slenderness Greater Than S_2, ksi
COMPRESSION in Columns Subjected to Axial Load, Gross Section	COMPRESSION(a) gross section (Also see Specs. I-8d to I-10d)	I-7d	Columns(a)	6.5	$L/r = 64$	$9.0 - 0.039\ L/r$	$L/r = 100$	$\frac{51,000}{(L/r)^2}$
	COMPRESSION in components of columns (Also see Spec. I-7d	I-8d	Outstanding flanges and legs	6.5	$b/t = 4.4$	$\frac{13.6}{\sqrt{b/t}}$	$b/t = 27$	$\frac{1,940}{(b/t)^2}$
		I-9d	Flat plates with both edges supported	6.5	$b/t = 47$	$10.2 - 0.079\ b/t$	$b/t = 58$	$\frac{19,200}{(b/t)^2}$
		I-10d	Curved plates supported on both edges and walls of round or oval tubes	6.5	$R/t = 12$	$\frac{12.0}{(R/t)^{1/4}}$	$R/t = 125$	- - - -
COMPRESSION in Members Subjected to Bending, Gross Section	COMPRESSION(a) in extreme fibers of beams, gross section (Also see Specs. I-15d to I-18d)	I-11d	Single-web structural shapes and built-up sections bent about X-axis(a)	6.5	$L_b/r_y = 78$	$9.0 - 0.032\ L_b/r_y$	$L_b/r_y = 120$	$\frac{74,000}{(L_b/r_y)^2}$
		I-12d	Round or oval tubes	7.5	$R_b/t = 12$	$\frac{13.9}{(R_b/t)^{1/4}}$	$R_b/t = 125$	- - - -
		I-13d	Solid rectangular beams bent about X-axis	7.5	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 11$	$\frac{24.3}{[(d/t)^2 L_b/d]^{1/4}}$	$\frac{d}{t}\sqrt{\frac{L_b}{d}} = 55$	$\frac{9,900}{(d/t)^2\ L_b/d}$
		I-14d	Rectangular tubes and box sections(a)	6.5	$\frac{L_b S_c}{I_y} = 1620$	$9.0 - 0.002\sqrt{\frac{L_b S_c}{I_y}}$	$\frac{L_b S_c}{I_y} = 3920$	$\frac{20,000}{L_b S_c / I_y}$
	COMPRESSION in components of beams, where component is under uniform compression (Also see Specs. I-11d to I-14d)	I-15d	Flat plates with one edge free and one edge supported	6.5	$b/t = 4.8$	$\frac{14.2}{\sqrt{b/t}}$	$b/t = 31$	$\frac{2,500}{(b/t)^2}$
		I-16d	Flat plates with both edges supported	6.5	$b/t = 47$	$10.2 - 0.079\ b/t$	$b/t = 58$	$\frac{19,200}{(b/t)^2}$
	COMPRESSION in components of beams where component is under bending in its own plane, (Also see Specs. I-11d to I-14d)	I-17d	Flat plates with compression edge free and tension edge supported, bent about X-axis	7.5	$b/t = 6.9$	$\frac{19.6}{\sqrt{b/t}}$	$b/t = 38$	$\frac{4,200}{(b/t)^2}$
		I-18d	Flat plates with both edges supported, bent about X-axis	6.5	- - - -	6.5	$h/t = 188$	$\frac{230,000}{(h/t)^2}$
SHEAR in webs of beams, and also in members subjected to torsion, gross section		I-19d	Unstiffened flat webs	4	$h/t = 70$	$5.9 - 0.027\ h/t$	$h/t = 103$	$\frac{33,000}{(h/t)^2}$

(a) The allowable stresses for columns, single web beams and rectangular tubes and box sections apply to members supported at both ends and welded at the ends only. See Specification I-26 for allowable stresses in these members with welds at locations other than the ends and in cantilever columns and beams.

(b) This value applies for a ratio of edge distance to rivet or bolt diameter of 2 or greater. For smaller ratios, multiply this allowable stress by the ratio, (edge distance)/(twice the rivet or bolt diameter).

ADMINISTRATIVE BUILDING CODE

where M_c = bending moment at center of span resulting from applied bending loads, in-kips

M_m = maximum bending moment in span resulting from applied bending loads, in-kips

d. Cross sections with part of area affected by heat of welding

If less than 15 per cent of the area of a given cross section lies within one inch of a weld, the effect of the welds can be neglected and allowable stress for that cross section can be calculated by the formulas in tables 3C or 3D. If the area of a cross section that lies within one inch of a weld is between 15 per cent and 100 per cent of the total area of the cross section, the allowable stress shall be calculated by the following formula:

$$f_{pw} = f_n - \frac{A_w}{A}(f_n - f_w) \qquad (4)$$

where f_{pw} = allowable stress on cross section, part of whose area lies within one inch of a weld, ksi

f_n = allowable stress for same cross section if there were no welds present (see table 3C or 3D), ksi

f_w = allowable stress for same cross section if entire area lies within one inch of a weld (see table 5C or 5D), ksi

A = net area of cross section of a tension member or tension flange of a beam, or gross area of cross section of a compression member or compression flange of a beam, sq. in. (A beam flange is considered to consist of that portion of the member farther than 2c/3 from the neutral axis, where c is the distance from the neutral axis to the extreme fiber).

A_w = area within area A that lies within one inch of weld, sq. in.

e. Columns and single web beams with welds at locations other than ends and cantilever columns and single web beams.

The allowable stresses in specifications I-7 and I-8 apply to members supported at both ends with welds at the ends only (not farther from the supports than 0.05 of the length of the column or beam). For cantilever columns or beams and for columns and beams having welds at locations other than the ends, the allowable stress shall be determined from the following:

Members with welds affecting the entire cross section:

Alloy 6063-T6

$$\begin{aligned} f_n > 13.3 \quad & f_w = 6.5 \\ 13.3 \geq f_n \geq 1.9 \quad & f_w = \frac{6.7}{\sqrt{14.4 - f_n}} \\ f_n < 1.9 \quad & f_w = f_n \end{aligned} \qquad (5)$$

Alloy 6063-T5

$$\begin{aligned} f_n > 8.5 \quad & f_w = 6.5 \\ 8.5 \geq f_n > 1.7 \quad & f_w = \frac{4.7}{\sqrt{9.0 - f_n}} \\ f_n < 1.7 \quad & f_w = f_n \end{aligned} \qquad (6)$$

where f_n and f_w are as previously defined.

Members with welds affecting less than the entire cross section:

The allowable stress shall be detrmined from Eq. 4, where the value of f_w is given by Eqs. 5 or 6.

f. Single web beams and girders

The simplified formulas of tables 3 and 5 give very conservative values of allowable stress for values of L_b/r_y exceeding about 50. If the designer wishes to compute more precise values of allowable compressives stress for single web beams and girders, the value of r_y in specification A-8 may be replaced by an "effective r_y" given by the following formula

$$\text{Effective } r_y = \frac{1}{1.7}\sqrt{\frac{I_y d}{S_c}}\sqrt{1 + 0.152\frac{J}{I_y}\left(\frac{L_b}{d}\right)^2} \qquad (7)$$

where d = depth of beam, in.

I_y = moment of inertia of beam about axis parallel to web, in.^{4}

J = torsion constant of beam, in.^{4}

S_c = section modulus of beam for compression flange, in.^{3}

g. In applications where it is conventional practice to increase allowable stresses for certain types of loads, such as wind loads, the allowable stresses in these specifications should be increased in the same proportion as are the allowable stresses in accepted specifications for steel structures.

(See table 3C.)

TABLE 4C
ALLOWABLE SHEAR STRESSES IN RIVETS AND BOLTS
(Building Structures of 6063-T6)

Specification Number	Description of Rivet or Bolt	Allowable Stress, ksi: Shear on Effective Shear Area	Allowable Stress, ksi: Tension on Root Area
A-20c	6053-T61 rivets, cold driven	8.5	..
A-21c	6061-T43 rivets, driven at temperatures of from 990°F to 1050°F	9	..
A-22c	2024 T 4 bolts	16[a]	26

[a] This allowable shear stress applies to either turned bolts in reamed holes or unfinished bolts in 1/16-inch oversize holes.

(See table 5C.)

TABLE 6C
ALLOWABLE SHEAR STRESSES IN FILLET WELDS
(Building Structures of 6063-T6)

Specification Number	Filler Alloy	Allowable Shear Stress [a], ksi: Transverse Shear in Single Filet Welds or Longitudinal Shear[b]	Allowable Shear Stress [a], ksi: Transverse Shear in Double Fillet Welds[b]
1-20c	5356 } 5556 }	6.5[c]	6.5[c]
1-21c	4043	5	6.5[c]

[a] Shear stress is considered to be equal to the load divided by the throat area, regardless of direction of loading.

[b] Single fillet welds in transverse shear may be treated as double fillet welds in joints so designed as to prevent local bending of the parts adjacent to the fillet weld.

[c] These values are controlled by the shear strength of the parent material; all other values are controlled by the strength of the filler metal.

(See table 3D.)

TABLE 4D
ALLOWABLE SHEAR STRESSES IN RIVETS AND BOLTS
(Building Structures of 6063-T5)

Specification Number	Description of Rivet or Bolt	Allowable Stress, ksi: Shear on Effective Shear Area	Allowable Stress, ksi: Tension on Root Area
A-20d	6053-T61 rivets, cold driven	8.5	..
A-21d	6061-T43 rivets, driven at temperatures of from 990°F to 1050°F	9	..
A-22d	2024-T4 bolts	16[a]	26

[a] This allowable Shear stress applies to either turned bolts in reamed holes or unfinished bolts in 1/16 in. oversize holes.

(See table 5D.)

TABLE 6D

ALLOWABLE SHEAR STRESSES IN FILLET WELDS

(Building Structures of 6063-T5)

Specification Number	Filler Alloy	Allowable Shear Stress [a], ksi: Transverse Shear in Single Fillet Welds or Longitudinal Shear[b]	Allowable Shear Stress [a], ksi: Transverse Shear in Double Fillet Welds[b]
1-20d	5356 } 5556 }	6.5[c]	6.5[c]
1-21d	4043	5	6.5[c]

[a] Shear stress is considered to be equal to the load divided by the throat area, regardless of the direction of loading.

[b] Single fillet welds in tranverse shear may be treated as double fillet welds in joints so designed as to prevent local bending of the parts adjacent to the fillet welds.

[c] These values are controlled by the shear strength of the parent material; all other values are controlled by the strength of the filler metal.

Sub-Article 5. Bearing Values of Soils

§ C26-376.0 Test Pits or Borings.—a. Except as otherwise provided in this title, applications for permits for new structures, and where required, applications for alterations in structures erected before January first, nineteen hundred thirty-eight, shall contain a statement of the character of the soil strata supporting the foundations or footings. Such applications shall include the records of borings or test pits which shall show the nature of the soil in at least one location in every twenty-five hundred square feet of building area. The borings or test pits shall be carried sufficiently into good bearing material to establish its character and thickness. For structures more than one story in height except dwellings not more than two stories in height, or for structures having an average area load exceeding one thousand pounds per square foot, there shall be at least one boring in every ten thousand square feet of building area carried to a depth of one hundred feet below the curb or to a depth which shows twenty-five continuous feet of material of class 10 or better, as classified in section C26-377.0, below the deepest part of the excavation of the proposed structure, or five feet into ledge rock.

For structures having an average area load in excess of two thousand pounds per square foot, supported on rock, either directly or by piles to rock, or piers to rock, all borings shall be carried to a depth of at least five feet below the surface of the rock except where ledge rock is completely uncovered. Such structures not bearing on rock, shall have at least one boring in each ten thousand square feet of building area carried to a depth of one hundred feet below curb, or five feet into ledge rock.

Records of core borings into rock shall show in all cases the percentage of rock core recovered.

The average area load is the sum of all dead loads and the reduced live loads of the building, as specified in section C26-348.0, divided by the area of the building at the ground level.

Such records shall be certified by a licensed professional engineer or a licensed architect. Samples of the different strata encountered in such borings or test pits, representing the natural state in the ground of such strata, shall be available for the inspection of the superintendent.

b. It shall be unlawful to take washed or bucket samples and all samples, except those of rock, shall be so bottled as to protect them against evaporation. The number, location and depth of such pits and borings, together with the method used in making and reporting them, shall be satisfactory to the superintendent.

§ C26-377.0 Presumptive Bearing Capacities of Soils.—a. Satisfactory bearing materials shall be ledge rock in its natural bed, natural deposits of gravel, sand, compact inorganic silt, or clay or any combination of these materials. These bearing materials shall not contain an appreciable amount of organic matter or other unsatisfactory material, nor shall they be underlaid by layers of such unsatisfactory materials of appreciable thickness.

b. Fill material, mud, muck, peat, organic silt, loose inorganic silt, and soft clay shall be considered as unsatisfactory bearing materials and shall be treated as having no presumptive bearing value.

c. The maximum allowable presumptive bearing values for satisfactory bearing materials shall, except for pile foundations (see section C26-405.0, c), in the absence of satisfactory load tests or other evidence, be those established in the following classification:

Classification of Supporting Soils

Class	Material	Maximum allowable presumptive bearing values in tons per square foot
1	Hard sound rock	60
2	Medium hard rock	40
3	Hardpan overlaying rock	12
4	Compact gravel and boulder-gravel formations; very compact sandy gravel	10
5	Soft rock	8
6	Loose gravel and sandy gravel; compact sand and gravelly sand; very compact sand-inorganic silt soils	6
7	Hard dry consolidated clay	5
8	Loose coarse to medium sand; medium compact fine sand	4
9	Compact sand-clay soils	3
10	Loose fine sand; medium compact sand-inorganic silt soils	2
11	Firm or stiff clay	1.5
12	Loose saturated sand-clay soils; medium soft clay	1

Explanation of Terms
Compaction Related to Spoon Blows; Sand

Descriptive Term	Blows/Foot	Remarks
Loose	15 or less	These figures approximate for medium sand, 2½-inch spoon, 300-pound hammer, 18-inch fall. Coarser soil requires more blows, finer material fewer blows.
Compact	16 to 50	
Very compact	50 or more	

Consistency Related to Spoon Blows; Mud, Clay, Etc.

Descriptive Term	Blows/Foot	Remarks
Very soft	push to 2	Molded with relatively slight finger pressure.
Soft	3 to 10	
Stiff	11 to 30	Molded with substantial finger pressure; might be removed by spading.
Hard	30 or more	Not molded by fingers, or with extreme difficulty; might require picking for removal.

EXPLANATION OF TERMS

Supplementary Tables for 2" Spoons Compaction Related to Spoon Blows
Supplement to Building Code

FOR MEDIUM SAND

Descrip. Term	Blows per ft.	
Loose	15 or less	These figures approximate for 2" spoon, 148 pound hammer, 30 inch fall.
Med. compact	16-30	
Compact	30-50	
Very compact	50 or more	

Descrip. Term	Blows per ft.	
Loose	10 or less	These figures approximate for 2" spoon, 300 pound hammer and 18 inch fall.
Med. compact	11 to 25	
Compact	26 to 45	
Very compact	45 or more	

Descrip. Term	Blows per ft.	
Loose	25 or less	These figures approximate for 2" spoon, 150 pound hammer and 18 inch fall.
Med. compact	25-45	
Compact	45-65	
Very compact	65 or more	

FOR CLAY

Descrip. Term	Blows per ft.	
Very soft	Push to 3	These figures approximate for 2" spoon, 148 pound hammer, 30 inch fall.
Soft	4 to 12	
Stiff	12 to 35	
Hard	35 or more	

Descrip. Term	Blows per ft.	
Very soft	Push to 2	These figures approximate for 2" spoon, 300 pound hammer and 18 inch fall.
Soft	3 to 10	
Stiff	10 to 25	
Hard	25 or more	

Descrip. Term	Blows per ft.	
Very soft	Push to 5	These figures approximate for 2" spoon, 150 pound hammer and 18 inch fall.
Soft	5 to 15	
Stiff	15 to 40	
Hard	40 or more	

Coarser soil requires more blows; finer material fewer blows. A variation of 10 percent in the weight of hammer will not materially affect values in tables.

The use of any specific size of spoon, weight and fall of hammer is not mandatory in the Code. However, any other size of spoon or weight of hammer exceeding the 10 percent variation from weight of hammer specified in above tables shall not be accepted until sufficient data has been submitted for investigation and approval.

Soil Sizes

Descriptive Term	Pass Sieve Number	Retained Sieve Number	Size Range
Clay	200	Hydrometer	.006 mm.
Silt	200	analysis	.006 to .074 mm.
Fine sand	65	200	.074 to .208 mm.
Medium sand	28	65	.208 to .589 mm.
Coarse sand	8	28	.589 to 2.362 mm.
Gravel	—	8	2.362 mm.
Pebble	—	—	2.362 mm. to 2½"
Cobble	—	—	2½" to 6"
Boulder	—	—	6"

Hard sound rock is rock such as Fordham gneiss, Ravenswood gneiss and trap rock, in sound condition, with some cracks allowed.

Medium hard rock is rock such as Inwood limestone, Manhattan schist and massive serpentine with some cracks allowed and slight weathering along cracks.

Soft rock is rock such as shale, decomposed serpentine, decomposed schist or decomposed gneiss, with some disintegration and softening and with considerable cracks allowed.

Hardpan overlying rock is a natural deposit of a thoroughly cemented mixture of sand and pebbles, or of sand, pebbles and clay, with or without a mixture of boulders and difficult to remove by picking.

d. When it is shown by borings, or otherwise, that materials of varying bearing values must be used for the support of structures:

1. The bearing value allowable for footings on the stronger material shall be unchanged;

2. The bearing value allowable for footings on the weaker material shall be unchanged, provided the weaker material is not more than two classes below that of the stronger material as established in this section, but

3. If the weaker material is ranked more than two classes below that of the stronger material as established in this section, the bearing value allowable for footings on the weaker material shall be reduced by a percentage equal to five times the number of classes it is below the stronger material in ranking.

(7.5.3.1). § C26-378.0 Soil Tests. — a. When soil tests are required. — Where there is doubt as to the character of the soil or should application for permission to impose on the soil loads in excess of those specified in section C26-377.0, a static load test shall be made in accordance with the rules of the board and at the expense of the owner of the proposed structure. The superintendent shall be duly notified of

any such test in order that he may be present either in person or by representative. A complete record of such test shall be filed with the department.

b. Procedure for Soil Tests.—In conducting tests to determine the safe sustaining power of the soil, the following regulations shall govern:

1. The soil shall be tested at one or more places and at such level or levels as the conditions may determine or warrant.

2. All tests shall be made under the supervision of the superintendent or his representative.

3. For bearing materials of classes 1 to 4 inclusive as specified in section C26-377.0, the loaded area shall be at least one square foot and for other classes at least four square feet. For materials of classes 4 to 12 inclusive, the loaded area shall be the full size of the pit and shall be at such depth that the ratio of the width of the loaded area to its depth below the immediate adjacent ground surface is the same or greater than the larger of the following two values:

(a). Ratio of the width of any footing to its depth below the immediately adjacent ground surface.

(b). Ratio of the width of the entire foundation or group of footings to its depth below the average surrounding ground surface.

4. When loading tests are made on bearing materials of classes 7, 11 and 12, suitable methods shall be used to prevent evaporation from the materials being tested.

5. Before any test is made, the proposed testing apparatus and specifications of the procedure shall be approved by the superintendent.

6. The loading of the soil shall proceed as follows:

(a). The loads shall be applied by direct weight or by means of a hydraulic jack pressure that is automatically maintained constant.

(b). The load per square foot which it is proposed to impose on the soil shall be first applied and allowed to remain undisturbed and readings taken at least once every twenty-four hours in order to determine the rate of settlement. The applied load shall remain until there has been no settlement for a period of twenty-four hours.

(c). After the requirements of class (b) of this sub-division are met, an additional fifty percent excess load shall be applied in increments not exceeding twenty-five percent of the design load. At least four hours shall elapse between application of successive increments. The total load shall be allowed to remain undisturbed until no settlement occurs during a period of twenty-four hours.

(d). Measurements of settlement shall be accurate to one thirty-second inch and shall be taken and recorded every hour during the first six hours after the application of each increment and at least once every twelve hours thereafter. Settlement readings shall be referred to a bench mark established at a sufficient distance from the test to be unaffected by it.

§ C26-379.0 Determination of Results of Soil Tests.—1. The gross settlement under the proposed safe load upon bearing materials of classes 1 to 10 inclusive shall not exceed one-half inch and the total gross settlement after the fifty percent excess load is applied shall not exceed one inch.

2. Whenever the proposed foundation rests on or is underlaid by a stratum of compressible soil ranking below class 10 as classified in section C26-377.0, c, effective measures shall be used to reduce the magnitude and unequal character of the settlement to be expected as a result of the consolidation of such stratum under the stresses imposed by the foundation loads, in which case a report shall be submitted by a licensed professional engineer experienced in soil testing and analysis, to the superintendent establishing the effectiveness of such measures, based upon laboratory soil tests on undisturbed samples of the compressible soils of a satisfactory quality and upon foundation analysis to determine to the satisfaction of the superintendent that the probable total magnitude, distribution and time-rate of settlement to be expected for the proposed structure will not be excessive.

ARTICLE 9. CONSTRUCTION

Sub-Article 1. Workmanship

(8.1.1). § C26-380.0 Workmanship on Wood Frame Structures.—Structural members of wood shall be so framed, anchored, tied and mutually braced as to develop the strength and rigidity necessary to their purpose or use and to develop at least the safe strength of their details and connections. Fabrication and workmanship shall conform to good engineering and trade practice.

(8.1.2) § C26-381.0 Workmanship on Welded Structures.—a. It shall be unlawful for any person to perform any structural welding work until such person has obtained from the examinefs for welders, after examination and submission of evidence of

experience and ability, a certificate attesting to his fitness for the performance of such work.

b. Before the examiners for welders shall issue a certificate of qualification, the applicant shall pass the operator qualification tests prescribed in part II, operator qualification of the standard qualification procedure, 1941 edition, issued by the American Welding Society. Such qualification tests shall be conducted by the examiners for welders or their representative, but in the discretion of the examiners for welders, documentary or other evidence or both to the effect that the applicant has passed the prescribed qualification tests, conducted by a standard testing laboratory may be accepted as satisfactory proof of such applicant's fitness to make structural welds.

c. The quality of welds permitted under this title shall conform to the requirements of section 2, design of welded connections and section 4, workmanship of the standard code for arc and gas welding in building construction, 1946 edition, of the American Welding Society.

(8.1.3). § C26-382.0 *Repealed December,* 1962.

Sub-Article 2. Excavations

(8.2.1). § C26-383.0 Owner.—The responsibility of affording any license referred to in sections C26-383.0 through C26-390.0, and sections C26-561.0 through C26-570.0, shall rest upon the owner but in case the tenant of any such owner fails or refuses to permit such owner to afford such license, such failure shall be a cause to the owner for dispossessing such tenant through proceedings provided in the civil practice act for recovering possession of real property. In case the duty devolves upon such owner to make his premises safe under any of the provisions of sections C26-383.0 through C26-390.0 and sections C26-561.0 through C26-570.0, such owner shall have a like remedy against a tenant of a part of the premises.

(8.2.2.1). § C26-384.0 Excavations Affecting Adjoining Property.—a. Temporary Support of Adjoining Property.—Any person causing any excavation to be made shall provide such sheet piling and bracing as may be necessary to prevent the earth of adjoining property from caving in before permanent supports have been provided for the sides of such excavation.

(8.2.2). b. Permanent Support of Adjoining Property.—Whenever provisions are lacking for the permanent support of the sides of an excavation in accordance with the provisions of section C26-563.0, a person causing such excavation to be made shall build a retaining wall at his own expense and on his own land. Such retaining wall shall be carried to a height sufficient to retain the adjoining earth, shall be properly coped and shall be provided with a substantial guard rail or fence four feet high.

(8.2.2.3). c. License to Enter Adjoining Premises.—For the purpose of subdivisions a and b of this section, any person causing an excavation to be made shall be afforded the license necessary to enter the adjoining premises. If such license is not afforded, the owner of the adjoining premises shall have the responsibility of providing temporary and permanent support of his premises at his own expense, and for that purpose such owner shall be afforded the license necessary to enter the premises where such excavation is to be made.

(8.2.3.1). § C26-385.0 Excavations Affecting Adjoining Structures.—a. Excavations More Than Ten Feet Deep.—Whenever an excavation is carried to a depth of more than ten feet below the curb, the person who causes such excavation to be made shall, if afforded the license necessary to enter the adjoining premises, at all times and at his own expense, preserve and protect from injury any structure the safety of which may be affected by such part of the excavation as extends more than ten feet below the curb, and such person shall support the adjoining structure by proper foundations, whether or not such structure is more than ten feet below the curb. If the necessary license is not afforded to the person causing the excavation to be made, it shall be the duty of the owner who fails to afford such license to make the structure safe, and to support such structure by proper foundations, and such owner shall, if it is necessary for such purpose, be afforded the license necessary to enter the premises where such excavation is to be made.

(8.2.3.2). b. Excavations Ten Feet or Less in Depth.—The owner of any structure, the safety of which may be affected by an excavation, shall preserve and protect such structure from injury and shall support such structure by proper foundations, except as otherwise provided in subdivision a of this section and shall, if it is necessary for such purpose, be afforded the license necessary to enter the premises where the excavation is to be made.

(8.2.3.4). c. Support of Party Walls.—In case an adjoining party wall is intended to be used by the person who causes an excavation to be made, and such party wall is in good condition and sufficient for the uses of the existing and proposed buildings,

such person shall, at his own expense, preserve such party wall from injury and support it by proper foundations, so that it shall be and remain practically as safe as it was before the excavation was commenced.

(8.2.3.5). d. Weather Protection.—Where permission has been given under this section to any person to enter any adjoining structure, such person shall provide for such adjoining structure adequate protection against any danger of injury due to the elements which may result from such entry.

(8.2.4). § C26-386.0 Structures Unsafe at Commencement of Excavation or Demolition.—If the person who causes an excavation to be made or an existing structure to be demolished has reason to believe an adjoining structure is unsafe, such person shall forthwith report his belief in writing to the superintendent, who shall cause an inspection of such premises to be made, and if such structure is found unsafe, he shall declare such structure unsafe and shall cause it to be repaired as provided in sections C26-193.0 through C26-201.0.

(8.2.5). § C26-387.0 Physical Examination of Adjoining Property Prior to and During Excavation or Demolition.—A license to enter upon adjoining property for the purpose of physical examination of such property, prior to the commencement and at reasonable periods during the progress of the excavation or demolition, shall be afforded by the owner and tenants of such adjoining property to the person causing such excavation or demolition to be made.

(8.2.6). § C26-388.0 Excavations Other Than For Construction Purposes.—a. An excavation made for the purpose of taking soil, earth, sand, gravel, or other material shall be made in such a manner as will prevent injury to neighboring properties, to the street which adjoins the lot where such excavation is made, and to the public health and comfort.

b. Such excavations shall not be commenced until a permit therefor has been obtained from the superintendent.

c. Applications for permits shall be such form as may be prescribed by the commissioner and shall be accompanied by a plot plan on which is indicated the location of the plot, the exact location of the proposed excavation and the area and depth of the excavation.

d. Permits for the operation of such excavations shall be issued only upon proof by the applicant that the land is free from any lien for unpaid city taxes, assessments, water rates, bail bonds and judgments obtained by the city. In addition, if the owner shall be under legal age the consent of the surrogate's court must be submitted. If there is an unpaid mortgage upon the property, the consent of the mortgages must also be submitted.

e. It shall be unlawful for any such excavation to exceed a depth greater than ten feet below the grade of the street or streets adjacent thereto, as may have been established by the board of estimate and shown upon the city map, unless the side walls of such excavation be maintained at an incline of not less than forty-five degrees from horizontal or the side walls be supported by piling or other retaining equipment equal to that specified for building excavations.

f. Such excavation shall be properly drained as long as the excavation remains.

g. Any such abandoned excavation which shall become unsafe, menacing or dangerous to life or limb, shall be filled in by the owner, as the superintendent may require with clean ashes, sand or earth or otherwise made safe and secure.

h. Any person who shall violate any provision of this section, upon conviction thereof, shall be punished by a fine of not more than five hundred dollars or by imprisonment of not more than three months or both.

i. If any provision of this section shall be held invalid or ineffective in whole or in part or inapplicable to any person or situation, it is the purpose and intent of this section that all other provisions thereof shall nevertheless be separately and fully effective and that the application of any such provision to other persons or situations shall not be affected.

(8.2.7). § C26-389.0 Protection At Excavations.—Guards or fences shall be provided along the open sides of excavations, except that, in the discretion of the superintendent, such guards or fences may be omitted from any side or sides other than such as are adjacent to streets or public passageways. Suitable means of exit from excavations shall be provided.

(8.2.8). § C26-390.0 Abandoned Foundations—Safety and Protection.—Any abandoned foundation which shall become unsafe, menacing or dangerous to life or limb, shall be filled in, as the superintendent may require, with clean ashes, sand or earth or otherwise made safe and secure.

Sub-Article 3. Foundations

GROUP 1

General

(8.3). § C26-391.0 General.—a. The foundation loads of permanent structures shall be carried down to satisfactory bearing materials so that the entire transmitted load will be distributed over the supporting soils at any depth beneath the foundation at unit intensities within the allowable bearing values established by this title and by sections C-26-376.0 through C26-379.0. Any type of pile or other foundation construction unprovided for in this title shall meet, in addition to the requirements of this article, all the requirements which may be established by the rules of the board.

b. The provisions of sub-article 3 apply to all vertical and lateral loads and forces on foundations.

c. Foundations supporting rigid frame structures shall be designed so as to minimize differential displacements and to avoid displacements on such magnitude that they would overstress the superstructure.

GROUP 2

Footings

(8.3.1.1). § C26-392.0 Spread of Footings.—The superintendent shall have authority to permit or require a variation in unit loads between different footings on the same plot, when in his opinion such variation may be desirable or necessary to secure adequate stability in the structure.

(8.3.1.2). § C26-393.0 Levels of Footings.—Where footings are on sloping ground or where the bottoms of footings in a structure are on different levels or are on levels different from the footings of adjoining structures, the plans submitted must include vertical cross-sections to natural scale, showing all such variations in level. When such change of level occurs, adequate provision shall be made for the lateral support of the material supporting the higher footing.

(8.3.1.3). § C26-394.0 Wood Footings.—Wood footings may be used only for wood frame structures, if such footings are placed entirely below the permanent water level, or for capping wood piles which project above water level in foundations for wood frame structures over submerged or marsh lands.

(8.3.1.4). § C26-395.0. Concrete footings. Concrete footings shall comply with requirements of sections C26-1547.0 through C26-1555.0 of this code.

(8.3.1.5). § C26-396.0 Masonry Footings.—a. Masonry footings other than concrete for walls and piers shall be of solid masonry and shall have an area sufficient to distribute the superimposed load in accordance with the bearing capacity of the soil upon which such footings are built. When such footings rest upon other than solid rock, they shall extend at least four feet below finished grades. Masonry footings shall be laid in cement mortar or cement-lime mortar, shall be at least eight inches wider than the foundation wall above, and shall have a depth at least equal to the total projection beyond the foundation walls next above.

b. When brickwork in foundation walls is stepped up from the footings, the maximum offset, if the brickwork is laid in single courses, shall be one and one-half inches, and if laid in double courses, three inches.

c. Footings of concrete masonry shall also conform to the requirements of sections C26-395.0, and C26-400.0.

(8.3.1.6). C26-397.0 Masonry Foundations.—a. General.—

1. Foundation walls shall have a thickness at least equal to that of the wall next above, and at least equal to the thicknesses given in inches in the table below:

	Solid masonry	Hollow masonry	Hollow walls of brick	Rubble stone masonry
Private dwellings at most twenty feet high and one-story structures at most twenty feet high	8	12	12	16
Private dwelling over twenty feet high or other structures of more than one story and over twenty feet high	12	16	16	16

2. Foundation walls of hollow blocks may be used above grade when the upper walls are of wood frame or of hollow building block construction. All other foundation walls shall be of solid masonry, except when the structure is without basement or cellar.

(8.3.1.6.1). b. Mortar.—Foundation walls built of masonry units shall be laid in cement mortar or cement-lime mortar.

(8.3.1.6.2). c. Thickness.—

1. In structures over two stories high, except private residences, foundation walls shall be at least four inches thicker than the wall section next above, except that when the walls are of hollow units or are hollow walls of brick, the foundation walls may be of the same thickness as the walls next above, provided such foundation walls are built of solid masonry or concrete and that a maximum of two stories above the foundation are of the same thickness. Foundation walls of reinforced concrete shall comply with the requirements of sections C26-468.0 through C-26-509.0.

2. Every foundation wall serving as a retaining wall shall be designed to support safely all vertical and lateral loads to which such foundation wall may be subjected. It shall be unlawful to have tensile stresses in any masonry, except where such masonry is properly reinforced. The maximum compressive stresses due to combined dead, live and lateral loads shall be within those permitted in sections C26-355.0 through C26-362.0.

3. When any foundation wall other than a retaining wall extends more than thirteen feet below the top of the first floor beams, such extended portion shall be increased by at least four inches for each interval of thirteen feet or fraction thereof, except when such portion is adequately braced by an intermediate floor construction.

(8.3.1.6.3). d. All masonry walls enclosing cellars, basements and lower floors below ground in all residential buildings hereafter erected shall be waterproofed by a method approved by the board.

(8.3.1.7). § C26-398.0 Steel Grillage Footings.—Steel grillage beams may be used in footings, but when such beams are used on yielding soils, they shall rest upon a bed of concrete, at least eight inches thick, mixed in compliance with section C26-311.0. In all cases such beams shall be entirely encased by at least four inches of concrete of the same quality, and the spaces between beams shall be entirely filled with concrete, or with grout of one to two mixture by volume. The beams shall be provided with proper spacers.

(8.3.1.8). § C26-399.0 Pressure Under Footings.—a. In the case of loads exerting pressure under the footings of foundations, the full dead loads, including the weight of the foundations, and the figured total live loads from all floors on the lowest tier of columns, piers or walls shall be taken. For this purpose the reduced live loads permitted by section C26-348.0, may be used.

b. Where a footing is subject to a combination of pressure from wind and from live and dead loads, the normal pressure may be increased by thirty-three and one-third percent, provided the area of the footing thus found is at least that required for the live and dead loads alone. Where the pressure on any footing, due to wind, is less than thirty-three and one-third percent of the pressure due to live and dead loads, such pressure may be neglected.

(8.3.1.9) § C26-400.0 Design of Footings.—a. Footings shall be designed so as properly to distribute their loads within the allowed bearing capacities of soils as established by sections C26-376.0 through C26-379.0, and so as to insure that the stresses in the materials shall be within those fixed by sections C26-354.0 through C26-375.0.

Subd. b. repealed Dec. 1962.

(8.3.1.10). § C26-401.0 Eccentric Footings.—Eccentricity of loading in foundation shall be fully investigated and the maximum loading shall be kept within the approved safe loads of the supporting soil.

(8.3.1.11). § C26-402.0 Weight of Foundations, Fill and Floors.—The weight of foundations and of overlying fill and floors shall be included in the dead load for which provision shall be made.

(8.3.1.12). § C26-403.0 Depth of Foundations.—Footings, piers or pile caps exposed to frost shall, unless such footings, piers and caps are on sound rock, be carried down at least four feet below the adjoining ground surface. It shall be unlawful to lay footings in freezing weather, unless adequate precautions are taken against frost action. It shall be unlawful to lay footings, piers or pile caps on frozen soil.

(8.3.1.13). § C26-404.0 Foundation Piers.—a. The minimum diameter of foundation piers shall be two feet and the method of their installation and construction shall be such as to provide for accurate preparation and inspection of their bottoms, and to insure sound concrete or other masonry.

b. The design of foundation piers shall be governed by the requirements of article eight of this title.

c. The height shall in all cases be at most twelve times the least horizontal dimension.

d. Foundation piers of concrete shall comply with the requirements of section C26-1556.0.

GROUP 3

Pile Foundations

(8.3.2.1.1). § C26-405.0 General Requirements.—a. Definition of a Pile.—A "pile" is a structural unit introduced into the ground to transmit loads to lower strata or to alter the physical properties of the ground, and is of such shape, size and length that the supporting material immediately underlying the base of the unit cannot be manually inspected.

b. General.—All piles shall conform to the requirements of this Group 3 and of such other provisions of the Code as are referred to in Group 3.

c. Evaluation of Supporting Materials for Pile Foundations.—The bearing values of soils supporting pile foundations shall be evaluated by one of the following methods in accordance with the provisions of the sections specified herein; (a) the resistance to driving of piles, section C26-405.2, h; (b) pile load tests, section C26-405.2, i; (c) the resistance to jacking, section C26-405.2, j. The above values may be modified as required by section C26-405.2, paragraphs e, f or g. The presumptive bearing values contained in section C26-377.0 shall not apply to pile foundations.

d. Protection of Pile Materials.—Where the boring records or site conditions indicate possible deleterious action on pile materials because of soil constituents or of changing water levels, such materials shall be adequately protected by approved preservatives or impervious encasements which will not be rendered ineffective by driving and which will prevent such deleterious action.

e. Wood Piles.—1. Wood piles shall be cedar, cypress, Douglas fir, hickory, Norway pine, oak, Southern pine, spruce, Western hemlock, or other similar species approved for such use. Where required to be protected by preservatives, such treatment shall conform to the preservative treatment hereinafter specified.

2. All wood piles shall be of sound timber suitable for driving, cut above the ground swell, free from decay, unsound knots, knots in groups or clusters, wind-shakes and short or reversed bends. The maximum diameter of any sound knot shall be one-third the diameter of the pile section where the knot occurs, but not more than four inches in the lower half of pile length nor more than five inches otherwise. All knots shall be trimmed flush with the body of the pile and ends shall be squared with the axis. Such piles shall have reasonably uniform taper throughout their length and shall be so straight that a line joining the centers of point and butt shall not depart from the body of the pile. No bark or wane shall be measured in required dimensions. The diameter at any section is the average of the maximum and minimum dimensions at that section. All piles required to be treated shall be thoroughly peeled.

3. For temporary structures of a minor character as approved by the superintendent and for lightly loaded class 4 and class 5 structures, as defined in sections C26-242.0 and C26-243.0, located over submerged or marsh land, untreated wood piles having minimum diameters of four inches at the point and eight inches at the butt shall be permitted above high tide level provided the top five feet of each such pile remains exposed for visual inspection.

4. Wood piles not impregnated with an approved preservative shall not be used unless the cut-off or top level of the pile is below permanent water table level. The permanent water table level shall not be assumed higher than the invert level of any sewer, drain or subsurface structure, existing or planned, in the adjacent streets, nor higher than the water level at the site resulting from the lowest drawdown of wells or sumps.

5. Creosoted timber piles when pressure treated to a final net retention of not less than twelve pounds of creosote per cubic foot of wood may extend above permanent water level when installed and protected in accordance with the following provisions:

(a) The tops of the cut-off piles shall be below finished ground level and shall be treated with three coats of hot creosote oil and capped with at least average concrete as defined in Section C26-1456.6-b.

(b) The preservative shall be grade one coal-tar creosote oil as required by United States federal specification, No. TT-W-571-b. Preservative treatment shall be an empty-cell process, in accordance with the same specification.

f. Rolled Structural Steel Piles.—Rolled structural steel piles shall conform as to material to the requirements of section C26-322.0. Sections of such piles shall be of H form, with flange projection not exceeding fourteen times the minimum thickness of metal in either web or flange and with total flange width at least eighty-five per cent of the depth of the section. No section shall have a thickness of metal less than three-eighths of an inch. Other structural sections or combinations of sections

having flange widths and depths of not less than ten inches and thickness of metal not less than one-half inch may also be used.

g. Pre-cast Concrete Piles.—Pre-cast concrete piles shall be reinforced with longitudinal reinforcing equal to at least two per cent of the volume of the concrete in such piles and with lateral reinforcing in the form of hoops or spirals of at least one-quarter inch round rods or wires, spaced twelve inches on centers throughout the length of the pile, except in the bottom and top three feet, where this spacing shall be reduced to not more than three inches. The top of this pile may be cut off after driving. Reinforcing steel shall be covered with not less than two inches of concrete. All piles shall be properly cured before they are driven.

h. Cast-in-place Concrete Piles.—After installation to final depth and immediately before the placing of the concrete filling, the inside of the tube, shell or bore shall be free of any foreign matter. Concrete shall be placed by such methods that the entire volume of the tube, shell or bore is filled. Concrete filling shall not be placed through water, unless the superintendent specifically consents in writing to such placing, after the submission to him of the detailed method of procedure. The concrete cap shall not be poured until at least one hour after all piles within the cap group are completely filled.

i. Combination or Composite Piles.—Combination or composite piles may consist of two types of piles. The maximum allowable load shall be that allowed for the weaker section. The design of the piles shall be satisfactory to the superintendent. The connection or joint between the two sections shall be so constructed as to prevent the separation of the upper and lower sections during construction and thereafter. The details and methods of making joints shall be submitted to the superintendent and approved by him before any piles of this type are used.

j. Piles Located in Soils Subject to Physical Change or Movement.—1. Structures on piles installed in unstable strata of soil which are or may be subject to lateral movements shall be adequately braced by batter piles or by other effective methods. All such piles, including the bracing piles, shall be driven to satisfactory resistance into material of class 11, or better as classified in section C26-377.0, c, below the lowest layer of unstable material, or to rock.

2. Piles installed in soils which exhibit considerable subsidence and consolidation during driving, shall penetrate to satisfactory resistance into suitable underlying material or shall be driven to rock.

k. Use of Existing Piles at demolished Structures.—1. Piles left in place, where the structure has been demolished, shall not be used for the support of new construction unless satisfactory evidence can be produced as to the length and driving conditions of each pile, which evidence will prove that the piles in question are adequate for loadings in accordance with the requirements of this group 3.

2. Where additional piles are required to support the loadings of the new structure, then the existing piles shall be limited to seventy-five per cent of their rated load-carrying capacity as determined under subparagraph 1 above, and the additional piles shall be of similar type and shall also be restricted to seventy-five per cent of the rated load-carrying capacity as determined by the provisions of section C26-405.2.

l. Minimum Overall Pile Dimensions.—Except as provided in section C26-405.0, e, 3, no tapered pile shall be less than six inches in diameter at any section, nor have less than an eight-inch diameter butt at cut-off. No pile of uniform section shall have a diameter of less than eight inches, or, if not circular, a minimum dimension of less than seven and one-half inches.

Tapered shoes or points of lesser dimensions may be attached to the ends of piles.

m. Minimum Spacing of Piles.—Except as provided in subparagraph 4 below, the minimum spacing of piles shall be as follows:

1. Piles bearing on rock or penetrating into rock shall have a minimum spacing center to center of twice the average diameter or 1.75 times the diagonal of the pile, but not less than twenty-four inches.

2. All other piles shall have a minimum spacing center to center of twice the average diameter or 1.75 times the diagonal of the pile, but not less than thirty inches, except that all piles located in groups or abutting groups that receive their principal support in materials below class 6, as classified in section C26-377.0, c, shall have their spacing increased above the minimum values by ten per cent for each interior pile up to a maximum increase of spacing of forty per cent.

3. If, because of known obstructions or space limitations, piles are originally designed to be spaced closer than specified above, or if piles along a lot line are located less than one-half of the required spacing, from the lot line, the carrying capacity of each pile not sufficiently distant from another pile or from the lot line shall be reduced. The percentage reduction in load-carrying capacity of each pile shall be one-half of the percentage reduction in required spacing.

4. When the supporting capacity of a single row of piles is adequate for the wall of a structure, effective measures shall be taken to provide for eccentricity and lateral forces, or the piles shall be driven alternately in lines spaced at least one foot apart and located symmetrically under the center of gravity of the loads carried. A single row of piles without lateral bracing may be used for private dwellings not exceeding two stories in height, provided the centers of the piles are located within the width of the foundation wall.

n. Minimum Penetration.—Piles shall penetrate into soil of class 12 or better, as classified in section C26-377.0, c, at least ten feet below cut-off level and at least ten feet below ground level. The pile point shall be at least ten feet below the nearest established curb level when the pile is located twenty-five feet or less from the lot or property line. Any embedment of such a pile in soil less than ten feet below the nearest established curb level shall not be considered as providing any resistance for such pile, and load-carrying determinations for such pile, in accordance with the provisions of section C26-405.2, shall be made after such embedment is eliminated, by casing off, by excavation, or by other acceptable means.

o. Bracing of Piles.—1. Tops of all piles shall be embedded in caps not less than three inches, and the caps shall extend at least four inches beyond the edge of all piles.

2. Except for single row piles permitted in section C26-405.0, m, 4, every pile shall be laterally braced by rigid connection to at least two other piles in radial directions not less than sixty degrees apart. Three or more piles, connected by a rigid cap, provided they are located in radial directions not less than sixty degrees apart, shall be considered as being braced.

3. Concrete ties for bracing piles shall have minimum dimensions of one-twentieth of the clear distance between pile caps, but not less than eight inches, and shall be reinforced as a column with the bars anchored in the caps to develop full tension value. A continuous reinforced stone or gravel concrete slab or mat six inches or more in thickness, supported by and anchored to the pile caps, or in which piles are embedded at least three inches, may be used in lieu of ties for bracing if such slab does not depend upon the soil for the direct support of its own weight and any loads which may be carried thereon.

p. Soil Under Pile Cap.—The soil immediately below the pile cap shall not be considered as carrying any vertical load.

q. Pile Caps.—Pile caps shall be designed in accordance with the requirements of sections C26-1547 through C26-1555.0 for the pile loads and butt dimensions, considering each pile as a separate reaction concentrated at the butt section.

§ C26-405.1 Requirements for Installation of Piles.—a. Precautions During Installation.—Piles shall be installed with due consideration for safety of adjacent structures, by method which leaves their strength unimpaired and which develops and retains the required load-bearing resistance. If conditions which will cause serious deterioration of piles exist at the site, suitable measures to avoid such damage shall be employed. Special precautions shall be taken to protect from injury both the butt, and where deemed necessary by the superintendent, the tip of piles. If any pile is damaged during installation, the damage shall be satisfactorily repaired or the pile rejected.

b. Equipment.—Equipment and methods for installing piles shall be such that piles are installed in their proper position and alignment.

Followers shall be used only upon written permission of the superintendent and only where necessary to effect installation of piles. A follower shall be of steel of such size, shape, length and weight as to permit driving the pile in the desired location and to the required depth and resistance. Cushion blocks shall be of such materials and design that loss of energy is held to a suitable minimum.

c. Tolerances and Modification of Design Due to Field Conditions.—If any pile is installed out of plumb more than two per cent of the pile length, the design of the foundation shall be modified as may be necessary to support the resulting vertical and lateral forces properly.

In types of piles which are impossible of subsurface inspection, a variance from the plumb of more than two per cent of the exposed section of the pile or other evidence which indicates that the piles are not installed within allowable tolerances shall be considered as sufficient cause for corrective measures.

Where piles are installed out of position and thus receive eccentric loading, the true loading on such piles shall be analytically determined from a survey showing the actual location of the piles as driven, and if the total load on any pile is more than one hundred and ten per cent of the allowable load bearing capacity, correction shall be made by installing additional piles or by other methods of load distribution.

Groups of piles shall not be modified by the addition of piles of lesser load values than the piles originally comprising the group.

A tolerance of three inches from the designed location shall be permitted in the installation of piles, without reduction in load capacity, provided the piles comply with the requirements of this subparagraph for conditions of eccentricity.

d. Jetting.—Jetting shall not be used except when permitted by the superintendent in writing. When jetting is used, it shall be carried out in such a manner that the carrying capacity of the piles already in place and safety of existing adjacent structures shall not be impaired. Jetting shall be stopped not less than three feet above the final expected pile-tip elevation and the piles shall be carried down at least three feet beyond the depth of jetting and until the required resistance is obtained. If there is evidence that jetting has disturbed the load-bearing capacities of previously installed piles, those piles which have been disturbed shall be restored to conditions meeting the requirements of this article by proper redriving or by other acceptable methods after the jetting operations in the area have been completed.

e. Piles Installed Without Impact.—Piles may be installed by methods other than impact driving provided the bottom of such piles bear on or in a material of class 9 or better, as classified in section C26-377.0, c.

f. Penetration Measurements.—Penetration measurements for the purpose of determining resistance to driving shall not be made when pile heads are damaged to an extent which may affect measured penetration, nor immediately after fresh cushion blocks have been inserted under the striking part of the hammer and such measurements shall be made without interrupting the driving more than may be necessary for such measurements, except for necessary repairs, or for redriving heaved piles as provided in paragraph "j."

Gross penetration per hammer blow is the downward axial movement of the pile as measured at an established point on the pile located not more than five feet above the ground surface.

Net penetration is the gross penetration less the rebound, or the net downward movement of the established point.

g. Pile Settlement.—Gross settlement is the total amount of downward movement of a pile or pile group which occurs under an applied test load. Net settlement of a pile or pile group is the gross settlement minus the rebound which occurs after removal of the applied test load.

h. Resistance.—Resistance is defined as the number of hammer blows or the jacking pressure required to cause any definite net penetration.

i. Sequence of Installation.—Individual piles and pile groups shall be installed in such sequence that the carrying capacity of previously installed piles is not reduced.

j. Heaved Piles.—In soils in which the installation of piles causes previously installed piles to heave, accurate level marks shall be put on all piles immediately after installation and all heaved piles shall be reinstalled to the required resistance.

k. Splicing of Piles.—Splices shall be avoided as far as practicable. Where used, splices shall be such that the resultant vertical and lateral loads at the splices are adequately transmitted. Splices shall be so constructed as to provide and maintain true alignment and position of the component parts of the pile during installation and subsequent thereto. Except for piles which can be visually inspected after driving, splices shall develop not less than fifty per cent of the value of the pile in bending. Proper consideration shall be given to the design of splices at sections of piles which may be subject to tension or to bending.

l. Inspection and Control.—The owner shall maintain a competent licensed professional engineer or *competent licensed architect* acceptable to the superintendent, on the site during pile installations to insure and certify that piles are installed in accordance with design and code requirements.

m. Identification of Piles.—A plan showing clearly the designation of all piles by an identifying system shall be filed with the department before the installation of piling is started.

n. Record of Pile Driving.—A record shall be kept by the owner's representative of the total penetration of every pile and the behavior of such pile during driving. Any deviation from the designed location, alignment or load-carrying capacity of any pile shall be promptly reported to the engineer or architect of record and adequate corrective measures shall be taken. Plans showing such deviations and corrective measures shall be filed with the department. Upon the completion of the pile driving, all pile driving records, together with the records of such additional borings or other sub-surface information that were obtained during the installation of the piles shall also be filed with the department.

§ C26-405.2 Allowable Load on Piles.—a. General.—The foundation loads of structures on pile foundations shall be carried down to satisfactory bearing materials, so that the entire transmitted load is supported without causing damaging vertical or lateral movements. The pile groups of a foundation shall be proportioned as to relative size, as nearly as practicable, to produce uniform settlement and shall be designed to

support the maximum combination of the following loads:

(1) All dead loads including the weight of the pile cap and any superimposed load thereon.

(2) The reduced live load specified in section C26-348.0.

(3) Lateral force and moment reactions, including the effect of eccentricity, if any, between the column load and the center of gravity of the pile group.

(4) That amount of the vertical, lateral and moment reactions resulting from wind loads in excess of one-third of the respective vertical, lateral and moment reactions computed from the dead and other live loads.

b. Allowable Axial and Lateral Loads on Vertical Piles.—The maximum load permitted on any vertical pile shall be the allowable axial load described herein applied concentrically in the direction of its axis. No lateral loads in excess of one thousand pounds per pile shall be permitted on a vertical pile, unless it has been demonstrated by tests that the pile will resist a lateral load of two hundred per cent of the proposed working lateral load without lateral movement of more than one-half inch at the ground surface; and will resist the proposed working lateral load without a lateral movement of more than three-sixteenths of an inch at the ground level.

c. Allowable Axial and Lateral Loads on Batter Piles.—The resultant of all vertical loads and lateral forces, occurring simultaneously, in the direction of the axis of batter piles shall not produce stresses in excess of those established in this section. The remaining horizontal component shall not exceed one thousand pounds per pile unless it is demonstrated, as established in section C26-405.2, b, that such piles can safely resist greater lateral loads.

d. Structural Strength of Piles and Limiting Values of Stresses.—1. Strength of Unbraced Piles: That portion of any pile which is free-standing in air or water shall be designed as a column considered to be fixed at a point five feet below the soil contact level in class 9 material or better, as classified in section C26-377.0, c, and ten feet below in any other material.

2. Handling and Installing of Piles: Piles shall demonstrate their capacity to be handled and installed to the desired total penetration and resistance, and to resist the forces caused by the installation of adjacent piles without structural injury.

3. Limiting Values of Stresses: The average compressive stress on any cross-section of a pile, produced by that portion of the design load which may be considered to be transmitted to that section, shall not exceed the allowable values listed below. As an alternative method for the purposes of this section, it may be assumed that for piles more than forty feet in length, installed in material of class 12 or better, as classified in section C26-377.0, c, seventy-five per cent of the load of an end bearing pile, as covered in section C26-405.2, paragraphs "e" and "f", is carried by the tip. For friction piles, as covered in section C26-405.2, paragraph "g", the full load shall be computed at the cross section located at two-thirds of the embedded length of the pile measured up from the tip.

(3.1) Timber piles: cedar, western hemlock, Norway pine, spruce or other woods of comparable strength—600 pounds per square inch; cypress, Douglas fir, hickory, oak, southern pine, or any woods of comparable strength—800 pounds per square inch. The maximum allowable load on a wood pile having a six inch point shall be twenty tons, and on a pile having a point of eight inches or more, the maximum allowable load shall be twenty-five tons.

(3.2) Concrete: Concrete for piles shall comply with section C26-1456.6, and shall be controlled or average concrete. f_c is the allowable axial compressive strength, and f'_c is the twenty-eight-day compressive strength of the concrete, but f'_c shall not exceed four thousand pounds per square inch for computation purposes. The ratio, n is defined as 30,000 divided by f'_c.

Bearing: $f_c=0.25\ f'_c$.

The value n is to be applied only to reinforcing steel in precast concrete piles.

(3.3) Reinforcing steel: The steel unit stress, $f_s=nf_c$. Reinforcing steel in excess of four percent of the average cross sectional area of the pile, and reinforcing steel in cast-in-place concrete piles except as provided in subparagraph (3.5) below, shall not be permitted any load-carrying capacity.

(3.4) Rolled structural steel piles and concrete-filled steel pipe, shells or Tubes: Steel unit stress, $f_s=9{,}000$ pounds per square inch, provided the pipe, shell or tube is at least one-eighth of an inch thick, and f_c shall be as provided for in subparagraph (3.2) above. Where injurious soil conditions exist, the steel shall be protected as provided for in section C26-405.0, d.

(3.5) Piles bearing on rock, consisting of a structural steel shape installed as a full length core, protected by a minimum of two inches of concrete, in a concrete-filled steel shell, at least as thick as No. 18 United States Standard Gauge which is to be left permanently in place.

The pile shall be formed by driving a casing containing a close fitting temporary

core in such manner as to exclude foreign matter from the casing, or by driving an open ended casing which shall be cleaned to the bottom. The casing shall be driven to rock or hardpan overlying rock, to a final penetration of not less than eight blows to the inch of the last three inches, using a hammer which delivers a blow of at least twenty-two thousand foot pounds, either leaving the drive casing permanently in place or placing a light shell within it and withdrawing the drive casing; placing a structural steel shape within the casing or shell; filling the casing or shell with concrete, then immediately driving the H beam to refusal on rock before the concrete has set, as indicated by a rate of penetration of one-fourth of an inch or less under the last five blows, with the hammer striking a blow of twenty-two thousand foot pounds or more or equivalent. Then f_s for the core shall be 12,000 pounds per square inch, and f_c for the concrete shall be as provided in sub-paragraph (3.2) above, with no load value for the shell.

The load on such a pile shall not exceed 100 tons without tests, or 200 tons on the basis of tests as specified in paragraph "i".

e. Piles Installed Open-Ended to Rock.—Concrete-filled steel pipe or shells installed open-ended to bearing on rock for the loads permitted in this paragraph shall have a minimum steel thickness of 0.3 inches. The piles shall be cleaned to the bottom and redriven or rejacked until the piles bear securely, without possibility of sliding, on class 1 or class 2 rock as classified in section C26-377.0, c. The allowable load on such piles, where satisfactory evidence is submitted that the piles are bearing on class 1 or class 2 rock, shall be determined by either of the following methods: (1) The load at the top of the pile shall not exceed eighty per cent of the load determined in accordance with the limiting stresses given in sub-paragraphs d-(3.4) and (3.5) for the combined steel and concrete section, provided that the pipe or shell shall be driven to resistance such that the net penetration for the last five blows totals one-quarter inch or less under the hammers specified in paragraph "h", unless permission is granted in writing, by the superintendent, to permit the use of lighter hammers because of limited headroom due to existing overhead structures; (2) in accordance with the provisions of paragraph "i" of this section for loading tests if driven, and not more than fifty per cent of the jacking pressure, if jacked.

The maximum allowable load on any single pile of this type shall not exceed that permitted by the limitations for material stresses, soil conditions and other requirements of sections C26-405.0, C26-405.1 and C26-405.2, but in no case shall the allowable load exceed two hundred tons.

f. Piles Bearing on Rock, Hardpan or Gravel-Boulder Formations Directly Overlying Rock.—Except as provided in paragraph "e" of this section, the allowable load of piles bearing on rock, hardpan or gravel-boulder formations directly overlying rock shall be determined in accordance with paragraph "i" or by formula in accordance with the provisions of paragraph "h" for loads of forty tons or less per single pile or shall be determined in accordance with the provisions of paragraph "i" for loads exceeding forty tons per single pile, provided that in the latter case the piles bearing on rock are driven to resistance such that the net penetration for the last five blows totals one-quarter inch or less under the hammers specified in paragraph "h", and piles bearing on hardpan or gravel-boulder formations directly overlying rock, are driven to resistance such that the net penetration for the last five blows indicates, in accordance with the formulas in paragraph "h", a bearing value not less than the proposed pile value.

The maximum allowable load on any single pile of this type shall not exceed that permitted by the limitations for material stresses, soil conditions and other requirements of sections C26-405.0, C26-405.1 and C26-405.2, but in no case shall the allowable load exceed one hundred and twenty tons for piles bearing on rock, nor eighty tons for piles bearing on hardpan or gravel boulder formations directly overlying rock.

g. Piles Which Receive Their Principal Support Other Than by Direct Bearing as Covered in Paragraphs "e" and "f".—The allowable load on piles which receive their principal support other than by direct bearing as covered in paragraphs "e" and "f" of this section, shall be determined in accordance with the provisions of paragraph "h" or "i" provided it is thirty tons or less per single pile; and for loads exceeding thirty tons per single pile in accordance with the provisions of paragraph "i" for load tests.

The maximum allowable load on any single pile of this type shall not exceed that permitted by the limitations for material stresses, soil conditions and other requirements of sections C26-405.0, C26-405.1 and C26-405.2, but in no case shall the allowable load exceed sixty tons.

Where the points of a proposed foundation are underlaid by a stratum of compressible soil ranking below class 10, as classified in section C26-377.0, c, either (a) the piles shall be driven completely through such compressible stratum to satisfactory bearing capacities in underlying material of class 9 or better, as classified in section C26-377.0, c, or (b) other effective measures shall be used to reduce the magnitude and unequal character of the settlement to be expected as a result of the consolidation of such stratum under the stresses imposed by the foundation loads, in which case a report shall be submitted by a qualified licensed professional soil engineer to the superintendent establishing the effectiveness of such measures, based upon laboratory soil tests on undisturbed samples of the compressible soils of a satisfactory quality and upon foundation analyses to determine to the satisfaction of the superintendent that the probable total magnitude, distribution and time-rate of settlement to be expected for the proposed structure will not be excessive.

h. Pile Loads Evaluated by Formula.—The following determination of the allowable pile load is to be used only where tests or experience have shown that formulas specified herein are applicable to the soil conditions shown by the borings and to the type of pile being considered. Where the existence of firm soil underlain by soil of poorer bearing value creates doubt as to the safe sustaining value of piles, or where for any other reason doubt exists as to the safe sustaining value of any pile, the superintendent may require that the site be investigated in accordance with the provisions of paragraph "i".

The allowable loads may be determined by the value of R obtained by one of the following formulas, provided that the piles with an average diameter or side of eight inches or less are driven by a hammer which delivers a blow of at least seven thousand foot-pounds; that the piles with an average diameter or side greater than eight inches and not more than eighteen inches are driven by a hammer which delivers a blow of at least fifteen thousand foot-pounds; and that piles with an average diameter or side of more than eighteen inches are driven by a hammer which delivers a blow of at least twenty-two thousand foot-pounds. Double acting hammers shall be operated at full rated speed, pressure, and stroke as shown in the manufacturers' catalogues. The minimum hammer blow for piles intended to carry twenty-five tons or more shall be fifteen thousand foot-pounds.

For drop hammers: $$R = \frac{2WH}{s + 1}$$

For single-acting hammers: $$R = \frac{2WH}{s + 0.1}$$

For double-acting hammers: $$R = \frac{2E}{s + 0.1}$$

Where:

R is the allowable pile load in pounds
W is the weight of striking part of hammer in pounds
H is the effective height of fall in feet
E is the actual energy delivered by hammer per blow in footpounds
s is the average net penetration in inches per blow for the last five blows after the pile has been driven to a depth where successive blows produce approximately equal net penetration.

i. Determination of Bearing Value by Load Tests.—When the allowable pile load is to be determined by load tests, the tests shall be made as provided below. Such load tests shall be made at the expense of the owner of the proposed structure, or of the person causing the piles to be installed. Before any load test is made the proposed apparatus and structure to be used in making the load test shall be approved by the superintendent. All load tests shall be made under the supervision of the superintendent or his representative. A complete record of such load tests shall be filed with the department.

(1) Uniform conditions: Areas of the foundation site within which the subsurface soil conditions are substantially similar in character, shall be established by borings not less than as required by section C26-376.0. Each such area shall be tested by driving at least three piles distributed over the area. Continuous records for the full depth of the penetration of the pile shall be kept of the blows per foot to drive the pile to the desired resistance. If the records of the driving resistance of these piles are not similar, or the driving resistance is not in reasonable agreement with the information obtained from the borings, or where piles designed to carry more than thirty tons each are to be installed in soils underlaid by soils of poorer bearing value, the superintendent may require additional piles to be driven for test purposes.

(2) Allowable pile load by load test: One of these three piles in each area of uniform conditions, but not less than two typical piles for the entire foundation installation of the building or group of buildings on the site, nor less than one pile for each fifteen thousand square feet of building area, shall be loaded by a method which will maintain constant load under increasing settlement. The test load shall be twice the proposed load value of the pile. The test load shall be applied in seven

increments equal to one-half, three-fourths, one, one and one-fourth, one and one-half, one and three-fourths and two times the proposed working load. Readings of settlements and rebounds shall be referred to a constant elevation bench mark and shall be recorded to one one-thousandth of a foot for each increment or decrement of load. After the proposed working load has been applied and for each increment thereafter, the test load shall remain in place until there is no settlement in a two-hour period. The total test load shall remain in place until settlement does not exceed one-thousandth of a foot in forty-eight hours. The total load shall be removed in decrements not exceeding one-fourth of the total test load with intervals of not less than one hour. The rebound shall be recorded after each decrement is removed, and the final rebound shall be recorded twenty-four hours after the entire test load has been removed. The maximum allowable pile load shall be one-half that which causes a net settlement of not more than one-hundredth of an inch per ton of total test load or shall be one-half that which causes a gross settlement of one inch, whichever is less.

(3) Foundation piles: In the subsequent driving of the foundation piles for the structure, a pile shall be deemed to have a bearing value equal to that determined by the load test pile for that area of the foundation, when the foundation pile, using the same or equivalent make and model of pile hammer, and the same operation of the hammer with regard to speed, height of fall, stroke and pressure, and all other variable factors, shall develop equal or greater final resistance to driving than the load test pile. Where actual pile lengths vary more than fifty per cent from that of the test pile, the superintendent may require investigation to determine the adequacy of the piles.

(4) Pile groups: Where the superintendent has reason to doubt the safe load sustaining capacity of pile groups, he may require, at the expense of the owner, group load tests up to one hundred and fifty per cent of the proposed group load.

j. Piles Installed by Jacking or Other Methods Without Impact.—The carrying capacity of a pile installed by jacking or other methods without impact shall be not more than fifty per cent of the load or force used to install the pile. The carrying capacity of piles installed by static forces shall be demonstrated by load tests, on not less than two piles selected by the superintendent, applied over a period of time sufficient to indicate that excessive settlement will not occur. Carrying capacities shall not exceed the allowable loads as provided in section C26-405.2, e, f and g.

k. Underpinning Piles.—Piles jacked into position for permanent and for temporary underpinning shall be evaluated for safe bearing capacity by the jacking pressures used. The working load of each temporary underpinning pile shall not exceed the total jacking pressures used to obtain the required penetration. The working load of each permanent underpinning pile shall not exceed two-thirds of the total jacking pressure used to obtain the required penetration if the load is held constant for ten hours, or one-half of the total jacking pressure at final penetration, but in no case are the load values set forth in section C26-405.2, e, f and g, to be exceeded.

Sub-Article 4—Masonry Construction

GROUP 1

General Requirements for Masonry Construction

(8.4.1). § C26-412.0 General.—a. Masonry shall be plumb and true to line. Materials and assemblies shall conform to the requirements of articles eight and eleven of this title, and the other requirements of this title and rules of the board.

b. Dimensions of masonry units and thickness of masonry walls and partitions shall be construed as nominal dimensions. In all masonry walls and partitions exceeding 3½ inches in thickness, actual dimensions may vary from the nominal by the thickness of one mortar joint, but in no case shall the variation exceed three-eighths inch, and in no case shall the variation apply to required shell thickness of hollow masonry units.

(8.4.1.1.) § C26-413.0 Mixing of Mortar.—Mortar ingredients shall be thoroughly mixed and uniformly distributed throughout the mass. Mortar shall be used before the initial set has commenced. It shall be unlawful to use retempered mortar containing cement. The mixing into mortar of lime putty which has not been properly slaked and then cooled, is forbidden.

(8.4.1.2). § C26-414.0 Protection During Freezing Weather.—Masonry shall be protected against freezing until such time as the setting of the cementing material has advanced far enough to prevent any displacement of such masonry. It shall be unlawful to use any frozen material or to build upon any frozen masonry or frozen soil.

(8.4.1.3). § C26-415.0 Masonry Piers.—a. Masonry piers shall be built of solid masonry and, except as provided in section C26-314.0, shall be laid in cement mortar or cement-lime mortar, and the maximum unsupported height shall be ten times the least dimension. Sections of panel walls in skeleton construction shall not be considered as piers.

b. It shall be unlawful to have openings or chases within the required area of any pier.

c. Masonry piers shall be bonded in accordance with the requirements of C26-424.0.

(8.4.1.4). § C26-416.0 Anchorage of Masonry Walls.—a. Masonry walls shall be anchored, at maximum intervals of four feet, to each tier of joists or beams bearing on such walls by metal anchors having a minimum cross-section of one-quarter of an inch by one and one-quarter inches, and a minimum length of sixteen inches, which anchors shall be securely fastened to the joists or beams and shall be provided with split and upset ends or other approved means for building into masonry.

b. Masonry walls parallel to joists or beams shall be provided, at maximum intervals of six feet with similar anchors engaging three joints or beams. Girders shall be similarly anchored at their bearings. Upset and "T" ends on anchors shall develop the full strength of the anchor strap.

(8.4.1.5). § C26-417.0 Bracing of Masonry Walls.—Masonry walls in structures, except as provided in section C26-428.0, shall be braced either horizontally or vertically at right angles to the wall face, at maximum intervals of twenty times the wall thickness. Horizontal bracing may be obtained by floors or roofs. Vertical bracing may be obtained by cross walls, wall columns or buttresses, or by increasing the wall thickness.

(8.4.1.6). § C26-418.0 Bearing Wall Openings.—The area of openings in any horizontal section of bearing wall shall be fifty percent or less of the gross sectional area, except that the thickness of the wall shall be increased four inches for each fifteen percent or fraction thereof of increased opening area in excess of fifty percent and in all cases the total percentage of openings shall be less than seventy-five percent of the horizontal sectional area of the wall. Wall openings shall also comply with section C26-649.0.

(8.4.1.7). § C26-419.0 Total Thickness of Masonry Walls.—The total thickness of any wall, the thickness of which is increased in accordance with the requirements of sections C26-412.0 through C26-467.0, shall be governed by that requirement which produces the maximum thickness.

(8.4.1.8). § C26-420.0 Bonding of Buttresses.—Buttresses shall be bonded into the wall by masonry in the same manner employed in the construction of such wall.

(8.4.1.9). § C26-421.0 Design of Lintels and Arches.—a. Openings shall be spanned by a lintel or arch of incombustible material which shall comply with the requirements of section C26-617.0.

b. Where steel or reinforced masonry lintels are used, such lintels shall be of such strength that the maximum deflection is one-three-hundred-sixtieth of the clear span and such lintels shall have at least five inches of bearing on each end and shall rest upon solid bearing.

c. Lintels of natural or manufactured stone shall be of sufficient strength to carry the superimposed load without deflection and shall have a bearing on solid masonry at each end within the compressive strengths permitted under sections C26-356.0 through C26-362.0.

d. Masonry mullions less than twelve inches in width on either face of the wall shall be suitably reinforced, or shall be dowelled if made of stone.

e. Masonry arches shall have a rise of at least one inch for each foot of span and shall be so designed as to carry the superimposed load. Proper provision shall be made for resisting lateral thrust.

(8.4.1.10). § C26-422.0 Enclosing of Structures by Walls.—Structures shall be enclosed by materials conforming to the requirements of the type of construction under which such structures are classified. Such enclosures shall be entirely within the property lines, except for such projections beyond the building line as are authorized by the code. Party walls may be considered to be enclosing walls.

GROUP 2

Solid Masonry Walls

(8.4.2.1). § C26-423.0 Joints in Solid Masonry Walls.—The spaces between masonry units shall be filled with mortar.

(8.4.2.2). § C26-424.0 Bonding of Solid Masonry Walls.—a. Except where a wall is constructed of a single thickness of brick, having a width of at least five and one-half inches in solid brick walls there shall be the equivalent of at least one full header course for each six courses of each wall surface. Where facing brick of a different thickness from the brick used for backing is used, the course of the facing brick and backing shall be brought to a level at least once in each six courses in the height of the backing, and the facing brick shall be properly tied to the backing by a full header course of the facing brick or by some other approved method. Facing brick shall be

laid at the same time as the backing.

b. In walls more than twelve inches thick, the inner joints of header courses shall be covered with another header course which shall break joints with the courses below.

(8.4.2.3). § C26-425.0 Wetting of Brick.—All brick having appreciable absorption shall be thoroughly wet before laying.

(8.4.2.4). § C26-426.0 Bonding of Wall Intersections.—a. When two bearing walls meet or intersect and the courses are carried up together, the intersection shall be bonded by laying in a true bond at least fifty percent of the units at the intersection.

b. When the courses of meeting or intersecting bearing walls are carried up separately, the perpendicular joint shall be regularly toothed or blocked with eight-inch maximum offsets, and the joints shall be provided with metal anchors having a minimum section of one-quarter of an inch by one and one-half inches, with ends bent up at least two inches, or with cross pins to form anchorage. Such anchors shall be at least two feet long and the maximum spacing shall be four feet.

c. Meeting or intersecting non-bearing walls shall be bonded or anchored to each other in an approved manner.

(8.4.2.5). § C26-427.0 Thickness of Solid Bearing Walls.—a. The thickness in inches of solid masonry bearing walls for the respective story heights, with the exception of private dwellings thirty-five feet or less in height, two-story multiple dwellings, one-story commercial buildings and mixed occupancies provided for in section C26-443.0, shall be at least:

8	12							
7	12	12						
6	12	12	12					
5	12	12	12	12				
4	16	12	12	12	12			
3	16	16	12	12	12	8		
2	16	16	16	12	12	12	8	
1	20	16	16	16	12	12	12	8
Stories	8	7	6	5	4	3	2	1

b. For the purpose of calculating wall thicknesses, thirteen feet shall be assumed to be the maximum height of a story.

c. Regardless of the requirements of this section, it shall be unnecessary for the thickness of solid masonry bearing walls for structures of at most seventy-five feet in height to exceed twelve inches for the uppermost fifty-five feet of height and sixteen inches for wall below the required twelve-inch wall. Where, under the foregoing provision, a change in required thickness of wall occurs between two floors, thickness required at that tier of beams nearest the elevation of the required change shall govern.

d. When the clear span between bearing walls or between a bearing wall and an intermediate support is more than twenty-six feet, the thickness of such walls shall be increased four inches in thickness for each twelve and one-half feet or fraction thereof that such span is in excess of twenty-six feet, except where such bearing walls are adequate reinforced by buttresses.

(8.4.2.6). § C26-428.0 Thickness of Interior Walls in Residence Structures.—a. The thickness in inches of interior bearing walls with bearing on both sides in residence structures for the respective story heights shall be at least:

6	8					
5	8	8				
4	8	8	8			
3	8	8	8	8		
2	12	8	8	8	8	
1	12	12	8	8	8	8
Stories	6	5	4	3	2	1

b. Where interior walls in residence structures have bearing on one side only or are non-bearing, the required thickness in inches shall be eight inches for the uppermost fifty-five feet of wall height and twelve inches below the fifty-five-foot distance from top of such walls.

c. Where wood floor and roof beams bear on both sides, such beams shall be staggered on the bearing wall and there shall be at least four inches of masonry between any two such wood beams.

d. The maximum length of such bearing and non-bearing walls between cross-walls, cross-bracing, piers or buttresses shall be thirty feet.

(8.4.2.7). § C26-429.0 Walls Above Roof Levels.—Walls above roof levels, twelve feet or less in height, enclosing stairways, elevator shafts, penthouses or bulkheads if of masonry shall be at least eight inches thick (except that panel walls may be constructed in accordance with the requirements of section C26-446.0) and may be

considered as neither increasing the height nor requiring any increase in the thickness of the wall below, provided the allowable working stress requirements are met.

GROUP 3
Hollow Walls

(8.4.3.1). § C26-430.0 Hollow Walls of Solid Masonry Units.—a. General.—The requirements of sections C26-416.0 through C26-421.0 and of sections C26-423.0 through C26-429.0, shall apply to hollow walls of brick, except as regards the bonding of the inner joints of header courses in walls over twelve inches thick as provided in section C26-424.0.

(8.4.3.1.1). b. Thickness of Hollow Walls of Solid Masonry Units.—The thickness in inches of hollow bearing walls of solid masonry units, except in private dwellings thirty-five feet or less in height and mixed occupancies as provided in subdivision a of section C26-443.0, shall be at least:

40	8			
30	12	8		
20	12	12	8	
10	12	12	12	8
Height of wall in feet	40	30	20	10

(8.4.3.1.2). c. Maximum Height of Hollow Walls of Solid Masonry Units.—The maximum height of hollow bearing walls solid masonry units, or portions of such walls in any class of structure shall be forty feet above the support of such walls or portions of walls.

(8.4.3.1.3). d. Superimposed on Solid Masonry Walls.—Hollow bearing walls of solid masonry units may be constructed to the maximum permissible height on top of a solid masonry wall whose maximum height is thirty feet above the first tier of beams. The minimum thickness of such walls shall be based upon the requirements of section C26-427.0.

(8.4.3.1.4). e. Decrease in Thickness of Hollow Walls of Solid Masonry Units.—At points where wall thicknesses decrease in hollow walls of solid masonry units, a course of solid masonry shall be interposed between the wall section below such point and the wall section next above.

(1.77). f. Bonding of Withes in Hollow Walls.—When hollow walls are built in two or more vertically separated withes, such withes shall be bonded together with similar units as are used in construction of the wall, so that the parts of the wall will exert common action under the load, or with approved non-corroding metal ties one to every four square feet.

(8.4.3.2). § C26-431.0 Walls of Hollow Block or Tile or Solid Structural Units.—a. General.—

1. Walls of hollow block or tile or solid structural units shall have the spaces between the units filled with mortar.

2. The requirements of sections C26-416.0 through C26-421.0 and of section C26-426.0, shall apply to such walls.

(8.4.3.2.1). b. Bonding of Walls of Hollow Block or Tile or Solid Structural Units.—

1. In all walls of hollow block or tile or solid structural units, built only one unit in thickness, each unit shall break joints with those next above. When more than one unit is required to produce a given wall thickness, the units shall break joints with the units next above and shall be laid with a masonry bond equivalent to one course of bonding units to each three courses of stretcher units, but in no event shall the interval between bonding courses be greater than twenty-six inches.

2. In the case of non-bearing interior partitions one story or less in height, constructed of units to be left exposed on one or both sides for architectural effect, these bonding requirements may be waived.

(8.4.3.2.2). c. Decrease in Thickness in Wall of Hollow Masonry.—Where walls of hollow masonry are decreased in thickness, the units in the top course of the thicker wall shall be filled solidly with concrete or shall be covered with slabs of solid masonry at least one inch in thickness.

(8.4.3.2.3). d. Anchorage in Walls of Hollow Masonry.—Where anchors are used in walls of hollow masonry, such anchors shall be galvanized, or shall be of non-corroding metal of adequate size and substantial construction.

(8.4.3.2.4). e. Beds and Joints of Hollow Masonry.—Where hollow units are set with cells horizontal, such units shall be set in a full bed of mortar one-half of an inch or less in thickness, with vertical joints buttered full on shells and webs; where such units are set with cells vertical, the bearing members shall be buttered and vertical joints slushed full of mortar.

(8.4.3.2.5). f. Supports for Structural Members on Hollow Masonry.—Wherever girders, beams, joists, or other structural members frame into masonry of hollow block or tile or solid building block, such members shall rest upon such solid incombustible material as will properly distribute the load.

(8.4.3.2.6). g. Thickness of Walls of Hollow Masonry.—The minimum thickness in inches of bearing walls of hollow masonry, except in private dwellings thirty-five feet or less in height, two-story multiple dwellings, one-story commercial buildings, as provided in subdivision a of section C26-443.0, and mixed occupancies as provided in sub-division b, shall be:

40	8			
30	12	8		
20	12	12	8	
10	12	12	12	8
Height of walls	40	30	20	10

(8.4.3.2.7). h. Maximum Height of Walls of Hollow Masonry.—The maximum height for walls or portions of walls of hollow masonry in any class of structure shall be forty feet above the support of such walls or portions of walls.

(8.4.3.2.8). i. Hollow Masonry Walls Superimposed on Solid Masonry Walls.—Walls of hollow masonry may be constructed to the maximum permissible height on top of a solid masonry wall whose maximum height is thirty feet above the first tier of beams. The minimum thickness of the solid masonry in such walls shall be based upon the requirements of section C26-427.0 and the minimum thickness of hollow masonry, if in bearing walls, shall be based upon the requirements of section C26-431.0, g, and the solid masonry wall below shall not be of a lesser thickness than the hollow masonry wall.

(8.4.3.2.9). j. Partitions of Masonry.—

1. Partitions of masonry shall have the joints between the units filled with mortar and shall conform to the requirements of subdivisions b and d of this section.

2. Masonry partitions, exclusive of plaster, shall, unless otherwise required for fire resistive purposes under sections C26-633.0 through C26-637.0, have at least the following thicknesses:

Under 12 feet in height	3 inches
12 feet to 16 feet in height	4 inches
Over 16 feet to 20 feet in height	6 inches
Over 20 feet to 24 feet in height	8 inches

3. Partitions of masonry shall rest on an incombustible structural support and shall be wedged or anchored to the ceiling construction.

GROUP 4

Plain Concrete

(8.4.4). § C26-432.0 Plain Concrete.—The general requirements for plain concrete masonry poured in place, as to workmanship, bond, anchors, forms, tests, construction details and miscellaneous provisions shall be the same as the requirements prescribed in sections C26-1455.0 through C26-1556.0, except that wall thickness of concrete masonry may be two inches less than those required in Section C26-427.0 and subdivision a of Section C26-443.0, but all such walls shall be at least eight inches thick, except that exterior panel walls of plain concrete masonry shall be at least six inches thick and shall be provided with proper temperature reinforcement.

GROUP 5

Stone Masonry

(8.4.5.1). § C26-433.0 Construction Requirements for Stone Masonry.—Stone masonry shall meet the requirements of sections C26-416.0 through C26-421.0, and of section C26-426.0, except that anchors for stone masonry in bearing walls shall be at least three feet long and at least one-quarter of an inch by two inches in section.

(8.4.5.2). § C26-434.0 Beds and Joints of Stone Masonry.—Stone in bearing masonry shall be laid in cement or cement-lime mortar and all spaces and joints shall be thoroughly filled, except as provided in section C26-314.0.

(8.4.5.3). § C26-435.0 Ashlar Masonry.—Walls of ashlar masonry having sawed, dressed or squared beds shall be of the same thickness as that required in section C26-427.0. Bond stones uniformly distributed shall be provided which shall have an area equivalent to at least sixteen percent of the face area of the walls.

(8.4.5.4). § C26-436.0 Rubble Stone Masonry.—The wall thickness of rubble stone masonry shall be at least four inches greater than the thickness required by section C26-427.0, except as provided in subdivision a of section C26-443.0. Rubble stone

masonry twenty-four inches or less in thickness shall have bond stones with a maximum spacing of three feet vertically and horizontally and if such masonry is of a greater thickness than twenty-four inches, such masonry shall have one bond stone for each six square feet of wall surface on both sides.

GROUP 6

Veneered Walls

(8.4.6.1). § C26-437.0 Anchorage for Veneered Masonry Walls.—When masonry walls are veneered with brick, architectural terra cotta, stone or other masonry, the material shall be securely tied into the backing with the equivalent of the following minimum anchorage requirements:

(8.4.6.1.1). 1. For anchorage of brick veneering on masonry, one substantial non-corroding metal wall tie for each three hundred square inches of wall surface.

(8.4.6.1.2). 2. For anchorage of architectural terra cotta and other moulded units on masonry, one non-corroding metal anchor at least equal to five-sixteenths of an inch round or one-eighth of an inch by three-quarters of an inch flat in sectional area to each piece and two or more such anchors to all pieces over eighteen inches in length or more than three hundred square inches in superficial area, except where such architectural terra cotta facing is bonded and completely filled with the brick backing.

(8.4.6.1.3). 3. For anchorage of stone veneering on masonry, one non-corroding anchor at least three-sixteenths of an inch by one inch flat, or its equivalent in cross-sectional area, to each piece over one-half of a square foot in face area and at least two anchors to all pieces over twenty-four inches in length or more than four hundred square inches in superficial area.

(8.4.6.2). § C26-438.0 Thickness and Height of Veneered Walls.—In all cases the veneering shall be excluded in calculating the bearing wall thickness and the required thickness of the wall. The maximum height of veneering on walls, other than panel or enclosure walls, shall be forty feet above the foundations.

(8.4.6.3). § C26-439.0 Veneered Wood Frame Structures.—a. Wood frame structures may be veneered with masonry laid up in cement or cement-lime mortar. Such veneer shall be anchored to the frame by non-corroding metal ties equivalent to the following minimum requirements:

(8.4.6.3.1). 1. For anchorage of brick veneer on frame structures, one wall tie to every one hundred sixty square inches of wall area.

(8.4.6.3.2). 2. For anchorage of stone, architectural terra cotta and other moulded units on frame structures, one spike anchor or two wall ties to every two hundred sixty square inches of wall area.

(8.4.6.3.3). b. It shall be unlawful to use such veneer on frame structures above a maximum height of thirty-five feet above the foundation; it shall be unlawful also, to use such veneer on structures having more than two stories and a gable. The veneer shall be directly supported on the foundation.

(8.4.6.3.4). c. Frame structures veneered with masonry shall be considered to be in a different class from masonry structures. It shall be unlawful to attribute any structural strength to the veneer.

GROUP 7

Faced Walls

(8.4.7). § C26-440.0 Faced Walls.—a. Faced walls shall be of at least the thickness required for masonry walls of the material forming the backing. Facings of brick or solid structural units shall be bonded into the backing with headers, or stretchers at least four inches thicker than the facing, the equivalent of one-sixth of the area of wall. Dressed stone facings shall be bonded to the backing with the equivalent of approximately one-fifth of the superficial area in bond stone at least four inches thicker than the facing, in addition to which, every stone other than bond stone shall be anchored to the backing witn at least one non-corroding metal anchor, at least three-sixteenths of an inch by one inch, or the equivalent, in cross-sectional area. In the case of plain coursed ashlar the bond stone shall occur at least as every alternate stone in every third course.

b. In the case of random ashlar, range work or other jointing schemes where the more frequently spaced smaller units are used for bond stone, the metal anchors may be omitted, provided the superficial area of the bond stone is at least equal to that required for brick facing, one-sixth the area of the wall.

c. When faced walls are built of different materials, the minimum thickness shall be that required for masonry walls built entirely of the material having the lower compressive strength.

d. The height of a single course in faced walls shall, in all cases, except for pilaster and spandrel facing stone, be at most ten times the thickness of the facing material.

e. When facing is used, such facing shall not be figured in the strength of the wall unless such facing is at least four inches in thickness or at least the normal thickness of an average brick.

f. For private dwellings and multiple dwellings not in excess of two stories, and for one-story commercial buildings, faced walls with 4 inches of brick and 4 inches of hollow block may be used with header courses every 7th course. This shall apply to residence buildings only, which are not in excess of two stories or 20 feet in height of the wall and commercial buildings not in excess of one story or 13 feet in height of the wall.

GROUP 8

Party and Fire Walls

(8.4.8.1). § C26-441.0 Party Walls.—a. Party walls may be of any type of masonry provided for herein and shall comply with all requirements for bearing walls. Party walls which function also as fire walls shall, in addition, conform to the requirements of section C26-631.0 and of section C26-632.0.

b. It shall be unlawful to load any party wall on either side to more than fifty percent of its allowable loading.

(8.4.8.2). § C26-442.0 Fire Walls.—Fire walls of masonry shall meet the material, thickness and construction requirements of section C26-631.0 and of section C26-632.0.

GROUP 9

Special Forms of Bearing, Non-Bearing Walls and Other Masonry Construction

(8.4.9.1). C26-443.0 Bearing Walls for Private Dwellings, Two-story Multiple Dwellings and One-story Commercial Buildings.—a. The minimum thickness in inches of walls for private dwellings thirty-five feet or less in height, except as provided in subdivision c of this section, two-story multiple dwellings and one-story commercial buildings not more than thirteen feet in height shall be:

	Solid Masonry Solid Structural Units			Hollow Masonry and Hollow Walls of Solid Structural Units			Rubble Stone Masonry		
3	8	..	..	8	..	..	16	..	..
2	8	8	..	8	8	..	16	..	..
1	8	8	8	10	8	8	16	16	16
Stories	3	2	1	3	2	1	3	2	1

b. Mixed occupancies.—In three-story structures having a maximum width of twenty-five feet, where the first story is used for commercial purposes and the upper stories for residence purposes, the minimum thickness of bearing walls shall be eight inches.

c. The minimum thickness of bearing walls of private dwellings not more than one story in height shall be five and one half inches, provided the height of the wall does not exceed nine feet to the eaves or fifteen feet to the peak of gables and provided such walls are constructed of solid masonry.

(8.4.9.2). § C26-444.0 Parapet Walls.—a. In all structures exceeding twenty-two feet in height, exterior walls of masonry, shall have parapet walls carried 3 feet 6 inches above the roof with the following exceptions:

1. One or two family residence structures with overhanging roofs or where roofs are finished with cornices or gutters, when access to roof is limited to a scuttle and vertical ladder.

2. Detached structures with overhanging roofs or cornices where metal railings not less than 3 feet 6 inches in height are provided.

3. Exterior walls of fireproof buildings having metal railings not less than 3 feet 6 inches in height.

All metal railings shall be of a type which will prevent children crawling through or climbing over same and shall be provided with any further maximum protection as required by the commissioner.

Where roofs are used for recreational purposes, wire caging at least 10 feet high, structurally supported, shall be constructed.

Where ball games are played on roofs, a continuous wire roofing shall be constructed.

b. Parapet walls shall be of the same thickness as the wall below, except that in all cases, the thickness required shall be at most twelve inches.

c. Residence structures shall have parapet walls carried at least two feet above the roof, with the following exceptions:

1. Parapet walls between structures of the same height and forty feet or less in height shall extend at least eight inches above the roof;

2. Party walls in structures the roofs of which pitch at an angle of twenty degrees or more from the horizontal may stop at the top of the roof boards, provided, no combustible material passes through the wall, and the junction of roof and wall is thoroughly fire-stopped;

3. Fire partition walls for the purpose of subdividing non-fireproof residence structures shall be carried to the top of the roof boards be thoroughly grouted with cement mortar and fire-stopped, or carried through the roof.

d. When parapet walls function as parts of party walls, or fire walls, such parapet wall shall conform to the requirements for such walls.

e. All parapet walls shall be coped with incombustible and durable material.

(8.4.9.3). § C26-445.0 Non-bearing Masonry Walls.—The minimum thickness of non-bearing masonry walls, except as provided in section C26-428.0 may be four inches less than the thickness required for bearing walls, but any such wall shall be at least eight inches thick, except as provided in Section C26-446.0.

(8.4.9.4). § C26-446.0 Panel, Apron and Spandrel Walls.—a. Panel walls shall be constructed of incombustible materials or assemblies of materials having a fire resistive rating of at least two hours in class 1 structures, and one hour in class 2, 3 and 6 structures except as otherwise provided in Sections C26-240.0, C26-241.0 and C26-244.0. Panel walls shall be so designed as to transmit into the frame an assumed wind pressure of thirty pounds per square foot of exposed surface applied in either direction without undue deflection and shall be secured to the frame in a permanent and weatherproof manner.

b. Panel walls shall be bonded or otherwise so secured to the structure as to furnish adequate lateral support to the wall.

(8.4.9.5). § C26-447.0 Enclosure Walls.—Enclosure walls shall meet all the requirements of height, thickness and type of construction prescribed for bearing walls.

(8.4.9.6). § C26-448.0 Masonry Curtain Walls.—a. Curtain walls of solid masonry shall be at least eight inches thick for the uppermost thirteen feet and at least twelve inches thick for the next fifty-two feet or fraction thereof below and shall be increased four inches in thickness for each succeeding sixty feet or fraction thereof below.

b. When masonry curtain walls are built of masonry other than solid masonry, such walls shall be at least ten inches thick for the first thirteen feet, twelve inches thick for the next lower thirty-nine feet and shall be increased in thickness four inches for each thirty-nine feet or fraction thereof next below, provided that the maximum horizontal distance between lateral supports shall be twenty feet. When the distance between the lateral supports exceeds twenty feet, the thicknesses of all walls specified in this section shall be increased four inches for each additional ten feet or fraction thereof between lateral supports. Curtain walls of hollow masonry twelve inches or more in thickness shall be made of at least two bonded units.

(8.4.9.7). § C26-449.0 Furring.—Masonry materials used as furring shall be excluded in calculating the required wall thickness, and such furring shall be considered to lack any structural value.

(8.4.9.8). § C26-450.0 Chases and Recesses.—a. It shall be unlawful to have chases in eight-inch walls or within the required area of any pier. The maximum depth of any permitted chase in any wall shall be one-third of the wall thickness. The maximum length of any horizontal chase without suitable structural support shall be four feet, and the maximum horizontal projection of any diagonal chase shall be four feet.

b. Recesses shall have at least eight inches of material at the back.

c. The maximum aggregate area of recesses and chases in any wall shall be one-quarter of the whole area of the face of the wall in any story, except that for stairs, elevators and dumbwaiters, the walls, including foundation walls behind such facilities, may be reduced to twelve inches.

d. It shall be unlawful to have chases or recesses in fire walls, fire partitions and in fire protection of structural members which chases or recesses would reduce the thickness below the minimum specified in this title.

e. Chases and recesses may be built into hollow walls and walls constructed of hollow block or tile, but it shall be unlawful to cut chases or recesses in walls of these types of construction.

(8.4.9.9). § C26-451.0 Corbelling.—It shall be unlawful to corbel walls less than twelve inches thick, except for fire-stopping. Corbelling of hollow masonry shall be supported by at least the equivalent of one full course of the hollow masonry in solid masonry. All corbelling shall be done with solid masonry. The maximum horizontal projection in any corbel shall be one inch for each two inches of vertical projection, and in all cases the total projection of the corbelling shall be one-third or less of the minimum thickness of the wall to be corbelled.

(8.4.9.10). § C26-452.0 Cornices.—The center of gravity of all projecting or moulded cornices, unless such cornices are surmounted by masonry, shall be within the middle third of the wall below, unless satisfactory structural support is provided. Projecting cornices of stone or terra cotta shall have beds in the wall at least one inch greater in depth than their maximum projection, unless such beds are anchored to the structure. Moulded projecting courses shall have at least four-sevenths of their cubical contents inside the wall, unless such courses are anchored to and supported by the structure.

(8.4.9.11). § C26-453.0 Use of Existing Walls.—A wall, erected before January first, nineteen hundred thirty-eight, whose thickness at the time of its erection was in accordance with law, but the thickness of which does not conform to the requirements of this title, may be used without change, if such wall is in good condition, in structures erected or altered after January first, nineteen hundred thirty-eight, provided the stresses in the masonry are within the working stresses prescribed by sections C26-355.0 through C26-362.0, and that the height of such wall is increased only in so far as may be necessary to make the height uniform.

(8.4.9.12). § C26-454.0 Lining of Walls.—If it is desired to increase the height of any wall, erected before January first, nineteen hundred thirty-eight, which is thinner than required by this title, such wall shall be reinforced by a lining of solid masonry so that the combined thickness shall be at least four inches more than is required for a new wall corresponding with the total height of the wall when increased in height; provided that it shall be unlawful to use such lining to a greater height than forty feet or to increase the height of such wall to exceed seventy-five feet. Such lining shall be supported on proper foundations and shall be at least eight inches in thickness and so anchored to the old wall as to make the reconstructed wall act as a unit. Where any lining is to be built against an old wall, such wall shall be first cleaned of plaster or other coatings. Walls to be lined shall be in good condition and the approval of the superintendent shall be necessary before the work begins.

(8.4.9.13). § C26-455.0 Unsupported Height of Masonry Walls During Construction.—The maximum unsupported height of any masonry wall during the period of construction shall be two stories or twenty-six feet, unless satisfactory support is provided and specific approval of the superintendent obtained, except when walls are carried separately by structural members on each story.

(8.4.9.14). § C26-456.0 Stairway, Elevator and Similar Enclosures.—a. Enclosing walls of interior shafts, if non-bearing, shall meet the requirements for non-bearing walls, and if such walls are bearing, they shall meet the requirements for bearing walls, except as provided in section C26-428.0, and where such enclosing walls are supported at each story on structural members.

b. Where the enclosures are supported by structural members at each story, such enclosures shall meet the requirements of sections C26-638.0 through C26-647.0 and of sections C26-660.0 through C26-665.0.

GROUP 10

Plastering

(8.4.10.1). § C26-457.0 General Plastering Requirements. — Plastering shall be performed in accordance with the requirements of sections sixty through sixty-eight of the general city law and with the requirements of this title.

(8.4.10.2). § C26-458.0 Combustible Lath.—a. It shall be unlawful, in the case of structures exceeding three stories in height, to apply combustible lath on wood studs more than two stories in advance of the scratch coat plastering.

b. It shall be unlawful to run combustible lath through from room to room.

c. Wood lath shall be between one and one-quarter and one and five-eighths inches wide and between five-sixteenths and three-eighths of an inch thick.

d. The quality of wood lath shall permit use without waste and shall be of the grade of at least No. 2 lath with small and loose knots wane and other defects limited.

e. Wood lath and other combustible lath shall be solidly nailed at every bearing.

f. It shall be unlawful to apply vertical or diagonal lathing. Ceiling lath shall run in one direction only.

g. The joints on walls and ceilings shall be broken at least every eighth lath in the case of wood lath, and as required by the rules of the board in the case of other combustible lath.

(8.4.10.3). § C26-459.0 Metal Lath.—a. Metal lath shall weigh at least three pounds per square yard and shall be galvanized or painted for interior use and either galvanized or of non-corroding metal for exterior use. Expanded metal reinforcing with integral flame-proof paper backing shall weigh not less than 2.2 pounds per square yard exclusive of paper and the maximum mesh opening shall be 1⅛ inches by 2½ inches from center point to center point of the bridges and shall be expanded from no lighter metal than 23 gauge.

b. Woven lath with a maximum mesh opening of one-half inch may be made of wire as fine as No. 20 steel wire gauge, and shall be painted or galvanized.

c. Welded lath shall be made of galvanized wire of No. 16 steel wire gauge, or larger, with a maximum mesh opening of two by two inches, or equal weight per yard if mesh is finer, but in any case at least No. 20 steel wire gauge.

d. Expanded sheet metal and wire lath shall be of a type suitable to form a key sufficient to retain the plaster firmly.

e. Metal lath shall be lapped at least one inch on abutting edges. Where metal lath finishes against masonry walls, the lath shall be extended to at least three inches on the surface of such walls and secureiy fastened.

f. Metal lath shall be kept at least three-eighths of an inch away from sheathing or other solid surfaces.

g. Metal lath without stiffeners shall be tied or laced to metal supports at least every six inches with No. 18 steel wire gauge galvanized, soft annealed wire, and all lath with stiffeners at least at eight inch intervals; at lap joints horizontally, between the studs, a similar tie shall be provided. The ends of all tie wires shall be twisted tight with a double turn and bent flush with the face of the lath.

h. Metal lath fastened to wood furring or studs shall be attached at least at six-inch intervals with four-penny nails or one-inch roofing nails or No. 14 steel wire gauge wire staples; and two wood joists by at least six-penny nails, one and one-quarter-inch roofing nails, or one-inch No. 14 steel wire gauge wire staples. Laps between the studs or joists shall be securely tied or laced as required under the preceding paragraph. Stiffened metal lath on wood studs or joists shall be nailed or stapled at least at eight-inch intervals, and the laps between studs similarly tied or laced.

(8.4.10.4). § C26-460.0 Furring and Studding for Metal Lath and Plaster Partitions and Ceilings.—a. Furring or studding for metal lath and plaster partitions or ceilings shall have a maximum spacing for varying weights of lath as given in the following schedule:

Maximum Spacing of Studding or Furring in Inches

Nailed-On Work

Types of metal Lath	Walls and Partitions	Ceilings
Expanded metal:		
3.4 pounds per square yard, plastered one side	16	16
Flat rib metal lath:		
2.75 pounds per square yard, plastered one side	16	16
3.4 pounds per square yard, plastered one side	19	19
Three-eighth-inch rib metal lath:		
3.4 pounds per square yard, plastered one side	24	24
Bar ribbed expanded metal lath:		
3.4 pounds per square yard, plastered one side	24	24
4.0 pounds per square yard, plastered one side	24	24
Sheet lath:		
4.5 pounds per square yard, plastered one side	24	24

Tied-On Work

	Solid partitions	Hollow and double partitions	Suspended ceilings
Expanded metal lath:			
3.4 pounds per square yard	16	12	12
3.4 pounds per square yard	16	13½	13½
Flat rib metal lath:			
2.75 pounds per square yard	16	16	12
3.4 pounds per square yard	19	19	19

	Solid partitions	Hollow and double partitons	Suspended ceilings
No. 19 steel wire gage, 2½ mesh to inch, plastered on one or two sides	16	16	16
No. 16 steel wire gage, 2-inch mesh, plastered on one side	12	16	12
No. 20 steel wire gage, ½-inch mesh, V-stiffened 8 inches center mesh, plastered on one side	16	16	12
No. 16 steel wire gage, 2-inch mesh, galvanized welded wire fabric with integral backing and horizontal stiffening members spaced not more than five inches on centers, plastered on one side	16	16	16

b. Furring or studding for partitions plastered on one or two sides shall consist of channels of the following sizes, or angles, tees or flats of equivalent sectional area:

Maximum height in feet	Minimum thickness in inches	
	Of partition	Of channels
12	2	¾
14	2	1
14	2¼	¾
16	2¼	1
18	2½	1

c. The furring or studs shall be securely fastened on top and bottom and, wherever necessary, shall be braced at intermediate points.

d. In the case of heavy ornamental ceiling work, special provision shall be made to sustain the load.

(As amended by Local Law 53 of 1948 in effect July 1, 1948.)

§ C26-461.0 Suspended ceilings.—Suspended ceilings shall comply with the following minimum requirements as to material and construction. When required by the superintendent, details of the method of supporting suspended ceilings shall be submitted to the department for approval.

1. Hangers for suspended ceilings.—Hangers for suspended ceilings shall comply with the following requirements:

(a) Class 1—Fireproof structures:

(1) Hangers for suspended ceilings in new fireproof structures shall be placed to line in either direction with a maximum spacing of five feet on centers. Such hangers shall extend through the floor arches and shall be formed of two pieces of one-inch hot rolled channels, weighing not less than six-tenths of a pound per linear foot, or three-sixteenths by one inch flat bars, at least seven inches long, bolted, riveted or welded together to form a tee and punched to receive three-eighths inch diameter bolts at the lower end and coated with asphaltum. Other types of hangers may be used if approved by the board as corrosion-resistant, durable, and having strength and rigidity adequate for ceiling hangers. Where ceilings weigh less than four pounds per square foot and are constructed as dry ceilings without plastering, flat bars used as hangers may be one-eighth inch by one inch in size.

When hangers are installed for suspended ceilings in existing fireproof structures, they shall be attached directly by steel bridging in each bay anchored into the haunch of the beams supporting the floor or roof construction above, or as approved by the superintendent; however, the steel bridging in alternate bays may be replaced by a hanger, one inch by three-sixteenths of an inch, hooked over the reinforcing wire or bar of the floor or roof construction above. Such bridging shall be of sufficient strength to safely support the ceiling and be anchored into the haunches of the beams at least two and one-half inches on each side.

(Subd. (1) of Subd. 1(a) amended by Local Law 103 of 1955 in effect November 4, 1955.)

(b) Class 2—Fire protected structures. Hangers for suspended ceilings in class 2 fire protected structures shall be installed in conformity with requirements for class 1 structures wherever possible or as approved by the superintendent.

(c) Hangers for suspended ceilings in new non-fireproof construction, except where the ceilings are constructed in conformance with paragraph 2 (d) of this section, shall be flat metal bars at least one-inch by three-sixteenths of an inch placed not more than five feet on centers, and be bent around three sides of the supporting joist and nailed to the joist. In new non-fireproof construction, hangers may also be attached to the joist by means of two (2) one-quarter-inch diameter through bolts which shall be at least two inches above the bottom of the joist. In existing non-fireproof construction, except where the ceilings are constructed in conformance with paragraph (d) of subdivision two of this section, where it is impractical to use bent hangers or through bolts as described above, each hanger shall be nailed to the joist with two (2) two and one-quarter-inch barbed anchor nails (over-all dimension), which are one-quarter-inch in diameter with oval head, which shall be at least two inches above the bottom of the joist. Purlins to which ceiling is attached shall be placed not in excess of five feet on centers. *(Par. (c) of subd. 1 as amended by Local Law 19 of 1951 in effect January 30, 1951.)*

2. Purlins for suspended ceilings.

(a) Purlins shall be either hot or cold rolled steel channels or angles and the maximum spans and spacings for the respective weights and materials shall be as shown in Table 1, except where the ceilings are constructed in conformance with paragraph 2 (d) of this section.

Table 1

Maximum spacing in both directions	Size purlins required	Weight per foot
5 feet	1½-inch hot rolled channel	1.05 pounds
5 feet	1½-inch by 1½-inch by ⅛-inch angle	1.23 pounds
4 feet	1½-inch hot rolled channel	0.85 pounds
3 feet	1½-inch cold rolled channel	0.475 pounds

Purlins shall be bolted to each hanger with three-eighths (⅜) inch diameter stove bolts or equivalent.

(b) When purlins are attached to beams, girders or trusses, approved anchors or clips shall be used. All purlins not supported directly by hangers shall be fastened with approved metal clips to cross pieces at most four feet on centers.

(c) Purlins for lightweight ceilings. For lightweight ceilings weighing four (4) pounds or less per square foot, constructed dry without plastering, purlins may be one and one-half (1½) inch cold rolled channel weighing 0.475 pounds per linear foot spaced four (4) feet or less on center. *(As amended by section 2. of Local Law 16 of 1954 in effect April 26, 1954.)*

(d) In other than class 1 and class 2 structures, and except for ceilings in special occupancy structures, wood purlins may be used to support suspended ceilings. They shall be adequate to support the ceilings, with stresses not exceeding the limitations of section C26-270.0, and shall be at least two inches by three inches, nominal size. They shall be straight, in as long lengths as practical, and shall be spaced not more than sixteen inches apart center to center. The wood purlins when constructed in conformance with this paragraph may be hung by galvanized steel hangers, not smaller than number fourteen Birmingham Wire Gage (.083 inch) thick by one inch wide, with holes not more than one-quater inch in diameter, located to receive the nails, and such hangers shall be spaced not more than five feet apart along each purlin. The hangers shall be nailed to each supporting beam and purlin by at least two galvanized roofing nails, not less than one and three-quarter inches long and number eleven United States Steel Wire Gage (.1205 inch) in thickness. Cross braces at least two inches by three inches in size shall be provided across the top of the purlins, not more than five feet apart, securely nailed to each purlin. Sufficient stiffeners shall be provided between the supporting beams and the purlins to provide rigidity for the application of lath and plaster. Such stiffeners may be of wood and wood stiffeners left in place shall not be closer than eight feet apart along each purlin. When this type of construction is used, cross-furring shall not be required. Where wood purlins are used as provided herein, the space between the ceiling and the floor or roof above shall be divided into areas of two thousand square feet or less by firestops extending from the ceiling to the underside of the floor or roof boards above. Firestopping shall consist of one-half inch plaster boards on both sides of two inch by three inch, or larger, studs, spaced not more than sixteen inches apart, with tight joints, or any construction approved for a one hour partition, securely fastened in place.

(Subd. 2 as amended by Local Law 19 of 1951 in effect January 30, 1951.)

3. Cross furring for suspended ceilings.—For purlins spaced as shown in table 1 above, the maximum size and spacing of the cross furring shall be as shown in table 2. (This cross furring table applies to plastered ceilings varying in weight from six to twelve pounds per square foot depending upon the type of plaster used.)

Table 2

Maximum span of cross-furring	Size	Weight per foot	Maximum Spacing	Attachment of cross furring to purlin
5 feet	1-inch chan.	0.600#	13½ inches	No. 8 gage hairpin wire clips, 2 strands of no. 16 gage galvanized annealed wire, or equivalent.
4 feet	1-inch chan.	0.410#	13½ inches	
3 feet	¾-inch chan.	0.300#	13½ inches	

4. Cross furring for lightweight ceilings. When ceilings attached to cross furring weigh less than four (4) pounds per square foot and are constructed dry without plastering, hangers shall be not more than five (5) feet center to center supporting purlins, and cross furring shall be at least ¾-inch cold rolled channels spaced not more than sixteen (16) inches center to center; except that the board may approve, in a specific case, spacing of cross furring in excess of sixteen (16) inches on centers but not to exceed twenty-four (24) inches on centers. *(As amended by section 3. of Local Law 16 of 1954 in effect April 26, 1954.)*

§ C26-461.1 **Plastic light diffusers.**—a. Plastic light diffusers suspended below and associated with lighting fixtures shall not be construed as suspended ceilings.

b. Plastic diffuser shall be a special compound plastic developed for light diffusion, with a fire rating classification as self-extinguishing when tested in conformance with A.S.T.M. standard method of test D635-44 for plastic materials of .050 thickness or greater, and A.S.T.M. standard method of test D568-43 for plastic materials of less than .050 thickness.

c. "Plastic light diffusers shall be adequately supported by frames and hangers of incombustible material secured to the ceiling, floor or roof construction above. The maximum dimension of any single sheet of plastic shall not exceed five feet for plastic material exceeding .050 inches in thickness and shall not exceed twenty-five feet for plastic material of .050 inches thickness or less. The area of a single sheet of such thinner material shall not exceed seventy-five square feet. Plastic light diffusers shall not be constructed in any required stair enclosure, in public hallways. required exit corridors or exit passageways."

d. The plastic diffusers shall be approved by the board of standards and appeals.

(As added by Local Law 191 of 1953 in effect December 31, 1953.)

(8.4.10.6). § C26-462.0 **Gypsum lath and other solid plaster bases.**—1. Gypsum lath. Gypsum lath shall comply with the standard specifications of the ASTM,D,C-37-42 and shall be not less than three-eighths inch thick.

Gypsum lath shall be securely nailed to wood supports spaced not to exceed sixteen inches on center at intervals not to exceed four inches on ceilings and five and one-half inches on walls or partitions with thirteen gage, one and one-eighth inch long, nineteen-sixty-fourths inch flat head, blued nails. The nails shall be driven with the underside of the head flush with the face of the lath and shall not be closer than three-eighths inch from edges or ends. There shall be five nails per lath per support on ceilings and four nails per lath per support on walls or partitions. Gypsum lath shall be applied with the face side out and with the long dimensions at right angles to the framing members. Gypsum lath shall be attached to horizontal or vertical incombustible supports by means of special attachment devices approved by the board. The joints shall be broken at every other board on walls and at right angles to the furring on ceilings.

2. Other solid plaster bases.—Other types of solid plaster bases shall be approved in accordance with the rules of the board and shall be nailed directly to all wood studding or furring with one and one-eighth inch wire nails of at least no. 13 steel wire gage. Such nails shall have flat three-eighths inch heads. The maximum space between nails for walls shall be six inches; the maximum space between nails for ceilings shall be four inches. Joints shall be broken at every other board on walls and at right angles to the furring on ceilings.

(As amended by Local Law 122 of 1952 in effect October 20, 1952.)

(8.4.10.7). § C26-463.0 **Quality of Plastering Materials.**—Gypsum, lime cement, sand perlite, vermiculite and mortar shall comply with the requirements of section C26-312.0.

(8.4.10.8). § C26-464.0 **Proportioning and Application of Plaster.**—Plaster shall

consist of lime, sand, hair or fibre, or gypsum plaster, sand, vermiculite, perlite or fibre.

The hair binder shall be water-soaked, well beaten, clean, long winter hair. Fibre shall be approved by the board.

Plaster shall be applied in three coats, the scratch coat, the brown coat, and the finish coat, except as otherwise provided in this section. No "laid-off" work on lath shall be permitted.

The scratch coat shall be applied first on all types of lath and shall be mixed in the proportions of one part lime putty to two parts of sand by volume, or two cubic feet of sand, perlite or vermiculite to not less than one hundred pounds of gypsum plaster.

The brown coat shall be applied second and shall be mixed in the proportions of one part of lime putty to three parts of sand by volume, or three cubic feet of sand, perlite or vermiculite to not less than one hundred pounds of gypsum.

In lieu of the proportioning specified above for scratch and brown coats, the proportions may be 100 pounds gypsum neat plaster to not more than 250 pounds of sand or 2½ cubic feet of vermiculite or perlite, and provided such proportions are used for both scratch and brown coats.

The finish coat shall be applied over the brown coat and shall consist of lime putty and gauging plaster or other finish approved by the board.

The scratch coat shall be applied to all lathed surfaces, and on walls and partitions such coats shall be carried to the floor. The scratch coat shall be applied with sufficient pressure and material to provide a proper key or bond and in all cases such coat shall be scratched vertically and horizontally. Gypsum plaster only shall be used on gypsum plaster bases.

The scratch coat may be omitted when applying plaster directly to brick, clay or gypsum tile, stone or concrete masonry.

The brown coat shall be applied over the scratch coat where used, and on all masonry surfaces, and shall be carried to the floor. Where lime plaster is used, the brown coat shall be applied a minimum of twelve hours after the application of the scratch coat. Where gypsum plaster is used, the brown coat shall be applied a minimum of twelve hours after the application of the scratch coat. The brown coat shall be brought out to grounds and straightened to a true surface and left rough to receive the finish coat.

The finishing coat shall be applied after the second or brown coat has become set and about dry.

A base coat for plastering on cement surfaces or on cinder or stone concrete shall be used and shall be a specially prepared bond plaster base coat to which aggregate shall not be added, or a specially prepared bonding finishing plaster approved by the board and applied in accordance with such approval.

(8.4.10.9). § C26-465.0 **Mixing of Plaster.**—Where hard wall plaster is specified, such plaster shall be received at the structure in the manufacturer's original package and shall be mixed and applied in accordance with his specifications.

(8.4.10.10). § C26-466.0 **Keene's Cement.**—Keene's cement shall be approved by the board and shall comply with the standard specifications of the A.S.T.M.,D., C61-40 and shall be delivered in the manufacturer's original package and shall be applied according to the manufacturer's specifications.

(8.4.10.11). § C26-466.1 **Vermiculite Plaster.**—The particle size of vermiculite shall conform with the requirements of the "standard specifications for inorganic aggregates for use in gypsum plaster." A.S.T.M.C. 35-59. The weight shall not be less than six nor more than ten pounds per cubic foot as determined by measurements in a cubic foot box using the shoveling procedure as outlined in the "standard method of test for unit weight of aggregate." A.S.T.M.C. 29-60.

(8.4.10.12). § C26-466.2 **Perlite Plaster.**—The particle size of perlite shall conform with the requirements of the "standard specifications for sand for use in plaster," A.S.T.M. C35-39, except that the minimum percentage retained on a no. 100 (149 micron) sieve shall be decreased from 95% to 90%. The weight shall be not less than seven and one-half nor more than ten pounds per cubic foot as determined by measurements in a cubic foot box using the shovelling procedure as outlined in the "standard method of test for unit weight of aggregate," A.S.T.M. C29-42.

(8.4.10.13). § C26-467.0 **Plastering Notes.**—a. Unpainted masonry surfaces which are to be plastered shall be thoroughly broomed off before plastering is started. Where masonry surfaces exhibit high suction they shall be wet down before plastering.

b. Concrete and cement surfaces which are to be plastered shall be cleaned of all dust and loose particles. Where bond plaster basecoat is used, surfaces shall be washed with a ten per cent solution of muriatic acid and water and then with clean water to remove all traces of the acid and roughened to provide a proper bond. Specially prepared bonding finishing plaster approved by the board may be applied to smooth concrete and cement surfaces in accordance with such approval.

c. When plastering is in progress and until such plastering has become thoroughly dry, the structure shall be enclosed and heated if necessary to maintain a minimum temperature of 40°F.

d. It shall be unlawful to apply on the inner surface of an exterior masonry wall of a dwelling structure, any materials which are not impervious to moisture except when such materials are applied on furring of at least seven-eights of an inch in thickness. A hollow wall of masonry shall not be deemed a solid masonry wall for the purpose of this section.

All of Sub-Article 5, *"Reinforced Concrete Construction,"* (§C26-468.0 *to* §C26-509.0 *inclusive*) *repealed December*, 1962 *and replaced by Article* 19.

Sub-Article 6. Iron and Steel Construction

GROUP 1

Cast Iron

(8.6.1.1.1). § C26-510.0 Cast Iron Columns.—a. Dimensions of Cast Iron Columns.—Cast iron columns shall have an outside diameter or side of at least five inches, and their maximum unsupported length shall conform to the requirements of section C26-367.0.

(8.6.1.1.2). b. Thickness of Metal in Cast Iron Column.—The thickness of metal shall be at least one-twelfth the diameter or least dimension of cross-section, with a minimum thickness of three-fourths of an inch. The core of columns above and below a joint shall be the same, but where one column is supported by another of larger diameter, the core of the latter shall be tapered down over a distance of at least six inches, or a joint plate shall be inserted of sufficient strength to distribute the load. Wherever the core of a cast iron column has shifted more than one-fourth the thickness of the shell, the thickness of the metal all around shall be assumed equal to the thinnest part.

(8.6.1.1.3). c. Joints of Cast Iron Columns.—Cast iron columns shall be machine faced at the end to a true surface perpendicular to the axis. They shall be bolted together with at least four bolts, three-quarters of an inch or more in diameter, passing through the flanges, the bolts being of sufficient length to allow the nuts to be screwed up tightly; and as each column is placed in position, the bolts shall also be placed in position and the nuts shall be screwed up tightly.

(8.6.1.1.4). d. Flanges of Cast Iron Columns.—Where cast iron columns rest one on top of another, the top flange of the lower column shall project on all sides at least three inches from the outer surfaces of the column, and the shape and dimensions of the bottom flange of the upper column shall be the same as those of the top flange of the lower column, except that when a column is placed on a lot line, the flanges on the side toward such lot may be omitted, unless required for boltings. Flanges shall be at least one inch in thickness when finished, and shall be reinforced by fillets and brackets.

(8.6.1.1.5). e. Bolt Holes in Cast Iron Columns.—All holes in cast iron columns shall be drilled. The diameter of the holes shall be within the diameter of the bolts plus one-sixteenth of an inch.

(8.6.1.1.6). f. Limitation on Use of Cast Iron Columns.—It shall be unlawful to use cast iron columns in any case where the load is so eccentric as to cause tension in the cast iron or for such parts of the structural frame of structures as are required to resist stress due to wind.

(8.6.1.1.7). g. Inspection of Cast Iron Columns.—A cast iron column shall be set in place only after it has passed an inspection satisfactory to the superintendent. Wherever blowholes or imperfections are found, which reduce the area of the cross-section at that point more than ten percent, such columns shall be condemned. Columns cast without one open side or back, shall have three-eighth-inch holes drilled in the shaft, to exhibit the thickness of the castings, as may be required by the superintendent. Columns shall be inspected before painting.

(8.6.1.2). § C26-511.0 Cast Iron Lintels.—Cast iron lintels shall be at least three-quarters of an inch in thickness at any point, and it shall be unlawful to use such lintels for spans exceeding six feet.

(8.6.1.3). § C26-512.0 Cast Iron Column Bases.—All parts of a cast iron base or bearing plate shall be at least one inch thick.

GROUP 2

Structural Steel

(8.6.2.1). § C26-513.0 General Requirements as to Quality and Workmanship for Structural Steel.—The material used in structural steel work shall be of uniform quality and free from defects which would influence the strength or stability of the structure. Workmanship shall be good and shall conform to the best accepted standards of practice. Methods of fabrication, transportation and erection shall be such that the finished structure is free from defects or injuries which would render it unfit for use or occupancy, and shall be in accordance with the rules of the board.

(8.6.2.2). § C26-514.0 Welding of Structural Steel.—Arc and gas welding may be employed, either alone or in combination with riveting, bolting or other connecting means permitted under this chapter for connecting to one another or assembling the component parts of steel beams, girders, lintels, trusses, columns and other structural steel members of buildings, or for connecting steel to wrought-iron members of existing buildings, provided that such work be designed and executed in accordance with the provisions of this chapter and the rules of the board.

In new work, rivets or bolts not conforming with the provisions of section C26-520.0 d, in combination with welds shall not be considered as sharing the stress, and welds shall be provided to carry the entire stress for which the connection is designed.

In making alterations to structures, existing rivets may be utilized for carrying stresses resulting from existing dead loads, and welding shall be provided to carry all live load and additional dead load.

b. Minimum preheat and interpass temperatures.—Minimum preheat and interpass temperatures for welding of structural steel shall be as specified in table A of this sub-section.

Table A

Thickness of Thickest Part at Point of Welding	Minimum Preheat and Interpass Temperatures					
	Other Than Low-Hydrogen Welding Processes[1]			Low-Hydrogen Welding Processes[2]		
	A373 Steel	A7,A36 Steel	A441 Steel	A373 Steel	A7,A36 Steel	A441 Steel[3]
To 1", incl.	None[4]	None[4]	Welding with this process not recommended	None[4]	None[4]	None[4]
Over 1" to 2", incl.	100° F	200° F		None[4]	50° F	100° F
Over 2"	200° F	300° F		100 F°	150° F	200° F

[1]Welding with ASTM A233 E60 series or E70 series electrodes other than a low-hydrogen class.

[2]Welding with properly dried ASTM A233 E6015, 16, 18, 28 or E7015, 16, 18, 28 electrodes or submerged arc welding with properly dried flux.

[3]Preheating for weldable A242 steel may need to be either higher or lower than these requirements, depending on composition of steel.

[4]Except when base metal temperature is below 32° F.

(8.6.2.3.1). § C26-515.0 Design of Structural Steel.—a. General Design Requirements for Structural Steel.—All steel work shall be designed to sustain the total imposed dead load, including the weight of the steel work itself, together with the required live load as specified in this title. Proper provisions shall be made in the design for temporary stresses occurring during erection, for eccentricity of loading, and for the influence of live loads producing impact or vibration. In addition to the plans and specifications required by sections C26-161.0 through C26-173.0, the applicant shall submit to the superintendent a copy of such computations for the design of the structural steel work of the proposed structure as the superintendent may request.

(8.6.2.3.2). b. Design for Wind Stresses in Structural Steel.—The design of all members and their connections shall be consistent with the assumed distribution of the horizontal shears due to wind throughout the structure. In analyzing the columns for bending due to wind, it shall be assumed that the column formula given in section C26-368.0, produces the maximum allowable extreme fibre stress under live and dead loads at the point where the maximum moment due to wind occurs.

(8.6.2.3.3). c. Design and Supervision of Construction of Welded Structures.—The licensed architect or licensed professional engineer designing or supervising the construction of a welded structure shall be experienced and skilled in such work.

(8.6.2.3.4). d. Rigidity of Narrow Structures.—For structures or portions of structures whose height exceeds four times the width, special attention shall be given to the character of connections to secure rigidity.

(8.6.2.3.5). e. Eccentric Loading of Structural Steel.—

1. Full provisions shall be made for stresses caused by eccentric loading.
2. All columns shall be fully investigated for conditions of loading in the prepa-

ration of the design, and such conditions shall be reviewed when the erection plans are approved, and the location of all framing shall be determined by figures.

3. Where the design is predicated on special details to reduce eccentric conditions, such details shall be illustrated on the design drawings. Eccentric conditions shall be fully considered also in the examination and approval of shop drawings.

4. The column formula given under section C26-368.0, shall be assumed to produce the maximum allowable extreme fibre stress at the floor line, without eccentric loading.

5. In all cases of eccentric loading special attention shall be given in the design to tying columns securely above and below the point of loading at the nearest floor line where it can be done adequately.

f. Simple and continuous spans

1. Simple spans. Beams, girders and trusses shall ordinarily be designed on the basis of simple span whose effective length is equal to the distance between the supports to which they deliver their end reactions.

2. End Restraint. When designed on the assumption of full or partial end restraint, due to continuous, semi-continuous or cantilever action, the beams, girders and trusses, as well as the sections of the members to which they connect, shall be designed to carry the shears and moments so introduced, as well as all other forces, without exceeding at any point the unit stresses precribed in section C26-368.0 c, except that some non-elastic but self-limiting deformation of a part of the connection may be permitted when this is essential to the avoidance of overstressing of fasteners.

g. Gross and net sections

1. Definitions. The gross section of a member at any point shall be determined by summing the products of the thickness and the gross width of each element as measured normal to the axis of the member. The net section shall be determined by substituting for the gross width the net width computed in accordance with section C26-515.0 g., 3 through 6.

2. Application. Unless otherwise specified, tension members shall be designed on the basis of net section. Compression members shall be designed on the basis of gross section. Beam and girders shall be designed in accordance with section C26-517.0 a.

3. Net section. In the case of a chain of holes extending across a part in any diagonal or zigzag line, the net width of the part shall be obtained by deducting from the gross width the sum of the diameters of all the holes in the chain, and adding, for each gage space in the chain, the quantity.

$$\frac{s^2}{4g}$$

The critical net section of the part is obtained from that chain which gives the least net width; however, the net section taken through a hole shall in no case be considered as more than 85 per cent of the corresponding gross section.

In determining the net section across plug or slot welds, the weld metal shall not be considered as adding to the net area.

4. Angles. For angles, the gross width shall be the sum of the widths of the legs less the thickness. The gage for holes in opposite legs shall be the sum of the gages from back of angles less the thickness.

5. Size of holes. In computing net area the diameter of a rivet or bolt hole shall be taken as ⅛ inch greater than the nominal diameter of the rivet or bolt.

6. Effective areas of weld metal.. The effective area of butt and fillet welds shall be considered as the effective length of the weld times the effective throat thickness.

The effective shearing area of plug and slot welds shall be considered as the nominal cross-sectional area of the hole or slot, in the plane of the faying surface.

The effective area of fillet welds in holes and slots shall be computed as above specified for fillet welds, using for effective length, the length of centerline of the weld through the center of the plane through the throat. However, in the case of overlapping fillets, the effective area shall not exceed the nominal cross-sectional area of the hole or slot, in the plane of the faying surface.

The effective length of a fillet weld shall be the overall length of full-size fillet including returns.

The effective length of a butt weld shall be the width of the part joined.

The effective throat thickness of a fillet weld shall be the shortest distance from the root to the face of diagrammatic weld.

The effective throat thickness of a complete penetration butt weld shall be the thickness of the thinner part joined.

The effective throat thickness of single-V or single-bevel groove welds having no root opening and having partial penetration into their joints shall be ¼ inch less than the depth of the V or bevel groove. The effective throat thickness of single-J or single-U groove welds having no root opening and having partial penetration into their joints shall be the depth of the J or U groove. The effective throat thickness of any of these partial penetration groove welds shall not be less than $\sqrt{t_t/6}$.

h. Deflections.

1. Beams and girders supporting floors and roofs shall be proportioned with due regard to the deflection produced by the design load.

2. Beams and girders supporting plastered ceilings shall be so proportioned that the maximum live load deflection will not exceed 1/360 of the span.

3. The depth of beams and girders supporting flat roofs shall be not less than (f_b/600,000) times their span length whether designed as simple or continuous spans.

i. Slenderness ratios

1. Definition. In determining the slenderness ratio of an axially loaded compression member, except as provided in section C26-368.0 c. 4, (3) the length shall be taken as its effective length Kl and r as the corresponding radius of gyration.

2. Sidesway inhibited. In frames where lateral stability is provided by diagonal bracing, shear walls, attachment to on adjacent structure having adequate lateral stability, or by floor slabs or roof decks secured horizontally by walls or bracing systems parallel to the plane of the frame, and in trusses, the effective length factor K for the compression members shall be taken as unity unless analysis shows that a shorter value may be used.

3. Sidesway uninhibited. The effective length Kl of compression members in a frame which depends upon its own bending stiffness for lateral stability shall be determined by a rational method and shall not be less than the actual unbraced length.

4. Maximum ratios. The slenderness ratio of compression members shall not exceed 200. The slenderness ratio of tension members, other than rods, preferably should not exceed:

For main members	240
For bracing and other secondary members	300

j. Width-thickness ratios

1. Projecting elements of members subjected to axial compression or compression due to bending shall have ratios of width to thickness not greater than the following:

Single angle struts; double angle struts with separators	$2{,}400/\sqrt{F_y}$
Struts comprising double angles in contact; angles or plates projecting from girders, columns or other compression members; compression flanges of beams; stiffeners on plate girders	$3{,}000/\sqrt{F_y}$
Stems of tees	$4{,}000/\sqrt{F_y}$

The width of plates shall be taken from the free edge to the first row of rivets, bolts or welds; the width of legs of angles, channels and tees, and the stems of tees, shall be taken as the full nominal dimension; the width of flanges of beams and tees shall be taken as one-half the full nominal width. The thickness of a sloping flange shall be measured halfway between a free edge and the corresponding face of the web.

When a projecting element exceeds the width to thickness ratio prescribed in the preceding paragraph, but would conform to same and would satisfy the stress requirements with a portion of its width considered as removed, the member will be acceptable.

2. In compression members the unsupported width of web, cover or diaphragm plates, between the nearest lines of fasteners or welds, or between the roots of the flanges in case of rolled sections, shall not exceed $8{,}000/\sqrt{F_y}$ times its thickness.

When the unsupported width exceeds this limit, but a portion of its width no greater than $8{,}000/\sqrt{F_y}$ times the thickness would satisfy the stress requirements, the member will be considered acceptable.

The unsupported width of cover plates perforated with a succession of access holes, may exceed $8{,}000/\sqrt{F_y}$ but shall not exceed $10{,}000/\sqrt{F_y}$, times the thickness. The gross width of the plate less the width of the widest access hole shall be assumed available to resist compression.

k. Built-up members

1. Open box-type beams and grillages. Where two or more rolled beams or channels are used side-by-side to form a flexural member, they shall be connected

together at intervals of not more than 5 feet. Through-bolts and separators may be used, provided that in beams having a depth of 12 inches or more, no fewer than 2 bolts shall be used at each separator location. When concentrated loads are carried from one beam to the other, or distributed between the beams, diaphragms having sufficient stiffness to distribute the load shall be riveted, bolted or welded between the beams. Where beams are exposed, they shall be sealed against corrosion by interior surfaces, or spaced sufficiently apart to permit cleaning and painting.

2. Compression members.

(1) All parts of built-up compression members and the transverse spacing of their lines of fasteners shall meet the requirements of section C26-515.0 i, j1 and j2.

(2) At the ends of built-up compression members bearing on base plates or milled surfaces, all components in contact with one another shall be connected by rivets or bolts spaced longitudinally not more than 4 diameters apart for a distance equal to 1½ times the maximum width of the member, or by continuous welds having a length not less than the maximum width of the member.

(3) The longitudinal spacing, for intermediate rivets, bolts or intermittent welds in built-up members shall be adequate to provide for the transfer of calculated stress. However, where a component of a built-up compression member consists of an outside plate, the maximum spacing shall not exceed the thickness of the thinner outside plate times $4{,}000/\sqrt{F_y}$ when rivets are provided on all gage lines at each section, or when intermittent welds are provided along the edges of the components, but this spacing shall not exceed 12 inches. When rivets or bolts are staggered, the maximum spacing on each gage line shall not exceed the thickness of the thinner outside plate times $6{,}000/\sqrt{F_y}$ nor 18 inches. The maximum longitudinal spacing of rivets, bolts or intermittent welds connecting two rolled shapes in contact with another shall not exceed 24 inches.

(4) Compression members composed of two or more rolled shapes separated from one another by intermittent fillers shall be connected to one another at these fillers at intervals such that the slenderness ratio l/r of either shape, between the fasteners, does not exceed the governing slenderness ratio of the built-up member. The least radius of gyration r shall be used in computing the slenderness ratio of each component part.

(5) Open sides of compression members built up from plates or shapes shall be provided with lacing having tie plates at each end, and at intermediate points if the lacing is interrupted. Tie plates shall be as near the ends as practicable. In main members carrying calculated stress, the end tie plate shall have a length of not less than the distance between the lines of rivets, bolts or welds connecting them to the components of the member. Intermediate tie plates shall have a length not less than one-half of this distance. The thickness of tie plates shall not be less than 1/50 of the distance between the lines of rivets, bolts or welds connecting them to the segments of the members. In riveted and bolted construction the pitch in tie plates shall be not more than 6 diameters and the tie plates shall be connected to each segment by at least three fasteners. In welded construction, the welding on each line connecting a tie plate shall aggregate not less than one-third the length of the plate.

(6) Lacing, including flat bars, angles, channels or other shapes employed as lacing, shall be so spaced that the ratio l/r of the flange included between their connections shall not exceed the governing ratio for the member as a whole. Lacing shall be proportioned to resist a shearing stress normal to the axis of the member equal to 2 per cent of the total compressive stress in the member. The ratio l/r for lacing bars arranged in single systems shall not exceed 140. For double lacing this ratio shall not exceed 200. Double lacing bars shall be joined at their intersections. In determining the required section for lacing bars, Formula (1) or (3) shall be used, l being taken as the unsupported length of the lacing bar between rivets or welds connecting it to the components of the built-up member for single lacing and 70 per cent of that distance for double lacing. The inclination of lacing bars to the axis of the member shall preferably be not less than 60 degrees for single lacing and 45 degrees for double lacing. When the distance between the lines of rivets or welds in the flanges is more than 15 inches, the lacing shall preferably be double or be made of angles.

(7) The function of tie plates and lacing may be performed by continuous cover plates perforated with a succession of access holes. The width of such plates at access holes, as defined in section C26-515.0 j2, is assumed available to resist axial stress, provided that: the width to thickness ratio conforms to the limitations of section C26-515.0 i2; the ratio of lengths (in direction of stress) to width of holes shall not exceed 2; the clear distance between holes in the direction of stress shall be not less than the transverse distance between nearest lines of connecting rivets, bolts or welds: and the periphery of the holes at all points shall have a minimum radius of 1½ inches.

3. Tension members.

(1) The longitudinal spacing of rivets, bolts and intermittent fillet welds connecting a plate and a rolled shape in a built-up tension member, or two plate components in contact with one another, shall not exceed 24 times the thickness of the thinner plate nor 12 inches. The longitudinal spacing of rivets, bolts and intermittent welds connecting two or more shapes in contact with one another in a tension member shall not exceed 24 inches. Tension members composed of two or more shapes or plates separated from one another by intermittent fillers shall be connected to one another at these fillers at intervals such that the slenderness ratio of either component between the fasterners does not exceed 240.

(2) Either perforated cover plates or tie plates without lacing may be used on the open sides of built-up tension members. Tie plates shall have length not less than two-thirds the distance between the lines of rivets, bolts or welds connecting them to the components of the member. The thickness of such tie plates shall not be less than 1/50 of he distance between these lines. The longitudinal spacing of rivets, bolts or intermittent welds at tie plates shall not exceed 6 inches. The spacing of tie plates shall be such that the slenderness ratio of any component in the length between tie plates will not exceed 240.

1. The minimum column tie shall be capable of resisting a normal force of at least two per cent of the design column load.

(8.6.2.4.1) § C26-516.0. Bases and anchor bolts for structural steel columns.—a. Bases of structural steel columns

1. Loads—Proper provision shall be made to transfer the column loads, and moments if any, to the footing and/or foundations.

2. Alignment—Column bases shall be set level and to correct elevation with full bearing on the masonry.

3. Finishing—Column bases shall be finished in accordance with the following requirements:

(1) Rolled steel bearing plates, 2 inches or less in thickness, may be used without planing, provided a satisfactory contact bearing is obtained; rolled steel bearing plates over 2 inches but not over 4 inches in thickness may be straightened by pressing; or, if presses are not available, by planing for all bearing surfaces (except as noted under requirement (3) of this subsection), to obtain a satisfactory contact bearing; rolled steel bearing plates over 4 inches in thickness shall be planed for all bearing surfaces (except as noted under requirement (3) of this subsection).

(2) Column bases other than rolled steel bearing plates shall be planed for all bearing surfaces (except at noted under requirement (3) of this subsection).

(3) The bottom surfaces of bearing plates and column bases which are grouted to insure full bearing contact on foundations need not be planed.

b. Anchor Bolts.—Anchor bolts shall be designed to provide resistance to all conditions of tension and shear at the base of columns, including the net tensile components of any bending moments which may result from fixation or partial fixation of columns.

(8.6.2.5.1). § C26-517.0 Structural Steel Beams and Girders.—a. Rolled Beams and Plate Girders.—

1. Proportions. Riveted, high strength bolted and welded plate girders, cover-plated beams and rolled beams shall in general be proportioned by the moment of inertia of the gross section. No deduction shall be made for shop or field, rivet or bolt holes in either flange, except that in cases where the reduction of the area of either flange by such holes, calculated in accordance with the provisions of section C26-515.0 g 3, exceeds 15 per cent of the gross flange area, the excess shall be deducted.

2. Web. The clear distance between flanges in inches, shall not exceed

$$\frac{14{,}000{,}000}{\sqrt{F_y\,(F_y + 16{,}500)}}$$

times the web thickness.

3. Flanges. The thickness of outstanding parts of flanges shall conform to the requirements of section C26-513.0 j 1 and 2.

Each flange of welded plate girders shall in general consist of a single plate rather than two or more plates superimposed. The single plate may comprise a series of shorter plates, laid end-to-end and joined by complete penetration butt welds.

Unstiffened cover plates on riveted and bolted girders shall not extend more than $3{,}000/\sqrt{F_y}$ times the thickness of the thinnest outside plate beyond the outer row of rivets or bolts connecting them to the angles. The total cross-sectional area of cover plates of riveted or bolted girders shall not exceed 70 per cent of the total flange area.

4. Flange development. Rivets, high strength bolts or welds connecting flange to web, or cover plate to flange, shall be proportioned to resist the total horizontal shear resulting from the bending forces on the girder. The longitudinal distribution of these rivets, bolts, or of intermittent welds shall be in proportion to the intensity of the shear. But the longitudinal spacing shall not exceed the maximum permitted, respectively, for compression or tension members in section C26-515.0 k, 2(3) or section C26-515.0 k3(1). Additionally, rivets or welds connecting flange to web shall be proportioned to transmit to the web any loads applied directly to the flange unless provision is made to transmit such loads by direct bearing.

Partial length cover plates shall be extended beyond the theoretical cut-off point and the extended portion shall be attached to the beam or girders by rivets, high strength bolts (friction-type joint), or fillet welds, adequate, at stresses allowed in sections C26-368.0 c8, c9 and d, to develop the cover plate's portion of the flexural stresses in the beam or girder at the theoretical cut-off point. In addition, for welded cover plates, the welds connecting the cover plate termination to the beam or girder in the length a′, defined below, shall be adequate, at the allowed stresses, to develop the cover plate's portion of the flexural stresses in the beam or girder at the distance a′ from the end of the cover plate. (This may require the cover plate termination to be placed at a point in the beam or girder that has lower bending stress than the stress as the theoretical cut-off point.) The length a′, measured from the end of the cover plate, shall be:

(1.) A distance equal to the width of the cover plate when there is a continuous weld equal to or larger than ¾ of the plate thickness across the end of the plate and continued welds along both edges of the cover plate in the length a′.

(2.) A distance equal to 1½ times the width of the cover plate when there is a continuous weld smaller than ¾ of the plate thickness across the end of the plate and continued welds along both edges of the cover plate in the length a′.

(3.) A distance equal to 2 times the width of the cover plate when there is no weld across the end of the plate but continuous welds along both edges of the cover plate in the length a′.

5. Stiffeners

(1) Bearing stiffeners shall be placed in pairs at unframed ends on the webs of plate girders and, where required at points of concentrated loads. Such stiffeners shall have a close bearing against the flange, or flanges, through which they receive their loads or reactions, and shall extend approximately to the edge of the flange plates or flange angles. They shall be designed as columns subject to the provisions of section C26-368.0 c, assuming the column section to comprise the pair of stiffeners and a centrally located strip of the web whose width is equal to not more than 25 times its thickness at interior stiffeners or a width equal to not more than 12 times its thickness when the stiffeners are located at the end of the web. The effective length shall be taken as not less than ¾ of the length of the stiffeners in computing the ratio l/r. Only that portion of the stiffener outside of the angle fillet or the flange-to-web welds shall be considered effective in bearing.

(2) The largest average web shear, f_v, in any panel between stiffeners (total shear force divided by web cross-sectional area), in pounds per square inch, computed for any condition of complete or partial loading, shall not exceed the value given by Formula (8) or (9), as applicable.

$$F_v = \frac{F_y}{2.89}\left[C_v + \frac{1 - C_v}{1.15\sqrt{1 + (a/h)^2}}\right] \qquad \text{Formula (8)}$$

when C_v is less than 1.0:

$$F_v = \frac{F_y}{2.89}(C_v) \qquad \text{Formula (9)}$$

but not more than $0.4F_y$, when C_v is more than 1.0 or when intermediate stiffeners are omitted:

where

$$C_v = \frac{45{,}000{,}000k}{F_y(h/t)^2}, \text{ when } C_v \text{ is less than } 0.8$$

$$C_v = \frac{6.000}{h/t}\sqrt{\frac{k}{F_y}}, \text{ when } C_v \text{ is more than } 0.8$$

$$k = 4.00 + \frac{5.34}{(a/h)^2}, \text{ when a/h is less than 1.0}$$

$$k = 5.34 + \frac{4.00}{(a/h)^2}, \text{ when a/h is more than 1.0}$$

When a/h is more than 3 its value shall be taken as infinity. In this case Formula (8) reduces to Formula (9) and k = 5.34.

(3) Intermediate stiffeners are not required when the ratio h/t is less than 260 and the maximum web shear stress f_v is less than that permitted by Formula (9).

The spacing of intermediate stiffeners, when stiffeners are required, shall be such that the web shear stress will not exceed the value for F_v given by Formulas (8) or (9), as applicable, and the ratio a/h shall not exceed $\left(\frac{260}{h/t}\right)^2$ nor 3.0.

The spacing between stiffeners at end panels and panels containing large holes shall be such that the smaller panel dimension, a or h, shall not exceed $\frac{11{,}000t}{\sqrt{f_y}}$.

(4) The gross area, in square inches, of intermediate stiffeners spaced in accordance with formula (8) (total area, when stiffeners are furnished in pairs) shall be not less than that computed by Formula (10).

$$A_{st} = \frac{1 - C_v}{2}\left[\frac{a}{h} - \frac{(a/h)^2}{\sqrt{1 + (a/h)^2}}\right] YDht \qquad \text{Formula (10)}$$

where

D = 1.0 for stiffeners furnished in pairs
= 1.8 for single angle stiffeners
= 2.4 for single plate stiffeners

When the greatest shear stress f_v in a panel is less than that permitted by Formula (8) this gross area requirement may be reduced in like proportion.

The moment of inertia of a pair of stiffeners, or a single stiffener, with reference to an axis in the plane of the web, shall be not less than $(h/50)^4$.

Intermediate stiffeners may be stopped short of the tension flange a distance not to exceed 4 times the web thickness, provided bearing is not needed to transmit a concentrated load or reaction. When single stiffeners are used they shall be attached to the compressoin flange, if it consists of a rectangular plate, to resist any uplift tendency due to torsion in the plate. When lateral bracing is attached to a stiffener, or a pair of stiffeners, these, in turn, shall be connected to the compression flange to transmit 1 per cent of the total flange stress, unless the flange is composed only of angles.

Intermediate stiffeners required by the provisions of section C26-517.0 a5(3) shall be connected for a total shear transfer, in pounds per linear inch of single stiffener or pair of stiffeners, not less than that computed by the formula

$$f_{vs} = h\sqrt{\left(\frac{F_y}{3{,}400}\right)^3}$$

where F_y = yield point of web steel.

This shear transfer may be reduced in the same proportion that the largest computed shear stress f_v in the adjacent panels is less than that permitted by Formula (8). However, rivets, bolts and welds in intermediate stiffeners which are required to transmit to the web an applied concentrated load or reaction shall be proportion for not less than the applied load or reaction.

Rivets or high strength bolts connecting stiffeners to the girder web shall be spaced not more than 12 inches on center. If intermittent fillet welds are used, the clear distance between welds shall not be more than 16 times the web thickness nor more than 10 inches.

6. Reduction in flange stress. When the web to thickness ratio exceeds $24{,}000/\sqrt{F_b}$, the maximum stress in the compression flange shall not exceed

$$F'_b \leq F_b \left[\left(1.0 - 0.0005 \frac{A_w}{A_f} \frac{h}{t} - \frac{24{,}000}{\sqrt{F_b}} \right) \right] \qquad \text{Formula (11)}$$

7. Combined shear and tension stress. Plate girder webs subject to a computed average shear stress in excess of that permitted by Formula (9) of this section shall be so proportioned that bending tensile stress, due to moment in the plane of the girder web, shall not exceed $0.6F_y$ nor

$$\left(0.825 - 0.375 \frac{f_v}{F_v} \right) F_y \qquad \text{Formula (12)}$$

8. Splices. Butt welded splices, in plate girders and beams, shall be complete penetration groove welds and shall develop the full strength of the smaller spliced section. Other types of splices in cross-sections of plate girders and in beams, shall develop the strength required by the stresses, at the point of splice, but in no case less than 50 per cent of the effective strength of the material spliced.

9. Horizontal forces. The flanges of plate girders supporting cranes or other moving loads shall be proportioned to resist the horizontal forces produced by such loads.

10. Web crippling

(1) Webs of beams and welded plate girders shall be so proportioned that the compressive stress at the web toe of the fillets, resulting from concentrated loads not supported by bearing stiffeners, shall not exceed the value of $0.75\ F_y$ pounds per square inch allowed in section C26-368.0 c.; otherwise, bearing stiffeners shall be provided. The governing formulas shall be:

For interior loads,

$$\frac{R}{t(N + 2k)} = \text{not over } 0.75F_y \text{ pounds per square inch} \qquad \text{Formula (13)}$$

For end-reactions

$$\frac{R}{t(N + k)} = \text{not over } 0.75F_y \text{ pounds per square inch} \qquad \text{Formula (14)}$$

where

k = distance from outer face of flange to web toe of fillet, in inches

(2) Webs of plate girders shall also be so proportioned or stiffened that the sum of the compression stresses resulting from concentrated and distributed loads, bearing directly on or through a flange plate upon the compression edge of the web plate, and not supported directly by bearing stiffeners, shall not exceed

$$\left[5.5 + \frac{4}{(a/h)^2} \right] \frac{10{,}000{,}000}{(h/t)^2} \text{ pounds per square inch} \qquad \text{Formula (15)}$$

when the flange is restrained against rotation, nor

$$\left[2 + \frac{4}{(a/h)^2} \right] \frac{10{,}000{,}000}{(h/t)^2} \text{ pounds per square inch} \qquad \text{Formula (16)}$$

when the flange is not so restrained.

These stresses shall be computed as follows:

Concentrated loads and loads distributed over partial length of a panel shall be divided by the product of the web thickness and the girder depth or the length of panel in which the load is placed, whichever is the lesser panel dimension. Any other distributed loading, in pounds per linear inch of length, shall be divided by the web thickness.

b. Composite construction.

1. Definition. Composite construction shall consist of steel beams or girders supporting a reinforced concrete slab, so inter-connected that the beam and slab act together to resist bending. When the slab extends on both sides of the beam, the effective width of the concrete flange shall be taken as not more than one-fourth of the span of the beam, and its effective projection beyond the edge of the beam shall not be taken as more than one-half the clear distance to the adjacent beam, nor more than eight times the slab thickness. When the slab is present on only

one side of the beam, the effective width of the concrete flange (projection beyond the beam) shall be taken as not more than one-twelfth of the beam span, nor six times its thickness nor one-half the clear distance to the adjacent beam.

Beams totally encased 2 inches or more on their sides and soffit in concrete poured integrally with the slab may be assumed to be interconnected to the concrete by natural bond, without additional anchorage, provided the top of the beam is at least 1½ inches below the top and 2 inches above the bottom of the slab, and provided that the encasement has adequate mesh or other reinforcing steel throughout the whole depth and across the soffit of the beam. When shear connectors are provided in accordance with section C26-517.0 b4, encasement of the beam to achieve composite action is not required.

2. Design assumptions.

(1) Encased beams shall be proportioned to support unassisted all dead loads applied prior to the hardening of the concrete (unless these loads are supported temporarily on shoring) and, acting in conjunction with the slab, to support all dead and live loads applied after hardening of the concrete, without exceeding a computed bending stress of $0.66F_y$, where F_y is the yield point of the steel beam. The bending stress produced by loads after the concrete has hardened shall be computed on the basis of the moment of inertia of the composite section. Concrete tension stresses below the neutral axis of the composite section shall be neglected. Alternately, the steel beam alone may be proportioned to resist unassisted the moment produced by all loads, live and dead, using a bending stress equal to $0.76F_y$, in which case temporary shoring is not required. Concrete used for the encasement of steel beams in composite construction as outlined above shall be average or controlled concrete, meeting the requirements of section C26-1477.0 or C26-1478.0.

(2) When shear connectors are used in accordance with section C26-517.0 b4 the composite section shall be proportioned to support all of the loads without exceeding the allowable stress prescribed in section C26-368.0 c5(1) or c5(4) as applicable. The moment of inertia I_{tr} of the composite section shall be computed in accordance with the elastic theory. Concrete tension stresses below the neutral axis of the composite section shall be neglected. The compression area of the concrete above the neutral axis shall be treated as an equivalent area of steel by dividing it by the modular ratio n. Concrete used in composite construction, with approved shear connectors, shall be average or controlled concrete meeting the requirements of section C26-1477.0 or C26-1478.0. Concrete aggregates shall conform to the standard specifications for concrete aggregates A.S.T.M.,D. C33-61T unless otherwise approved by the board.

For construction without temporary shoring the value of the section modulus of the transformed composite section used in stress calculations (referred to the tension flange) shall not exceed the value S_{tr} as determined by Formula (17), provided that the steel beam alone, supporting the loads before the concrete has hardened, is not stressed to more than the applicable bending stress given in section C26-368.0 c.

$$S_{tr} = \left(1.35 + 0.35 \frac{M_L}{M_D} \right) S_s \qquad \text{Formula (17)}$$

3. End Shear. The web and the end connections of the steel beam shall be designed to carry the total dead and live load.

4. Shear Connectors.—Except in the case of encased beams as defined in section C26-517.0 b1, the entire horizontal shear at the junction of the steel beam and the concrete slab shall be assumed to be transferred by shear connectors welded to the top flange of the beam and embedded in the concrete. The total horizontal shear to be thus resisted between the point of maximum positive moment and each end of the steel beam (or between the point of maximum positive moment and a point of contraflexure in continuous beams) shall be taken as the smaller value using the formulas

$$V_h = \frac{0.85f'_c A_c}{2} \qquad \text{Formula (18)}$$

and

$$V_h = \frac{A_s F_y}{2} \qquad \text{Formula (19)}$$

The number of connectors resisting this shear, each side of the point of maximum moment, shall not be less than that determined by the relationship V_h/q, where q, the allowable shear load for one connector, or one pitch of a spiral bar, as given in the following table,

Connector	Allowable Horizontal Shear Load (q) (kips) (Applicable only to stone concrete)		
	$f'_c = 3{,}000$	$f'_c = 3{,}500$	$f'_c = 4{,}000$
½" diam. × 2" hooked or headed stud	5.1	5.5	5.9
⅝" diam. × 2½" hooked or headed stud	8.0	8.6	9.2
¾" diam. × 3" hooked or headed stud	11.5	12.5	13.3
⅞" diam. × 3½" hooked or headed stud	15.6	16.8	18.0
3" channel, 4.1 lb.	4.3w	4.7w	5.0w
4" channel, 5.4 lb.	4.6w	5.0w	5.3w
5" channel, 6.7 lb.	4.9w	5.3w	5.6w
½" diam. spiral bar	11.9	12.4	12.8
⅝" diam. spiral bar	14.8	15.4	15.9
¾" diam. spiral bar	17.8	18.5	19.1

w = length of channel in inches.

The required number of shear connectors may be spaced uniformly between the sections of maximum positive and zero moment.

Shear connectors shall have at least 1 inch of concrete cover in all directions.

Stone concrete shall be deemed to be only that concrete whose coarse aggregate conforms to A.S.T.M., D., C33-61T unless otherwise approved by the board.

(8.6.2.6). § C26-518.0 Minimum Thickness of Structural Steel Framework.—
a. In the main structural framework of buildings, primary members shall be construed to include any steel member used as a column, a grillage beam, or to support masonry walls or masonry partitions, including trusses, isolated lintels spanning an opening of eight (8) feet or more, and any member required to brace a column, or a truss, or to support two hundred (200) or more square feet of floor or roof area. Secondary members shall be construed to include all other steel members, including filling-in beams of floor systems, which individually support less than 200 square feet of floor or roof area.

b. For the primary members of the structural frame, all steel used shall be at least one-fifth of an inch thick for interior work; all steel in the exterior walls of a stucture except lintels spanning an opening of less than eight (8) feet shall be at least 0.20 inches in thickness when protected as required in sections C26-611.0 to 615.0, inclusive, and at least one-quarter of an inch thick when not so protected.

c. For the secondary members of the structural frame, all steel shall be at least 0.15 inches in thickness; except that material of less thickness may be used in steel structural members as hereinafter provided:

1. In steel joists conforming with the provisions of section C26-519.0.

2. In other steel floor and roof constructions, in which the structural members are spaced not farther apart than 24 inches on centers for floors, or 30 inches on centers for roofs; provided the allowable unit stresses otherwise specified in this title are not exceeded, the material used is protected against corrosion, and such constructions are approved by the board but not to exceed the use limitations prescribed in subdivision b of section C26.519.0.

3. In other floor and roof constructions used as secondary framing, involving steel members of which the strength cannot be determined by generally accepted methods of design, provided such constructions are approved by the board with use limitations, after tests in accordance with the provisions of section C26-588.0 to 590.0, inclusive, and section C26-626.0.

4. In bearing-wall and bearing-partition construction, consisting of steel structural members spaced not farther apart than 24 inches on centers, conforming with the requirements of paragraph c.2 of this section, when approved by the board; but in no case shall such vertical framing be used in buildings exceeding three (3) stories nor more than 35 feet in height.

d. All unprotected structural steel exposed to the elements used on the exterior of a building for sign supports, exterior stairways, tank towers and similar accessory structures shall not be less than 0.25 inches in thickness, unless the steel used is an atmospheric corrosion resistant grade approved by the board.

e. Copper bearing steel.—Copper bearing steel containing not less than .20 per cent of copper may have a minimum thickness of not less than .135 inch for secondary members.

(8.6.2.7.1). § C26-519.0 Steel Joists.—a. Steel Joists; Application.—Limiting provisions as to steel joists in the following subdivisions shall be inapplicable to structural steel sections such as hot rolled solid web "I" beams, channels or plate girders which may be used as steel joists, their design, spacing and loading to be governed only by the stresses required in this title and provided that lateral bracing as specified in subdivision e of section C26-519.0, shall be used.

(8.6.2.7.2). (b) Use of steel joists.—Steel joists may be used elsewhere than around stairs, shafts and other floor openings as secondary members for floor and roof fillers in structures where the required live load is one hundred twenty pounds or less per square foot.

Where Steel Joist construction is subject to unusual concentrated or moving loads, adequate top slab and lateral bracing shall be provided to support and distribute such loads. In multi-story buildings, steel joists shall not be used as primary bracing or as ties for columns.

Steel Joists may be used in floor and roof assemblies in buildings of all types of construction. When used in class 1 fireproof structures, such assemblies shall have a fire resistive rating not less than prescribed for floors in section C26-239.0. When used in class 2 fire protected structures, such assemblies shall have a fire resistive rating not less than that prescribed for floors in section C26-240.0.

(8.6.2.7.3). (c) Design of steel joists.—Steel joists shall be designed as simply supported uniformly loaded trusses using stresses within those allowed under this title. The shear to be used in designing web members shall be determined from full uniform loading, provided, such shear shall not be less than 50 per cent of the required maximum end reaction.

(8.6.2.7.4). (d) Span and spacing of steel joists.

1. The span of joists shall be within twenty-four times the depth of the joists. The maximum deflection shall not be greater than one three hundred sixtieth of the span for the total designed live load as determined by test.

2. The maximum spacing of the joists shall be the safe span of the top slab or flooring over the joist, but in any case such spacing shall be twenty-four inches or less in floors and thirty inches or less in roofs, except that steel joists may be used as purlins to support roof decks of poured or precast concrete or gypsum, formed steel, wood plank or other suitable material, together with accessory fill material, insulation and built up roofing required, at spacings not to exceed the safe span of such decks.

(8.6.2.7.5). (e) Loading and lateral bracing of steel joists.

Joists when erected and braced laterally at top and bottom chords shall be capable of sustaining a load of 800 pounds at any panel point on any one joist. Such lateral bracing shall be 7 feet or less apart and 7 feet or less from supports, shall securely support the top chord of the joists against lateral displacement and shall be rigid in character.

Steel joists shall be designed to carry directly the total dead load of partitions where they occur, in addition to all other dead and live loads imposed.

(8.6.2.7.6). (f) Bearing and anchoring of steel joists.—Where steel joists have a bearing on masonry or concrete, at least four inches of their length shall be on each such bearing and the joists shall be securely anchored to the masonry or concrete. When bearing on steel, steel joists shall have at least two and one-half inches of their length on each such bearing except where opposite joists butt over a narrow steel support and positive attachment is provided by welding or bolting, a shorter bearing length may be used if it provides the necessary bearing area. The bearing stresses shall be within the allowable working stresses permitted in this title. All joists shall be anchored to supports so as to prevent dislodgment during their erection, and they shall be bolted or welded to all steel supports except that in residence structures up to and including four stories in height, the joists may be anchored to steel supports with an anchor made of not less than a three-sixteenth inch bar fastened over the flange of the steel supports. Any joists at the end of a panel shall be anchored to masonry wall or steel beam at each line of lateral bracing.

(8.6.7.2.7). (g) Connections of steel joists.—Connections of the various members of steel joists shall be designed with as little eccentricity as possible and all stresses due to eccentricity shall be included with primary stresses in designing. All such connections shall be made by leaving a portion of the metal intact or by fusion welding in accordance with the requirements of section C26-381.0, or by resistance welding performed in accordance with the American Welding Society. Recommended practice for resistance welding, edition of 1950.

(8.6.2.7.8). (h) Painting or dipping of steel joists.—

1. Painting of steel joists shall be in accordance with the requirements of section C26-522.0, or the joists shall be dipped once in hot asphalt at the place of manufacture or given two coats of asphalt either by dipping or spraying or an equivalent protective

coating approved by the Commissioner, applied at the place of manufacture. When either hot or cold asphalt is used, all abrasions shall be touched up at the job with the same material. If an asphaltic base paint is used it shall include asphaltic bitumen containing not over 10 per cent of carbon pigment and not over 10 per cent of saponifiable material. The paint shall dry to a firm elastic film before joists are loaded for shipment and shall not soften sufficiently to drip at 120 degrees. F.

2. A certificate as to the quality of the asphalt shall be furnished to the Commissioner by an approved testing laboratory.

(8.6.2.8.1). § C26-520.0 Riveted and Welded and High-strength Bolted Connections.—a. Connections. 1. Minimum connections. Connections carrying calculated stresses, except for lacing, sag bars, and girts, shall be designed to support not less than 6,000 pounds.

2. Eccentric connections. Axially stressed members meeting at a point shall have their gravity axes intersect at a point if practicable; if not, provision shall be made for bending stresses due to eccentricity.

3. Placement of rivets, bolts, and welds. Except as hereinafter provided, the rivets, bolts or welds at the ends of any member transmitting axial stress into that member shall have their centers of gravity on the gravity axis of the member unless provision is made for the effect of the resulting eccentricity. Except in members subject to repeated variations in stress, as defined in section C26-368.0 d, disposition of fillet welds to balance the forces about the neutral axis or axes for end connections of single angle, double angle, and similar type members is not required, eccentricity between the gravity axes of such members and the gage lines for their riveted or bolted end connections may be neglected.

4. Unrestrained members. Except as otherwise indicated by the designer, connections of beams, girders or trusses shall be designed as flexible, and may ordinarily be proportioned for the reaction shears only.

Flexible beam connections shall permit the ends of the beam to rotate sufficiently to accommodate its deflection by providing for a horizontal displacement of the top flange determined as follows:

$e = 0.007d$, when the beam is designed for full uniform load and for live load deflection not exceeding 1/360 of the span.

$e = \frac{f_b L}{3{,}600{,}000}$ when the beam is designed for full uniform load producing the unit stress f_b at mid-span.

5. Restrained members. Fasteners or welds for end connections of beams, girders and trusses not conforming to the requirements of subsection 4 above, shall be designed for the combined effect of end reaction shear and tensile or compressive stresses resulting from moment induced by the rigidity of the connection when the member is fully loaded.

6. Fillers. When rivets or bolts carrying computed stress pass through fillers thicker than ¼ inch, except in friction-type connections assembled with high strength bolts, the fillers shall be extended beyond the splice material and the filler extension shall be secured by enough rivets or bolts to distribute the total stress in the member uniformly over the combined section of the member and the filler, or an equivalent number of fasteners shall be included in the connection.

In welded construction, any filler ¼ inch or more in thickness shall extend beyond the edges of the splice plate and shall be welded to the part on which it is fitted with sufficient weld to transmit the splice plate stress, applied at the surface of the filler as an eccentric load. The welds joining the splice plate to the filler shall be sufficient to transmit the splice plate stress and shall be long enough to avoid overstressing the filler along the toe of the weld. Any filler less than ¼ inch thick shall have its edges made flush with the edges of the splice plate and the weld size shall be the sum of the size necessary to carry the splice plate stress plus the thickness of the filler plate.

7. Connection of tension and compression members in trusses. The connections at ends of tension or compression members in trusses shall develop the strength required by the stress, but not less than 50 per cent of the effective strength of the member. Groove welds in connections at the ends of tension or compression members in trusses shall be complete penetration groove welds.

8. Compression members with bearing joints. Where compression members bear on bearing plates, and where tier-building columns are finished to bear, there shall be sufficient rivets, bolts or welds to hold all parts securely in place

Where other compression members are finished to bear, the splice material and its riveting, bolting or welding shall be arranged to hold all parts in line and shall be proportioned for 50 per cent of the computed stress.

All of the foregoing joints shall be proportioned to resist any tension that would be developed by the specified lateral forces acting in conjunction with 75 per cent of the calculated dead load stress and no live load.

9. Combination of welds. If two or more of the general types of weld (butt, fillet, plug, slot) are combined in a single joint, the effective capacity of each shall be separately computed with reference to the axis of the group, in order to determine the allowable capacity of the combination.

10. Rivets and bolts in combination with welds. In new work, rivets, A307 bolts, or high strength bolts used in bearing type connections, shall not be considered as sharing the stress in combination with welds. Welds, if used, shall be provided to carry the entire stress in the connection. High strength bolts installed in accordance with the provisions of section C26-520.0 d, as a friction-type connection prior to welding may be considered as sharing the stress with the welds.

Existing rivets and properly tightened high strength bolts may be utilized for the purpose of carrying stresses resulting from existing dead loads when existing structures are altered by welding, and welds shall be of sufficient strength to carry all additional stress.

11. High strength bolts (in friction-type joints) in combination with rivets. In new work and in making alterations, rivets and high strength bolts, installed in accordance with the provisions of section C26-520.0 d, as friction-type connections, may be considered as sharing the stresses resulting from dead and live loads.

12. Field connections. Rivets, high strength bolts or welds shall be used for the following connections:

Column splicers in tier structures 200 feet or more in height.

Column splices in tier structures 100 to 200 feet in height, if the least horizontal dimension is less than 40 per cent of the height.

Column splices in tier structures less than 100 feet in height, if the least horizontal dimension is less than 25 per cent of the height.

Connections of all beams and girders to columns and of any other beams and girders on which the bracing of columns is dependent, in structures over 125 feet in height.

Roof-truss splices and connections of trusses to columns, column splices, column bracing, knee braces and crane supports, in all structures carrying cranes of over 5-ton capacity.

Connections for supports of running machinery, or of other live loads which produce impact or reversal of stress.

Any other connections stipulated on the design plans.

In all other cases field connections may be made with A 307 bolts.

For the purpose of this section, the height of a tier structure shall be taken as the vertical distance from the curb level to the highest point of the roof beams, in the case of flat roofs, or to the mean height of the gable, in the case roofs having a rise of more than 2-2/3 in 12. Where the curb level has not been established, or where the structure does not adjoin a street, the mean level of the adjoining land shall be used instead of curb level. Penthouses may be excluded in computing the height of structure.

b. Rivets and bolts.

1. High strength bolts. Use of high strength bolts shall conform to the provisions of subsection d. of this section, except that A354, Grade BC, bolts approved by the board and tightened to their proof load, may be substituted for A325 bolts at the working stresses permitted in section C26-368.0 c.

2. Effective bearing area. The effective bearing area of rivets and bolts shall be the diameter multiplied by the length in bearing, except that for countersunk rivets and bolts half the depth of the countersink shall be deducted.

3. Long grips. Rivets and A307 bolts which carry calculated stress, and the grip of which exceeds five diameters, shall have their number increased 1 per cent for each additional 1/16 inch in the grip.

4. Minimum pitch. The minimum distance between centers of rivet and bolt holes shall be not less than 2-2/3 times the nominal diameter of the rivet or bolt but preferably not less than 3 diameters.

5. Minimum Edge Distance. The minimum distance from the center of a rivet or bolt hole to any edge, used in design or in preparation of shop drawings, shall be that given in the following table:

Rivet or Bolt Diameter (Inches)	Minimum Edge Distance for Punched, Reamed or Drilled Holes (Inches) At Sheared Edges	At Rolled Edges of Plates, Shapes or Bars or Gas Cut Edges**
½	⅞	¾
⅝	1⅛	⅞
¾	1¼	1
⅞	1½*	1⅛
1	1¾*	1¼
1⅛	2	1½
1¼	2¼	1⅝
Over 1¼	1¾ × Diameter	1¼ × Diameter

*These may be 1¼ in. at the ends of beam connection angles.

**All edge distances in this column may be reduced ⅛ in. when the hole is at a point per stress does not exceed 25 per cent of the maximum allowed stress in the element.

6. Minimum edge distance in line of stress. In bearing-type connections of tension members, where there are not more than two fasteners in a line parallel to the direction of stress, the distance from the center of the end fastener and that end of the connected part toward which the stress is directed shall not be less than

(a) for riveted connections: the area of the fastener divided by the thickness of the connected part for fasteners in single shear, and twice this distance for fasteners in double shear.

(b) for high strength bolted connections: 1½ times the distances given in (a) above.

The end distance may, however, be decreased in such proportion as the fastener stress is less than that permitted under section C26-368.0 c. 8, (1), but it shall not be less than the distance specified in section C26-520.0 b. 5. above.

When more than two fasteners are provided in the line of stress the provisions of section C26-520.0 b. 5. shall govern.

7. Maximum edge distance. The maximum distance from the center of any rivet or bolt to the nearest edge of parts in contact with one another shall be 12 times the thickness of the plate, but shall not exceed 6 inches.

c. Welds

1. Welder and welding operator qualifications. Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in section C26-381.0, to perform the type of work required, except that this provision need not apply to tack welds not later incorporated into finished welds carrying calculated stress.

2. Qualification of weld and joint details. The details of all joints (including for butt welds the groove form, root face, root spacing, etc.) to be employed under this title without welding procedure qualifications shall comply with all the requirements for joints which are accepted without procedure qualification under the standard code for arc and gas welding in building construction, 1946 edition, or the standard specifications for welded highway and railway bridges, 1956 edition, of the American Welding Society.

Weld grooves for complete penetration welds which are accepted without welding procedure qualification under the standard code for arc and gas welding in building construction or the standard specification for welded highway and railway bridges of the American Welding Society may be used under this specification without welding procedure qualification. Weld grooves of the 60° single-V or 45° single bevel form and single-J or single-U grooves, conforming to the details of such grooves as provided in the above American Welding Society standards but having partial penetration with an effective throat thickness as defined in section C26-515.0 g, 6, and no root opening, may be used without welding procedure qualification. However, they shall not be used in butt joints to resist tensile stress acting in a direction normal to the plane of the weld throat, except in splices or connections of columns or other members subject primarily to axial compressive stress.

Joint forms or welding procedures other than those included in the foregoing may be employed provided they shall have been qualified in accordance with the requirements of the above American Welding Society standards.

E60 and E70 series electrodes for manual arc-welding and grade SAW-1 or grade SAW-2 submerged arc process may be used for welding A7 and A36 steel.

Only E70 low hydrogen electrodes for manual arc-welding or Grade SAW-2 for submerged arc-welding shall be used with A441 or weldable A242 steel, except that fillet welds or partial penetration groove welds used to connect parts of built-up members and not carrying calculated stress may be made with E60 series low hydrogen electrodes and Grade SAW-1 submerged arc process.

3. Minimum size of fillet welds. In joints connected only by fillet welds, the minimum size of fillet weld to be used shall be as shown in Table A below. Weld size is determined by the thicker of the two parts joined, except that the weld size need not exceed the thickness of the thinner part joined unless a larger size is required by calculated stress:

Table A

Material Thickness of Thicker Part Joined (Inches)	Minimum Size of Fillet Weld (Inches)
To ½ inclusive	3/16
Over ½ to ¾	¼
Over¾ to 1½	5/16
Over 1½ to 2¼	⅜
Over 2¼ to 6	½
Over 6	⅝

4. Maximum effective size of fillet welds. The maximum size of a fillet weld that may be assumed in the design of a connection shall be such that the stresses in the adjacent base material do not exceed the values allowed in section C26-368.0 c. The maximum size that may be used along edges of connected parts shall be:

(1.) Along edges of material less than ¼ inch thick, the maximum size may be equal to the thickness of the material.

(2.) Along edges of material ¼ inch or more in thickness, the maximum size shall be 1/16 inch less than the thickness of the material, unless the weld is especially designated on the drawings to be built out to obtain full throat thickness.

5. Length of fillet welds. The minimum effective length of a strength fillet weld shall be not less than 4 times the nominal size, or else the size of the weld shall be considered not to exceed one-fourth of its effective length.

6. Intermittent fillet welds. Intermittent fillet welds may be used to transfer calculated stress across a joint or faying surfaces when the strength required is less than that developed by a continuous fillet weld of the smallest permitted size, and to join components of built-up members. The effective length of any segment of intermittent fillet welding shall be not less than 4 times the weld size with a minimum of 1½ inches.

7. Lap joints. The minimum width of laps on lap joints shall be 5 times the thickness of the thinner part joined and not less than 1 inch. Lap joints joining plates or bars subjected to axial stress shall be fillet welded along the edge of both lapped parts except where the deflection of the lapped parts is sufficiently restrained to prevent opening of the joint under maximum loading.

8. End returns of fillet welds. Side or end fillet welds terminating at ends or sides, respectively, of parts or members shall, wherever practicable, be returned continuously around the corners for a distance not less than twice the nominal size of the weld. This provision shall apply to side and top fillet welds connecting brackets, beam seats, and similar connections on the plane about which bending moments are computed. End returns shall be indicated in the design and detail drawings.

9. Fillet welds in holes and slots. Fillet welds in holes or slots may be used to transmit shear in lap joints or to prevent the buckling or separation of lapped parts, and to join components of built-up members. Such fillet welds may overlap, subject to the provisions of section C26-515.0 g, 6. Fillet welds in holes or slots are not to be considered plug or slot welds.

10. Plug and slot welds. Plug or slot welds may be used to transmit shear in a lap joint or to prevent buckling of lapped parts and to join component parts of built-up members.

The diameter of the holes for a plug weld shall be not less than the thickness of the part containing it plus 5/16 inch, rounded to the next greater odd 1/16 inch, nor greater than 2¼ times the thickness of the weld metal.

The minimum center-to-center spacing of plug welds shall be 4 times the diameter of the hole.

The length of slot for a slot weld shall not exceed 10 times the thickness of the weld. The width of the slot shall be not less than the thickness of the part containing it, plus 5/16 inch, rounded to the next greater odd 1/16 inch, nor shall it be

greater than 2¼ times the thickness of the weld. The ends of the slot shall be semicircular or shall have the corners rounded to a radius not less than the thickness of the part containing it, except those ends which extend to the edge of the part.

The minimum spacing of lines of slot welds in a direction transverse to their length shall be 4 times the width of the slot. The minimum center-to-center spacing in a longitudinal direction on any line shall be 2 times the length of the slot.

The thickness of plug or slot welds in material ⅝ inch or less in thickness shall be equal to the thickness of the material. In material over ⅝ inch in thickness, it shall be at least one-half the thickness of the material but not less than ⅝ inch.

d. High strength bolted connection—

1. Connections using high strength bolts shall be designed as friction-type or bearing-type connections and be so designated on the plans.

2. A friction-type connection shall be one in which the shearing forces are resisted through the friction, developed between the connected parts and the fastener, which has been induced by the clamping action resulting from tightening the bolt to the prescribed tension. The friction-type fastener shall be designed in accordance with the stresses permitted by section C26-368.0 c, for high strength bolts.

3. A bearing-type connection shall be one in which the shearing forces are resisted through the physical bearing of the connector on the connected parts. Connectors in bearing-type connection shall be tightened to the same minimum bolt tension required for connectors in friction-type connectors. The bearing-type connectors shall be designed in accordance with the stresses permitted by section C26-368.0 c, for high strength bolts.

4. The slope of surfaces of bolted parts in contact with the bolt head and nut shall not exceed 1 to 20 with respect to a plane normal to the bolt axis, where bearing faces of the bolted parts have a slope of more than 1 to 20 with respect to a plane normal to the bolt axis, smooth beveled washers shall be used to compensate for the lack of parallelism.

5. Bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or by any other interposed compressible material. All joint surfaces, including those adjacent to the bolt head, nut or washer shall be free of scale, except tight mill scale, and shall be free of burrs, dirt and other foreign materials that would prevent solid seating of the parts.

6. Contact surfaces within friction-type joints shall be free of oil, paint, lacquer or galvanizing.

7. Installation

(1) Each fastener shall be tightened to provide, when all fasteners in the joint are tight, at least the minimum bolt tension shown in Table A below for each size fastener.

Table A

Bolt Size in inches	Minimum Bolt Tension in pounds
½	12,050
⅝	19,200
¾	28,400
⅞	36,050
1	47,250
1⅛	56,450
1¼	71,700
1⅜	85,450
1½	103,950

(2) High strength bolts meeting the requirements of section C26-322.0 d, may be installed without washers when they are tightened by the turn-of-nut method. Any bolt tightened by the calibrated wrench method (or by torque control) shall have a hardened washer under the element (nut or bolt head) turned in tightening.

(3) Turn-of-nut tightening. When the turn-of-nut method is used to provide the minimum bolt tension required in Table A of subsection 7 (1) above, sufficient bolts shall be brought to a "snug tight" condition to insure that the parts are brought into full contact with each other. Bolts shall then be placed in all remaining holes in the connection and brought to the "snug tight" condition. All bolts shall then be tightened the additional amount prescribed by Table B below, for the condition described.

Nut Rotation* from Snug Tight Condition for Coarse Thread Heavy Head Bolts of All Sizes and Lengths and Heavy Semi-finished Nuts.

Disposition of outer faces of bolted parts:		
Both faces normal to bolt axis.	One face normal to bolt axis; One sloped 1:20. (Bevel washers not used)	Both faces sloped 1:20 from normal to bolt axis. (Bevel washers not used)
½ turn	¾ turn	1 turn

*Nut rotation is rotation relative to bolt regardless of the element (nut or bolt) being turned.

Tolerance on rotation; 1/6 turn (60°) over; nothing under.

(4) Calibrated wrench tightening. When calibrated wrenches are used to provide the minimum bolt tension required in Table A of subsection 7 (1) above, they shall be calibrated to induce a bolt tension 5 to 10 per cent in excess of that value.

8. The installation of high strength bolts shall be supervised by a licensed professional engineer or registered architect engaged by the owner to insure that the high strength bolts are installed according to design, code requirements and any supplemental rules of the department of buildings. The licensed professional engineer, registered architect, or their representative shall be present at all times when high strength bolts are being tensioned.

(8.6.2.9). § C26-521.0 Field and Shop Riveted, Bolted and Welded Connections.—a. In tier structures less than one hundred twenty-five feet high, in which the height is less than two and one-half times the minimum horizontal dimensions, all column splices and field and shop connections may be bolted with unfinished bolts.

b. In structures in which the height is over one hundred feet and is more than two and one-half times the minimum horizontal dimension, and in structures one hundred feet or less in height in which the height is more than four times the minimum horizontal dimensions, column splices and connections to columns shall be riveted or welded or bolted with high-strength bolts.

c. In structures over one hundred twenty-five feet in height and in all structures of a special character, connections of beams and girders to columns, and beams and girders bracing columns shall be riveted or welded or bolted with high-strength bolts. Column splices in structures two hundred feet or more in height shall be riveted or welded or bolted with high-strength bolts. Column splices in tier structures less than two hundred feet high, except as provided in the preceding paragraph, may be bolted.

d. All other field and shop connections may be bolted with unfinished bolts, except that, in all structures, the connections for supports for running machinery or other moving loads shall be riveted or welded or bolted with high-strength bolts.

e. Within existing structures steel work for alterations, or additions, except to the main structural framework, which do not affect existing column splices, connections and other riveted or welded work, may be bolted with unfinished bolts.

f. Roof-truss splices and connections of trusses to columns, column splices, column bracing, knee braces and crane supports, in all structures carrying cranes shall be riveted, welded or bolted with high strength bolts.

(8.6.2.10). § C26-522.0. Painting of Structural Steel.—a. All structural steel, except as provided in subsection b of this section shall receive one coat of approved metal protection before erection, applied thoroughly and evenly to dry surfaces which have been cleaned by hand wire brushing, or by other suitable methods, of loose mill scale, loose rust, weld slag flux deposit, dirt and other foreign matter. Oil and grease deposits shall be removed by solvents. Surfaces inaccessible after assembly shall be treated as required above prior to assembly.

b. Surfaces of structural steel shall not be required to receive approved metal protection when used under the following conditions, however these surfaces shall be cleaned of oil or grease by solvent cleaners and be cleaned of dirt and other foreign material by thorough brushing with a fiber brush.

1. Structural steel which is to be encased in non-corrosive concrete or surfaces that will abut non-corrosive concrete at interior locations.

2. Structural steel which is to be encased in approved non-corrosive fire resistive materials and to which an adhesive is included in the application.

3. Surfaces of structural steel which are to be riveted, bolted or welded in close contact with each other.

4. Surfaces of structural steel within two inches of field welds shall be free of protective coverings that would prevent proper welding or produce objectionable fumes while welding is being done.

5. Surfaces of structural steel which have been machine finished.

6. Surfaces of structural steels meeting the specifications for atmospheric corrosion resistant steel shown by test to not require metal protection and having been approved by the board.

c. Part of structural steel members left unpainted because of welding, bolting or riveting operations not exempted from painting by the provisions of sub-section b above, shall receive a field application of approved metal protection as prescribed in sub-section a above.

d. Structural steel, except approved atmospheric corrosion resistant grades, which will remain exposed to atmospheric corrosion shall receive an additional coat of acceptable metal protection of another color after erection.

e. Should the metal protection required on structural steel surfaces become excessively deteriorated due to prolonged exposure or any other cause the commissioner may require additional metal protection in whole or in part.

(8.6.2.11). § C26-523.0 Templates.—When any lintel, beam, girder or truss is supported at either end by a wall or pier, such lintel, beam, girder or truss shall be properly anchored to such wall or pier and shall rest upon a template or shoe of cast iron, steel or stone of such design and dimensions as to safely distribute its load on the masonry, except that when beams, not exceeding six inches in depth, are placed not more than thirty inches on centers, templates shall be unnecessary.

(8.6.2.12). § C26-524.0 Protection of Structural Steel from Weather.—Exterior steel columns in walls, which columns are unprotected by glass, or similar material, shall be protected from the weather by efficient and approved waterproof material or by at least eight inches of masonry.

GROUP 3

Gas Cutting of Structural Steel

(8.6.3.1). § C26-525.0 Oxygen Cutting of Structural Steel Permitted.—Oxygen cutting may be employed in the fabrication of structural steel members or parts, used in building construction, in accordance with rules of the board.

(8.6.3.2.1). § C26-526.0 Use of Oxygen Cutting Torch.—a. Competence to use oxygen cutting torch. Contractors desiring to do oxygen cutting shall satisfy the superintendent as to their ability to produce satisfactory oxygen cuts.

(8.6.3.2.2). b. Oxygen cutting of structural steel while carrying stress. It shall be unlawful to do oxygen cutting on any member while it is carrying stress, except for detail cutting to correct minor fabricating errors where the removal of metal resulting from such detail cutting would leave unimpaired the required strength of the members to be cut.

(8.6.3.2.3). c. Oxygen cut edges. Oxygen cut edges shall be smooth and regular in contour.

(8.6.3.2.4). d. Oxygen cutting in preparation for welding. Oxygen cutting may be used in the preparation of base metal parts for welding provided the edges are thoroughly cleaned after cutting so as to expose clean steel.

(8.6.3.2.5). e. Milling of surfaces by oxygen cutting. It shall be unlawful to do oxygen cutting to replace the milling of surfaces.

(8.6.3.2.6). f. Oxygen cutting of undesigned holes. It shall be unlawful to do oxygen cutting of holes in a member designed without provision therefor.

(8.6.3.2.7). g. Radius and area of re-entrant oxygen cut fillets. The radii of re-entrant oxygen cut fillets shall be as large as possible and at least one-half inch. To determine the net area of members so cut, one-eighth of an inch shall be deducted from the oxygen cut edges.

GROUP 4

Structural Steel for Stair Construction

(8.6.4). § C26-527.0 Structural Steel for Stair Construction.—a. Steel strings for interior stairs shall have a minimum thickness of three-sixteenths of an inch, except the webs of hot rolled beams or channels which shall have a minimum thickness of .145 of an inch.

b. Material for risers, treads, and landing plates for interior stairs shall have a minimum thickness equal to No. 12 U. S. standard gage iron.

c. Material used for the construction of exterior steel stairs or fire escapes shall be at least one-quarter of an inch in thickness.

Sub-Article 7. Wood Construction

GROUP 1

General Requirements for Wood Construction

(8.7.1.1). § C26-528.0 Support of Wood Structural Members.—a. The ends of wood beams, joists and rafters resting on masonry walls shall be cut to a bevel of three inches in their depth, and shall have a bearing of at least four inches on the masonry.

b. The ends of wood beams resting on girders shall have bearings of at least four inches.

c. The ends of wood beams framing into girders may be supported by approved metal stirrups, hangars or bolted hardwood cleats, provided that all bearings of timber shall be at least four inches or as may be otherwise designed and shown in detail on the framing plans and have a bearing within the working stress of the timbers.

d. It shall be unlawful, except in the case of one and two family dwellings, to support either end of a floor or roof beam on stud partitions. Tail beams over eight feet long and trimmer and header beams shall be hung in approved metal stirrups or hangers and shall be spiked unless supported on a wall or girder.

e. It shall be unlawful to notch or cut wood beams, joists or rafters unless they are suitably reinforced.

f. Built-up girders shall be securely bolted together. Other built-up members shall be securely spiked or bolted together. Spiked trusses shall be of types which have been tested and approved.

(8.7.1.2). **§ C26-529.0 Bridging of Wood Beams.**—Wood floor beams and beams in flat roofs exceeding eight feet in clear span shall be braced with mitred cross bridging measuring at least one inch by two and one-half inches (actual), nailed twice at each bearing, or, if metal bridging is used, it must have equivalent effective strength and durability. The maximum distance between bridging or between bridging and bearing shall be eight feet.

(8.7.1.3.1). § C26-530.0 Anchoring and Fastening of Wood Beams and Girders.—a. Anchoring of Wood Beams and Girders to Masonry.—Each tier of beams parallel to masonry and beams and girders bearing on masonry shall provide adequate lateral stability by anchorage as required in section C26-416.0.

(8.7.1.3.2). b. Fastening of Wood Beams on Girders.—The ends of wood beams resting upon girders, walls or bearing partitions required to be anchored in accordance with section S26-416.0, except as otherwise provided, shall lap each other at least six inches and be well bolted or spiked together or shall be butted end to end and fastened by approved metal straps, ties, or dogs in the same beams as the wall anchors. The ends of such wood beams framing into girders shall be tied together with approved metal straps or dogs so as to provide continuity in the same beams as the wall anchors.

(8.7.1.3.3). c. Fastening of Wood Girders.—The ends of wood girders shall be fastened to each other by approved straps, ties or dogs.

(8.7.1.4.1). § C26-531.0 Fire Prevention.—a. Trimming Around Flues and Fireplaces.—Wood beams shall be trimmed away from flues and chimneys. The header and trimmer beams shall be at least four inches from the face of chimneys and backs of fireplaces. In front of a fireplace an opening shall be trimmed to support a trimmer arch or approved masonry hearth at least sixteen inches from the face of the breast and at least twelve inches wider than the fireplace opening on each side.

(8.7.1.4.2). b. Separation of Combustible Members in Masonry Walls.—Combustible members entering a masonry wall shall be separated from each other and from the outside of the wall by at least four inches of solid masonry.

(8.7.1.5). § C26-532.0 Wood Columns and Posts.—a. Wood columns and posts shall have level bearings and shall be supported on properly designed metal bases or base plates.

b. Where timber columns are superimposed they shall be squared at the ends perpendicular to their axis and supported on metal caps with brackets or shall be connected by properly designed metal caps, pintles and base plates.

(8.7.1.6). § C26-533.0 Bolting in Wood Construction.—Bolts in wood construction shall be provided with washers and when carrying tensile stress they shall be of such proportions that the compression on the wood at the face of the washer will be less than the working stresses prescribed in section C26-370.0.

(8.7.1.7). § C26-534.0 Stud Bearing Partitions.—a. Stud bearing partitions which rest directly over each other and are not parallel with wood floor beams shall run down between the wood floor beams and rest on the top plate of the partition girder or foundation below.

b. Stud bearing partitions parallel to the floor joists shall be supported on doubled joists, or beams, at least as wide as the studs supported.

(8.7.1.8.1). § C26-535.0 Fire-Stops.—a. Fire-Stopping of Stud Bearing Partitions. —Exterior stud walls and stud bearing partitions shall have the studding filled in solid between the uprights to the depth of all floor beams with suitable incombustible materials.

(8.7.1.8.2). b. Fire-Stopping of Furred Spaces.—Where walls are furred off, or studded off, the space between the inside of the furring or studding and the wall shall be fire-stopped from the ceiling to the under side of the flooring or roof above with incombustible material.

GROUP 2

Frame Structures of Wood

(8.7.2.1) § C26-536.0 Height of Wood Frame Structures.—The maximum height of any frame structure erected after January first, nineteen hundred thirty-eight, or enlarged after January first, nineteen hundred thirty-eight, shall be as provided in article five of this title. It shall be unlawful to use more than two stories for living quarters in two family residence buildings.

(8.7.2.2). § C26-537.0 Area of Wood Frame Structures.—a. The maximum area of any wood frame structure erected after January first, nineteen hundred thirty-eight, or enlarged after January first, nineteen hundred thirty-eight, shall be as provided in article five of this title.

b. Attached wood frame dwellings in rows and semi-detached dwellings housing more than two families shall be separated by unpierced fire partitions.

(8.7.2.3). § C26-538.0 Wood Frame Construction Details.—a. The framework of wood frame structures shall conform to the balloon frame, braced frame, or platform frame types and shall consist of sills, posts, girts, or ribbon strips and plates mutually braced at all angles or by wood sheathing laid diagonally and nailed twice at each bearing. The corner posts shall be at least the equivalent of three two by four inch timbers, and sills shall be at least four by six inches or three by eight inches. Mortise and tenon framing shall be used only with timbers at least four by six inches (nominal). All structural parts of the wood framework shall be built at least twelve inches above the adjoining finished grade.

b. Approved fibre board sheathing at least one-half of an inch in thickness and four feet in width may be used instead of wood sheathing when bearing on four studs and fastened to each bearing with nails spaced six inches or less apart, except that where necessary for fitting around openings and similar purposes, the dimension of each board used for such purpose shall be the maximum possible if such board is less than four feet in width.

c. Gypsum sheathing board, at least one-half of an inch in thickness and two feet in width may be used instead of wood sheathing when set horizontally and fastened to each bearing with one and three-quarter inch (No. 10½ gage) galvanized flat head roofing nails spaced four inches or less apart.

(8.7.2.4). § C26-539.0 Wood Shingle Roofing.—a. It shall be unlawful to use wood shingles on the roof of any structure erected after January first, nineteen hundred thirty-eight, or to replace with wood shingles any roofing of other than wood shingles.

b. It shall be unlawful to replace wood shingle roofing on structures erected before January first, nineteen hundred thirty-eight, with wood shingle roofing, except when:

1. Shingles are placed on a solid roof deck, with rust resistive nails;
2. Shingles are of vertical or edge grain having a thickness of two inches in five shingles, measured at the butt (American lumber standard);
3. The maximum exposure of such wood shingle roofing to the weather is:

(a) for roofs with a pitch of more than thirty degrees from the horizontal:
Five inches for sixteen-inch shingles
Five and one-half inches for eighteen-inch shingles
Seven and one-half inches for twenty-four-inch shingles

(b) for roofs with a pitch between twenty-two and one-half degrees and thirty degrees from the horizontal:
Four inches for sixteen-inch shingles
Four and one-half inches for eighteen-inch shingles
Six and one-half inches for twenty-four-inch shingles

(8.7.2.5). § C26-540.0 Covering of Wood Frame Towers.—All towers on wood frame structures shall be roofed with approved incombustible roofing, except as provided in section C26-539.0.

(8.7.2.6.1). § C26-541.0 Minor Wood Frame Structures.—a. Wood Frame Sheds. —Wood frame sheds, open on at least one side, may be erected of wood or with approved fibre board siding, throughout the city, but such sheds shall be fifteen feet or less in height, shall cover twenty-five hundred square feet or less, shall be placed at least four feet from any lot line, and shall be covered on the sides and roof with approved fire retarding material.

(8.7.2.6.2). b. Wood Frame Outhouses.—Wooden outhouses used exclusively for domestic purposes may be constructed throughout the city to a wall height of eight feet, and may be one hundred fifty square feet in area, provided the roofs are covered with approved fire retarding materials and the walls are located at least three feet from the lot line.

(8.7.2.6.3). c. Wood Frame Builders' Shanties.—One-story structures for the use of builders in connection with any building operation for which a permit has been issued, may be constructed of wood, or may be sheathed with approved fibre board, and placed on the lot where such building operation is carried on in any part of the city, or on adjoining lots if such structures do not interfere with the safe occupancy of any structures thereon, or on the sheds provided over the sidewalks in front of such building operation.

(8.7.2.6.4). d. Wooden Fences.—Wooden fences may be erected throughout the city to a maximum height of ten feet, except as provided in section C26-257.2 of the code.

(8.7.2.7.2). § C26-542.0 Temporary Wood Frame Structures and Tents.—a. Permit Requirements for Temporary Wood Frame Structures and Tents.—It shall be unlawful to erect temporary wood frame structures and tents until a permit, specifying the purpose and the period of maintenance, shall have been obtained from the superintendent.

(8.7.2.7.3). b. Location of Temporary Wood Frame Structures and Tents.—It shall be unlawful to place temporary structures, which are enclosed in any manner, nearer than four feet to any lot line.

(8.7.2.7.4). c. Removal of Temporary Wood Frame Structures and Tents.—Every temporary structure shall be removed at the expiration of the period or periods for which the permit was issued.

(8.7.2.7.5). d. Unlawful Use of Temporary Wood Frame Structures and Tents.— It shall be unlawful to use any temporary structure for any other purpose than that designated in the permit.

(8.7.2.7.6). e. Area of Tents.—No tent shall exceed twenty-five hundred square feet in area.

(8.7.2.8). § C26-543.0 Miscellaneous Wood Frame Structures.—Miscellaneous wood frame structures of an unusual character to which the provisions of this article are not directly applicable, including structures for fair and exhibition purposes, towers for observation, amusement devices, greenhouses and lumber sheds, and temporary structures of any kind, shall be erected in accordance with plans approved by the superintendent.

§ C26-543.1 Steel and Wood Frame Structures.—a. Dining cars or lunch wagons —dining cars or lunch wagons not exceeding fifteen feet in height and 1,200 square feet in area may be constructed of steel frames with wood nailers fastened thereto to permit interior and exterior finishing with wood sheathing. The sheathing on walls and roof to be provided with an incombustible veneer or metal asbestos cement composition sheets or vitreous tile. The flooring shall be of vitreous tile or equal, placed on a one-inch tongue and groove underflooring except behind counters which shall be of tongue and groove hardwood.

All spaces between roof rafters and side-walls to be filled with a two-inch fireproof insulation. The trim around doors and windows may be of wood construction. The minimum thickness of metal in the steel frame-work shall be one-eighth of an inch, provided that the safe loads and unsupported lengths specified elsewhere in this title are not exceeded.

b. Jurisdiction and supervision over said dining cars or lunch wagons shall be under the Department of Housing and Buildings.

c. Permits may be revoked for just causes upon thirty (30) days' notice to the owners.

d. The structure must at all times be kept in a sanitary, safe and attractive condition.

Sub-Article 8. Glass Veneer

(8.8). § C26-544.0 General.—Glass veneer on the exterior of structures may be used only in accordance with the provisions of this title and the rules of the board.

(8.8.1). § C26-545.0 Minimum Thickness.—The minimum thickness of glass veneer shall be eleven-thirty-seconds of an inch, except that where glass veneer extends within four inches or less of the sidewalk level, the minimum thickness of that portion of the veneer below a level of four inches above the sidewalk at its point of intersection with the veneer shall be seven-sixteenths of an inch.

(8.8.2). § C26-546.0 Maximum Area and Dimensions.—a. The maximum area of a single section of glass veneer shall not exceed ten square feet in area when fifteen feet or less above the level of the sidewalk directly below and shall not exceed six square feet in area when more than fifteen feet above the level of the sidewalk directly below.

b. The maximum length of any section of glass veneer shall be sixty inches.

(8.8.3). § C26-547.0 Edges.—All edges of each plate of glass veneer shall be ground square. It shall be unlawful to use mitred joints.

(8.8.4). § C26-548.0 Backing for Glass Veneer.—Glass veneer may be placed only against substantial, rigid, incombustible surfaces of true plane, plumb and straight. The backing shall in any case provide rigidity and stability equal to or greater than that provided by one-inch thick cement mortar on wire lath secured to studs spaced twelve inches or less on centers. It shall be unlawful to use wood backing surfaces, regardless of whether they are fire-proofed.

(8.8.5). § C26-549.0 Setting of Glass Veneer.—a. Glass veneer shall be set only when the backing is thoroughly dry and after the application of a thorough and uniform bond coat of material approved by the board. The bond coat shall be such as to effectively seal the portions of the veneer backing and to insure against the absorption of the vital properties of the mastic cement.

b. Mastic cement approved by the board shall be applied to the back surface of each plate of the glass veneer, which veneer shall be applied to the backing with a substantial and uniform pressure over its entire area sufficient to flatten out the gobs of mastic cement to a thickness of between one-quarter of an inch and five-eighths of an inch. Sufficient mastic cement shall be applied to insure that at least sixty per cent of the total area of the section is bonded to the backing.

c. The bond coat and the mastic cement shall be of one manufacture and shall be certified to be of such composition as to insure close affinity between the two materials.

d. Abutting edges of glass veneer shall be ground square and uniformly buttered with an approved pointing compound.

e. Where glass veneer extends to the sidewalk surface each such section shall rest on two cushions of approved resilient material, one near the end of each such section or plate. Cushions shall be one-quarter of an inch or more in thickness. The joint between the bottom edge of the glass section and the top of the sidewalk shall be caulked with a waterproof compound.

f. Where the glass veneer is permitted to extend below the level of the sidewalk surface, an expansion joint of one-quarter of an inch of more shall be provided between the outer face of the glass veneer and the edge of the sidewalk. Such expansion joint space shall be filled with a resilient caulking compound from the level of the sidewalk surface to a depth at least three-quarters of an inch below such level.

g. Where glass veneer is applied at an elevation more than eight feet above the sidewalk surface, the mastic cement binding shall be supplemented by the use of metal clip angles of a design approved by the board. Clips shall be located in each vertical or horizontal edge of each section of veneer and shall be secured through the backing directly into the wall behind by means of expansion bolts and in a manner satisfactory to the superintendent. Angle clips shall be two inches or more in length and shall be of at least No. 16 U. S. gage, and shall be so designed as to furnish at least two-inch bearing support on each clip and shall hold the glass in a vertical plane independently of the mastic cement.

h. All horizontal joints shall be cushioned with pads of adhesive asphaltic tape which shall extend from the rear surface of the glass to one-eighth of an inch or less from the front surface. Horizontal joints shall be buttered with joint cement over the full depth of the joint, including the surface of the cushion tape.

i. Shelf angles of approved design shall be set at vertical intervals of three feet or less, in all horizontal joints located eight feet or less above the sidewalk, except that, where there are show windows, it shall be unnecessary to have shelf angles below the level of the tops of the show window bulkheads. Shelf angles shall be of a type approved by the board and shall be secured to the backing in a manner satisfactory to the superintendent.

j. Where glass veneer is confined between non-resilient materials at ends, expansion shall be provided for by means of an expansion joint at each end of one-quarter of an inch or more throughout the entire height of the veneer.

(8.8.6). § C26-550.0 Flashing.—Upon the completion of glass veneer installation, exposed edges shall be flashed with non-corrodible sheet metal and caulked with a waterproof compound. Flashing and waterproof compounds and their application shall be as prescribed by the superintendent.

§ C26-550.1. Glass Blocks.—a. Glass blocks may be used in the construction of

exterior walls and interior walls and in partitions of structures in accordance with the provisions of this title and the rules of the board.

b. The term "glass blocks" as used in this title shall mean glass units partially evacuated, consisting of two halves made of pressed glass effectively sealed in manufacture. These units shall have a minimum thickness of 3¾ inches and a maximum dimension of 11¾ inches. The blocks may have various face patterns and special shapes may be used for such purposes as corners, trims and curves not to exceed the dimensions noted herein.

The mortar face of glass blocks shall be treated so as to insure an effective bond with the mortar.

c. Permitted uses of glass blocks: Glass block construction may be used in exterior wall openings, which openings could otherwise be filled with windows, either isolated or in continuous bands. Glass block construction shall not be deemed an integral part of a wall or partition nor shall it bear any load other than its own weight. No isolated panel nor portion of continuous band of glass block construction shall exceed 20 feet in height nor 25 feet in length without adequate intermediate supports and expansion joints. No such panel nor portion of continuous band shall exceed 144 square feet in area.

Glass block construction may be used for non-bearing interior partitions which are not required to have a prescribed fire resistive rating, provided that the maximum area of any individual panel does not exceed 250 square feet except that where fire resistive ratings have been satisfactorily established in accordance with provisions of the administrative code such legally established ratings will be recognized by the department.

d. Fire department access panels: Above the first story or ground floor in every story of a building, fire department access panels shall be provided in every frontage, spaced not more than 50 feet apart on centers horizontally. Each such panel shall consist either of a fixed sash with a single sheet of at glass at least 32 inches wide and 48 inches high set in metal frame, or a movable metal sash at least 32 inches wide and 48 inches high and openable either from exterior or interior. Wherever practicable one such panel in each story shall give access to a stairway or, where there is no stairway at the front exterior wall, one such panel in each story shall provide access as close as practicable to a stairway.

e. Glass blocks shall be laid up in mortar of the following proportions by volume; one part portland cement, one part hydrated lime or lime putty, four to six parts of clean well graded sand.

Mortar shall be mixed as nearly dry as is consistent with good workmanship. Neither anti-freeze agents nor accelerators shall be used in mortar.

f. Wall ties: Wall ties are to be installed in horizontal mortar joints as follows: In the first four stories in height, but in no case more than the first 52 feet in height:

Block sizes—Maximum, 6 inches by 6 inches in every fourth course.

Block sizes—Maximum 8 inches by 5 inches in every fourth course.

Block sizes—More than 6 inches by 6 inches or 8 inches by 5 inches and not more than 8 inches by 8 inches in every third course.

Block sizes—more than 8 inches by 8 inches and not more than 12 inches by 12 inches in every course.

In buildings not over nine stories in height, in the fourth and succeeding stories and in all cases above a height of 52 feet, ties shall be provided in every second course except in the cases of blocks exceeding a face size of 8 inches by 8 inches, where ties shall be provided in every course. Where glass blocks are used above the ninth story in any exterior wall opening panel exceeding 60 square feet in area, wall ties shall be used in every course regardless of the size of the blocks used.

Ties shall be either flat expanded metal mesh, 20 gauge in thickness, galvanized after forming 2⅜ inches wide, or, galvanized steel wire mesh of two parallel longitudinal wires number 16 gauge or larger, spaced 2 inches apart and having welded thereto number 16 or heavier gauge cross wires at intervals not exceeding 8 inches. All ties shall run continuously with ends lapping at least 6 inches.

g. All glass block panels shall be held in place in the wall openings at both jambs, so as to resist the reaction resulting from a wind pressure of 20 pounds per square foot of panel. Resistance shall provide for both internal and external pressure.

h. All glass block panels shall be provided with expansion joints at the sides and top. Expansion joints shall be entirely free of mortar, and shall be filled with resilient material such as premoulded strips of fibrous glass covered with asphalted paper, or resilent cork, loose oakum, mineral wool or other material approved by the board.

Both sides of each expansion joint shall be lined with tightly packed oakum or similar material and pointed with non-hardening caulking material. The depth of caulking shall be not less than ½ inch.

i. The sills of glass block panels, previous to the laying of the first mortar course, shall be coated with approved asphalt emulsion.

j. Veneer or ashlar: Glass blocks may be used as exterior wall veneer under rules of the board.

k. Fire resistive ratings: Nothing herein contained shall be construed as limiting the use of glass block construction as fire resistive construction where a prescribed fire resistive rating is required, provided such construction after prescribed tests is approved by the board as an opening protective assembly or partition of specified fire resistive rating.

(8.8.7). § C26-550.2. Glass Facing.—a. Where glass is used for facing the exterior walls of a structure, and the glass is supported independently on metal framing carried on the structural supports, the glass facing shall conform to the following requirements:

1. Glass shall be firmly held in a metal frame continuously on all edges.

2. Frame and structural supports shall be adequate to resist a pressure of 30 pounds per square foot applied on either side of the glass surface, without exceeding the stress limitations provided in Article 8 of this title for the materials specified. If other materials are used, the stresses shall not exceed the limitations used in accepted engineering practice.

3. The space between the glass facing and the spandrel construction shall be fire stopped at each story with concrete, metal or other incombustible material secured in place.

4. Glass conforming in area and thickness to the limitations set forth in the following table 1, shall be assumed adequate to withstand a wind pressure of 30 pounds per square foot from either direction:

Table 1

Nominal glass thickness.....	SS	1/8"	3/16"	1/4"	5/16"	11/32"	3/8"	or thicker
Maximum area allowed in square feet	5.8	12	27	48	75	90	108	

Note—SS means single strength.

ARTICLE 10. PRECAUTIONS DURING BUILDING OPERATIONS

Sub-Article 1. Storage of Materials

(9.1.1). § C26-551.0 Loading of Structures During Construction or Demolition.—It shall be unlawful to load or cause to be loaded any structure, or any temporary support or scaffolding or any sidewalk or sidewalk shed or bridge or any device or equipment, during construction or demolition, in excess of its safe carrying capacity.

Sub-Article 2. Protection of the Public and Workmen

(9.2.1). § C26-552.0 Enforcement of Measures for Protection of the Public and Workmen.—a. The superintendent shall notify the owner of the structure affected of any failure to comply with any provisions of sections C26-551.0 through C26-560.0. Unless the owner so notified proceeds within twenty-four hours to comply with the orders of the superintendent, the superintendent shall have full power to correct the violation. All expenses incurred therefor shall become a lien on the property which may be enforced as provided in section C26-204.0.

b. The superintendent shall also notify the owner of the structure affected of any failure to comply with any provisions of the labor law and industrial code which affect the safety of persons during the construction or demolition of structures as defined in this title. Unless the owner so notified proceeds within twenty-four hours to comply with the orders of the superintendent, the superintendent shall have full power to correct the violation. All expenses incurred therefor shall become a lien on the property which may be enforced as provided in section C26-204.0. This power of the superintendent to enforce shall be in addition to the powers conferred upon him by other provisions of law.

(9.2.2). § C26-553.0 Responsibility of Employees and Other Persons for Protection of the Public and Workmen.—a. It shall be unlawful to remove or render inoperative any safeguard or sanitary convenience now provided, except where necessary during the actual installation of work or for the purpose of immediately repairing or adjusting such safeguards or conveniences, in which case they shall be immediately replaced. Every person shall be responsible for carrying out all rules which immediately concern or affect his conduct and shall use safety devices furnished for his protection.

b. When a structure which has connections with a sewer is demolished, all sewer connections shall be sealed off in a manner satisfactory to the borough president.

(9.2.3). § C26-554.0 Guarding Machinery.—All dangerous moving parts of machines shall, where practicable, be adequately guarded.

(9.2.4). § C26-555.0 Construction and Maintenance of Equipment and Safeguards.—All devices or equipment which are used in connection with the performance of work and regulated by this article, shall be constructed, installed and maintained in a substantial manner and so operated as to give proper protection to persons and shall not be removed, altered, weakened, or rendered inoperative so long as they are needed or in use, except as provided in section C26-553.0, unless so ordered by a person in responsible charge of the operation.

§ C26-555.1 Protection of Floor Openings.—All floor openings within a building in the course of construction shall be enclosed or fenced in on all sides by a barrier of suitable height, except on those sides which may be used for the handling of materials hoisted through such openings, or at which stairs or ladders land; provided, that such sides, other than landings, shall be guarded by an adjustable barrier not less than three nor more than four feet from the floor and not less than two feet from the edge of such opening.

§ C26-555.2 Escape Hatches Required.—a. Where salamanders or other heating equipment are used to provide temporary heating during the placing of concrete for a floor, an escape hatch shall be provided from the floor where the concrete is being placed, which shall extend through at least one story immediately below such floor. The escape hatch shall be located as near to the center of the building as practical.

b. The escape hatch shall be constructed with at least two ladders enclosed in a metal shield. The ladders shall extend from a distance of 3 feet above the floor under construction to at least two stories below unless such floor is less than two stories above the lowest floor. The metal shield shall enclose the ladders on all sides from the top of the floor where the concrete is being placed to at least the top of the floor next below.

c. The inside dimensions between faces of the shield shall be not less than 3 feet 8 inches.

d. The space between the shield and the perimeter of the opening in the floor under construction and also between the shield and the perimenter of the opening in the floor next below, shall be decked over with two-inch or heavier planking covered with plywood or sheet metal so as to make the decking smoke tight. At the termination of the ladders two floors below the floor under construction, the opening in the floor shall be covered completely with two-inch planking or other material of equivalent strength.

e. At least one fire extinguisher of a two gallon capacity shall be provided at the floor where salamanders or other heating equipment are used. The extinguishers shall be readily accessible.

(9.2.5). § C26-556.0 Sizes and Stresses of Materials Used for Protection of the Public and Workmen.—a. The sizes mentioned in this article are minimum requirements, except that lumber sizes are nominal or commercial sizes before dressing. Where wood is specified in this article, members of iron, steel or other material of equivalent strength, rigidity and suitability may be substituted.

b. Where sizes are not specifically mentioned in this article, the equipment and safeguards when of a temporary nature and not subjected to serious shock may be designed using such stresses as may be approved by the superintendent, but at most thirty-three percent above the stresses provided in this title for similar material when used in permanent structures.

c. Sizes governing ladders and scaffolding shall be as specified in the industrial code rules relating to the erection, repair or demolition of buildings.

(9.2.6). § C26-557.0 Protections for Sidewalks.—Whenever a structure is to be constructed to exceed forty feet in height above the curb or whenever a structure more than twenty-five feet in height above the lowest point of the curb, is to be demolished, unless the street is officially closed during the construction or demolition, the owner shall erect and maintain safeguards during the period, as defined below, of such work as follows:

(9.2.6.1). 1. Sidewalk Sheds Required.—

(a) If the structure is to be erected to a height exceeding forty feet above the curb, or if the structure to be demolished is more than twenty-five feet in height above the curb, then if the horizontal distance from the structure to the inside edge of the sidewalk, or to the inside edge of a temporary sidewalk erected by permission of the local authority having jurisdiction, is equal to one-half or less of the height of the structure, a substantial sidewalk shed shall be constructed over the sidewalk or temporary sidewalk in front of the structure.

(b) Regardless of the horizontal distance from the structure to sidewalk or temporary sidewalk, sidewalk sheds of adequate dimensions shall be erected when building materials are being moved over the sidewalk by means of derrick, hoist or chute. The extent of such sidewalk sheds shall be as required by the superintendent.

(9.2.6.1.1). 2. Design of Sidewalk Sheds.—

(a) Sidewalk sheds, where required, shall extend the entire length of the sidewalk in front of the structure, except that where construction work or demolition work on a structure erected before January first, nineteen hundred thirty-eight, involves only a portion of the structure, the superintendent shall prescribe the extent of sidewalk shed protection required.

(b) Such sidewalk shed shall be capable of sustaining safely a minimum live load of one hundred fifty pounds per square foot, but if such sidewalk shed is used for overhead storage of material, it shall be capable of sustaining safely a minimum live load of three hundred pounds per square foot. The members of the sidewalk shed shall be so connected, and such adequate bracing, shall be provided as may be necessary to resist the displacement of members or the distortion of the framework. The deck of the shed shall be built tight and of ample width, and where deemed necessary by the superintendent, shall extend over the entire width of the sidewalk, except for clearances of two feet from the building line and one foot from the curb. Such shed may extend beyond the curb to such extent as may, on the recommendation of the superintendent, be approved by the local authority having jurisdiction. If posts supporting the deck of the shed are placed beyond the curb, such posts shall be protected from displacement.

(9.2.6.1.2). 3. Protection of Ends and Sides of Sidewalk Sheds.—

(a) The outer side and ends of the deck of the shed shall be provided with substantial railings and toe boards, except that, in connection with the demolition of a structure originally more than twenty-five feet in height, or in connection with the erection of a structure which is to exceed seventy-five feet in height, the outer side and ends of the deck of the shed shall be provided with a substantial vertical enclosure, at least forty-two inches high, of boards, laid close, or of galvanized wire screen at least No. 16 steel wire gage, and of a mesh which will reject a ball five-eighths of an inch in diameter. Temporary openings shall be permitted in the railing or enclosure for handling material.

(b) With the consent of the owners of the adjoining property, the deck and protective guards of the sidewalk shed shall be extended parallel with the curb at least five feet beyond the ends of the face of the structure, or a protection the full width of the shed extending upward at an angle of forty-five degrees from the ends of the deck and outward a horizontal distance of at least five feet beyond the ends of the face of the structure. Such sloping protection shall be constructed with substantial outriggers, bearing on and securely attached to the deck of the shed. The decking of this latter protection shall be of closely laid boards or galvanized wire screen of at least No. 16 steel wire gage and with a mesh which will reject a five-eighths-inch ball. When such sloping end protection is installed, it shall take the place of the railing or enclosure required at the ends of the shed deck.

(9.2.6.1.3). 4. Pedestrian Passageways under Sidewalk Sheds.—Adequate passageways on the sidewalk shall be provided for pedestrians. Unless the top deck of the sidewalk shed is built solidly against the face of the structure in such a manner that no material can fall on the sidewalk, the side of the sidewalk shed toward the structure shall be sealed in a substantial manner with wood or other suitable material to a minimum height of eight feet above the sidewalk, except for such sliding gates, or gates swinging inward, as may be necessary for the proper prosecution of the work.

(9.2.6.1.4). 5. When Sidewalk Sheds Are to be Erected.—

(a) When a sidewalk shed is required in connection with the erection of a structure, the construction of the structure shall stop at forty feet above the curb, unless and until such sidewalk shed has been completed. Such shed shall remain in place until the structure is enclosed, sash is glazed above the second story, masonry is cleaned down and all outside handling of material above the second story is completed.

(b) When a sidewalk shed is required in connection with the demolition of a structure, such sidewalk shed shall be completed before performing any work of demolition.

(9.2.6.1.5). 6. Lighting of Sidewalk Sheds.—The under side of the sidewalk shed shall have sufficient natural or artificial light to insure safety, which light shall be maintained at all times.

(9.2.6.2). 7. Fences Permitted in Lieu of Sidewalk Sheds.—If the structure to be demolished is more than twenty-five feet high above the curb, or if the structure is to be erected to a height exceeding forty feet above the curb, and if the horizontal distance from the structure to the inside edge of the sidewalk or relocated temporary sidewalk is between one-half and three-quarters of the height of the structure, a shed shall be constructed over the sidewalk as described above, or, in place of such shed, a substantial fence shall be constructed along the inside edge of such sidewalk or

relocated temporary sidewalk or along the inside edge of the roadway, if permission to close the sidewalk has been granted by the superintendent. Such fence may be constructed outside of the curb to such extent as may on the recommendation of the superintendent, be approved by the borough president, but in any event, such fence at its ends shall be returned to within two feet of the building line. Such fence shall be at least six feet high of wood or other suitable material and shall be built solid for its entire length, except for such openings provided with sliding gates, or gates swinging inward, as may be necessary for the proper prosecution of the work.

(9.2.6.3). 8. Railings Permitted in Lieu of Sidewalk Sheds or Fences.—

(a) If the structure to be demolished is more than twenty-five feet high above the curb, or if the structure is to be erected to a height exceeding forty feet above the curb, and if the horizontal distance from the structure to the inside edge of the sidewalk or relocated temporary sidewalk is three-quarters of the height of the structure or more, a shed or fence shall be constructed as described above, or in place of such shed or fence, a substantial railing shall be constructed along the inside edge of such sidewalk or relocated temporary sidewalk, or along the inside edge of the roadway, if permission has been granted to close the sidewalk. Such railing at its ends shall be returned to within two feet of the building line and shall be continuous for its entire length, except for such openings, provided with movable bars as may be necessary for the proper prosecution of the work.

(b) At the discretion of the superintendent, thrustout platforms or other suitable protections may be substituted for sidewalk sheds, fences and railings during alterations or under other conditions which in his judgment permit of such substitution. It shall be unlawful to use such thrustout platforms or other protections for the storage of material.

(9.2.7). § C26-558.0 Foot Bridges.—When a foot bridge is used to support the temporary sidewalk in front of a structure during construction or demolition, it shall be substantially built to sustain safely a minimum live load of one hundred fifty pounds per square foot. Such foot bridge shall be provided with hand-rails on both sides and shall be provided at both ends with substantial steps with hand-rails or with inclined ramps with hand-rails and with cleats to prevent slipping.

(9.2.8). § C26-559.0 Catch Platforms.—a. During the demolition of the exterior walls of a structure, originally more than seventy feet in height, catch platforms shall be erected along the street fronts and over public passageways. Such catch platforms shall be erected and maintained not more than three stories below the story from which the exterior walls are being removed until such demolition has progressed to within three stories of the ground level. They shall be constructed of planking laid close without openings between the planks or between the plank and the wall. The outside edge of the platforms shall be at least five feet horizontally from the wall of the structure and shall be higher than the inside edge. The supports shall consist of yellow pine or spruce outriggers three inches by twelve inches, placed on edge, and secured against turning, spaced not more than ten feet apart. Each outrigger shall have ample bearing on the structure and the inside end shall be adequately secured. The planking shall be at least two inches thick. Plank shall lap the supports at least one foot at each end or shall be secured to the supports to prevent displacement.

b. A fence of galvanized wire netting of at least No. 18 steel wire gage and with mesh which will reject a ball five-eighths of an inch in diameter or of one-inch boards laid close shall be provided along the outer edge and ends of the catch platform. Such fence shall be supported by substantial posts not more than ten feet apart, shall be pitched outward at an angle of approximately forty-five degrees from the horizontal and shall be at least forty-six inches high, measured along the slope of the fence, above the planking of the catch platform with which the fencing shall make a tight connection.

c. Catch platforms may be constructed of other materials and following other designs, if they provide strength and security from falling material equal to that provided by the details specified above, and are approved by the superintendent.

d. It shall be unlawful to use catch platforms for the storage of materials.

(9.2.9). § C26-560.0 Riding on Hoisting Apparatus Prohibited.—It shall be unlawful for any person to ride on any platform hoist or on any elevator car which is not equipped and operated as required for carrying passengers or for any person to ride on any concrete bucket, derrick, or other hoisting apparatus, or on loads.

§ C26-560.1 Sidewalk Sheds; Fences; Railings, etc.— It shall be unlawful to construct any sidewalk shed, fence, railing, footbridge, catch platform, builder's sidewalk shanty or an over the sidewalk chute without a permit therefor. The fee for such permit shall be ten dollars except that in the case of a sidewalk shed, such fee shall be ten dollars for the first twenty-five feet or fraction thereof in the length of such shed plus two dollars for each additional twenty-five feet or fraction thereof.

Sub-Article 4. Protection of Adjoining Property

(9.4.1). § C26-561.0 Protection of Skylights, Roofs and Roof Outlets.—a. When any structure is to be carried above the roof of an adjoining structure, proper means for the protection of the skylights, roofs and roof outlets of such adjoining building shall be provided, at his own expense, by the person constructing or causing such structure to be erected, provided he is granted the necessary license to enter the adjoining premises for that purpose.

b. The owner and tenants of adjoining premises shall allow the person causing a structure to be erected adjacent to a property line to place protections, hanging scaffolds and other usual equipment suspended over the adjoining premises provided every reasonable care is exercised to avoid interference with the use of the adjoining premises.

c. An owner of adjoining premises who shall fail to afford any license to enter thereon referred to in section C26-387.0 and this section shall cease to be entitled to any of the benefits otherwise accruing to him under any of the provisions of sections C26-383.0 through C26-390.0, and sections C26-561.0 through C26-570.0.

(9.4.2). § C26-562.0 Regulation of Lots.—The regulation of lots, in conformity with the street on which they are situated, shall be calculated at curb level. Where a lot has more than one street frontage, and is so situated that the street frontages intersect, the curb of the longest street frontage shall be used. When the street frontages do not intersect, the curb along each frontage shall be used to one-half the depth of the lot between street frontages. A lot, as referred to in this section, shall mean a parcel of land twenty-five feet by one hundred feet, or less, in one ownership whether adjacent land be in the same or other ownership; but, for this purpose, no land in the same ownership may be divided into lots smaller than twenty-five feet by one hundred feet.

(9.4.3.1). § C26-563.0 Retaining Walls.—a. Retaining Walls to Conform to Street Regulation.—When the regulation of a lot, in conformity with section C26-562.0, requires the ground on such lot to be raised or lowered and kept higher than the ground of an adjoining lot, provided the ground of such adjoining lot is not maintained at a grade lower than in conformity with the street or streets on which it is situated, any necessary retaining wall shall be made and maintained jointly by the owners of the land on each side and shall stand one-half upon the land of each owner, unless otherwise agreed to by both owners.

(9.4.3.2). b. Retaining Walls to Support Adjoining Earth.—Where an excavation has been made or a fill placed on any lot within the legal grade required by section C26-562.0, and the adjoining land is maintained at a grade in conformity with or lower than the street or streets on which it is situated and is without permanent structures other than frame sheds or similar structures, any retaining wall which shall be necessary to support the adjoining earth shall stand equally upon the lot of each owner and shall be made and maintained jointly by the owners of the land on each side, unless otherwise agreed to by both owners.

(9.4.3.3). c. Surplus Retaining Wall.—Where any owner shall insist on maintaining his ground either higher or lower than the legal regulation as provided in section C26-562.0, the surplus retaining wall, which may be necessary to support such height or provide for such excavation, shall be made and maintained at the sole expense of such owner, and such additional thickness as may be required shall be built on the land of such owner.

(9.4.3.4). d. Construction of Retaining Walls.—All retaining walls required under this section shall be constructed in accordance with the requirements of sections C26-412.0 through C26-467.0, or sections C26-1455.0 through C26-1555.0, and shall be provided with a substantial fence or guard rail at least four feet high, on the top thereof.

(9.4.3.5). e. Removal of Retaining Walls.—Any retaining wall erected or provided under section C26-384.0, or sections C26-561.0 through C26-570.0, standing partly on the land of each owner, may be removed by either owner when the necessity for such retaining wall ceases to exist.

(9.4.4). § C26-564.0 Maintenance and Repair of Partition Fences and Retaining Walls.—a. Partition fences, unless erected under special agreements, shall be so built that the dividing line between the properties shall run through the center of the fence and such fences shall be built and maintained at the joint expense of the owners of the land on each side.

b. If any person whose duty it is jointly to maintain or repair any partition fence, or retaining wall according to section C26-563.0, shall neglect to do so, or to join in doing so within six days after a written request has been made by the owner of the adjoining ground, the owner of such adjoining ground may make the necessary repairs and may recover from such person a proportionate share of the cost of the repairs, with costs, in any court having jurisdiction, except that where the replacement of a partition fence removed by one owner is necessary for safety, the person removing the fence shall replace it at his own cost.

(9.4.5). § C26-565.0 Disputes.—In case of any dispute between parties as to what part of the expense shall be borne by either of them, for building or maintaining any partition fence or wall, and in all cases of dispute concerning the sufficiency of any fence or wall, the dispute shall be settled by a board of survey similar to that provided for in sections C26-193.0 through C26-201.0.

(9.4.6). § C26-566.0 Wall Openings.—It shall be unlawful to construct wall openings in a lot line wall within twelve feet vertically of the top of any chimney or flue, carrying combustion products, on an adjoining existing structure unless such openings, located on the lot line, are distant at least ten feet in a horizontal direction from the top of such chimney or flue. Fixed fire window assemblies having a fire resistive rating of three-quarters of an hour shall not be considered wall openings within the meaning of this section.

(9.4.7). § C26-567.0 Cellar Drainage.—During the course of construction of the foundation walls of any structure, provisions shall be made to prevent the accumulation of water in the excavation or cellar to the injury of the foundation or adjoining property.

(9.4.8.1). § C26-568.0 Protection of Party Walls During Demolition.—a. Party Walls.—When a structure containing a party wall is being demolished, the owner of the demolished structure shall, at his own expense, bend over the anchors at the beam ends in the standing wall and shall brick in all open beam holes.

(9.4.8.2). b. Party Wall Fire Escape Balconies.—No party wall balcony fire exit shall be demolished or removed when such demolition or removal will destroy the full effectiveness of such party wall balconies as means of egress, unless and until the owner of the structure from which the party wall balcony is to be removed has erected or legally obligates himself to erect on the structure to be deprived of a required means of egress, a legal fire escape meeting the requirements of the superintendent.

(9.4.9). § C26-569.0 Enforcement of Provisions for Protection of Adjoining Property.—The superintendent, in order further to effectuate the purposes of sections C26-383.0 and C26-390.0, and sections C26-561.0 through C26-570.0, shall if requested by the person aggrieved or otherwise, notify in writing any owner or tenant of any requirements under any provision of sections C26-383.0 and C26-390.0, and sections C26-561.0 through C26-570.0. If any person, whose duty it is under sections C26-383.0 and C26-390.0, and sections C26-561.0 through C26-570.0, to protect his own or adjoining property, fails to proceed within three days in accordance with such notice and to comply therewith within such reasonable time thereafter as may be allowed by the superintendent, the superintendent may cause the work to be done and the cost of doing such work shall become a lien against the property recoverable in any court having jurisdiction.

(9.4.10—11.3.13). § C26-570.0 Protection of Chimney Draft and Exterior of Soil and Vent Stacks.—a. Whenever any wall or structure is constructed within ten feet of any stack, chimney or flue of any adjoining structure, and whenever such wall or structure is greater in height than such adjoining structure, the owner of such wall or structure shall either:

1. Carry up such stacks, chimneys or flues, either independently or within his own structure, to a height above the level of the roof parapet wall of such higher structure; or

2. Equip such stacks, chimneys or flues with such simple mechanical devices as will ensure up-draft and prevent down-draft. Such devices need only provide such draft as can reasonably be expected, considering the design, construction and physical condition of such stacks, chimneys or flues; except that whenever the higher structure is within three feet of the property line, and extends above the top of such stacks, chimneys or flues, such draft shall be as effective as the draft existing prior to the erection of the higher structure.

b. The superintendent may waive the provisions of this section when he believes such equipment to be unnecessary. The superintendent shall waive such provisions when a written release, from the owner of such stacks, chimneys or flues to the owner of such higher structure, is filed with him.

c. Devices used to equip stacks, chimneys or flues, as required in this section shall be of such types as are approved by the board and are prescribed in specific cases by the superintendent. All construction done pursuant to this section shall be approved by the superintendent.

d. At least ten days before any work is done pursuant to this section, the owner of the higher wall or structure shall notify the owner of the stacks, chimneys or flues of his intention to do such work.

e. Whenever a structure is of a height greater than that of any adjoining structure, the owner of the structure of greater height may, with the consent of the owner of the structure of lesser height, extend to a level above the parapet of the higher roof, any or all soil, waste and vent stacks above the lower roof and within twenty feet of the common lot line.

ARTICLE 11. FIRE RESISTIVE CONSTRUCTION

Sub-Article 1. Fire Resistive Materials

GROUP 1

Classification and Use of Fire Resistive Materials

(10.1.1). § C26-571.0 Classification and Use of Fire Resistive Materials.—a. Fire resistive materials shall be classified on a time and temperature basis and used in accordance with the requirements of this title and the rules of the board.

b. The requirements of this article are intended to provide adequate protection against fire and do not limit any requirements of other sections of this title providing for stronger construction in order to provide safe load carrying capacity.

GROUP 2

Fire Resistive Construction Details

(10.1.2). § C26-572.0 General.—a. Fire resistive units of burnt clay or shale, sand-lime, concrete or gypsum shall be laid up in cement mortar, cement-lime mortar or gypsum mortar for gypsum units.

b. Units shall be solidly bedded, and shall be thoroughly bonded by broken joints in alternate courses, or by approved metal ties.

c. Structures of reinforced concrete meeting the requirements of sections C26-1455.0 through C26-1564.0, in respect to the reinforced concrete and of section C-26-239.0, in respect to other parts shall be considered as Class 1, fireproof structures.

d. Poured in place concrete or gypsum fire resistive materials shall be reinforced for protective purposes with a sufficient amount of metal bars or mesh to insure the integrity of the construction.

e. Plaster used in fire resistive construction shall consist of gypsum or cement mortar, or other equally fire resistive material.

(10.1.2.1). § C26-573.0 Spaces Exterior to Structures.—a. Any space within the grade story in a structure may be considered as outside the structure provided such space is cut off from the structure on all sides adjacent thereto by walls having a fire resistive rating of at least four hours, and access to such space is from the outside only.

b. Any area of a grade story of a structure without exterior walls and cut off from the remainder of the structure by partitions or walls having a fire resistive rating of at least four hours may be considered as outside of the structure.

c. These provisions do not permit the erection of any structure in a manner inconsistent with the provisions of article four of this title.

GROUP 3

Tests for Fire Resistive Materials

(10.1.3). § C26-574.0 Tests for Fire Resistive Materials.—Other materials, appliances or methods of construction for fire resistive purposes not specifically provided for in this title shall, on written application to the superintendent, be tested in accordance with the rules of the board and if found to comply with the requirements of this title, they shall be approved by the superintendent.

GROUP 4

Thicknesses and Fire Resistive Ratings for Protection of Structural Steel

(10.1.4). § C26-575.0 General.—Unless otherwise determined by test in accordance with the rules of the board, the thicknesses of fire resistive materials in the following table, exclusive of air spaces when used for the protection of structural steel members, shall be assumed to have the following fire resistive ratings. It shall be unlawful to reduce such thicknesses for the embedment of pipes, conduits, or wires, or for any other purpose.

Inches of:	1 hour	2 hours	3 hours	4 hours
Brick (burned clay or shale)	2¼	2¼	3¼	3¾
Brick (sand lime)	2¼	2¼	3¼	3¾
Concrete brick, block or tile, except cinder concrete units	2¼	2¼	3¼	3¾
Hollow or solid cinder concrete block and tile having a compressive strength of at least seven hundreds pounds per square inch of gross area	1½	2	2	2½
Solid gypsum block, provided that to obtain the four-hour rating such blocks shall be plastered with at least one-half inch of gypsum plaster	1	1½	2	2
Gypsum poured in place and reinforced	1	1½	1½	2
Hollow or solid burned clay tile or combinations of tile and concrete	1½	2	2	2½
Metal lath and gypsum plaster	⅞	1½	2	2½
Cement concrete, Grade I	1	1½	2	2
Cement concrete, Grade II	1½	2	3	4
Cement concrete, Grade II, with wire mesh	1½	2	2	3
Hollow gypsum block, provided that to obtain the four-hour rating such blocks shall be plastered with at least one-half inch of gypsum plaster on outer side	3	3	3	3
Metal lath and Vermiculite-gypsum plaster provided that to obtain a four-hour rating for columns a backfill of loose Vermiculite shall be employed. For the 3 and 2-hour ratings for floors, the thickness may be ¾". Note: Thickness shown includes finish coat of plaster	¾	⅞	1	1

(10.1.4.1). § C26-576.0 Anchors, Bonds and Ties.—a. Metal anchors, bonds or caging shall be used with solid gypsum block and cement concrete. For gypsum block protections for all periods, and for other block or tile protections for periods of over two hours, metal anchors in the horizontal joints shall be used.

b. Hollow gypsum shall be anchored with "U" straps placed between the blocks and running into the hollow spaces. For Grade I or Grade II concrete, or poured gypsum, the tie shall consist of wire mesh complying with section C26-578.0, or the equivalent in metal ties or spirally wound wire.

(10.1.4.2). § C26-577.0 Plaster Equivalents.—One-half of an inch of unsanded gypsum plaster shall be equivalent to three-quarters of an inch of sanded gypsum or cement plaster. Plaster protections more than one inch in thickness shall have an additional layer of metal lath imbedded three-quarters of an inch or less from the outer surface and securely tied to the protected member. The thickness of the plaster shall be the minimum thickness of plaster measured from the face of the lath or of the masonry.

(10.1.4.3). § C26-578.0 Wire Mesh.—Wire mesh for tying concrete protections shall weigh at least one and one-half pounds per square yard and shall be of a type approved by the board.

GROUP 5

Fire Tests

(10.1.5.1). § C26-579.0 Time-Temperature Curve.—The conduct of all fire tests of materials and construction shall be controlled by the standard time-temperature curve shown in figure 1. The points on the curve which determine its character are:

1,000° F. ..... at 5 minutes
1,300° F. ..... at 10 minutes
1,550° F. ..... at 30 minutes
1,700° F. ..... at 1 hour
1,850° F. ..... at 2 hours
2,000° F. ..... at 4 hours
2,300° F. ..... at 8 hours

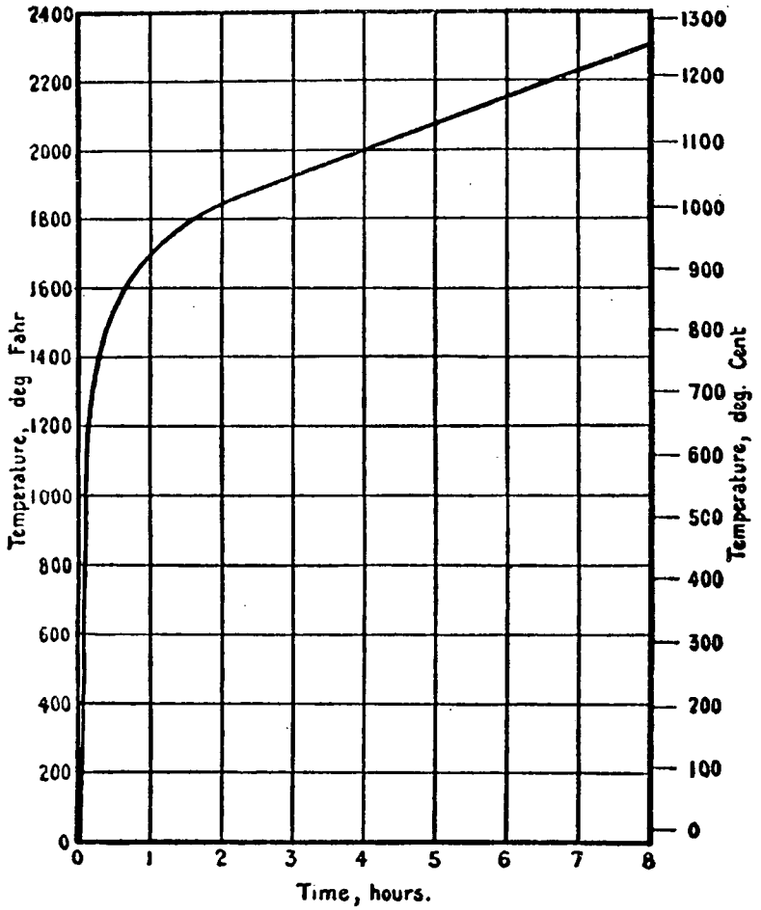


FIG. 1.—Time Temperature Curve.

(10.1.5.2.). § C26-580.0 Determination of Furnace Temperatures.—a. The temperature fixed by the curve shown in figure 1 of section C26-579.0, shall be deemed to be the average temperature obtained from the readings of at least three thermo-couples symmetrically disposed and distributed to show the temperature near all parts of the sample. All thermo-couples shall project at least twelve inches into the furnace chamber.

b. The temperatures shall be read at intervals of five minutes or less during the first hour, and thereafter the intervals may be increased to a maximum of ten minutes.

c. The accuracy of the furnace control shall be such that the area under the time-temperature curve, obtained by averaging the results from the pyrometer readings, is within seven and one-half per cent of the corresponding area under the standard time-temperature curve shown in figure 1 of section C26-579.0, for fire tests of one hour or less duration, and within five percent for tests exceeding one hour in duration.

(10.1.5.3). § C26-581.0 Determination of Temperatures on Unexposed Surfaces.—a. Temperatures on unexposed surfaces shall be measured with thermo-couples or thermometers placed under oven dry asbestos fire felt pads six inches square, four-tenths of an inch thick, and weighing between one and one and four-tenths pounds per square foot. The wire leads of the thermo-couple or the stem of the thermometer shall have an immersion under the pad and be in contact with the unexposed surface for at least three and one-half inches. The hot junction of the thermo-couple or the

bulb of the thermometer shall be placed approximately under the center of the pad. The pad shall be held firmly against the surface, and shall fit closely about the thermo-couples or thermometer stems. Thermometers shall be of the partial-immersion type, with a length of stem, between the end of the bulb and the immersion mark, of three inches. The wires for the thermo-couple in the length covered by the pad shall not be heavier than No. 19 steel wire gage (0.041 inch) and shall be electrically insulated with heat and moisture resistive coatings.

b. The temperature readings shall be taken at five or more points on the surface, one of which shall be approximately at the center of such surface, and four approximately at the centers of the quarter sections. If additional points are used, they shall be symmetrically disposed about the center, with no location nearer than one and one-half times the thickness of the construction, or nearer than twelve inches in the edges. It shall be unlawful to use points located opposite or on top of beams, girders, pilasters or other structural members.

c. Temperature readings shall be taken at intervals of fifteen minutes or less until a reading exceeding two hundred twelve degrees Fahrenheit has been obtained at any one point. Thereafter at the discretion of the superintendent, the readings may be taken more frequently but the intervals need not be less than five minutes.

d. Where the conditions of acceptance place a limitation on the rise of temperature of the unexposed surface, the temperature end point of the fire endurance period shall be determined by the average of the measurements taken at individual points, except that if a temperature rise of thirty percent in excess of the specified limit occurs at any one of these points, the remainder shall be ignored and the fire endurance period judged as ended.

(10.1.5.4). § C26-582.0 Report of Results of Fire Tests.—Results shall be reported in accordance with the performance in the tests prescribed in this title. Such results shall be expressed in time periods of resistance.

GROUP 6

Fire Test Structures

(10.1.6). § C26-583.0 Fire Test Structures.—a. Fire test structures may be located at any place where all the necessary facilities for properly conducting the test may be provided.

b. Entire freedom is left to each applicant in the design of his test structure and the nature and use of fuel, provided the test requirements are met.

GROUP 7

Fire Test Samples

(10.1.7). § C26-584.0 Fire Test Samples.—The fire test sample shall be truly representative of the construction for which classification is desired, and shall be built under conditions representative of actual practice. Test samples of shop-made units shall be selected at the place of manufacture by the superintendent or his representative. When test samples are constructed in place, all workmanship shall be inspected and all materials used in the test samples shall be selected by the superintendent or his representative. The physical properties of the materials or ingredients used in the test sample shall be determined and recorded.

GROUP 8

Fire Endurance Test

(10.1.8). § C26-585.0 Fire Endurance Test.—The fire endurance test on the sample with its applied load, if any, shall be continued until failure occurs, or until it has withstood the test conditions for a period equal to that specified in the conditions of acceptance for the given type of construction.

GROUP 9

Hose Stream Test

(10.1.9). § C26-586.0 Hose Stream Test.—a. Immediately following the expiration of the fire endurance test, the sample shall be subjected to the impact, erosive and cooling effects of a fire hose stream directed first at the middle and then at all parts of the exposed surface. Changes in direction shall be made slowly. The stream shall be delivered through a one and one-eighth inch standard taper, smooth bore nozzle. The water pressure and duration of application shall be as specified in the following table:

Parts of Structure	Resistance Period	Water Pressure at Nozzle, Pounds per Square Inch	Duration of Application, Minutes per One Hundred Square Feet of Exposed Area
Floors and roofs	Less than 1 hour	30	1
	1 hour to less than 2 hours	30	1½
	2 hours to less than 4 hours	45	2½
	4 hours and over	45	5
Walls and partitions	Less than 1 hour	30	1
	1 hour to less than 2 hours	30	1½
	2 hours to less than 4 hours	30	2½
	4 hours and over	45	5

b. The nozzle orifice shall be twenty feet from the center of the exposed surface of the test sample if the nozzle is so located that when directed at the center its axis is normal to the surface of the test sample. If the nozzle is otherwise located, its distance from the center shall be less than twenty feet by an amount equal to one foot for each ten degrees of deviation from the normal.

GROUP 10

Time of Testing

(10.1.10). § C26-587.0 Time of Testing.—a. The material or construction shall not be tested until a large proportion of its final strength has been attained, and, if it contains free water, until the excess thereof has been given off. Test samples may be dried artificially.

b. The maximum length of time intervening between construction of the sample and the test shall be thirty days, unless an extension of time is granted by the superintendent.

GROUP 11

Fire Tests of Floors and Roofs

(10.1.11.1). § C26-588.0 Size of Floor and Roof Samples.—The area exposed to fire shall be at least one hundred eighty square feet with each dimension at least twelve feet. Beams or girders, if forming part of the construction under test, shall lie within the combustion chamber and have a clearance of at least eight inches from the walls of such chamber.

(10.1.11.2). § C26-589.0 Loading of Floor and Roof Samples.—During the fire endurance and hose stream test, the construction shall support a uniformly distributed load equal to the design live load, as determined by either the use of accepted engineering formula or by the load test described in section C26-626.0.

(10.1.11.3). § C26-590.0 Conditions of Acceptance for Floor and Roof Construction.—Tests shall be regarded as unsuccessful unless the following conditions have been met:

1. The construction shall have sustained the applied load during the fire endurance test without passage of either flame, or gases hot enough to ignite dry cotton waste, for a period equal to that for which classification is desired.

2. The construction shall have sustained the applied load during the fire and hose stream tests, without passage of either flame, or gases hot enough to ignite dry cotton waste, or of the hose stream. After cooling, but within seventy-two hours after completion of these tests, the construction shall sustain a total superimposed load equal to twice the design live load, and if the top finish is omitted from the test sample, an additional load of thirty-five pounds per square foot uniformly distributed, without deflecting at the center of the span more than one-quarter inch per foot of clear span in either case.

3. Transmission of heat through the construction during the fire endurance test shall have been such as to raise the average temperature on the unexposed surface of the floor or roof two hundred fifty degrees Fahrenheit or less above the initial temperature of such surface.

GROUP 12

Fire Tests of Fire Walls, Fire Partitions and Fireproof Partitions

(10.1.12.1). § C26-591.0 Size of Fire Wall, Fire Partition and Fireproof Partition Samples.—The area of samples of fire walls, fire partitions and fireproof partitions

exposed to fire shall be at least one hundred square feet; and each dimension shall be at least nine feet.

(10.1.12.2). § C26-592.0 Conditions of Acceptance of Fire Wall, Fire Partition and Fireproof Partition Construction.—Tests of samples of fire walls, fire partitions and fireproof partitions shall be regarded as unsuccessful unless the following conditions have been met:

1. The wall or partition shall have withstood the fire endurance test without passage of either flame, or gases hot enough to ignite dry cotton waste, or the emission of any considerable volume of smoke or noxious fumes, for a period equal to that for which classification is desired.

2. Fire walls and fire partitions shall have withstood the hose stream test without passage of the stream.

3. Transmission of heat through the wall or partition during the fire endurance test shall have been such as to raise the average temperature on its unexposed surface two hundred fifty degrees Fahrenheit or less above the initial temperature of such surface.

GROUP 13

Fire Tests for Column and Beam Protection

(10.1.13.1). § C26-593.0 Size of Fire Test Samples for Columns.—Test samples of column protection shall consist of a ten-inch square steel column of "H" section approximately nine feet long and encased in the material of which the insulating properties are to be determined. If the insulation contemplates the use of air spaces between the steel and the insulator, the ends of the test sample shall be thoroughly fire-stopped.

(10.1.13.2). § C26-594.0 Position for Testing Column Protection.—Samples of column protection shall be tested in a vertical position.

(10.1.13.3). § C26-595.0 Determination of Temperatures for Column Protection.—a. The furnace temperature in tests of column protection shall be deemed to be the average temperature obtained from the reading of at least three thermo-couples, one through the center of the roof and one through each side wall at the upper third point.

b. The temperature beneath the insulating material shall be deemed to be the average temperature obtained from the readings of at least five thermo-couples located at the upper tri-point of the sample and so disposed as to indicate the temperature at the center of the web, the centers of both flanges and of two directly opposite flange edges.

(10.1.13.4). § C26-596.0—Size of Fire Test Samples for Beams.—Test samples for beams shall consist of a steel "I" beam not less than twelve inches nor more than fifteen inches at least twelve feet long located in the ceiling of the furnace, encased in the material of which the insulating properties are to be determined. If the insulation contemplates the use of air spaces between the steel and the insulator, the ends of the test sample shall be thoroughly fire-stopped.

(10.1.13.5). § C26-597.0 Position for Testing Beam Protection.—Samples of beam protection shall be tested in a horizontal position.

(10.1.13.6). § C26-598.0 Determination of Temperatures for Beam Protection.—a. The furnace temperature in tests of beam protection shall be deemed to be the average temperature obtained from the reading of at least four symmetrically disposed thermo-couples projecting through the furnace roof and located within one foot of the sample.

b. The temperature beneath the insulation shall be deemed to be the average temperature obtained from the reading of at least six thermo-couples located as indicated in figure 2.

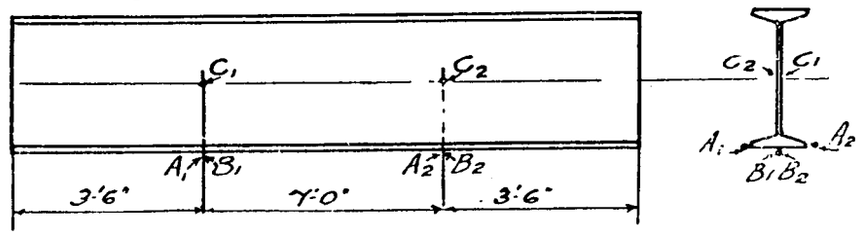


Fig. 2. Location of Thermo-Couples for Beam Tests.

(10.1.13.7). § C26-599.0 Conditions of Acceptance for Column and Beam Protection.—Tests shall be regarded as unsuccessful unless the following conditions have been met:

1. The transmission of heat through the insulation during the test shall not raise the average temperature of the steel to more than one thousand degrees Fahrenheit. nor more than 1,200 degrees Fahrenheit on any of the measured points.

2. The insulation shall function within the temperature range of its use without breaking, spalling or buckling so as seriously to expose the steel to the fire.

GROUP 14

Fire Tests of Short Span Fire Resistive Ceilings for the Protection of Structural Steel

(10.1.14.1). § C26-600.0 Size of Fire Test Samples of Short Span Fire Resistive Ceilings.—Unless tested in accordance with section C26-604.0, the area of short span fire resistive ceilings for the protection of structural steel exposed to the furnace shall be at least five square feet with neither dimensions less than two feet.

(10.1.14.2). § C26-601.0 Position for Testing Short Span Fire Resistive Ceilings.—The specimen shall be tested in a horizontal position with the fire applied to the under side.

(10.1.14.3). § C26-602.0 Determination of Temperatures for Short Span Fire Resistive Ceiling Tests.—a. The furnace temperature shall be deemed to be the average of at least two symmetrically disposed thermo-couples projecting at least twelve inches into the furnace through the test sample and located at least one foot apart.

b. The temperature of the unexposed surface shall be measured by one or more thermo-couples. If a single thermo-couple is used it shall be located at the center of the sample. If two or more are used they shall be symmetrically disposed. The thermo-couples on the unexposed surface shall be insulated and covered in accordance

(10.1.14.4). § C26-603.0 Conditions of Acceptance for Short Span Fire Resistive Ceilings.—a. The test shall be regarded as unsuccessful unless the following conditions are met:

1. The sample shall have withstood the fire endurance test, for a period equal to that for which classification is desired, without developing openings capable of passing any considerable volume of flame or hot gases.

2. Transmission of heat through the test sample during the fire endurance test shall have been such as to raise the temperature of the unexposed surface eight hundred degrees Fahrenheit or less.

b. The superintendent may also require a full size test according to section C26-604.0, if a test of a short span ceiling construction leaves any doubt as to the adequacy of such construction.

GROUP 15

Fire Tests of Long Span Fire Resistive Ceiling Construction

(10.1.15). § C26-604.0 Fire Tests of Long Span Fire Resistive Ceiling Construction.—The classification of fire resistive ceilings having spans exceeding thirty inches shall be determined in accordance with sections C26-588.0 through C26-590.0. The test sample shall consist of a complete assembly of a panel of the ceiling and of that type of floor construction in connection with which it is to be used.

GROUP 16

Fire Tests of Roof Coverings

(10.1.16). § C26-605.0 General.—Roof coverings shall be subjected to a brand test.

(10.1.16.1). § C26-606.0 Test Samples of Roof Coverings.—Test samples shall consist of complete assemblies of roof deck and covering. The deck construction shall be of that type on which the covering is to be applied in practice. The test sample shall have an area of at least twelve square feet, with a least dimension of three feet.

(10.1.16.2). § C26-607.0 Brand Test for Roof Coverings.—a. The brand shall consist of thirty-six pieces of kiln-dry spruce three-eighths by three-eighths by six inches placed in three tiers of twelve pieces each.

b. The brand shall be ignited and when burning freely shall be set in place on the surface of the test sample, with a horizontal current of air from a twelve-inch fan directed against it. The fan shall be set five feet from the brand and shall produce an air velocity of six miles per hour two feet from such fan.

(10.1.16.3). § C26-608.0 Conditions of Acceptance for Roof Coverings.—Tests shall be regarded as unsuccessful unless the following conditions have been met:

1. The brand shall have been entirely consumed without spread of fire more than one foot beyond the area directly exposed to the brand and without the ignition of the deck construction.

2. All flame shall die out in less than five minutes after the brand is consumed.

GROUP 17

Alternative Test Method

(10.1.17). § C26-609.0 Alternative Test Method.—As an alternative method of testing, the standard fire test specifications of the A. S. T. M., E 119-47, may be used so far as applicable when made by a laboratory of recognized national reputation, except that the maximum temperature tolerance permitted shall be seven and one-half percent.

GROUP 18

Fire Tests of Opening Protective Assemblies

(10.1.18). § C26-610.0 Fire Tests of Opening Protective Assemblies.—a. Tests of the fire resistive qualities of opening protective assemblies shall be made upon complete full size samples of the device, but in any case the sample need not exceed twelve by nine feet, constructed and installed in all essentials as in actual service and subjected to a fire on one side continuously for the periods stated below in accordance with the standard time-temperature curve. Tests of opening protective assemblies of a given size may be accepted as covering assemblies of smaller sizes, or of larger sizes not exceeding the area of the sample by more than twenty-five percent.

b. Opening protective assemblies tested to establish a fire resistive rating in excess of three-quarters of an hour shall be subjected to a hose stream test. Opening proective assemblies other than fire windows and fire shutters tested to establish a three-quarters of an hour rating need not be subjected to a hose stream test. The hose stream test shall be conducted in accordance with the standard fire test specifications of the A. S. T. M., D., C19-26 T.

c. The duration of the fire test shall be for:

door assemblies for fire walls.....3 hours,
fire partitions .....1½ hours,
fireproof partitions ..... ¾ hour;
fire window and fire shutter assemblies..... ¾ hour.

d. When two protective door assemblies, both previously accepted as entitled to a one and one-half hour fire resistive rating, are installed on two sides of the same opening, such combined assembly shall be accepted as having a three-hour fire resistive rating.

e. Tests of protective door assemblies shall be considered unsuccessful unless the assemblies prevent the passage of smoke or flames in considerable volume under neutral furnace pressure at the mid-point of the door, and withstand the pressure of the hose stream when required. Tests on all protective door assemblies to be used in required fireproof partitions and in corridors used as means of egress as required by articles seven and thirteen of this title, shall be considered unsuccessful when the average rise in temperature measured at the middle of the unexposed surface of the assembly and at the mid-points of the upper and lower half of the assembly exceeds six hundred fifty degrees Fahrenheit in half an hour, but no such temperature readings shall be taken directly over glass panels.

f. Tests of fire windows and fire shutters to be successful shall meet the requirements for doors as to structural strength and passage of flame, but no restriction shall be made as to the amount of heat transmitted through the windows or shutters; furthermore small portions of glass dislodged by application of the stream of water shall not be considered as structural weakness.

Sub-Article 2. Protection of Structural Steel and Iron Members

(10.2.1). § C26-611.0 Protection of Columns.—Iron or steel columns shall be protected by material or assemblies having a fire resistive rating of four hours for Class 1, fire-proof structures, and of three hours for Class 2, fire-protected structures, except that interior columns in Class 2, fire-protected structures, for residence purposes need have only two-hour protection.

(10.2.2). § C26-612.0 Protection of Lugs, Brackets and Wind Bracing.—Where a column is solidly encased with fire resistive material, the extreme outer ledge of lugs, brackets, wind bracing, or other supporting parts may extend to within one inch of the outer surface of the protection.

(10.2.3). § C26-613.0 Protection of Fire Resistive Covering.—Where the fire resistive covering on columns is exposed to injury from moving vehicles or the handling of merchandise it shall be jacketed to a height of five feet from the floor with an adequate protective covering.

(10.2.4). § C26-614.0 Protection of Wall Girders and Other Steel Supporting Masonry.—Wall girders and other steel supporting masonry in Class 1, fireproof structures, and Class 2, fire-protected structures, shall be protected by materials or assemblies having a fire resistive rating of three hours.

(10.2.5). § C26-615.0 Protection of Joists, Beams and Girders.—a. Joists, beams and girders supporting *floor* or *roof* construction in class 1, fireproof structures, shall be individually encased with materials or assemblies having a three-hour fire resistive rating, except that in areas of twenty-five hundred square feet or less joists, beams and girders may be protected by a ceiling with a three-hour fire resistive rating provided such areas are completely fire-stopped.

b. Joists, beams and girders supporting *floor* and *roof* construction in class 2, fire-protected structures, shall be individually encased with materials or assemblies having a one and one-half hour fire resistive rating, except that in areas of twenty-five hundred square feet or less joists, beams and girders may be protected by a ceiling with a one and one-half hour fire resistive rating provided such areas are completely fire-stopped.

c. Fire-stopping as required in this section shall be done with materials, or assemblies having the same fire resistive rating as the fireproofing; or joists, beams, or girders with solid webs may be substituted for such materials or assemblies. At fire-stops, where a space occurs between the bottom of the joist, beam or girder and the ceiling, such space shall be filled with material similar to that used for the fireproofing.

(10.2.6). § C26-616.0 Protection of Lintels.—Iron or steel lintels over openings more than four feet wide in walls shall be protected as required for beams unless the lintel is supported from a fireproof member above; provided that when the span of any such opening is six feet or less and such opening is spanned by an adequate masonry arch above the lintel, the protective covering may be omitted.

(10.2.7). § C26-617.0 Use of Stone Lintels Restricted.—It shall be unlawful to use stone lintels unless such lintels are supplemented on the inside of the wall with iron or steel lintels or with suitable masonry arches carrying the masonry backing, or by other methods approved by the superintendent.

(10.2.8). § C26-618.0 Protection of Trusses.—a. Trusses in Class 1, fireproof structures, and Class 2, fire-protected structures, shall be entirely protected by materials or assemblies having fire resistive ratings of three hours and one and one-half hours respectively. In one-story structures the protective covering may be omitted from members of trusses, including beams and subpurlins. In multi-story stuctures such covering may be omitted when such members support only roof loads, access passageways, or ventilating equipment, and have a clear height of at least twenty feet below the lower chords of the trusses.

b. The protective covering may be omitted from roof truss members, including beams and subpurlins, if a continuous ceiling, having a fire resistive rating or three hours is provided below the lower chords of the trusses, and the space above the ceiling is completely enclosed and fire-stopped and contains no passageways or apparatus of any kind. Access to the enclosed roof space shall be permitted by an access door having a fire resistive rating of at least one hour, and having maximum dimensions of three feet by three feet.

c. In an auditorium with fixed seats having metal frames, the fireproofing may be omitted from structural steel roof trusses with their adjoining steel framing, when the clear height below the lower chords of the trusses is less than twenty feet and when such members support only roof loads, access passageways or ventilating equipment provided a wire lath and plaster ceiling of one-hour fire resistive rating placed at least three inches clear of any steel surface separates such steel completely from such auditorium spaces.

Sub-Article 3. Fire Resistive Floors and Roofs

(10.3.1). § C26-619.0 Form and Fire Resistive Ratings of Floor and Roof Construction.—a. Floor and roof construction between supporting beams in Class 1, fireproof structures, shall consist of arches or slabs of incombustible material or assemblies

and shall either by itself or in combination with its protective ceiling have a fire resistive rating of at least three hours, except as specifically provided otherwise. Nothing in this section shall prevent the application of cork or fibre insulation board or other combustible insulation material applied directly to the fire resistive floor or roof construction in cement, provided that in case of floor construction such insulation is covered by at least one and one-half inch thicknesses of Portland cement concrete or other equally fire resistive material of equal thickness. Similar floor and roof construction in Class 2, fire-protected structures, shall either by itself or in combination with its protective ceiling have a fire resistive rating of at least one and one-half hours, except as otherwise specifically provided.

b. Where the fire protective covering is omitted from roof trusses as provided in section C26-618.0, blocks of book tile, gypsum, concrete or other equivalent fire resistive materials may be used for horizontal or sloping roofs directly above such trusses, provided the necessary strength requirements are met.

c. A floor or roof construction in which the structural members are not individually encased in fire resistive materials or assemblies shall be fire-stopped as provided in section C26-615.0.

(10.3.2.1). § C26-620.0 Concrete Floor and Roof Construction.—a. Materials for Concrete Floor and Roof Construction.—Unless designed in accordance with the provisions of sections C26-1455.0 through C26-1564.0, concrete floor and roof construction shall consist of a mixture of one part of cement by volume, two parts of sand by volume, and a maximum of five parts of coarse aggregate measured separately by volume and reinforced with steel as provided in subdivision d of section C26-620.0. Cinder aggregate shall be clean and well burned, containing a maximum of thirty-five percent by weight of unconsumed carbon and one and one-half percent by weight of sulphur. Other aggregates shall conform to section C26-1467.0.

(10.3.2.2). b. Reinforcement of Concrete Floor and Roof Construction.—Reinforcement shall consist of steel fabric, rods, or other suitable shapes. The reinforcement shall be at least fifteen hundredths percent for continuous steel fabric for A-432 and A-16 special grade bars or at least twenty-five hundredths percent for other forms of steel reinforcement, the percentage to be based on the sectional area of the slab above the center of reinforcement. The center of the reinforcement shall be at least one inch above the bottom of the slab, but all parts of the reinforcement shall be at least three-quarters of an inch from the bottom of the slab.

(10.3.2.3). c. Thickness of Concrete Floor and Roof Construction.—

1. Unless designed in accordance with the provisions of sections C26-468.0 through C26-509.0, the minimum thickness of concrete floor and roof construction shall be determined by the following formula, in which

t = total thickness in inches
L = clear span in feet between steel flanges
w = gross uniform load in pounds per square foot:

$$t = \frac{L}{2} + \frac{w-75}{200}$$

The total thickness shall be at least four inches except in the following cases:

(a) Special forms of construction which have passed the three-hour fire test specified in sections C26-588.0 through C26-590.0.

(b) In Class 2, fire-protected structures, floor construction, except the floor construction above the cellar or basement, and roof construction may be used consisting of two inches or more of reinforced concrete or gypsum top slab, or two inches or more of stone or cinder concrete poured over rib lath secured to the top of steel beams or steel joists, and at least a seven-eight-inch gypsum or cement plaster ceiling on metal lath; or any other material or assembly having a fire resistive rating of at least one and one-half hours.

2. Four-inch slabs may be used for spans of eight feet or less provided the gross floor load is two hundred pounds per square foot or less.

(10.3.2.4). d. Strength of Concrete Floor and Roof Construction.—

1. Unless designed in accordance with sections C26-1455.0 through C26-1564.0, the safe carrying capacity of concrete floor and roof construction shall be determined by the following formula, in which

w = gross uniform floor load in pounds per square foot
A_s = cross-sectional area of reinforcement in square inches per foot of width of slab
L = clear span in feet between steel flanges and shall not exceed ten feet in any case, and when the gross floor load exceeds two hundred pounds per square foot shall not exceed eight feet

C = the following coefficient, for steel having an ultimate strength of at least fifty-five thousand pounds per square inch:

(a) For Cinder Concrete
  (1) Twenty thousand when reinforcement is continuous
  (2) Fourteen thousand when reinforcement is hooked or attached to one or both supports

(b) For Stone Concrete
  (1) Fifteen thousand when reinforcement is hooked or attached to one or both supports
  (2) Twenty-three thousand when reinforcement is continuous:

$$w = \frac{3CA_s}{L^2}$$

2. When this formula is used the reinforcement shall be hooked or attached to one or both supports or be continuous, and the slab shall be stone or cinder binder concrete at least four inches in thickness.

3. The concrete in such floor and roof construction shall have an ultimate compressive strength of at least seven hundred pounds per square inch at the end of twenty-eight days. For such concrete, the safe fibre stress may be taken as two hundred pounds per square inch, the bond fifty pounds per square inch and n, as defined in section C26-1472.0, shall equal thirty; and the strength may be figured by approved engineering methods.

4. If steel of an ultimate strength in excess of fifty-five thousand pounds per square inch is used, the above coefficient may be increased in the ratio of the ultimate strength to fifty-five thousand, but at most thirty percent, provided a certificate of the manufacturer, certifying to the minimum strength of the wire fabric actually to be used, is submitted before erection.

§ C26-620.1 Cellar Floors and Garage Floors.—The cellar floor and garage floor or any floor resting directly on the ground shall be constructed of stone concrete or cinder concrete at least four inches thick, but in no instance shall the mix be more than eight parts aggregate to one part cement except that for garage floors on ground in other than private dwellings, a bituminous plant mix wearing surface not less than two inches thick when compressed and laid on a stabilized base course four inches in thickness after compression may be used. The wearing surface shall be of asphaltic concrete mixture type 1 and shall comply with the specifications in section 3.01 of the standard highway specifications for assessable improvements adopted by the Board of Estimate of the City of New York on May 24, 1945. The base course of one and one-half inch (1½") and three-eighths inch (⅜") aggregate shall comply with the provisions set forth in section 4.02 class 2 for asphalt macadam pavement defined in standard highway specifications for assessable improvements adopted by the Board of Estimate of the City of New York on May 24, 1945.

§ C26-620.2 Floors Constructed With Glass.—Where glass has been placed in a floor so that it forms a structural part of the floor and is carried upon structural supports framed about the glass, it shall be removed and shall be replaced by solid closed flooring constructed the same as the adjoining flooring. This section shall not apply to vault lights in sidewalks, yard or court pavements and similar exterior locations. The provisions of this section shall apply to all existing installations of glass in floors.

(10.3.3). § C26-621.0 Gypsum Floor and Roof Construction.—Gypsum floor and roof construction may be either of reinforced poured gypsum or precast units and may be either of the suspension type or of the slab and ceiling type with the slabs constructed of such thickness as to support the imposed loads, provided the floor or roof construction complies with the requirements of section C26-619.0.

(10.3.4.1). § C26-622.0 Hollow Tile Arches.—a. Material for Hollow Tile Arches. Hollow blocks of burnt clay or shale used in hollow tile arches for fire resistive construction shall be medium or hard and of uniform density. The shells and webs shall be at least five-eighths of an inch thick. The maximum spacing of interior vertical and horizontal webs shall be four inches. The blocks shall be at least two cells deep, and shall be laid in cement mortar and be properly keyed.

(10.3.4.2). b. Depth of Flat Arches.—The depth of flat arches of burnt clay or shale hollow blocks shall be at least one and one-half inches for each foot of span inclusive of the portion of the block extending below the under side of the beam and such arches shall be at least six inches thick.

(10.3.5). § C26-623.0 Brick Arches.—a. Brick arches shall be built of common or hollow brick solidly bonded. Such arches shall be segmental in form with a minimum thickness of four inches for spans of five feet or less and of eight inches for spans exceeding five feet, unless such spans are suitably reinforced.

b. The rise of such arches shall be at least one inch per foot of span and the joints shall be filled with cement.

(10.3.6). § C26-624.0 Rise of Segmental Arches.—a. Segmental arches for floor and roof construction shall have a rise of at least one inch per foot of span.

b. The minimum thickness of this type of arch shall be six inches.

(10.3.7). § C26-625.0 Special Roof Construction. — For mansards and dormers having a slope of more than thirty degrees from the horizontal, blocks of book tile, gypsum, concrete or other fibre resistive materials may be used subject to the load test specified in section C26-626.0, provided they have a fire resistive rating of at least one hour.

(10.3.8). § C26-626.0 Load Tests for Floor and Roof Construction.—When the strength of any floor or roof construction cannot be determined by the methods prescribed in this section, or by the application of accepted engineering formulae, the safe uniformly distributed carrying capacity shall be taken as a fraction of the total load causing failure in a full-sized test sample, when applied along two lines each distant one-third of the span from the supports. Each fraction shall be one-quarter when the specimens are tested as simple spans and one-sixth when tested as continuous spans.

(10.3.9). § C26-627.0 Span of Floor and Roof Construction.—Unless designed in accordance with section C26-1455 through C26-1564.0, the maximum clear span for floor and roof slabs or arches between supporting beams shall be eight feet, except as otherwise permitted by subdivision "d" of section C26-620.0.

(10.3.10). § C26-628.0 Openings in Floors and Roofs.—Suitable metal framing or reinforcement shall be provided in fire resistive floor and roof construction around any opening having an area in excess of two square feet. When openings are provided for pipes and conduits, the unoccupied space shall be filled with approved incombustible material for the full depth of the slab, unless close fitting individual sleeves, solidly embedded in the construction, are used; or the opening is enclosed as a shaft and constructed in compliance with section C26-638.0.

(10.3.11). § C26-629.0 Tie Rods.—The supporting beams in fire resistive floors and roofs shall be tied together by steel tie rods of proper size, spacing and location; provided that when floor filling is in the form of reinforced slabs and the reinforcement is continuous over the supports or securely attached to the supports, tie rods may be omitted.

(10.3.12). § C26-630.0 Top Filling.—In Class 1, fireproof structures, the space between the floor slab and the finished floor shall be filled with concrete consisting of one part of cement to a maximum of ten parts of cinders, or with other incombustible material approved by the superintendent.

Sub-Article 4. Fire Walls and Partitions

GROUP 1

Fire Walls

(10.4.1.1). § C26-631.0 Materials and Thicknesses for Fire Walls.—a. Fire walls shall be constructed of the following materials and minimum thicknesses, exclusive of any required plaster:

1. Solid brick, solid structural units, or plain concrete eight inches thick.
2. Solid reinforced concrete six inches thick.
3. Solid cinder concrete blocks eight inches thick.
4. Solid cinder concrete blocks six inches thick, plastered on both sides.
5. Hollow clay tile twelve inches thick, two units, three cells in wall thickness.
6. Hollow clay tile eight inches thick, three cells in wall thickness plastered on both sides.
7. Hollow concrete blocks (one piece) twelve inches thick, webs and shells of which are at least one and one-half inches thick and at least two cells in wall thickness.
8. Hollow concrete blocks (one piece) eight inches thick, plastered on both sides, shells of which are at least one and one-half inches thick.

b. Fire walls of other materials or forms of construction shall have a fire resistive rating of four hours.

(10.4.1.2). § C26-632.0 Construction of Fire Walls.—a. Fire walls shall be constructed with solid joints of cement or cement-lime mortar. Where plaster is required, unsanded gypsum shall be at least one-half of an inch thick, and sanded gypsum or cement plaster, three-quarters of an inch thick.

b. In a Class 2, fire-protected structure, or a Class 3, non-fireproof structure, a fire wall shall be continuous from its foundation to three feet above the roof surface, except as provided in the following paragraph, and except that in residence structures of these two classes, fire walls may be carried only to the top of the roof boards in

Class 2, fire-protected structures, and in Class 3, non-fireproof structures, provided the junction between the roof and the fire wall in thoroughly grouted with cement mortar and fire-stopped.

c. Fire walls may be offset from floor to floor in any structure provided the entire offset is of fire resistive construction having a fire resistive rating of four hours.

d. Combustible structural members built into a solid fire wall shall be separated from each other and from the outside of the wall by at least four inches of solid masonry.

e. When combustible members project into hollow fire walls the hollow space shall be filled solidly with incombustible, fire resistive materials for the full thickness of the wall and for four inches or more above, below and between the members.

f. Fire walls of masonry used as party or bearing walls shall conform in thickness and material to the requirements for such walls as specified in sections C26-412.0 through C26-467.0.

g. The application of cork or fibre insulation board may be permitted if cemented or attached directly to the face of the wall laid up with no intervening air spaces and protected as required by the rules of the board.

GROUP 2

Fire Partitions

(10.4.2.1). § C26-633.0 Materials for Fire Partitions.—a. Fire partitions shall be constructed of the following materials and minimum thicknesses, exclusive of any required plaster:

1. Solid brick, solid structural units or plain concrete, eight inches thick.
2. Solid reinforced concrete, five inches thick.
3. Solid cinder concrete blocks, six inches thick.
4. Hollow clay tile, two cells in wall thickness, six inches thick, plastered on the room side.
5. Hollow concrete block, eight inches thick, provided calcareous, burnt clay or cinder aggregates are used and the shells are at least one and one-half inches thick if unplastered, and at least one and one-quarter inches thick if plastered.
6. Hollow gypsum block, three inches thick, plastered on both sides.
7. Hollow gypsum block, six inches and two cells in wall thickness, plastered on one side.
8. Clay tile, glazed or unglazed, six inches thick, cored not in excess of twenty-five per cent and laid two units in wall thickness.
9. Solid gypsum block, three inches thick.

b. Where combustible insulation board is permitted, it shall be applied directly to the face of the partition by cement or other approved method, but in no case shall it be built into the required partition construction.

c. Fire partitions or other materials or forms of construction shall have a fire resistive rating of three hours.

(10.4.2.2). § C26-634.0 Construction of Fire Partitions.—a. The maximum unsupported height of a fire partition shall be thirty times its total thickness unless suitably anchored and reinforced or constructed in accordance with the requirements for walls as specified in sections C26-412.0 through C26-467.0. Intermediate support for fire partitions shall be of construction having a fire resistive rating of three hours. Fire partitions may be offset from floor to floor in any structure provided the entire offset is of fireproof construction having a fire resistive rating of three hours.

b. Combustible structural members built into a fire partition wall shall be separated from each other and from the outside of the wall by at least four inches of solid masonry.

c. Where combustible insulating boards are permitted on a fireproof partition, they shall be cemented or directly attached to the face of the partition and may not be built into the required construction.

d. Fire partitions shall be constructed and plastered, if plastering is required, as prescribed for fire walls in section C26-632.0.

(10.4.2.3). § C26-635.0 Fire Resistive Stairway Enclosures.—a. Fire resistive stairway enclosures constructed of the following materials and minimum thicknesses, exclusive of any required plaster, may be used in Class 1, fireproof structures, exclusively for school purposes, and in Class 2, fire-protected structures:

1. Solid brick, or solid structural units, eight inches thick.
2. Solid concrete, plain or reinforced, four inches thick.
3. Solid cinder concrete blocks, four inches thick; plastered on both sides, three inches thick.
4. Solid gypsum (poured or block), three inches thick.
5. Hollow clay tile, two cells in wall thickness, four inches thick, plastered on both sides; or six-inch partition tile, two cells in wall thickness, plastered on one side
6. Hollow concrete block, eight inches thick; four inches thick, plastered on both sides.

7. Hollow gypsum block, three inches thick, plastered on both sides.

b. Fire resistive stairway enclosures of other materials or forms of construction shall have a fire resistive rating of at least two hours.

GROUP 3

Fireproof Partitions

(10.4.3.1). § C26-636.0 Materials for Fireproof Partitions.—a. Fireproof partitions shall be constructed of the following materials and minimum thicknesses, exclusive of any required plaster:

1. Solid or hollow brick or solid structural units, four inches thick.
2. Solid gypsum (poured or block), two inches thick.
3. Solid cinder concrete (poured or block), three inches thick.
4. Solid walls of cement mortar or concrete, two and one-half inches thick, reinforced in two directions with at least one-eighth of one per cent of steel in each direction.
5. Solid walls at least two inches thick of gypsum plaster or two and one-half inches thick of cement plaster, supported by incombustible studding and metal lath or mesh meeting the requirements of section C26-460.0.
6. Hollow clay tile, three inches thick, plastered on both sides.
7. Hollow gypsum blocks, three inches thick.
8. Hollow concrete blocks, three inches thick, plastered on both sides.
9. Hollow partitions at least three inches thick of long length gypsum lath, at least one-half of an inch thick on both sides of incombustible studding, plastered on both sides with three-fourths of an inch of gypsum plaster, sanded one part gypsum to one part sand for the scratch coat and one part gypsum to two parts of sand for the brown coat both by weight.
10. Hollow partitions of metal lath or mesh or welded wire ribbed lath and plaster on incombustible studding, complying with the requirements of section C26-460.0, with three-quarters of an inch of cement or gypsum plaster on each side. When paper-backed lath is used, the paper shall be flame-proof.
11. Hollow walls, at least three inches thick, of gypsum board at least one-half inch thick, on both sides of incombustible studding spaced not over sixteen inches on centers and covered on both sides with one-eighth inch thick hard asbestos cement composition sheets, with all joints covered with two-inch wide batten strips made of the same material as sheets or of approved type metal strips.
12. Clay tile, glazed or unglazed, four inches thick, with outside shells not less than three-quarters of an inch in thickness plastered on one side.
13. Solid walls not less than two inches thick of vermiculite-gypsum plaster on metal or gypsum lath.
14. Solid walls not less than two inches thick of perlite-gypsum plaster on metal or gypsum lath.

b. In non-fireproof structures, wood stud fire retarding partitions may be used as fireproof partitions with a maximum stud spacing of sixteen inches on centers and metal lath or mesh weighing at least three and four-tenths pounds per square yard fastened to the studding at maximum intervals of six inches vertically and plastered on both sides with gypsum, vermiculite-gypsum, perlite-gypsum or cement plaster to at least three-quarters inch grounds or three-eighths inch perforated gypsum lath on both sides, plastered with one-half inch of sanded gypsum plaster or vermiculite-gypsum plaster or perlite-gypsum plaster or one-half inch plaster board on both sides covered with hard asbestos cement composition sheets at least one-eighth of an inch in thickness with all joints covered with two-inch batten strips of the same material or with approved metal battens or two layers of one-half inch gypsum wallboard. Grounds for chair rails, baseboards and similar appurtenances, if used in such partitions shall be of metal covered wood or of incombustible material. Continuous vertical spaces in such walls shall be fire-stopped as required in section C26-683.0 through C26-688.0.

c. Fire proof partitions of other materials or forms of construction shall have a fire-resistive rating of one hour.

(10.4.3.2). § C26-637.0 Construction of Fireproof Partitions.—a. Fireproof partitions in Class 1, fireproof structures, and Class 2, fire-protected structures, shall be carried at each tier of a structure on incombustible supports and unless suitably anchored or reinforced the maximum unsupported height shall be thirty times the total thickness.

b. Where plaster is required, unsanded gypsum plaster shall be at least one-half inch thick but the total thickness of plaster shall be at least three-quarters of an inch, or sanded gypsum or cement plaster three-quarter-inch thick.

c. The thickness of the material and construction of fireproof partitions of masonry as given are the minimum for fire resistive purposes and shall be increased as required to comply with sections C26-412.0 through C26-467.0.

These U.S.G. products and systems have been tested and approved by New York City Board of Standards and Appeals as meeting or exceeding requirements of the Administrative Building Code:

UNITED STATES GYPSUM

PARTITIONS—DRYWALL

SHEETROCK*; Metal Studs; 5/8" *FIRECODE 1 & 2 hr.	Cal. 301-60-SM
SHEETROCK 2" Solid Partition 1½ & 2 hr.	Cal. 898-47-SM
SHEETROCK Double Solid Partition 2 hr.	Cal. 898-47-SM
SHEETROCK Demountable—*THERMAFIBER Wool Blanket—1 hr.	Cal. 546-54-SM
†Movable Vaughan Walls—Solid Partition 1 hr.	Cal. 286-60-SM
*E-Z Wall Movable Partition 1 hr.	Cal. 34-66-SM
SHEETROCK Metal Stud—½" FIRECODE "C" 1 hr.	Cal. 35-66-SM
SHEETROCK Metal Stud—½" FIRECODE "C" 2 hr.	Cal. 1020-65-SM
STRUCTICORE*—Double 134 1½ hr.	Cal. 559-66-SM
STRUCTICORE—Double 134 1 hr.	Cal. 974-67-SM
SHEETROCK—Wood Stud—5/8" FIRECODE 1 & 2hr.	Cal. 171-52-SM
SHEETROCK—Wood Stud—RC-1—5/8" FIRECODE 1 hr.	Cal. 171-52-SM

PARTITIONS PLASTER

PYROBAR* Gypsum Tile 2" Solid no plaster 1 hr. 4" Solid (no plaster) 3 hr. 3" Hollow plaster 1 side—3 hr. 4" Hollow plaster 2 sides 4 hr. 3" Solid (no plaster) 3 hr. 6" Hollow plaster 1 side 3 hr.	Cal. 638-41-SM
TRUSSTEEL* Stud; Metal Lath; #400 Clips 1 hr.	Cal. 556-50-SM
TRUSSTEEL Stud; 3/8" ROCKLATH*; STRUCTOLITE* 1½" & 2 hr.	Cal. 556-50-SM
Channel Stud; 2½" Metal Lath & Perlite Plaster 2 hr.	Cal. 527-51-SM
Wood Stud; 3/8" Plain ROCKLATH; ½" Sanded Plaster; 1 hr.	Cal. 790-42-SM
IMPERIAL* Plaster Systems Approvals 1 & 2 hr. Drywall Assemblies including Imperial Product.	Cal. 800-39-SM

COLUMN FIREPROOFING

PYROBAR Gypsum Tile 2" Solid ½" Plaster—4 hr. 3" Hollow 2" Solid or 3" Hollow no plaster—3 hr. ½" Plaster—4 hr.	Cal. 638-41-SM
Plaster Self Furring Metal Lath: 1¾" Perlite—4 hr. Self Furring Metal Lath: 1⅜" Perlite—3 hr.	Cal. 827-51-SM
Drywall SHEETROCK FIRECODE Wallboard—3 layers 5/8" Thick—3 hr.	Cal. 171-52-SM
PYROBAR 2" Solid; 5/8" FIRECODE "C" 4 hr.	Cal. 712-66-SM
PYROBAR 3" Hollow; 5/8" FIRECODE "C" 4 hr.	Cal. 389-66-SM

SPRAY-ON FIREPROOFING

RED TOP FIRECODE* Plaster Steel Decks—2 & 3 hr. Beams—3 & 4 hr. Columns—3 & 4 hr.	Cal. 388-60-SM

OTHER U.S.G. PRODUCTS

TEXTONE* Gypsum Panels & Metal Mouldings	Cal. 486-39-SM
SHEETROCK W/R—½" & 5/8" Thick incombustible*	Cal. 486-39-SM
PAROBAR Mortar Mix	Cal. 386-41-SM
USG SUPER STRENGTH SHEATHING*	Cal. 620-39-SM
MORTASEAL*; 92% Hydrated masons lime	Cal. 710-44-SM
IVORY* 92% Double hydrated Ohio finishing Lime	Cal. 483-39-SM
RED TOP Hydrated Finishing Lime	Cal. 800-39-SM
STRUCTOLITE Basecoat Plaster—Millmixed with perlite aggregate	Cal. 116-52-SM
HI-LITE* Acoustical Plaster—Stipple or stipple perforated	Cal. 800-39-SM
AUDICOTE* Acoustical Plaster	Cal. 800-39-SM
STRUCTO-GAUGE* Gauging Plaster	Cal. 800-39-SM
DIAMOND FINISH* Plaster	Cal. 800-39-SM

CEILINGS—DRYWALL SYSTEMS

5/8" SHEETROCK FIRECODE—Wood joists—1 hr.	Cal. 171-52-SM
5/8" SHEETROCK FIRECODE—DWC channel—Bar joists concrete fl. 1½ or 2 hr.	Cal. 171-52-SM
½" SHEETROCK FIRECODE "C"—Wood joists—1 hr.	Cal. 217-65-SM
½" SHEETROCK FIRECODE "C"—DWC channels—2 hrs. Bar joists Concrete 2½"	Cal. 218-65-SM

CEILINGS—SOUND CONTROL—ACOUSTICAL PRODUCTS

ACOUSTONE*—incombustible case mineral natural fissured tile	Cal. 1144-40-SM
ACOUSTONE Space Units—12"x12"x2" clip mounted wall or ceiling	Cal. 783-64-SM
ACOUSTONE PC—Highly washable soil resistant plaster finish all Acoustone tiles.	Cal. 1144-40-SM
ACOUSTONE DB—Foil backed, sound attentuation 46 db	Cal. 1144-40-SM
AIRSON ACOUSTONE*—Controlled air distribution—slots & dampers	Cal. 1144-40-SM
AIRSON GRID—Controlled air distribution—Grid with slits & dampers	Cal. 1144-40-SM
ACOUSTONE MOTIF'D—Tile with design patterns—Adhesive applic.	UL Labels
ACOUSTONE 90—Under Pyrofill Gypsum Roof Deck or 2" Metal Edge Gypsum Plank—1½ hr. assembly. Under wood joists or by itself—1 hr.	Cal. 912-60-SM
ACOUSTONE 120—Under 2½" concrete on metal deck & Steel beams—12"x12"x¾" tile—50% A-5 or 100% A-2 with light troffers— 2 hr.—Under wood joists or by itself, 1½ hour.	Cal. 912-60-SM
ACOUSTONE 180—Under 2½" concrete on metal lath and bar joists, 12"x12"x¾" tile on concealed zee spline 3 hr.	Cal. 946-66-SM
AURATONE* FIRECODE—Incombustible water felted mineral fiber tile and ceiling board.	Cal. 489-63-SM
AURATONE FIRECODE—Wood joists—2'x4'x5/8"board & rated grid—1 hr.	Cal. 784-64-SM
AURATONE FIRECODE—2" concrete—bar joists—2'x4'x½" board & rated grid, 1½ hr. (beam 3 hr.).	Cal. 782-64-SM
AURATONE FIRECODE—2½" concrete—bar joists—2'x4'x5/8" board & rated grid or 12"x12"x5/8" tile & concealed Z spline—2 hr.	Cal. 786-64-SM
AURATONE FIRECODE—1½" Gypsum Pyrofill—bar joists—½" Sheetrock Form board—2'x4'x5/8" board & rated grid.	Cal. 781-64-SM
AURATONE FIRECODE—2½" concrete—3½" metal deck-steel beam—12"x12"x¾" tile & concealed Z spline—3 hr. (4 hr. beam).	Cal. 787-64-SM

NOTE: (1) Cal. 781-64-SM, Cal. 786-64-SM, Cal. 787-64-SM approved for 50% A-5 or 100% A-2 Airson.

(2) ALL AURATONE FIRECODE Tests included recessed light troffers, air ducts and air outlets: Troffers were protected with THERMAFIBER Troffer Blankets: 1¼"thick as per Cal. 1033-64-SM.

ACOUSTONE—concrete—bar joists—2'x2" ACOUSTONE Shadowline—pending.	Cal. 312-68-SM

ROOF DECKS (Incombustible) For All Classes of Construction.

PYROFILL* ..... Cal. 236-38-SM

Reinforced Poured Gypsum Concrete. Permanent incombustible formboard: USG Mineral Fiber Firecode Formboard, USG Sheetrock* Formboard, Asbestos Cement Formboard. Maximum clear span 10'-2".

Approved for all classes of construction using ¾" vermiculite plaster on metal lath (C-26-575). Approved for exposed steel on one story buildings and 20' elevation multistory roofs. Approved 2 hrs. for Class 2 roofs without protection of deck using 2½" PYROFILL.

U.S.G. 2" Metal Edge Gypsum Plank: Incombustible. For all classes of construction: maximum clear span 6'-4". Maximum live load 51 psf (safety factor of 6). Approved under C 26-618 where steel is exposed: for all 1-story buildings. For roof of multi-story buildings where steel is 20' clear of floor. Cal. 310-40-SM

U.S.G. 2" Metal Gypsum Plank: With AURATONE 2'x4'x5/8" board & rated grid 2 hr. pending. Cal. 973-67-SM

MASTICAL*—Low consistency super strength gypsum cement—interior floor and underlayment.	Cal. 947-66-SM

WHERE TO GET TECHNICAL INFORMATION

For complete information and specifications on these or any other U.S.G. building products or systems (including Acoustical Systems and Roof Decks of Gypsum or Steel), consult the Architects' Service Department, 600 Madison Avenue, New York City.

*T.M. Reg. U.S. Pat. Off. †T.M. of Vaughan Interior Walls, Inc.

Write or Telephone • Area Code 212 935-3300 • 600 MADISON AVENUE, NEW YORK, NEW YORK 10022

UNITED STATES GYPSUM

THE GREATEST NAME IN BUILDING

CLASSIFICATION OF MATERIALS AND THEIR RESISTIVE FIRE RATINGS FOR FIRE WALLS, PARTITIONS AND CEILINGS AS PER BUILDING CODE

4-HR. FIRE TEST
(Such as fire walls)

12" Hollow Clay Tile 2 units —3 cells in wall thickness

12" Hollow Concrete Blocks (one piece) webs & shells 1½" thick—2 cells in wall thickness.

8" Solid Brick

8" Plain Concrete

8" Solid Structural units

8" Solid Cinder Concrete Blocks

8" Hollow Clay Tile — 3 cells plastered both sides

8" Hollow Concrete Blocks (one piece) plastered both sides, shells 1½" thick.

6" Solid Reinforced Concrete

6" Solid Cinder Concrete plastered both sides.

3-HR. FIRE TEST
(Such as fire partitions)

8" Solid Brick

8" Solid Structural units

8" Plain Concrete

8" Hollow Concrete Blocks, —shells 1½" thick if unplastered, 1¼" if plastered, provided calcareous, burnt clay or cinder aggregates are used.

6" Solid Cinder Concrete Blocks

6" Clay Tile 25% voids — 2 units in wall thickness

6" Hollow Gypsum Blocks— 2 cells, plastered one side

6" Hollow Clay Tile 2 cells thick—plastered on room side

5" Solid Reinforced Concrete

3" Hollow Gypsum Blocks— plastered both sides

3" Solid Gypsum Blocks

2-HR. FIRE TEST
(Fire resistive stairway enclosures)

8" Solid Brick

8" Solid Structural units

8" Hollow Concrete Blocks

6" Hollow Clay Tile 2 cells —plastered on one side

4" Solid, Plain or Reinforced Concrete

4" Solid Cinder Concrete Blocks

4" Hollow Clay Tile 2 cells —plastered both sides

4" Hollow Concrete Blocks —plastered both sides.

3" Solid Gypsum poured or block

3" Hollow Gypsum Blocks— plastered both sides

3" Solid Cinder Concrete, plastered both sides

1-HR. FIRE TEST
(Such as fireproof partitions)

4" Solid or Hollow Brick

4" Solid Structural Units

4" Clay Tile, ¾" outside shells, plastered 1 side

3" Solid Cinder Concrete

3" Hollow Clay Tile, plastered both sides

3" Hollow Gypsum Blocks

3" Hollow Concrete Blocks, plastered both sides

3" Hollow Walls of ½" Gypsum boards on incombustible studs 3" thick, plastered both sides ¾" gypsum and sand plaster.

3" Hollow Walls of ½" Gypsum boards on 3" thick incombustible studs 16" o.c., covered both sides ⅛" asbestos cement comp. sheets, joints covered 2" wide battens of same material, or approved metal strips.

2½" Solid Cement Mortar or concrete reinforced in 2 directions with ⅛ of 1% steel in each direction.

2½" Solid Walls Cement Plaster on incombustible studs and metal lath or mesh.

2" Solid Walls Vermiculite-Gypsum or Perlite-Gypsum plaster on metal or Gypsum lath.

2" Solid Gypsum, poured or block

2" Solid Walls Gypsum Plaster on incombustible studs and metal lath or mesh.

NON-FIREPROOF BUILDINGS

Wood studs 16" o.c., metal lath 3.4 lbs. per sq. yd. plastered both sides with ¾" gypsum, vermiculite-gypsum, perlite-gypsum, or cement plaster;

or ⅜" perf. gypsum lath both sides, plastered ½" sand-gypsum, vermiculite-gypsum, perlite gypsum plaster;

or ½" plaster board both sides covered with ⅛" hard asbestos cement composition sheets, joints covered 2" battens same material, or approved metal battens;

or 2 layers ½" gypsum wall board.

Use metal covered or incombustible grounds.

Fire-code No. 60.

CEILINGS (Sec. C26-669.0)

Metal lath and plaster; gypsum lath and plaster; gypsum board and sheet metal; ½" gypsum board and ⅛" hard asbestos cement composition sheets, joints covered 2" battens same material or approved metal strips; metal lath and vermiculate gypsum or perlite gypsum plaster; gypsum lath and vermiculite gypsum or perlite gypsum plaster; 2 layers ½" gypsum board separated by 20 ga., 1" wire mesh.

Non-fireproof public assembly: Metal lath and ⅝" unsanded gypsum, vermiculite-gypsum or perlite-gypsum plaster or ⅞" cement or sanded gypsum plaster; ⅜" perf. gypsum lath and ½" vermiculite-gypsum or perlite gypsum plaster; ⅜" perf. gypsum lath, joints covered with 3" strips metal lath and plastered with ½" sanded gypsum plaster; 2 layers ½" gypsum board separated by 20 ga., 1" wire mesh.

Fire-code No. 60.

(10.4.3.3). § C26-637.1 Fireproof Partitions on Floors Used for Manufacturing.—a. Wherever the floor of a frame or non-fireproof building exceeding 2 stories in height has a dimension of one hundred fifty feet or more in length or width, and all or a part of the floor is used for a garment factory as defined in section C19-161.0 or a factory engaged in the processing of combustible fabrics with flammable oil as also defined in section C19-161.0 a partition having a fire resistive rating of at least one hour shall be provided to separate the floor area. The floor area shall be so separated that no area shall extend in length or width for more than one hundred ten feet. Openings in such partitions shall be provided with fireproof self-closing doors or automatic fire doors. Such doors shall have a rating of at least one hour. The provisions of this section shall apply to existing buildings so occupied.

b. Exception. Subdivision a of this section shall not apply where the floor area used for manufacturing is entirely protected with an approved sprinkler system.

Sub-Article 5. Shaft Enclosures

(10.5.1). § C26-638.0 Protection of Closed Shafts.—a. A series of floor openings, consisting of two or more openings in successive floors or a floor and a roof, shall be deemed to be a shaft and shall be enclosed.

b. Such shafts shall be constructed of materials or assemblies having the following fire resistive ratings:

1. Three hours when in:
(a) Class 1, fireproof structures, or
(b) Class 2, fire protected structures, exceeding fifty feet in height.
2. Two hours when in:
(a) Class 2, fire protected structures, not exceeding fifty feet in height, or
(b) Class 3, non-fireproof structures, except in residence structures not to exceed three stories and basement in height and other structures not exceeding four stories or forty feet in height, or
(c) Class 6, heavy timber construction structures, except as provided in sections C26-640.0 and C26-646.0 of this code.
3. One hour when in class 3, non-fireproof residence structures, not exceeding three stories and basement in height or other non-fireproof structures not exceeding four stories or forty feet in height.

(10.5.2). § C26-639.0 Protection of Elevator Shafts in Existing Non-Fireproof Public Structures—Shafts for elevators, escalators or similar hoisting devices in Class 3, or Class 4, public structures, built before January first, nineteen hundred thirty-eight, as defined in subdivision a of section C26-235.0, which are not already enclosed with fire resistive materials, shall be enclosed as provided in section C26-638.0, except as otherwise provided in section C26-647.0.

(10.5.3). § C26-640.0 Protection of Vent Shafts in Non-Fireproof Residence Structures.—In non-fireproof residence structures, occupied by one or two families, vent shafts shall be supported on and be constructed of materials having a fire resistive rating of one hour and shall extend at least three feet above the roof and be covered by a ventilating skylight of metal and glass.

(10.5.4.). § C26-641.0 Enclosures at the Top of Shafts.—a. Except in one- and two-family residence structures, shafts extending into the top story, except those stair shafts where the stairs do not continue to the roof, shall be carried through and at least two feet above the roof. Every shaft extending above the roof, except open shafts and elevator shafts, shall be enclosed at the top with a roof of materials having a fire resistive rating of one hour and a metal skylight covering at least three-quarters of the area of the shaft in the top story, except that skylights over stair shafts shall have an area not less than one-tenth the area of the shaft in the top story, but shall be not less than fifteen square feet in area. The required skylight may be replaced by a window or windows of equivalent area in the side of the shaft, provided that the sills of such windows are at least two feet above the roof and the windows do not face within ten feet of a property line, except that such windows may be installed within ten feet of a street. Any shaft terminating below the top story of a structure and those stair shafts not required to extend through the roof shall have the top enclosed with materials having the same fire resistive rating as required for the shaft enclosure.

b. In those structures not of class 1 or class 2 construction, other than private dwellings, all shafts including stair shafts, extending into the top story shall be carried through and at least three feet above the roof and the sills of windows used in place of skylights shall be at least three feet above the roof.

c. The provisions of this section shall not apply to stair shafts in multiple dwellings.

d. In all buildings which come under the exit provisions of the labor law, a skylight having an area of not less than fifteen square feet shall be provided over all stairs which extend into the top story. The walls of the enclosure below the skylight shall

extend at least two feet above the roof. Such skylights may be replaced by windows as provided in paragraph a of this section. The provisions of this paragraph d shall apply to all existing buildings to which the exit provisions of the labor law are applicable.

(10.5.5). § C26-642.0 Enclosure of the Bottom of Shafts.—The bottom of shafts, in buildings other than one or two-family residence structures, which do not extend to the ground, except vent shafts, shall be enclosed with materials having a fire resistive rating of three hours.

(10.5.6). § C26-643.0 Enclosures for Hoisting Machinery.—Any compartment, containing machinery, which communicates with a shaft enclosure shall have its enclosing walls constructed of materials or assemblies having at least the same fire resistive rating as the shaft enclosure with which it communicates.

(10.5.7). § C26-644.0 Numbers of Elevators in a Shaft.—When a bank of elevators is provided, three or less elevators may be placed in a common shaftway.

(10.5.8). § C26-645.0 Enclosure of Open Shafts.—Open shafts shall be enclosed with materials having a fire resistive rating as required for exterior walls, or with any other form of construction having a fire resistive rating of three hours and possessing proper weatherproof qualities.

(10.5.9.). § C26-646.0 Shafts.—Shafts not exceeding nine square feet in area. All shafts erected in any building, except class 1 fireproof structures, other than those occupied as schools and residence structures not exceeding six stories in height, which have a cross-sectional area of nine square feet or less, shall have at least a one-hour fire resistive rating if such shafts extend not more than three stories or forty feet above the basement or cellar, and shall have at least a two-hour fire resistive rating if such shafts extend more than three stories or forty feet but not more than six stories or seventy-five feet above the basement or cellar, except that any part of such shafts which extend into the cellar or basement shall be protected by materials or assemblies, having a fire resistive rating of at least three hours.

(10.5.10.1). § C26-647.0 Existing Hoistways.—a. Gates and Trapdoors—Any existing hoistway, elevator or wellhole not enclosed previous to January first, nineteen hundred thirty-eight, as provided in this title and not provided with fireproof doors, shall have the openings thereof through and upon each floor of any building provided with and protected by substantial guards or gates and with such good and sufficient trap-doors as may be directed and approved by the superintendent. When, in the opinion of the superintendent, automatic trap-doors are required to the floor openings of any unenclosed elevator, the same shall be constructed so as to form a substantial floor surface when closed, and so arranged as to open and close by the action of the elevator in its passage either ascending or descending.

(10.5.10.2). b. Enforcement of Section.—Except as otherwise provided by law, the superintendent shall have power and authority to require the openings of hoistways, elevators and wellholes in buildings to be enclosed or secured by trapdoors, guards or gates and railings.

(10.5.10.3). c. Guards, Gates and Trapdoors to Be Closed When Not in Use.—All guards or gates required by this section shall be kept closed at all times, except when in actual use, and the trapdoors shall be closed at the close of the business of each day by the occupant or occupants of the building having the use or control of such trapdoors.

Sub-Article 6. General Protectives

(10.6). § C26-648.0 Opening Protectives. — Opening protective assemblies required under this title shall be constructed as provided in this article.

Sub-Article 7. Protection of Exterior Openings

(10.7.1). § C26-649.0 Protection of Exterior Openings Required.—Every opening in the exterior walls of public and business structures more than forty feet high which opening is thirty feet or less in a direct line, but in a different plane, from any frame structure or from any opening in any other structure, or which opening is less than fifty feet in a vertical direction above a non-fireproof roof of an adjoining structure within a distance of thirty feet of the wall in which the opening is located, shall be equipped with an opening protective having a fire resistive rating of three-quarters of an hour, except that plate glass one-quarter of an inch thick may be used on the street fronts of such structures regardless of the separation from other structures. All windows shall be of automatic type or fixed sash type and all doors shall be self-closing.

(10.7.2). § C26-650.0 Materials for Exterior Window Frames and Sash.—When the height of a structure exceeds one hundred fifty feet, all exterior window frames

and sash shall be of incombustible materials throughout the full height of the structure.

(10.7.3). § C26-651.0 Protection of Openings in Walls of Garages and Similar Structures.—In structures to be used as garages, except as may be otherwise provided in the multiple dwelling law, including driveways and trucking spaces, motor vehicle repair shops or oil selling stations, all openings in exterior walls, except in the first story on street fronts, shall have automatic or self-closing doors with a fire resistive rating of one and one-half hours, or fixed or automatic fire windows or shutters. Oil selling stations five hundred square feet in area or less and any other structure whose exterior wall openings are so located that their protection is not required under the provisions of section C26-649.0 are excepted from the provisions of this section. In the discretion of the superintendent, private garages housing five cars or less used exclusively for non-commercial purposes may be exempted from the requirements of this section.

(10.7.4). § C26-652.0 Protection of Openings in Vestibules, Balconies or Bridges, or Adjacent Thereto.—a. Openings in vestibules, balconies or bridges that serve as horizontal exits, except as may be otherwise provided in the multiple dwelling law, shall have self-closing doors having a fire resistive rating of three-quarters of an hour, or fixed or automatic fire windows or shutters.

b. Window openings, where permitted, under and within thirty feet of or adjacent to such vestibules, balconies or bridges shall be protected by fixed or automatic fire windows or automatic fire shutters.

(10.7.5). § C26-653.0 Protection of Openings in Exterior Stairs, Fire Towers and Fire Escapes.—Door and window openings where permitted on exterior stairs, fire towers and fire escapes, or under or adjacent to exterior stairs or fire escapes, shall be protected by self-closing fire doors, or fixed or automatic fire windows or automatic fire shutters. Doors, windows and shutters in openings serving as means of egress to exterior stairs, fire towers and fire escapes shall be arranged so as to leave clear every exit.

(10.7.6). § C26-654.0 Protection of Openings in Smoke Houses.—At all openenings, smoke houses shall have self-closing doors having a fire resistive rating of one and one-half hours, or fixed or self-closing fire windows.

(10.7.7). § C26-655.0 Protection of Open Shafts.—In open shafts having a cross-sectional area at any point of thirty-six square feet or less, openings shall be equipped with protective assemblies having a fire resistive rating of at least three-quarters of an hour, except that this provision shall be inapplicable to such openings in shafts of private dwelling structures when such openings are three feet or more distant from any other structure.

(10.7.8). § C26-656.0 Fire Shutters to Open Readily.—When fire shutters are used in exterior openings, at least one row in every three vertical rows of shutters on front window openings shall be arranged to open readily from the outside. Distinguishing marks shall be provided on these shutters as may be required by the superintendent.

(10.7.9). § C26-657.0 Vertical Separation of Windows.—a. In business structures over forty feet high, exterior openings above the second story which are located vertically above one another shall have a space of at least three feet between the top of one opening and the bottom of the one next above. Such space shall be enclosed with materials having a fire resistive rating as required for exterior walls, or of any other form of construction having a fire resistive rating of three hours.

b. A maximum of one-third of the height of such enclosing materials may be replaced by wire glass in fixed metal sashes and trim, or other assemblies having equivalent fire resistive properties.

c. When there is a required horizontal exit through a fire partition no opening in such partition, whether or not a required means of egress, shall exceed four feet in width and seven feet six inches in height. Each such opening shall be equipped with a self-closing protective assembly having a fire-resistive rating or one and one-half hours.

(10.7.10). § C26-658.0 Closing of Protective Assemblies.—Protective assemblies on exterior openings, unless provided with approved automatic closing devices operative from either side, shall be closed except when required to be open. At the close of business each day, such assemblies shall be closed by the occupant or occupants of the structure having the use or control of such assemblies.

(10.7.11). § C26-659.0 Protection of Openings in Lot Line Walls.—All openings in walls erected on the lot lines shall be protected by fixed, self-closing or automatic-closing assemblies having a fire resistive rating of at least three-quarters of an hour.

Sub-Article 8. Protection of Wall and Partition Openings

(10.8.1). § C26-660.0 Protection of Openings in Fire Walls.—a. When there is no required horizontal exit through a fire wall, the maximum opening in such fire wall shall be eighty square feet, except that such openings when intended for the passage of motor trucks may be a maximum of one hundred forty square feet.

b. When there is a required horizontal exit through a fire wall, no opening in such wall, whether or not a required means of exit, shall exceed four feet in width and seven feet six inches in height.

c. The total width of all openings through a fire wall on any level shall be less than twenty-five per cent of the length of such wall and the minimum distance between such openings when not used as horizontal exits, shall be three feet, unless special permission is secured from the superintendent.

d. Each opening in a fire wall shall be equipped with an automatic or self-closing protective assembly having a fire resistive rating of one and one-half hours on each side of the opening, except that where there is a horizontal exit through a fire wall, all openings through such wall shall be equipped with an automatic protective assembly on one side normally held open by means of automatic attachments designed to close the door in the event of a fire, and a self-closing protective assembly on the other side, each having a fire resistive rating of one and one-half hours. Where there is no horizontal exit through any part of a fire wall and conditions are such that placing a door on each side of the opening would result in severe hardship, a door having a three-hour fire resistive rating may be accepted on one side of the opening by the superintendent, provided that automatic attachments are installed on each side of the opening in the fire wall in such manner that they will be actuated and will cause the door to close in the event of a fire on either side of the wall and provided no undue fire hazard exists. Overhead doors or shutters shall not be used for the protection of openings used as required means of egress.

e. All horizontal and vertical sliding doors and such swinging doors as are mounted on the face of the wall when used for the protection of openings in fire walls shall overlap the side and top of the opening at least four inches.

In buildings where the floor construction adjacent to the opening, including the wearing surface, is of incombustible material, and abuts the wall, or is extended through the opening, no special sill construction shall be required. Where the floor construction is not of incombustible material, sills constructed of steel angles bolted through the wall and extending at least six inches beyond each side of the opening and at least four inches out from the face of wall, having a thickness of not less than three-eighths of an inch, with the space between the angles on each side of the wall filled with portland cement concrete, shall be used. Other sill construction having equivalent resistance to the transmission of fire through the opening may be used where permitted by the superintendent.

Swinging doors closing into a rabbeted frame when used for the protection of openings in fire walls shall be installed with their frames as approved by the board.

Masonry at all wall openings shall be plumb and true and doors shall close snugly.

Bolts supporting sliding or rolling door tracks shall pass through the fire wall. Bolts supporting sliding or rolling door hangers shall pass through the door. Bolts supporting tracks shall be so located that a bolt shall be under each door hanger when the door is in the closed position.

Where stock or other material is piled close to a sliding door a substantial frame work shall be built at least two inches from the outside face of the door in such manner as to prevent the door being held open by material resting against it.

(10.8.2). § C26-661.0 Protection of Openings in Fire Partitions.—a. The only openings permitted in fire partitions except openings for ventilating ducts shall be those required for doors, and there shall be but one such door opening unless the provision of additional openings would not exceed in total width twenty-five per cent of the length of the wall, and the minimum distance between openings, when not used as horizontal exits, shall be three feet, unless special permission is secured from the superintendent. The maximum area for such a door opening shall be eighty square feet, except that such openings for the passage of motor trucks may be a maximum of one hundred forty square feet, and each such opening shall be equipped with an automatic or self closing protective assembly having a fire resistive rating of one and one-half hours.

b. When there is a required horizontal exit through a fire partition no opening in such partition, whether or not a required means of egress, shall exceed four feet in width and seven feet six inches in height. Each such opening shall be equipped with a self closing protective assembly having a fire resistive rating of one and one-half hours.

c. Openings not exceeding fifty square inches in area may be permitted in fire partitions when required for the passage of ventilating ducts, provided such ducts convey air for ventilation or air conditioning by means of forced circulation except that

openings for ventilating ducts not exceeding 48 inches in greatest dimension may be provided when such openings are protected by fire dampers conforming to the rules of the department and the ducts are constructed according to the standards of the National Board of Fire Underwriters for ducts passing through fire walls as contained in National Board of Fire Underwriters pamphlet No. 90 of August 1952. The ventilating or air conditioning system shall be provided with an effective means of detecting and controlling the spread of smoke in the system by stopping the fans of the system automatically. Devices used for detecting and controlling smoke shall be approved by the board and their installation and location shall be according to the rules of the board, or in the absence of such rules, according to the rules of the department. The smoke detecting and controlling equipment shall be maintained in operating condition at all times. Openings shall be provided with automatic fire dampers and shall not be less than three feet apart.

(10.8.3). § C26-662.0 Protection of Openings in Fireproof Partitions.—a. The only openings permitted in fireproof partitions enclosing publis hallways leading to required exits shall be those required for doors, except that openings from ventilating ducts shall be permitted if such openings are protected by automatic fire dampers conforming to the rules of the department, but the requirements of this section shall not apply to structures used exclusively as schools in which regular supervised fire drills are held.

b. Each such door opening shall be equipped with a self-closing protective assembly having a fire resistive rating of at least three-quarters of an hour except that when in the opinion of the superintendent there is no undue hazard present, he may permit in each such otherwise approved three-quarter hour rating door one or more wired glass panels of at least one-quarter inch thickness and total area of not more than seven hundred twenty square inches and where necessary for ventilation, he may permit a limited area of metal louvres but, in no case, shall this apply to door openings to required stair enclosures or to doors in horizontal exits.

c. Door openings five feet six inches or less in width, in partitions enclosing public hallways other than for stairs, elevators and horizontal exits, may be provided with self-closing doors of structural glass or other incombustible material when protected by automatic or self-closing fire door assemblies having a fire resistive rating of at least three quarters of an hour and an approved automatic sprinkler head on the room side and adjacent to such opening. Information window openings three square feet or less in area, whether or not provided with glazed assemblies, may be provided in such partitions when protected by automatic or self-closing fire door assemblies having a fire resistive rating of at least three quarters of an hour. In addition thereto an approved automatic sprinkler head shall be provided for the information window on the room side and adjacent to such opening. The minimum distance between any such openings described shall be four feet.

(10.8.4.1). § C26-663.0 Protection of Openings in Interior Shafts.—a. Protection of Openings in Vent Shafts.—Openings into vent shafts, except non-fireproof vent shafts, shall be equipped with protective assemblies having a fire resistive rating of one hour.

(10.8.4.2). b. Protection of Openings in Elevator Shafts.—Door openings into elevator shafts shall be equipped with protective assemblies having a fire resistive rating of one and one-half hours, except that where the elevator shaft opens into a vestibule constructed of materials or assemblies having a fire resistive rating of at least three hours and in which openings are protected by assemblies having a fire resistive rating of at least three-quarters of an hour, the openings into the elevator shaft shall be protected by assemblies having a fire resistive rating of at least three-quarters of an hour. It shall be unlawful to provide openings into such shafts other than window openings to the outer air and openings to elevator machinery rooms.

(10.8.4.3). c. Protection of Openings in Dumbwaiter Shafts.—Openings into dumbwaiter shafts shall be equipped with protective assemblies, having a fire resistive rating of three-quarters of an hour. When such protective assemblies are not equipped with locks and contacts as required by section C26-1139.0 they shall also be self-closing.

(10.8.4.4). d. Protection of Openings in Other Shafts.—Openings in shafts otherwise unprovided for in section C26-663.0, shall be equipped with self-closing protective assemblies having a fire resistive rating of one and one-half hours, except that where such a shaft opens into a vestibule constructed of materials of assemblies having a fire resistive rating of at least three hours and in which openings are protected by assemblies having a fire resistive rating of at least three-quarters of an hour, the openings into the shaft shall be protected by assemblies having a fire resistive rating of at least three-quarters of an hour.

(10.8.5). § C26-664.0 Protection of Openings in Cellar Partitions in Non-Fireproof Structures.—In non-fireproof structures, except structures occupied exclusively for residence purposes by one or two families, openings in partitions in any story more

than half below the curb, shall have self-closing protective assemblies having a fire resistive rating of one and one-half hours, or fixed or self-closing windows having a fire resistive rating of three-quarters of an hour.

(10.8.5.1) § C26-664.1 Protection of Lobbies and Stair Passageways Having Ventilating Systems.—Openings from ventilating ducts into the passageway, lobby or corridor, leading from the stairs to the street or other exterior exits, may be provided. Each such opening shall not exceed three square feet in area and the distance between any two openings shall not be less than three feet. Such openings shall be provided with automatic fire shutters conforming to the rules of the department. Ventilating systems employing recirculation of air which open upon lobbies, passageways or corridors leading from the stairs to the street or other exterior exits except ventilating systems which do not ventilate any other pars of the building, shall be provided with an effective means of detecting and controlling the spread of smoke in the system by stopping the fans of the ventilating system. Devices used for detecting and controlling smoke shall be approved by the board, and their installation and location shall be according to the rules of the board, or in the absence of such rules, according to the rules of the department. The smoke detecting and controlling equipment shall be maintained in operating condition at all times. Ducts opening on a lobby or stair passageway shall be enclosed in material having the same fire resistive rating as the stair enclosure for a distance of at least ten feet from the stair enclosure or to a partition having at least a one hour fire resistive rating, with a fusible link damper provided where the duct passes through such partition. The thickness and fire resistive rating of the material used to enclose the ducts shall be the same as that required for the protection of structural steel as specified in section C26-575.0 and as contained in the rules and approvals of the board. No openings shall be permitted in the fireproofing material enclosing the ducts within such distance. Branches entering the duct within this distance shall also be covered with material having a fire resistive rating the same as that required for the stair enclosures and as specified for the ducts opening on the passageway or lobby.

(10.8.6). § C26-665.0 Separation of Attached or Built-in Garages.—a. Where private garages are attached to, or form a part of a story within a residential structure of Class 3 non-fireproof construction, or Class 4, wood frame construction, walls, ceilings and floors enclosing such garages shall be separated from the remainder of the structure by assemblies having at least a one-hour fire resistive rating and all openings between the garage and the remainder of the structure shall be provided with self-closing or automatic protective assemblies having a fire resistive rating of three-quarters of an hour, except as may be otherwise provided in the multiple dwelling law. Where living quarters are located above such a garage, the egress facilities from such living quarters shall not pass through the garage.

b. Car ports shall be exempt from the requirements of this section.

Sub-Article 9. Interior Finish and Subdividing Partitions

(10.9.1). § C26-666.0 Restrictions on Use of Wood.—Wood or other combustible material may be used in the construction or interior finish of Class 1, fireproof structures, and Class 2, fire-protected structures, only as provided in this title.

(10.9.2). § C26-667.0 Permitted Uses of Wood or Other Combustible Materials in Class 1, Fireproof Structures, and Class 2, Fire-Protected Structures.—Wood and other combustible materials may be used in Class 1, fireproof structures, and Class 2, fire-protected structures, as follows:

(10.9.2.1). 1. Stair Enclosures.—Within stair enclosures, wood may be used only for handrails and, as permitted by subdivision a of section C26-273.0 for escalators, whether or not such escalators are used as required means of egress; and for door assemblies as permitted in paragraph six of section C26-667.0.

(10.9.2.2). 2. Floor sleepers, bucks, nailing blocks, and grounds. Floor sleepers, bucks, nailing blocks and grounds, if only the nailing surface is exposed, may be of wood. When floor sleepers of combustible material are used, the space between the floor construction and the wood flooring shall be filled with incombustible material, except that in Class 2, fire-protected structures, combustible floor sleepers may be used without filling in such space provided such floors are constructed in accordance with the provisions of section C26-615.0, b.

(10.9.2.3). 3. Interior Trim.—Wood flooring, interior doors and sash with their frames, trim and casings, and other interior wood and other approved combustible trim when backed solidly with fire resistive material may be used as provided in sections C26-721.0 through C26-723.0, and elsewhere than in stair enclosures, public hallways and passageways in Class 1, fireproof structures, one hundred fifty feet or less in height, and Class 2, fire-protected structures, but structures used exclusively as schools in which regular supervised fire drills are held shall be exempt from the restrictions of this section.

(10.9.2.4). 4. Wearing Surfaces.—

(a) Wearing surfaces one-half of an inch or less in thickness made of cork or rubber composition, linoleum, asphalt composition tile, or similar material having the same fire resistive qualities, when cemented to the upper surface of an approved type of fire resistive floor construction, may be used elsewhere than in stair enclosures. Where wood flooring is permitted such wearing surfaces may be cemented directly to the wood floor.

(b) Untreated wood finish flooring seven-eighths of an inch or less in aggregate thickness, when cemented or attached directly to the surface of an approved type of fire resistive floor construction, may be used elsewhere than in stair enclosures and corridors. In structures exceeding one hundred fifty feet in height a wood sub-flooring may be used to support such combustible finish flooring or such wearing surface as is permitted in the preceding paragraph, provided such sub-flooring and the sleepers supporting it shall be treated to render them fire resistive in accordance with the rules of the board.

(c) Untreated combustible insulation board in a single layer not to exceed one-half of an inch in thickness, when cemented or attached directly to the surface of an approved type of fire resistive floor construction, may be used elsewhere than in stair enclosures and corridors when covered by an incombustible wearing surface in accordance with the rules of the board.

(d) The use of asphalt tile shall be permitted for surfacing stairways in structures used exclusively as schools in which regular supervised fire drills are held.

(10.9.2.5). 5. Subdividing Partitions.—Subdividing partitions shall be made of incombustible material, or wood or other approved combustible material treated to render it fire resistive, except that in spaces without combustible occupancies requiring a permit from the fire commissioner, partitions made of a single thickness of wood or wood and glass may be used in Class 1, fireproof structures, one hundred fifty feet or less in height, and Class 2, fire-protected structures, to subdivide rooms or spaces five thousand square feet or less in area, except as provided in section C26-636.0, if separated from adjoining rooms or spaces, corridors, elevator and stair enclosures by fireproof partitions or walls made of incombustible material having a fire resistive rating of at least one hour.

(10.9.2.6). 6. Use of Treated Wood for Fire Protection.—

(a) Wood flooring treated in accordance with the rules of the board to render it fire resistive may be used elsewhere than in stairhalls and corridors.

(b) Wood window sash, frames and trim treated in accordance with the rules of the board to render them fire resistive may be used elsewhere than in stairhalls and corridors, except for exterior windows where otherwise provided in section C26-650.0.

(c) Wood treated in accordance with the rules of the board to render it fire resistive may be used for other interior trim elsewhere than in stairhalls or in corridors.

(d) Wooden doors with their frames and trim treated or protected in accordance with the rules of the board to render them fire resistive may be used in any location if they comply with the requirements of section C26-610.0 for such location.

(10.9.2.7). 7. Freestanding Moulding and Veneers.—

(a) Untreated wood may be used, except in stairhalls and required exit corridors, for freestanding mouldings have a cross-sectional area of two square inches or less and for face veneers, one-eighth of an inch or less in total or aggregate thickness, glued to treated cores or backing.

(b) Untreated wood veneers one-twentieth of an inch or less in thickness when mounted directly upon incombustible material may be used without restriction as to location.

(10.9.2.8). 8. Special Spaces.—Untreated wood trim in a single space on each floor of a structure over one hundred fifty feet high, provided such space is eight hundred square feet or less in area and is separated from the other parts of such floor by fireproof partitions.

(10.9.2.9). 9. Elevator Cabs.—Untreated wood trim may be used in elevator car enclosures in accordance with section C26-975.0.

Sub-Article 10. Use of Wired Glass in Doors

(10.10). § C26-668.0 Use of Wired Glass in Doors.—a. Doors for openings in fire walls shall be constructed without any glass.

b. Doors for openings in fire partitions may be constructed with glass provided they meet the fire resistive requirements for such doors, except that in structures used exclusively as schools, hospitals, museums and libraries, vision panels having a maximum total area of four square feet per door and divided into panes with a maximum area of one square foot per pane may be used.

c. Doors for openings in fireproof partitions may be constructed with a total maximum exposed area of wired glass of seven hundred twenty square inches.

d. Doors for openings in stair enclosures, except doors for openings of fire tower enclosures, may be constructed with vision panels having a total maximum exposed area of wired glass of one hundred square inches and a maximum dimension of twelve inches. Such vision panels shall be glazed with two thicknesses of wired glass, with an air space between.

e. All wired glass shall be at least one-quarter of an inch thick, enclosing a layer of wire fabric reinforcement. Such reinforcement shall have a maximum mesh of seven-eighths of an inch and the size of the wire shall be at least No. 25 steel wire gage, or shall be of equivalent fire resistive qualities. Such wired glass shall be set at least five-eighths of an inch into the frame.

Sub-Article 11. Fire Resistive Ceilings

(10.11). § C26-669.0 Fire-resistive Ceilings.—a. This section shall be inapplicable to private dwellings; except that in private dwellings, the ceilings immediately above and for at least two feet beyond all sides of any heating furnace or heating boiler shall be covered with galvanized sheet metal of not less than No. 16 U. S. gauge or with metal or gypsum lath and plaster, or two layers of three-eighths inch gypsum wallboard.

b. In class 3, non-fireproof structures, the ceilings of all stories below grade and over the lowest story, if such story is partially below the curb or surrounding ground level, shall be covered with metal lath and plaster, gypsum lath and plaster, gypsum wallboard and sheet metal one-half inch gypsum wallboard and one-eighth-inch thick hard asbestos cement composition sheets with joints covered with two-inch wide battens of the same material or approved metal strips, metal lath and vermiculite-gypsum plaster, metal lath and perlite-gypsum plaster, gypsum lath and perlite-gypsum plaster, or gypsum lath and vermiculite-gypsum plaster, or two layers of one-half inch gypsum wallboard separated by a twenty gauge, one-inch wire mesh, or other material having a fire-resistive rating of one hour. In class 3, non-fireproof structures erected before January 1, 1938, in which the classification by occupancy is thereafter changed to business, cellar ceilings, if not at such time of fireproof construction, shall be of materials or assemblies, having fire-resistive rating of at least one hour. Such a ceiling, however, shall not be required if the floor construction immediately above this lower story is of incombustible material having a fire-resistive rating of at least three hours.

c. The ceilings of motion picture theaters, or other structures for public assemblage, not required to be fireproof, as well as all rooms, entrances or exits used in connection therewith, shall have ceilings of five-eighths of an inch of unsanded gypsum plaster or vermiculite-gypsum plaster or perlite-gypsum plaster, or seven-eighths of an inch cement or sanded gypsum plaster on metal lath, measured from the face of the lath, or three-eighths inch perforated gypsum lath plastered with one-half inch of vermiculite-gypsum plaster or perlite-gypsum plaster, or three-eighths inch perforated gypsum lath with all joints covered with three-inch wide strips of metal lath and plastered with one-half inch of sanded gypsum plaster or two layers of one-half inch gypsum wallboard separated by a twenty gauge, one-inch wire mesh, or any form of construction having a fire-resistive rating of one hour as required by the rules of the board.

Sub-Article. 12 Roof Structures and Roofing

(10.12.1). § C26-670.0 Materials Required for Roof Structures and Roofing.—All construction, other than water tanks, placed, after January first, nineteen hundred thirty-eight, above the roof of any part of any structure within the fire limits or of any structure more than forty feet in height outside of the fire limits, shall be incombustible materials, except when otherwise specifically provided for in this title.

(10.12.2). § C26-671.0 Bulkheads.—a. The walls of any bulkhead erected after January first, nineteen hundred thirty-eight, on the roof of a fireproof structure shall be constructed of incombustible material having a fire resistive rating of one hour and shall be covered on the outside with material meeting the requirements of subdivision a of section C26-680.0, unless such bulkhead is constructed in accordance with sections C26-412.0 through C26-467.0.

b. The walls of any bulkhead erected after January first, nineteen hundred thirty-eight, on the roof of any non-fireproof structure may be of wood stud partition construction having a one-hour fire resistive rating and shall be covered on the outside with material meeting the requirements of subdivision a of section C26-680.0.

(10.12.3). § C26-672.0 Penthouses.—The exterior walls of penthouses (except panel walls) shall be constructed of incombustible materials or assemblies of materials having a fire resistive rating of at least two hours in class 1 and class 2 structures,

and one hour in class 3 and class 6 structures and shall be covered on the outside with material meeting the requirements of subdivision a of section C26-680.0, unless such walls are constructed in accordance with sections C26-412.0 through C26-467.0. When the exterior walls of penthouses are constructed in the form of panel walls, they shall comply with the requirements of section C26-446.0. Roofs of such structures shall be constructed of incombustible materials or assemblies of materials having a fire resistive rating of at least one hour.

(10.12.4). § C26-673.0 Doors and Windows.—Doors, door frames and windows in bulkheads or penthouses, except where otherwise specifically provided for, shall be constructed as other doors, door frames and windows similarly located in the structure.

(10.12.5). § C26-674.0 Greenhouses and Conservatories.—Greenhouses or conservatories may be erected on the roof of any structure provided only incombustible materials are used in their construction, and the floors of such structures are constructed as required for the other floors of the structure.

(10.12.6). § C26-675.0 Dormers.—Dormers erected after January first, nineteen hundred thirty-eight, shall be constructed in the same manner as the roof on which they are placed. The sides and top shall be covered with material meeting the requirements of section C26-605.0.

(10.12.7.1). § C26-676.0 Skylights.—a. Construction of Skylights.—The frame and sash of all skylights shall be constructed of metal, except that in structures in which corrosive fumes are present, wood frame and sash may be permitted in the discretion of the superintendent. The frames and other parts of the skylights shall be securely anchored to the supporting structure.

(10.12.7.2). b. Glazing of Skylights.—Skylights placed over shafts, including stairways, shall be glazed with plain glass three-sixteenths of an inch or less in thickness. The maximum area of any pane of glass used in such skylights shall be seven hundred twenty square inches. Skylights over places other than shafts shall be glazed with wired glass.

(10.12.7.3). c. Protection of Skylights.—Skylights in which plain glass is used shall be protected by wire screens placed between four and ten inches above the glazed portion of the skylight at all points. Such screen shall be of No. 12 steel wire gage, or heavier, wire; such screen shall have a mesh of between three-quarters of an inch and one inch; and such screen shall extend beyond the glazing on all sides of distance at least the height of the screen above the glazing. When any such skylight is located over any passageway, stairway, elevator or any occupied room a similar screen shall also be placed below the skylight.

(10.12.8). § C26-677.0 Scuttles. — Unless provided with some other means of access to the roof, every structure over fifteen feet high, except roofs with a pitch greater than twenty degrees from the horizontal, shall have a scuttle in the roof with a substantial ladder leading to such scuttle. Scuttles shall be covered on the top and edges with sheet metal or other approved incombustible material. Scuttle openings shall be at least two by three feet in size.

(10.12.9.1). § C26-678.0 Tanks.—a. Support of Tanks.—Tanks of more than five hundred gallons capacity placed, after January first, nineteen hundred thirty-eight, in or on any structure shall be supported on masonry, reinforced concrete or steel construction.

(10.12.9.2). b. Emergency Outlets for Tanks.—Every tank shall have in the bottom or on the side near the bottom, a pipe outlet, at least two inches in diameter, fitted with a suitable valve for discharging the contents in an emergency.

(10.12.9.3). c. Location of Tanks.—It shall be unlawful to locate a tank over or near a line of stairs or an elevator shaft unless there is a solid roof or floor underneath the tank.

(10.12.9.4). d. Tank Covers.—Unenclosed roof tanks shall have covers sloping at an angle of thirty degrees or more.

(10.12.9.5). e. Tank Hoops.—When hoops are used in the construction of tanks, such hoops shall be of metal round in section.

(10.12.10). § C26-679.0 Cooling Towers.—Cooling towers erected after January first, nineteen hundred thirty-eight, above any roof shall be of incombustible material, except the drip bars, which may be of wood.

(10.12.11.1). § C26-680 Roofing.—a. Materials for Roofing.—

1. Roofing placed on any structure shall meet the requirements of section C26-605.0, except as provided in section C26-539.0, and subdivision b of section C26-680.0.

2. The use of cork or fibre board as roof insulation is lawful provided such cork or fibre board is covered with an approved type of fire resistive roof covering applied directly thereto.

(10.12.11.2). b. Repairs to Roofing.—Any roof covering, existing on January first, nineteen hundred thirty-eight, of other than fire resistive material meeting the require-

ments of section C26-605.0, may be repaired with the same kind of material to an extent of twenty-five percent of its area in any one year.

(10.12.11.3). c. Replacement of Roofing.—All roof covering of other than approved fire retarding material shall be replaced on or before January first, nineteen hundred forty-seven with approved material, except as provided in section C26-539.0.

(10.12.11.4). d. Planking.—When wood planking or sheathing is used in roof construction, such planking or sheathing shall not extend across any lot line or party wall.

(10.12.12). § C26-681.0 Slanting Roofs.—a. Every mansard or other slanting roof having a pitch of more than thirty degrees placed on any non-fireproof structure over forty feet high shall be constructed in accordance with the provisions of sections C26-625.0 and C26-626.0.

b. Every mansard or other slanting roof having a pitch thirty degrees or less placed on any non-fireproof structure may be constructed of the same materials as the roof construction of the structure, provided the face and back of the mansard or slanting roof is covered with roofing material meeting the requirements of section C26-605.0.

(10.12.13.1). § C26-682.0 Cornices, Gutters and Half-Timbering Decoration.—a. Construction of Cornices, Gutters and Half-Timbering Decoration.—Cornices and gutters, including those on show windows, placed or replaced after January first, nineteen hundred thirty-eight, on the exterior of any structure except structures of frame construction, shall be of incombustible materials, except that wood half-timbering and other wood decorative treatment may be used on the face of masonry construction in structures of Class 3 and Class 6 construction that are less than forty-five feet in height. Such cornices and gutters shall be secured to the wall with metal brackets and anchors with a maximum spacing of four feet and extending at least four inches into the walls at the top and bottom.

(10.12.13.2). b. Repairs to Cornices, Gutters and Wood Decorative Treatment.—Any wood cornice or gutter, existing on January first, nineteen hundred thirty-eight, on other than frame structures, may be repaired with the same kind of material to the extent of fifty percent of its length in any one year.

Sub-Article 13. Fire-Stopping

(10.13.1). § C26-683.0 Fire-Stopping Required.—Structures, whether fireproof or non-fireproofed, shall have all concealed draft openings fire-stopped with incombustible material to form an effectual fire barrier between stories, and between the upper story and the roof space.

(10.13.2). § C26-684.0 Fire-Stopping of Openings for Pipes, Belts and Shafting.—a. Openings around exposed pipes, belts or power shafting shall be filled with incombustible material, or shall be closed off by close fitted metal caps at the ceiling and floor line or on each side of the wall. For non-fireproof construction, metal sleeves shall be provided in addition to the caps.

b. Openings for belts shall be provided with approved slotted doors or otherwise closed off. It shall be unlawful to pass belts through fire walls or fire partitions.

(10.13.3). § C26-685.0. Fire-stopping of furred walls, partitions and concealed roof spaces.—Walls, including masonry walls, furred with combustible material, and stud-bearing partitions, shall be fire-stopped with incombustible material at floors, ceilings and roofs. The fire-stopping shall extend from the ceiling to the under side of the flooring or roofing. Concealed roof spaces in class 3, non-fireproof structures, shall be cut off into areas of three thousand square feet or less by fire-stops. The space between any combustible wainscoting or panelling and the face of the wall or partition directly in back of such wainscoting shall be plastered or filled in solid with approved incombustible materials in a manner approved by the department. In class 3 structures, occupied for business purposes, where there are concealed roof spaces above such business occupancies, partitions separating the premises of one occupant from another shall be extended to the under side of the flooring or roofing. Such partitions shall be constructed of material approved for a one hour fire resistive rating.

(10.13.4). § C26-686.0 Fire-Stopping of Stairs.—Stairs, except in one and two-family residence structures, shall be fire-stopped between wooden stair carriages by headers at top and bottom. It shall be unlawful to locate closets beneath stairs, except in Class 1, fireproof structures, unless such closets are entirely lined with incombustible material. The under side of stairs of combustible material shall be covered with metal lath and plaster to a total thickness of three-quarters of an inch measured from the back of the lath, or with plaster board and a minimum of one-half of an inch of unsanded gypsum plaster, or one-half inch thick plaster board covered with one-eighth-inch thick hard asbestos cement composition boards with joints covered with a two-inch batten strip of the same material or approved metal strips, except where such stairs are enclosed by a partition of lawful construction as provided in article seven of this title.

(10.13.5). § C26-687.0 Fire-Stopping of Exterior Cornices.—On rows of frame structures, continuous exterior cornices built of wood or having wood frames, shall be fire-stopped at maximum intervals of twenty feet; if such cornices are non-continuous, they shall be built with closed ends and separated at least four inches.

(10.13.6). § C26-688.0 Materials for Fire-Stopping.—Fire-stopping shall be done with any of the following materials: brick, concrete, gypsum, asbestos, metal lath and cement or gypsum plaster, mineral wool, rock wool, or other approved materials.

Sub-Article 14 Fire Resistive Scaffolding and Construction Lumber

(10.14). § C26-689.0 Fire Resistive Scaffolding and Construction Lumber.—The board may make rules concerning the use of combustible materials for scaffolding and the use, during construction, of lumber treated to render it fire resistive.

Sub-Article 15. Fire Resistive Construction of Hospitals

(10.15) § C26-689.1 Enclosure of Rooms in Hospitals.—a. Regardless of requirements contained elsewhere in this chapter for the enclosure of public hallways or for the protection of openings on public hallways, patients' rooms or patients' wards and other rooms used directly in connection with and in the same section of the same floor with patients' rooms or patients' wards, in a recognized hospital, may be constructed with partitions of incombustible material without fire resistive rating. The lowest level of glazed openings where permitted, shall be at least forty-two inches above the surface of the floor. Nurses' stations not exceeding three hundred square feet in area, waiting spaces, lounges and recreation spaces provided for patients and visitors where such spaces do not exceed four hundred square feet in area, spaces used for the storage of not more than four litters and not exceeding one hundred square feet in area, and spaces used solely for public telephones, may be constructed without enclosures, or may be enclosed with metal and glass partitions or other enclosures of incombustible material. All other rooms and spaces not specifically excepted in this section, including storage closets, slop-sink closets and spaces in which medical supplies other than in nurses' stations and linens are stored, shall be enclosed as required by other provisions of this code.

b. Where a fire resistive rating of at least one hour is not required for the enclosure of rooms or spaces by the provisions of the preceding sub-division a of this section, doors may be omitted from openings to such rooms or spaces, whether or not such opening is on a public hallway, except that openings to patients' rooms or patients' wards shall be provided with doors but such doors shall not be required to be self-closing. Where doors are provided for such spaces they may be constructed of solid or veneered hardwood at least one and three-fourths inches in thickness throughout, except for glazed openings, or such doors shall be constructed of incombustible material or such doors may be constructed with an incombustible core except that stiles, rails and lock blocks not more than 5" wide of hardwood shall be permitted, covered with a wood veneering not more than one-tenth of an inch in thickness. Glazed openings shall be at least forty-two inches above the floor surface.

ARTICLE 12. HEATING APPLIANCES, COMBUSTION AND CHIMNEYS

Sub-Article 1. Heating Appliances

(11.1.1). § C26-690.0 Design and Installation of Heating Apparatus.—The design, installation and repair of heating apparatus shall be as required by this title and the rules of the board.

(11.1.2.1). § C26-691.0 Pipes for Steam and Hot Water Heating.—a. Contact of pipes with combustible material.

1. Except as provided in subparagraph 4 hereof, it shall be unlawful to make any contact between steam or hot water pipes and any woodwork or other combustible material.

2. Except as provided in subparagraph 4 hereof, steam or hot water pipes shall have a minimum clearance from any combustible material of one-half inch.

3. Except as provided in subparagraph 4 hereof, where steam or hot water pipes are located within one inch of any combustible material, such material shall be protected by a metal casing or lining and where such pipes pass through stock shelving, they shall be covered with at least one-half inch of insulating material. Steam and hot water pipe coverings shall be of fire-retarding material.

4. Subparagraph 1, 2 and 3 hereof shall not apply to hot water heating lines which incorporate an approved, non-tamperable temperature control device which has been set so that the water circulating in the pipes cannot exceed 160 degrees fahrenheit in temperature.

(11.1.2.2). b. Concealed Hot Water Piping.—Concealed hot water piping may be located in an outer wall in any structure, only when amply protected against freezing.

(11.1.2.3). c. Expansion and Contraction of Heating Pipes.—Heating pipes shall be so installed as to provide safety for all expansion and contraction.

(11.1.3). § C26-692.0 **Warm Air Pipes.**—Distributing pipes connected to warm air furnaces shall be kept at least one inch away from any woodwork, and if less than two inches away, the woodwork shall be protected by sheet metal covering or other incombustible material.

(11.1.4.1). § C26-693.0 **Furnaces and Boilers.**—a. Grate Areas Three Square Feet or More.—Furnaces or boilers having grate or burner areas of three square feet or more shall be set upon masonry foundations, which foundations shall rest upon incombustible construction or assemblies. Any such boiler operating at fifteen pounds pressure or more except a boiler of not more than thirty horsepower using gas fuel shall be enclosed in a room whose walls have a fire resistive rating of at least three hours and whose ceiling has a fire resistive rating of at least one hour.

(11.1.4.2). b. Solid or Gas Fuel in Grate Areas of Less Than Three Square Feet.—Furnaces or boilers using solid or gas fuel having grate or burner areas less than three square feet may be set on wood floors provided such furnaces or boilers rest upon foundations consisting of at least two inches of solid brick and four inches hollow tile, or the equivalent of these two materials, set on sheet metal plates at least as thick as No. 14 U. S. gage and at least twenty-four inches larger in all directions than the base of the boiler or furnace, if solid fuel is used, and six inches larger in all directions if gas fuel is used. Such tile shall be laid with open ends in contact. When solid fuel is used an ash plate or ash pan of metal at least as thick as No. 10 U. S. gage shall be provided above the foundation.

(11.1.4.2.1) bb. The board may adopt rules specifying the type of floor required under and around installations of fuel oil burning equipment. Such rules shall be adopted as the board may deem necessary and proper for the safety, protection and welfare of the city and its inhabitants.

(11.1.4.3). c. Water Cooled Base Boilers.—Boilers with water cooled bases having grate areas of less than three square feet may rest directly on sheet metal bases without any intervening masonry, provided the sheet metal is at least as thick as No. 14 U. S. gage.

(11.1.4.4). d. Spaces around furnaces and boilers *and other heaters.*

1. A clear working space of at least eighteen inches on the sides and twenty-four inches on the top shall be provided around all furnaces and boilers except that boilers, furnaces and other heaters using gas fuel, approved by the board and when installed in private dwellings which do not have a cellar, may be installed in accordance with the approval of the board. Such separation shall be maintained with respect to walls as well as pumps and other apparatus used in connection with the heating plant.

2. Combustible material shall be at least six feet away from the front, four feet away from the top and three feet away from the sides of furnaces or boilers, including enclosures. These separations may be reduced one-half when at least one and one-half inches of asbestos insulating material or its equivalent is applied to the furnace or combustible material. Boilers, furnaces and other heaters using gas fuel, approved by the board shall be installed with clearances from combustible material in accordance with the approval of the board.

3. Gas-fired window or wall-type vented recessed heaters approved by the board, including those which have sealed combustion chambers and which are so constructed and installed that all air for combustion is derived from outside of the building and all flue gases are discharged to the outside of the building, shall be installed with the clearances from combustible material in accordance with the approval of the board.

4. In rooms where fuel oil burning equipment is installed the ceiling shall be insulated with material or assemblies having a fire resistive rating of at least one hour and extending at least four feet on sides and rear, and eight feet in front of the furnace, except that in private dwellings No. 16 U. S. gage sheet metal may be substituted for one hour fire resistive rating protection. If the ceiling is constructed throughout so as to have a fire resistive rating of at least one hour the installation may be omitted.

However, the board may adopt rules prescribing fire protective measures and minimum spaces for and around furnaces, boilers or installations of fuel oil burning equipment. Such rules shall be adopted as the board may deem necessary and proper for the safety, protection and welfare of the city and its inhabitants. If the board shall adopt such rules, the provisions of paragraphs one, two and four of this subdivision shall not apply to such furnaces, boilers or installations of fuel oil burning equipment as are included within the purview of such rules.

(11.1.4.6). e. Connection of Furnaces and Boilers to Chimneys.—Every furnace or boiler shall be connected to a regulation chimney as classified under sections C26-703.0 through C26-713.0.

(11.1.4.7). f. Safety Valves on Steam Boilers.—Every boiler generating steam shall be equipped with a safety valve. Safety valves shall be adjusted and set to open under a lesser pressure than the maximum working pressure for which the boiler was designed.

(11.1.4.8). g. Relief Valves, Hot Water Systems.—Every closed hot water heating system shall be equipped with an approved pressure relief valve. Such pressure relief valves shall be adjusted and set to open at a pressure slightly higher than the normal operating pressure of the hot water heating system.

(11.1.5). § C26-694.0 **Boiler or Furnace Room Air Supply.**—Rooms in which boilers or furnaces are located shall have adequate fresh air supply to insure proper combustion. It shall be unlawful to make any direct connection of air inlets to the ash pits or combustion chambers of boilers or furnaces, except where forced draft is employed.

(11.1.6). § C26-695.0 **Stoves and Ranges.**—a. Cooking, laundry and heating stoves and combination coal and gas ranges installed in dwellings, shall be set on hearths supported by masonry trimmer arches extending at least six inches on all sides beyond such appliances, except that such appliances, when supported on legs furnishing an open air space of at least four inches below the bottom of the appliance, may be set on sheet metal of at least No. 24 U. S. gage, or other approved incombustible material.

b. It shall be unlawful to place any such appliances within twenty-four inches of wood stud partitions, wood furred walls or combustible material unless such appliances are protected by a shield of metal or other approved incombustible material so attached as to preserve an open air space behind such shield and to extend from the floor to twelve inches above and twelve inches beyond the sides of such appliances, in which case the appliance shall be placed at least six inches away from a wood stud partition, wood furred wall or combustible material.

c. Separation of Gas and Electric Ranges from Combustible Material.—1. Cooking top clearances.—Domestic gas and electric ranges shall have a vertical clearance above the cooking top to the bottom of shelves, cabinets, or other combustible material of not less than thirty-six inches. When the underside of the combustible material is covered with at least five-eighths of an inch of gypsum or portland cement plaster on gypsum or metal lath or clay tile set in cement or cement-lime mortar, or gypsum or asbestos board covered with sheet metal of not less than No. 28 U. S. gauge in thickness, or other material providing adequate fire protection satisfactory to the superintendent, the combustible material shall be not less than twenty-four inches from the cooking top. The vertical clearance from combustible material shall extend to a distance of not less than nine inches beyond the sides of the top burners or to the sides of the range, whichever is greater.

2. Separation of gas and electric ranges and ovens from combustible material.—(a) Gas and electric ranges and ovens that have been approved by a recognized testing laboratory shall be installed with clearances from combustible material not less than those specified by the manufacturer, except as provided in paragraph one of this subdivision.

(b) Domestic ranges not approved by a recognized testing laboratory shall have a clearance from combustible material of not less than six inches at the sides and back and where such range does not have top burners, there shall be a vertical distance of at least twelve inches between the top of the range and combustible material. Ranges in which the clearance between the base frame and the floor is two inches or less shall be set on a base of hollow clay tile four inches thick or its equivalent, extending at least two inches beyond the range on all sides. When such clearance is more than two inches but less than six inches, such ranges shall be set on a base of asbestos board three-sixteenths of an inch thick held between two sheets of metal at least No. 24 U. S. gauge and extending at least two inches beyond the range on all sides. When such clearance is more than six inches or the lower burners of the range are twelve inches or more above the floor measured from the burner ports, no protection shall be required.

(c) Vented products from recessed domestic ovens shall be conveyed through an incombustible vent pipe or duct to an opening in the outer surface of the cabinet or range or to the outer air. Clearances from the vent pipe to combustible material within cabinets shall not be less than twelve inches, and to the sides and back ten inches and from the bottom six inches unless the oven has been approved by a recognized testing laboratory for lesser clearances.

(d) Where the combustible material is protected as provided in paragraph one of this subdivision, one-half the clearances specified for ovens and ranges may be provided.

d. Stoves and ranges using solid fuel shall be connected by a smoke pipe to a regulation chimney.

(11.1.7.1). § C26-696.0 **Exhaust Vents on Gas Appliances.**—a. Vented Gas Appliances.—

1. The following gas appliances shall be connected to flues or outlet pipes:

(a) Every appliance used for domestic purposes using in excess of fifty thousand British thermal units per hour, except domestic gas ranges;

(b) Automatically controlled appliances using more than five thousand British thermal units per hour;

(c) Automatically controlled appliances using less than five thousand British thermal units per hour, which are not equipped with an effective device to shut off the gas supply to the main burner or burners automatically when the constantly burning flame or pilot flame is extinguished;

(d) Installation of Gas Appliances.—Gas appliances shall be installed in conformity with specification Z21.30 of nineteen fifty-four of the American Standards Association, which specification is entitled "Installation of Gas Piping and Gas Appliances in Buildings," except as otherwise specifically provided in this title. In addition, any gas appliance subject to the provision of section D26-3.10a or D26-3.10b of title D of this chapter shall be installed in conformity with the applicable requirements of such sections.

(e) Water heaters installed in bathrooms, bedrooms or any place not adequately ventilated.

(f) Except as provided in sub-paragraph (b) of paragraph 13 of subdivision a of section D26-3.10a, the provisions with reference to connection to flues or outlet pipes shall not apply to gas-fired window or wall type vented recessed heaters, approved by the board, which have sealed combustion chambers and which are so constructed and installed that all air for combustion is derived from outside of the building and all flue gases are discharged to the outside of the building at a distance of six feet or more from any window on the floor above the flue outlet. Such vented recessed heaters shall be installed in accordance with the approval of the board.

(11.1.7.2). b. Unvented Gas Appliances.—Gas appliances having vent outlets, but not requiring connection with flues or outlet pipes, may be left unvented; but if vented, they shall be connected to flues conforming to the requirements of this article, or to outlet pipes.

(11.1.7.3). c. Flues and Outlet Pipes for Gas Appliances.—

1. Flues and outlet pipes to which gas appliances are connected shall have cross-sectional areas at least equal to the aggregate areas of the vent outlets of the appliances connected to them, but in any case the least internal dimension or diameter shall be three inches.

2. Flues and outlet pipes for the venting of gas appliances shall be carried to and through the roof or through an exterior wall to the outer air. In all cases outlet pipes shall be surmounted by a suitable cap.

3. Flues shall be constructed as required for low temperature chimneys in subdivision b of section C26-710.0 or shall be type B gas vents approved by the board for venting of gas appliances. Such type B gas vents shall be installed in accordance with the terms of their approval, and the approval of the Underwriters Laboratories, Inc. and/or the American Gas Association.

Type B gas vents shall be vent piping of incombustible, corrosion resistant material of sufficient thickness, cross-sectional area, and heat insulating quality to avoid excess temperature on adjacent combustible material and shall be approved by the board.

Type B gas vents shall be used only with approved gas appliances which produce vent gas temperatures not in excess of 550 degrees F. They shall not be used for venting:

(a) Incinerators.

(b) Appliances which were designed to burn solid or liquid fuel or which may be converted readily to the use of solid or liquid fuel.

For the purpose of this provision approved gas fueled appliances when located in residences, including central heating boilers and furnaces with the exception of incinerators and conversion burners, may be accepted as producing vent gas temperatures not in excess of 550 degrees F. at the outlet of the drafthood.

Type B gas vents shall be plainly and permanently labelled to the effect that they are for use with appliances which burn only gas.

Type B gas vents shall be rigidly supported by strapping at each joint to insure the approved clearance from combustible material and to protect against damage to the vent.

Where a type B gas vent passes through a combustible floor or combustible wall, such passage shall be by means of an incombustible ventilating thimble or equivalent which will maintain the approved clearance from combustible construction, or where type B gas vents are of double wall construction and approved for passages through combustible floors and so ventilated, an unventilated thimble may be used for maintaining the approved clearance.

Where passing through occupied space, type B gas vents shall be suitably enclosed to prevent their being damaged. Such enclosure shall be of incombustible construction unless the board approves enclosures of other construction and specifies the clearance to be maintained between such other construction and the type B vents.

Type B gas vents shall extend at least 2 feet above the highest point where they pass through the roof of a building and at least 2 feet higher than any portion of the building within ten feet, except that gas vents need not comply with this provision when equipped with a vent cap approved by the board for the prevention of down-draft.

Materials of type B vent. The material used for the flue or vent shall be resistant to corrosion and shall be of sufficient thickness to withstand damage.

4. Outlet pipes shall be standard water, steam or soil pipe, or other approved incombustible, corrosion, resisting material so connected as to prevent leakage at the joints.

5. Outlet pipes shall be so installed that there is a clearance on all sides of at least three inches between such pipe and woodwork or other combustible material. It shall be unlawful to extend such outlet pipes through a floor.

(11.1.7.4). d. Installation of Gas Appliances.—Gas appliances shall be installed in conformity with the "requirements for House Piping and Appliance Installation" of the American Gas Association, fourth reprint, May first, nineteen hundred thirty-three, except as otherwise specifically provided in this title.

(11.1.7.5). e. Shut-off Devices for Gas Appliances.—Automatically controlled gas appliances which connect to flues or other heat producing devices shall be equipped with an effective device automatically to shut off the gas supply to the main burner or burners, when the constantly burning flame or pilot is extinguished. The connection of such gas appliance to the flue shall be at least nine inches above the connection of the other heat producing appliance or the smoke pipes or outlet pipes from the gas burning appliance and the other heat producing device may enter the flue through a single opening if joined together by a Y fitting located as close as practical to the flue. The angle of intersection between the branch and the stem of the Y shall not exceed 45 degrees. The area of the common outlet pipe shall not be less than the combined areas of the outlet pipes joined by the Y fitting.

Sub-Article 2.—Combustion

(11.2.5.1). § C26-701.0 Incinerator Combustion Chambers.—a. Installation of Incinerators.—Incinerators constructed as an integral part of a structure, for the reduction of garbage, refuse or other waste materials, shall be installed in accordance with the provisions of this section.

(11.2.5.2). b. Non-Fuel Fired Incinerators.—

1. Incinerators in which no fuel other than normal refuse is used for combustion, except that of a gas flame or similar means used to accomplish ignition, and in which the chute and smoke flue are identical, when installed in dwellings, public buildings and restaurants not over three stories in height, shall have the enclosing walls of the combustion chamber constructed of brickwork at least three and three-quarters inches thick when there is a horizontal grate area of nine square feet or less and at least eight inches thick when there is a horizontal grate area exceeding nine square feet, and, in each case, a lining of fire brick, at least four and one-half inches thick, with an air space, in the case of the thicker wall, between the brick and the fire brick sufficient to provide for expansion and contraction.

2. The combined chute and flue in structures over three stories in height shall be constructed as prescribed for smoke flues in section C26-706.0. Such chute and flue shall be constructed straight and plumb, and finished smooth on the inside.

3. Service openings into the chute shall be equipped with approved self-closing hoppers so constructed that the chute or flue is closed off while the hopper is being charged and that no part will project into the chute or flue. The area of the service opening shall not exceed one-third of the area of the chute or flue.

4. It shall be unlawful for any incinerator opening to open directly on a required means of egress unless such opening is cut off from such means of egress by a self-closing protective assembly having a fire resistive rating of at least one hour.

(11.2.5.3). c. Fuel Fired Incinerators.—

1. Fuel fired incinerators, whether the fuel is specially supplied or consists of refuse or waste material, shall have the enclosing walls of the combustion chamber constructed of brick at least eight inches thick and lining of fire brick at least four and one-half inches thick when the grate area is nine square feet or less, and with a lining of fire brick at least nine inches thick when the grate area exceeds nine square feet, all strongly braced and stayed with structural steep shapes; provided that the outer four inches of clay or shale brickwork may be replaced by a steel plate casing three-sixteenths of an inch in thickness. Such fire brick lining shall be laid in fire clay mortar.

2. The combustion chamber shall be located in a separate room or compartment

used for no other purpose, or in a room devoted exclusively to boilers and heating plant. In either case such room shall be separated from the rest of the structure by floors, walls and ceilings having a fire resistive rating of at least three hours. Openings to such rooms shall be protected with protective assemblies having a fire resistive rating of at least one and one-half hours.

3. The flue connections or breechings from the combustion chamber shall be constructed of No. 16 U. S. gage metal when twelve inches or less in diameter or greatest dimension and of No. 12 U. S. gage metal when they exceed twelve inches in diameter or greatest dimension. In addition they shall be lined with fire brick, laid in fire clay mortar, at least two and one-half inches thick when between twelve and eighteen inches in diameter or greater dimension, and at least four and one-half inches thick when they are larger. If they lead into and combine with flue connections or breechings from other appliances, such other connections or breechings shall also be lined as required for direct flue connection, unless the cross-sectional area of the connection into which they lead is at least four times their required cross-sectional area.

4. The clearance to woodwork or other combustible material or construction, on all sides of flue connections or breechings from the combustion chamber, shall be at least thirty-six inches; provided that when such woodwork or combustible construction is guarded by a metal shield backed with asbestos three-sixteenths of an inch thick, such clearance may be reduced to eighteen inches.

5. Refuse chutes, except when used exclusively for garbage disposal in dwellings, public buildings and restaurants, shall not feed directly to the combustion chamber, but shall discharge into a room or bin enclosed and separated from the incinerator room, by floors, ceilings, and walls of equal fire resistance to those required to enclose the incinerator room. The opening through which such material is transferred from such room or bin to the incinerator room shall be equipped with a protective assembly having a fire resistive rating of at least one and one-half hours.

6. Refuse chutes shall rest on substantial incombustible foundations. The enclosing walls of such chutes shall consist of brickwork at least eight inches thick or of reinforced concrete at least six inches thick. Such chutes shall extend at least four feet above the roof and shall be covered by a metal sky-light glazed with thin plain glass.

7. Service openings for chutes shall be located in separate rooms or compartments enclosed in walls or partitions, floors and ceilings, having a fire resistive rating of at least one hour. Such openings shall be equipped with approved fire doors or other approved devices.

d. It shall be unlawful to throw carpet sweepings containing naphthalene, camphor balls or flakes, floor scrapings, oil soaked rags, empty paint cans or any other inflammable or highly combustible substance into any incinerator chute or opening. There shall be continuously and conspicuously posted on every door opening into a space in which there is located any service opening into an incinerator and also on the wall directly over the hopper opening into such incinerator a notice containing the following:

"THROWING CARPET SWEEPINGS CONTAINING NAPTHALENE, CAMPHOR BALLS AND FLAKES, FLOOR SCRAPINGS, OIL SOAKED RAGS, EMPTY PAINT CANS OR ANY OTHER INFLAMMABLE OR HIGHLY COMBUSTIBLE SUBSTANCE INTO THIS INCINERATOR IS UNLAWFUL AND SUBJECTS THE OFFENDER TO A PENALTY."

e. All dampers on smoke breechings of incinerators shall be provided with adequate openings so as to prevent accumulations of gases.

(11.2.6). § C26-702.0 Drying Rooms and Dry Kilns.—Drying rooms or dry kilns constructed as an integral part of a structure shall be built entirely of incombustible materials. When the heating pipes are not placed overhead, they shall be so shielded as to be separated by at least two inches from the contents at all times.

Sub-Article 3. Chimneys

(11.3.1). § C26-703.0 Design, Construction and Use of Chimneys.—The design, construction, use, repair and inspection of chimneys and fireplaces shall be in accordance with the provisions of this title and the rules of the board.

(11.3.1.1). § C26-703.1 Prefabricated chimneys—Nothwithstanding the provisions of section C26-710.0c2. Prefabricated chimneys of refractory construction which are identified in the Underwriters Laboratories Guide No. 6011 3.13 and tested in accordance with their standards where thermal shock tests are conducted at 2,000° F and equilibrium tests at 1,800° F and which are listed by a nationally recognized testing laboratory and approved by the board are permitted for use together with their accessory connections such as elbows, tees, expansion joints breechings and other similar fittings on the appliances listed herein, when installed in accordance with the conditions of the approval of the board.

Interior chimneys shall be enclosed in all stories above the lowest one in which the equipment served thereby is located in incombustible walls with a fire rating of at least one hour, as approved by the board.

Connections to the chimney for additional heat producing appliances above the story of the lowest connected appliance shall be made by tee connections of the same construction as the main chimney and such tee shall extend at least one inch beyond he enclosure wall. Such opening for this connection shall be adequately firestopped. The enclosing wall shall be at least four inches away from such chimney. Multi-story venting shall be authorized only in accordance with the approval of the board.

Where the chimney passes through a combustible roof, it shall be protected by a ventilated roof thimble tested in accordance with the Underwriter Laboratories Standards established for this item and listed by a nationally recognized testing laboratory for specific use with this prefabricated chimney and as approved by the board.

Structural support and bracing of prefabricated chimneys shall be in accordance with this code and good engineering practice.

Chimneys supported at intermediate levels shall be supported on incombustible construction with a fire-resistive rating of at least three hours. This requirement is applicable to framing which supports the intermediate levels directly or indirectly.

The maximum unsupported height of a chimney shall not exceed the values as approved by the board.

Chimneys shall terminate at a distance above the roof in accordance with subdivision g of section C26-709.0, or subdivision b of this section C26-711.0 or subdivision g of section C26-710.0 of the Administrative Code, whichever applies for the attached appliance.

Notwithstanding any other provisions of this code, the provisions of this section shall apply to chimneys for use with: Apartment House Incinerators, Commercial-Industrial Incinerators, Annealing Furnaces, Steam Boilers over 100 cubic feet in size operating at over 50 psig pressure, other furnaces not exceeding 1,800° F exit temperatures, ventilating hoods as per section C26-712.0, and other appliances as listed under sections C26-705.0 and C26-706.0 of the Administration Code.

(11.3.2). § C26-704.0 Classification of Chimneys.—Chimneys shall be classified as:

1. Low temperature.
2. Medium temperature.
3. High temperature.

(11.3.3). § C26-705.0 Low Temperature Chimneys.—a. Chimneys constructed to convey products of combustion having a temperature of six hundred degrees Fahrenheit or less at a point of entrance shall be classified as low temperature chimneys.

b. The following heat producing devices shall be included among those requiring low temperature chimneys: bakers' ovens; boiling vats; candy furnaces; coffee roasting ovens; cooking ranges; core ovens; cruller furnaces; drying furnaces for spent materials; feed drying furnaces; fertilizer drying ovens; forge furnaces; gas producers; hardening furnaces (below dark red); hot air engine furnaces; hot air heating furnaces; hot water and low pressure steam heating boilers; japanning ovens; metal drying furnaces; lead melting furnaces; nickel plate furnaces; paraffine furnaces; rendering furnaces; rosin melting furnaces; stereotype furnaces; sulphur furnaces; type-foundry furnaces, wood drying furnaces; and wood impregnating furnaces.

(11.3.4). § C26-706.0 Medium Temperature Chimneys.—a. Chimneys constructed to convey products of combustion having a temperature of between six hundred and twelve hundred degrees Fahrenheit at the point of entrance shall be classified as medium temperature chimneys.

b. The following heat producing devices shall be included among those requiring medium temperature chimneys; charcoal furnaces; direct fire heated feed driers; direct fire heated fertilizer driers; direct fire heated pulp driers; galvanizing furnaces; hardening furnaces (cherry to pale red); porcelain biscuit kilns; smoke houses; steam boilers, other than low pressure heating boilers or gas-fired boilers designed to be operated with approved types of draft hoods which cause the products of combustion to be diluted with air; water-glass kilns; wood-distilling furnaces; and wood-gas retorts.

(11.3.5). § C26-707.0 High Temperature Chimneys.—a. Chimneys constructed to convey products of combustion having a temperature of over twelve hundred degrees Fahrenheit at the point of entrance shall be classified as high temperature chimneys.

b. The following heat producing devices shall be included among those requiring high temperature chimneys; annealing furnaces; blast furnaces; bone calcining furnaces; brass furnaces; carbon point furnaces; cement, brick and tile kilns; coal and water gas retorts; cupolas; earthenware kilns; gas blow furnaces; glass smelting furnaces; glass kilns; open hearth furnaces; ore roasting furnaces; porcelain baking and glazing kilns; regenerative furnaces; reverberatory furnaces; stacks, carburetor or superheating furnaces in water gas works; welding furnaces; and wood carbonizing furnaces.

(11.3.6). § C26-708.0 Unclassified Heat Producing Devices.—In doubtful cases the superintendent shall decide the grade of any heat producing device, being governed in his decision by the degree and amount of heat transmitted at the point of entrance to the chimney.

(11.3.7). § C26-709.0 Chimneys for Incinerators.—a. For non-fuel fired incinerators in which the grate area of the combustion chamber is nine square feet or less, the chimney walls shall be at least three and three-quarters inches thick and shall be lined with fire clay flue lining. It shall be unlawful to install more than three service openings in such a chimney or to use such chimneys in structures over three stories in height.

b. For non-fuel fired incinerators in which the grate of the combustion chamber exceeds nine square feet in area, the chimney walls shall be at least three and three-quarter inches thick and lined for a distance of at least thirty feet above the roof of the combustion chamber with four and one-half inches of fire brick; above this point the chimney wall shall be constructed with at least eight inches of brickwork.

c. For fuel fired incinerators in residence structures, institutional structures, churches, schools and restaurants, the chimney walls shall be encased as required for non-fuel fired incinerators with grates exceeding nine square feet in area, but the fire brick lining shall extend at least forty feet above the roof of the combustion chamber.

d. For rubbish and waste material incinerators, the chimney walls shall be encased in brick work at least eight inches thick and a lining of fire brick at least four and one-half inches thick laid in fire clay mortar for the full height of the chimney.

e. The connection of a fuel fired incinerator or a rubbish and waste material incinerator to a boiler stack or chimney for a high temperature heating device shall be permitted by means of an approved breeching, provided the cross-sectional area of such stack or chimney is at least four times that of the incinerator breeching.

f. The floor of the incinerator settling chamber shall consist of arches or slabs of incombustible materials or assemblies having a fire resistive rating of at least four hours and be at least six inches above any point of the roof adjacent to the settling chamber.

g. Chimneys for incinerators shall extend at least ten feet above the roof and terminate in substantially constructed spark arresters.

(11.3.8). § C26-710.0 Construction of Masonry Chimneys.—a. Construction of Masonry Chimneys.—

1. Masonry chimneys shall be built with solid walls of brick, stone or concrete or with perforated radial brick capable of withstanding high temperatures. Lining, when required, shall consist of fire brick or fire clay flue lining, except that sheet metal flue lining, enclosed in masonry, may be used for the repair or alteration of flues existing on January 1, 1938 in Residence Structures for sections other than vertical for fire place flues in Class 1, fireproof structures, and Class 2, fire-protected structures. Sheet metal flue lining shall be at least as thick as No. 16 U. S. gage for fireplace flues and at least No. 12 U. S. gage for other flues.

2. When metal flue lining is used, the eight feet immediately below the flue outlet shall be lined with sheet metal at least as thick as No. 10 U. S. gage or with terra cotta flue lining.

3. Masonry chimneys shall be provided with a cleancut opening equipped with tight fitting iron doors at the base of every flue other than fireplace flues.

(11.3.8.1). b. Brick Chimneys.—The walls of brick chimneys used for low temperatures shall be at least eight inches thick and shall be lined with fire clay flue lining, except that in dwelling house chimneys for ordinary stoves, ranges and fireplaces, the thickness of brick may be reduced to three and three-quarter inches and except that where boiler flues pass open fireplaces, the thickness of brick between flue lining and fireplace opening may be reduced to three and three-quarter inches. In multiple dwellings constructed before January first, nineteen hundred thirty-eight, the masonry walls of the chimney about the fire clay flue lining may be four inches in thickness. No existing brickwork may be used as any part of the four-inch wall. Such walls shall be constructed entirely new about the fire clay flue lining. Where not less than eight inches of masonry is provided about the flue lining, existing masonry may be used for the enclosure of the flue lining. All joints in chimneys shall be filled solidly with mortar. The space between the brickwork and the lining shall be filled with mortar as the brickwork rises. The brick shall be wetted sufficiently to form a good bond with the mortar. For medium temperatures the walls shall be at least eight inches thick, lined with an inner course of fire brick four and one-half inches thick laid in fire clay mortar or approved high temperature cement for the first fifty feet from the entrance. For high temperatures they shall be built with double walls, each at least eight inches in thickness with a minimum air space of two inches between them. The inside course of the interior walls shall be of fire brick laid in fire clay mortar or approved high temperature cement.

(11.3.8.2). c. Free Standing Radial Brick Chimneys.—Free standing perforat radial brick chimneys may be unlined when used for low or medium temperature provid the brick shall have a softening point of at least one thousand nine hundred ninety-fou degrees Fahrenheit (Segar Cone 03), shall be at least seven and one-half inches in radia thickness. The brick shall be shaped to the circular and radial lines of the variou sections so as to form even joints.

(11.3.8.3). d. Mortar and Joints in Chimneys.—Brick work shall be laid in spreac mortar, with all joints solidly push-filled. Exposed joints both inside and outside shal be struck smooth. Mortar used in chimney construction shall be cement mortar at leas equal in mixture to that required under subdivision d of section C26-313.0.

(11.3.8.44). e.

1. **Concrete Chimneys.**—Concrete chimneys cast-in-place shall be suitably re inforced vertically and horizontally. The walls shall be at least that thickness specifie for brick chimneys and shall be lined with fire clay flue lining.

2. **Precast masonry chimneys** of other thicknesses may be used when the cor ductivity of these chimneys having lesser wall thicknesses is equal to or less tha the conductivity of the standard concrete chimneys described in paragraph 1. Eac such precast masonry chimney shall be approved by the board. The board may requir such tests as it deems necessary.

(11.3.8.5). f. Stone Chimneys.—Stone chimneys shall have fire clay flue lining or metal where permitted by this section, and shall be at least four inches thicker tha required for corresponding brick chimneys, except that portions of stone chimneys e tending above the roof lines, when constructed of coursed ashlar, may be of the san thickness as required for brick chimneys. Rubble-stone chimney walls shall be at lea twelve inches thick.

(11.3.8.6). g. Extension of Chimneys Above Roof and Capping.—

1. Chimneys shall extend at least four feet above flat roofs and two feet abo the ridges of peak roofs when such peaks are within thirty feet of the chimney. T chimney shall be properly capped with stone, terra cotta, concrete, cast iron, or oth approved material.

2. Chimneys of cupola furnaces, blast furnaces and similar devices, erected aft January first, nineteen hundred thirty-eight, shall extend at least twenty feet above t highest point of any roof within a radius of fifty feet, except that chimneys of cup furnaces, used only occasionally for instruction purposes, in school structures, shall exte at least ten feet above the roof, and be covered on the top with heavy wire netting other approved spark arresters. It shall be unlawful to erect or place woodwork other combustible material or construction within three feet of any part of such a dev or its chimney.

(11.3.8.7). h. Fire Clay Flue Linings.—

1. Fire clay flue lining shall be manufactured from suitable refractory clay, eit natural or compounded, and shall be adapted to withstand high temperatures and action of flue gases. Such lining shall be of standard commercial thickness and at le five-eighths of an inch.

2. The flue sections shall be carefully bedded one upon another in cement mor with all joints left smooth on the inside. The masonry shall be built around each sect of lining as it is set in place, and all spaces between masonry and linings shall be co pletely filled with mortar. No cracked, broken or otherwise defective lining shall used. Flue linings shall start at least four inches below the bottom of smoke pipe inta and shall be continuous the entire height of the flue.

(11.3.8.8). i. Supports for Chimneys.—Chimneys shall not be carried directly indirectly on wood construction of any kind. In frame structures chimneys shall alw be built from the ground up, or rest on basement walls. Chimneys shall be prop supported to carry the weight imposed without danger of settling or cracking.

(11.3.8.9). j. Corbelling of Chimneys.—It shall be unlawful to use walls less t twelve inches thick to support a corbelled chimney. The maximum projection of belling shall be six inches from the face of the wall and, in all such cases, shall cor of at least five courses of brick. The corbelling of chimneys shall also conform to provisions of section C26-451.0.

(11.3.8.10). k. Separation of Flues.—Where more than one flue lining is insta within a chimney, the lining of each flue shall be separated, one from the other, b withe of cement grouting at least one inch thick, or by a division wall of brick or crete at least three and three-quarter inches thick. The cross-tie between flue lin thus established shall in all cases be adequate to give proper stability to the chim construction. Flues intended for heating furnaces or boiler connections shall be separ from other flues by a withe at least three and three-quarter inches in thickness.

(11.3.8.11). l. Smoke Pipe Intakes.—Smoke pipe intakes shall consist of fire clay or metal thimbles securely set in a chimney wall, or cast in concrete. Such openings shall be at least eighteen inches from wood or other combustible construction, except where such wood or combustible construction is protected in an approved manner by, incombustible insulation, in which case the distance shall be at least nine inches.

(11.3.8.12). m. Cleaning of Flues and Safety of Chimneys.—After a chimney has been completed, all flues shall be thoroughly cleaned and left smooth on the inside. Any chimney which may be dangerous in any manner whatever shall be repaired and made safe, or taken down.

(11.3.8.13). n. Framing of Wood Structural Members Around Chimneys.—It shall be unlawful to place any wood beams, joists or rafters within four inches of the outside faces of any chimney.

(11.3.8.14). o. Fire-Stopping Around Chimneys.—Spaces between chimneys and wood joists or beams shall be filled with loose cinders, loose mortar refuse, gypsum block, or other porous incombustible insulating material to form a fire-stop.

(11.3.8.15). p. Interior Woodwork Adjacent to Chimneys.—It shall be unlawful to place any wood furring, studding, lathing or plugging directly against any chimney or fireplace wall, or in any chimney breast. The space behind wood construction around chimneys and fireplace walls shall be solidly filled in with incombustible, heat resisting material. Plaster shall be applied directly on the masonry or on metal lath without the intervention of wood furring or studding. Furring, if used, shall be of metal or other incombustible material. Approved nail holding devices attached to the wall surface shall be used for nailing.

(11.3.8.16). q. Back Walls for Fireplaces.—The firebacks of fireplaces shall be of solid masonry at least eigth inches thick. A lining of firebrick or other approved material at least two inches thick shall be provided unless the fireback is twelve inches or more in thickness. It shall be unlawful to make any contact between solid woodwork and fireback walls.

(11.3.8.17). r. Trimmer Arches for Fireplaces and Chimney Breasts.—Fireplaces and chimney breasts shall have trimmer arches, or other approved fire resistive construction, supporting hearths. Such construction and hearths shall be at least sixteen inches wide measured from the face of the chimney breast and shall be of brick, stone, hollow tile, or other approved incombustible material. The length of trimmer arches and hearths shall be at least twelve inches greater than the fireplace opening. Wood centering under a trimmer arch shall be removed before plastering the ceiling beneath.

(11.3.8.18). s. Separation of Wood Mantels from Fireplaces.—It shall be unlawful to place any wood mantels or other woodwork within eight inches of the side or top of any open fireplace, or to use combustible summer pieces or fireboards.

(11.3.9.1). § C26-711.0 **Metal Chimneys.**—a. Thickness of Material in Metal Chimneys.—Metal chimneys shall be securely supported and all materials entering into their construction or serving as support shall be stressed within the working stresses fixed by this title. The metal work shall be riveted or welded and of adequate thickness, but at least as thick as No. 16 U. S. gage when the cross-sectional area is one hundred fifty-four square inches or less, or No. 14 U. S. gage when the cross-sectional area is between one hundred fifty-four and two hundred one square inches, or No. 12 U. S. gage when the cross-sectional area is between two hundred one and two hundred fifty-four square inches, and No. 10 U. S. gage when the cross-sectional area is more than two hundred fifty-four square inches. Cleanout openings equipped with tight fitting iron doors shall be provided at the base of every such stack.

(11.3.9.2). b. Extension of Metal Chimneys Above Roof.—Metal chimneys used for high temperatures shall extend to a height of at least ten feet above the highest point of any roof within a radius of twenty-five feet and shall also comply with the requirements of the second paragraph of subdivision g of section C26-710.0.

(11.3.9.3). c. Foundations for Outside Metal Chimneys.—Metal Chimneys erected after January first, nineteen hundred thirty-eight, outside and independent of any structure, shall be supported on substantial masonry foundations so designed that the maximum pressure for both dead and wind loads on the soil shall be two-thirds or less of the presumptive bearing capacity of the soil as indicated in section C26-377.0.

(11.3.9.4). d. Bracing and Clearances for Outside Chimneys.—Any metal chimney, or part thereof, erected after January first, nineteen hundred thirty-eight, on the immediate exterior of the structure it serves, shall be braced to such structure at least every twenty feet. Such chimney shall have a clearance of at least four inches from the walls of a fireproof or non-fireproof structure, eighteen inches from the walls of a frame structure, and a minimum clearance of eighteen inches in any direction from any wall opening, fire escape or other exit facility, unless such chimney is insulated in some approved manner, in which case the clearances herein provided may be reduced to an amount to be fixed by the superintendent when approving the insulation.

ADMINISTRATIVE BUILDING CODE

(11.3.9.5). e. Enclosure and Clearances for Inside Chimneys.—Any metal chimney, or part thereof, erected after January first, nineteen hundred thirty-eight, within any non-fireproof structure shall be enclosed in walls of solid masonry at least eight inches thick or, if in a fireproof building, such chimney or part thereof shall be enclosed in walls of approved masonry at least eight inches thick or at least four inches of solid masonry provided the stack is covered with at least two inches of approved incombustible insulating material. Where such chimney is less than twenty-four inches in its smallest internal dimension, it shall have a space left between the chimney and the enclosing walls sufficient to render the entire chimney accessible for examination and repair. The enclosing walls shall, in all cases, be without openings above the story at which they start. In any case the enclosing wall shall be at least four inches away from such chimney.

f. Clearances for Smoke Pipe or Breeching.—

(11.3.9.6). 1. (a) The minimum distance between any smoke pipe or breeching and any combustible material or construction shall be eighteen inches in the case of low temperature heating devices and thirty-six inches for medium or high temperature heating devices, except that, when such combustible material is protected with at least two inches of asbestos or in some other approved manner, such clearance may be reduced one-half.

(b) The board may adopt rules prescribing fire protective measures and minimum distances between smoke pipes or breechings and any combustible materials or construction. Such rules shall be adopted as the board may deem necessary and proper for the safety, protection and welfare of the city and its inhabitants. If the board shall adopt such rules, the provisions of item a of paragraph one of this subdivision shall not apply to such furnaces, boilers or installations of fuel oil burning equipment as are included within the purview of such rules.

2. It shall be unlawful to pass any smoke pipe through any floor.

(11.3.9.7). g. Smoke Pipes Passing Through Partitions.—Smoke pipes from low temperature heating devices, passing through combustible partitions, shall be guarded by a double metal ventilating thimble twelve inches larger in diameter than the pipe, or by a metal tube built in brick work or other approved fire resistive materials, at least eight inches thick on all sides of the tube.

(11.3.10). h. Underground Smoke Flues.—Underground smoke flues shall be covered with at least twelve inches of solid masonry or an approved equivalent insulation. If clean-out openings are installed they shall be provided with approved double iron doors or covers, of which the two parts shall be twelve inches apart, with the intervening space filled with insulating material. It shall be unlawful to lay combustible floorings over any such flues.

(11.3.11.1). **i. Warm Air Furnace Piping.—**

1. Intake and delivery ducts for warm air furnaces.—Intake and delivery ducts for warm air furnaces shall be of metal or other approved fire resistive material.

(11.3.11.2). 2. Clearance and Insulation for Warm Air Ducts Under Ceilings.—Warm air ducts placed under ceilings shall be at least six inches below wood floor beams, wood lath plaster ceilings, or other combustible materials, unless such combustible construction is protected by metal lath and plaster, or plaster boards of one-half inch asbestos, in which case the distance shall be at least three inches.

(11.3.11.3). 3. Insulation for Warm Air Ducts Through Partitions and Floors.—Warm air ducts or flues placed to pass through combustible partitions or floors shall be constructed double with a one and one-half inch air space open at one end, or shall be covered with approved incombustible insulation at least one inch thick.

(11.3.11.4). 4. Insulation for Warm Air Ducts in Partitions.—Warm air ducts or flues placed in combustible partitions shall be covered with one-half inch asbestos air cell covering or shall be constructed double with one-half inch air space. The asbestos covering or the outside pipe shall be at least one and one-half inches away from the woodwork. In lieu of such protection, four inches of brick work or concrete may be placed between the duct and woodwork.

(11.3.11.5). 5. Insulation for Warm Air Ducts in Floors.—Warm air ducts placed between the flooring and ceiling of non-fireproof floors shall be constructed double with a one inch air space. The outside pipe shall be at least two inches from any woodwork, unless such woodwork shall be covered with metal.

(11.3.11.6). 6. Insulation for Warm Air Ducts in Closets.—Warm air ducts or flues placed in closets or similar locations shall be constructed double with a one and one-half inch air space, or shall be covered with an approved incombustible insulation at least one inch thick. When constructed double, the outside pipe shall be at least No. 18 U. S. gage and at least one inch from any woodwork.

(11.3.11.7). 7. Insulation for Warm Air Ducts Adjacent to Interior Woodwork.—No casing, furring, or wood lath shall be placed against or cover a warm air duct of any

kind; but woodwork may be placed on a covering of such ducts of metal lath and plaster plaster board and one-half inch of plaster or asbestos if the thickness of the cover is a least seven-eighths of an inch.

(11.3.11.8). 8. Warm Air Registers.—Warm air registers placed in any woodwork or combustible floor shall rest upon stone or iron borders firmly set in plaster of Paris or gaged mortar. Register boxes used in any such heating system shall be made of tin plate or galvanized iron with a flange to fit the rabbet in the border. The register box shall be enclosed in a tin or galvanized iron casing turned under the border and placed at least two inches from the sides of the box. Such casings shall extend from the border to and through the cellar or basement ceiling in the case of a first floor register, and through the partition in the case of a wall register. When a register box is placed in the floor over a portable furnace, the space on all sides between the casing and the register box shall be at least four inches. Every warm air furnace shall have at least one register without a shut-off of any description.

(11.3.11.9). 9. The clearances in an approved automatically fired, forced air heating system having air temperature at the furnace outlet limited not to exceed 200° F. shall be at least one inch from any combustible material at the top and sides of the bonnet or plenum and, for the duct, at least one inch for a distance of three feet from the bonnet or plenum. The foregoing shall apply regardless of any provision of this subdivision to the contrary.

10. The standards of the national board of fire underwriters for the installation of residence type warm air heating and air conditioning systems, N.B.F.U. No. 90B, as recommended by the national fire protection association, shall apply when furnace outlet temperature does not exceed 200° F.

(11.3.12). § C26-712.0 Ventilating Hoods.—a. Ranges, candy kettles, cruller furnaces and appliances for the frying of bakery or confectionery products, except ranges in dwellings, shall be provided with ventilating hoods and pipes to take off the smoke, gases and vapors, unless such appliances are enclosed and vented in an approved manner.

b. Such hoods shall be six and one-half feet or less above the floor. The width and breadth shall be at least those of the appliance served thereby.

c. Such hoods and their pipes shall be constructed of incombustible materials. The pipes shall be connected with independent masonry flues, constructed as required for smoke flues for low temperature heating devices, provided that in structures erected before January first, nineteen hundred thirty-eight, when such masonry flues are unavailable, they may be connected with independent metal chimneys outside the structure. In any case such flues or stacks shall be used only for the ventilation of such hoods. All the hoods in a single room or kitchen may be connected to a single flue.

d. Such hoods shall be installed with the clearances required for smoke pipes. When the pipe from such a hood passes through a partition, it shall be protected as required for smoke pipes.

e. The system of hoods, vent pipes, flues and ducts shall be provided with grease filters or other similar devices approved by the board of standards and appeals so installed as to prevent the accumulation of grease within the vent system, or with approved fire extinguishing equipment. Such fire extinguishing equipment shall conform to the requirement of subsection c of section C19-165.3. The provisions of this subdivision e shall apply to all existing installations.

(11.3.13). § C26-713.0 Adjoining Chimneys.—When any stacks, chimneys or flues are carried up as provided in section C26-570.0, the internal areas of the new portions shall be at least equal to the internal areas below.

Sub-Article 4. Clearance of Cooking Space Fittings from Cooking Ranges

(11.4). § C26-714.0 Clearances of Cooking Space Fittings from Cooking Ranges.—Cooking space cabinets of wood or other combustible material installed adjacent to cooking ranges, shall have the clearances specified for domestic gas ranges in section C26-695.0. Any woodwork or other combustible material less than three feet above the range shall be covered on the under side with sheet metal at least as thick as No. 29, U. S. gage, backed with asbestos mill board at least three-sixteenths of an inch thick, but in any case the clearance shall be at least two feet.

ARTICLE 13. SPECIAL OCCUPANCY STRUCTURES

Sub-Article 1. General Provisions for Special Occupancy Structures

(12.1.1). § C26-715.0 Application of Requirements for Special Occupancy Structures.—a. Every structure or part of a structure, intended to be used for entertainment or instruction of any kind, erected after January first, nineteen hundred thirty-eight, for the accommodation of more than three hundred persons, shall be built to comply with the requirements of this article, except as otherwise provided in sections C26-281.0, C26-719.0, and C26-720.0. Structures occupied exclusively by an elementary grade school, high school, or other strictly educational institution where students are enrolled for regular courses of study, shall be exempt from the requirements of this article, except that the auditoriums of such structures shall comply with this article. It shall be unlawful to use for public entertainment or instruction of any kind, any structure or part of a structure, which on January first, nineteen hundred thirty-eight, is not in actual use for such purposes, or to use any structure erected after January first, nineteen hundred thirty-eight, not in conformity with the requirements of this article until such structures conform to this article.

b. For the purposes of this section the existence of a valid certificate of occupancy shall constitute actual use.

(12.1.2). § C26-716.0 Approval of Special Occupancy Structures Required.—It shall be unlawful to open any structure described in section C26-715.0, to the public for theatrical or operatic purposes, or for public entertainment or instruction of any kind, until the superintendent and the fire commissioner shall have stated in writing that the structure conforms to the requirements of this article. Any such structure in which departure from the provisions of this article has been made under an approval of the superintendent or of the board, and which, previous to May first, nineteen hundred sixteen, had been duly approved for use, may be approved as conforming to the requirements of this article, so long as it is deemed reasonably safe by the superintendent. It shall be unlawful for the superintendent to approve any structure when the courts have held that a permit for the alteration or reconstruction of such structure is void.

(12.1.3). § C26-717.0 Limitations on Use and Occupancy of Special Occupancy Structures.—a. It shall be unlawful to occupy or use any part of a structure, constructed or used for the purposes described in section C26-715.0, for factory or storage purposes, or for any occupancy or use for which a combustible occupancy permit is required.

b. It shall be unlawful to perform any kind of construction above the stage area of a structure constructed or used for the purposes described in section C26-715.0 unless the construction of the roof or uppermost tier above the stage area shall be separated from the structure above by four-hour construction capable of sustaining a live load of not less than 150 pounds per square foot and at least 100 pounds per square foot in excess of the otherwise required design load; and that the tier above the stage area shall not be pierced except by vent flues constructed according to the provisions of section C26-724.0 or by steam, water or plumbing pipes. Such pipes shall be run through individual pipe sleeves set in the slab, and the space between the sleeve and the pipe shall be packed solidly with mineral wool, and the sleeve shall be covered at top and underside of the slab by flat metal plates fitted snugly to the pipe, secured to the floor construction or to the sleeve. The enclosure of the stage vent flue or flue for stage skylight shall comply with the requirements for a low temperature chimney, section C26-710.0, b.

c. The space under the stage shall be used only as an accessory to and part of the stage proper, except as otherwise provided in this article. Other parts of any such structure including the area over the auditorium, may be used for any purpose not otherwise forbidden in this title, provided that:

1. The parts so used are separated from the theatre by unpierced walls and floors having a fire resistive rating of at least four hours and are constructed throughout in compliance with the requirements of section C26-239.0, and the means of egress from the parts so used are entirely separate from the means of egress from the theatre portion of the structure;

2. All openings in the walls of the structure facing the stage area for the first one hundred feet above the roof of the stage are provided with self-closing doors or automatic windows, containing either plate or wired glass, and having a fire resistive rating of at least three-quarters of an hour;

3. The edge of the stage skylight is located at least six feet from any wall of the structure facing the stage area;

4. Any part used as a multiple dwelling complies with the multiple dwelling law as to such part of the structure;

5. All ducts, pipes, conduits and similar facilities which may be required for servicing the occupancy above or below the auditorium are confined to spaces outside of the auditorium walls, and crossovers or horizontal lines of these facilities are also confined to spaces outside of the unpierced four-hour floor or wall.

d. The space below the auditorium and other portions of the theatre where separated by construction having a fire-resistive rating of at least four hours may be used for occupancies not in conjunction with special occupancies, provided such occupancies are such as not to require a combustible occupancy permit, and provided such space is separated from the special occupancy by construction as provided for occupancies above auditoriums.

(12.1.3.1). § C26-718.0 Certificate of Occupancy for the Use of the Roofs.—It shall be unlawful to use the roof of any structure, including factories and multiple dwell-

ings, for witnessing contests, games, exhibitions, amusements or similar spectacles, or as a place of public assembly for any purpose, unless such structure or such part thereof has been designated in its certificate of occupancy as a place to be used for such purposes.

(12.1.4). § C26-719.0 **Structures Used for Religious Purposes.**—a. The means of egress from auditoriums used for religious purposes shall comply with the provisions of article seven of this code.

b. Balconies within such auditoriums shall comply with section C26-732.0, and section C26-735.0.

c. The means of egress from rooms and spaces used for purposes of religious worship, instruction or recreation, other than the auditorium portion of such structure, shall comply with article seven of this title.

(12.1.5). § C26-720.0 **Auditoriums in School Structures and Public Museums.**—a. Auditoriums in school structures and public museums shall comply with the provisions of section C26-1381.0 in respect to standpipes.

b. Auditoriums in school structures and public museums which are without provision for stages, scenery, dressing rooms or other theatrical accessories shall be exempt from the requirements of this article.

c. Auditoriums in school structures and public museums with provisions for stages, scenery, dressing rooms or other theatrical accessories shall be exempt from the requirements of this article, provided that:

1. The entire structure is occupied as a school primarily for the education of children in the elementary or high school grades or as a public museum;

2. The exit facilities for the auditorium comply with all of the requirements for means of egress prescribed in article seven of this title, except that the arrangement of fixed seats shall comply with section C26-729.0, and the arrangement of aisles with section C26-738.0;

3. The stage is enclosed on both sides and rear with partitions having a fire resistive rating of at least four hours, openings in these partitions are protected by means of protective assemblies having a fire resistive rating of at least three-quarters of an hour, and the proscenium opening is equipped with a single asbestos fibre curtain approved by the superintendent;

4. Scenery, drops and valances are of incombustible material or are treated so as neither to ignite nor actively support combustion;

5. A complete system of automatic sprinklers is installed in dressing rooms, property rooms, wardrobe rooms and under the stage roof; a line of automatic sprinklers is provided over the proscenium opening on the stage side of the asbestos curtain; and the sprinkler system is supplied from either the house water supply system or a separate source of supply, which will give the required volume at a pressure of at least fifteen pounds per square inch at the highest line of sprinklers;

6. Dressing rooms, wardrobe rooms, property rooms and any carpenter shops are located outside of the fire resistive partitions enclosing the stage; these rooms are enclosed in partitions having a fire resistive rating of at least three hours and openings in such partitions are equipped with protective assemblies having a fire resistive rating of at least three-quarters of an hour;

7. An automatic skylight, of five percent of the area of the stage between the enclosing partitions and the asbestos curtain line, is installed in the roof over the stage, or if such skylight is impracticable, a vent duct, or ducts, of like area is extended from the top of the stage to a point above the roof. If ducts are installed, they may be either open or provided with plain glass dampers held closed by means of fusible links, and having three-quarters inch or smaller mesh wire screens immediately below as approved by the superintendent;

8. Such hand fire-extinguishing equipment as the superintendent may deem necessary is installed;

9. The handling of curtain, scenery, spotlights and other electrical equipment is done by trained adults;

10. Sufficient adult ushers are employed to handle the audience properly; pupils are not used as ushers;

11. Matches, open flames, torches, pistols, fire crackers or any devices producing an exposed spark or flame are not used;

12. All persons admitted to the auditorium are furnished with seats;

13. No seats, chairs, stools or other furniture are placed in any aisle or passageway leading to a means of egress.

14. Dry foliage, flowers and branches are used as stage setting or scenery only when so treated as to neither ignite nor support combustion.

Sub-Article 2. Construction of Special Occupancy Structures

(12.2). § C26-721.0 **Construction of Special Occupancy Structures.**—a. Every

structure intended to be used for public entertainment as stated in section C26-715.0 shall be a class 1, fireproof structure, except as otherwise specifically provided in this article and except that a theatre having a seating capacity of six hundred people or less may be of class 2, fireprotected construction, within the limitations of section C26-254.0.

b. It shall be unlawful to cover any of the walls or ceilings of such structures with combustible material, except that regardless of the height of the structure, wood wainscoting not over six feet in height may be used in the auditorium, orchestra pit, lobbies, foyers and promenades and wood flooring may be used in the auditorium and stage when the space behind the wainscoting or between the floor arch and the flooring is filled solidly with incombustible material, and except that, regardless of the height of the structure, combustible wall coverings may be used when pasted or cemented directly to the plaster surface and that combustible fabrics not pasted or cemented directly to the plaster surface may be used, if such fabrics are so treated that they will neither ignite nor actively support combustion and are tested to insure compliance with the rules of the board and provided such fabrics have one inch lap seams for each panel, and except that wood or other combustible material in the form of a veneer one-twentieth of an inch or less in thickness may be used as a wall covering.

c. Screens for the projection of motion, audible or sound, or television pictures shall be either made of incombustible material or treated so as neither to ignite nor actively to support combustion.

d. Notwithstanding any other provisions to the contrary in this article, combustible trim and decorations may be used in outer lobbies which open directly to the street, also in outer vestibules which are separated from the street by not more than two sets of doors and which are completely separated from the auditorium by fireproof doors and used solely for entrance and egress and which do not connect directly with rooms or stairways serving the auditorium provided:

1. That the aggregate area and width of said lobbies and vestibules shall not be encroached upon nor reduced below legal requirements.

2. That the said trim or decoration is closely attached to the masonry or plaster surface forming the enclosure of said lobbies or vestibules and that all spaces behind said trim or decoration are solidly filled with gypsum plaster or its equivalent.

3. That no portion of said trim or decoration projects more than 12 inches in front of the enclosure walls of said lobbies or vestibules.

4. That printed or painted advertising matter that may be displayed is kept behind tight glass enclosures or, if in the open, the same is not more than 3/16ths of an inch in thickness and is completely flame proofed in accordance with rules of the board, and is placed so as not to obstruct free entrance or egress.

e. In the case of any existing theatre on which there was on May 6, 1941 display advertising in the nature of ground signs or false fronts beyond the building line, such display advertising shall conform to the provisions hereinafter enumerated or shall be removed, or removed and replaced by display advertising conforming with the provisions hereinafter enumerated.

1. That the same does not extend at any point more than eight inches beyond the street wall of the building, that the same shall not extend above the bottom of the window sill of the second floor, and that no existing openings in the wall shall be covered by this construction, and that Siamese connections to the sprinkler and the standpipe (fire line) and ammonia Siamese connections shall be unobstructed.

2. That the same is constructed of material at least three-sixteenths inch in thickness and adequately siffened and attached directly to the street wall or other incombustible backing.

3. That all of the provisions of sections B26-5.0 to B26-19.0 inclusive, shall apply so far as not inconsistent herewith.

f. Theatres designed and used exclusively for the display of motion, audible or sound, or television pictures, and without stage, dressing rooms or scenery of any kind and without a platform exceeding ten feet in depth shall not be required to comply with section C26-724.0 through section C26-727.0 of this article. The platform shall be of fireproof construction, but may be covered with wood flooring. Sets, decorations or scenery are not to be used on such platforms. The use of furniture shall not be prohibited.

Sub-Article 3. Stage

(12.3). § C26-722.0 **Stage; General.**—a. That portion of the stage floor extending from each side of the proscenium opening to the enclosure walls and from the stage side of the proscenium wall to the front edge of the apron shall be of construction having a fire resistive rating of at least four hours. Regardless of the height of the structure, untreated wood flooring may be used on the stage floor. For a width of six feet more than the proscenium opening, the stage may be constructed of wood.

The term stage shall not include an unenclosed raised platform placed on an ope floor as described in section C26-141.0 of the Administrative Code.

b. The stage shall be separated from the auditorium by a fire wall of solid masonr extending from the foundation to at least four feet above the stage roof or the auditoriu roof if the latter be the higher. Such walls may be offset in the manner described in sectio C26-632.0.

c. Such wall shall be without openings above the stage level, except the prosceniu opening and one door opening on each side of the stage at the stage level. Three doo openings may be provided in this wall below the stage level. Door openings shall be thr feet or less in width. Only one duct may be provided on each side of the proscenium wa under the stage provided with a fire damper on each side of the wall if the duct for te feet on each side of the opening in the proscenium wall is of construction having a fi resistive rating of at least three hours.

d. The apron of the stage shall be located between two and seven feet from th curtain line. Platforms, extending along a portion or all of the stage, adjacent to c contiguous with the stage, constructed of incombustible material, for the operation d cameras and electronic equipment for television programs may be constructed in fron of such stage aprons provided that required aisles and exits are maintained unob structed and that electrical equipment has been approved by the Department of Wate Supply, Gas and Electricity. Such platforms may be used with scenery or properti or both for television programs only when in compliance with the foregoing and fo lowing provisions:

1. All such scenery, including but not limited to drapes and curtains, shall b made of incombustible material, or shall be treated so as neither to ignite nor activel support combustion, or shall be flame-proofed in accordance with the requirement of section C19-161.1 of the code;

2. All such scenery shall be placed not less than four feet from any seats occupie by the public;

3. Portable fire extinguishing appliances shall be provided as may be directed b the fire commissioner; and

4. The area of the asbestos curtain fall shall remain free and clear.

e. Door openings from underneath the stage to the auditorium and from under th stage to pipe passages and plenum chambers shall be protected on each side of the wal with a self-closing door, having a fire resistive rating of at least three-quarters of an hour arranged to open from either side of the wall. Door openings from the stage to the pi shall be protected with single self-closing doors, having a fire resistive rating of at leas three quarters of an hour, arranged to open from either side of the wall.

f. The space underneath the stage shall be subdivided, at the sides of the proscenium opening, by solid masonry walls having a fire resistive rating of at least three hours extending from the proscenium wall to the rear wall of the stage, and from the ground to the under side of the stage floor, and so located that the distance between these walls shall not be more than six feet greater than the width of the proscenium opening.

g. Openings in these walls shall be equipped with self-closing doors having a fire resistive rating of at least one hour.

(12.3.1). § C26-723.0 Mechanically Operated Stages.—Where at least one-half of the area of the stage between the proscenium opening, the curtain line and the back wall is equipped with a stage elevator or platform electrically or hydraulically operated, the space below the stage floor on each side of the stage may be used as a fireproof vault to receive scenery assembled on trucks, provided the following conditions are met:

1. Such vaults are entirely enclosed by fire walls, floors and ceilings unpierced by pipes, conduits, ducts or electrical apparatus, and having a fire resistive rating of at least four hours;

2. The doorways opening from such vaults are protected by fire doors having a fire resistive rating of at least one and one-half hours, operated mechanically in conjunction with the stage elevator or platform so that such doors can be opened only when the stage or platform is fully lowered, and closed automatically when the stage elevator or platform is at the stage level;

3. The area of such vaults is fifty percent or less of the floor area of the stage elevator or platform;

4. Where more than one such vault is constructed, adjoining vaults are separated from each other by walls having a fire resistive rating of at least four hours;

5. Each such vault is ventilated by an open flue starting at the ceiling of the vault and terminating within five feet of the main stage skylight; where such flues are installed the skylight is erected so that an automatic device will be located in each flue to open the skylight in case of fire; a protective wire mesh screen which will reject a ball one-half inch in diameter is placed immediately below the ceiling outlet of each such flue; the area of each flue is one-twelfth the area of the doors serving that vault;

6. Such vaults are equipped with automatic sprinkler systems.

Sub-Article 4. Stage Skylight

(12.4). § C26-724.0 Stage Skylight.—a. A skylight having a glazed area of at least one-eighth of the area of the stage shall be provided over the stage. Such skylights shall be glazed with single thick plain glass having a thickness between eleven and one-half and ten sheets to the inch, in panes having a minimum area of three hundred square inches. A protective wire mesh screen shall be placed immediately above and below the skylight.

b. In the skylight, ventilators of a type approved by the Board shall be placed in the highest part of the stage roof, and those parts which open shall be equal in aggregate area to one-eighth of the area of the stage. The covers or doors shall be constructed of incombustible material, shall be arranged to open in case of fire by an automatic device or by cutting a fibre cord. The ventilators shall be so designed as to function regardless of weather conditions.

c. Mechanical exhaust ventilation may be provided for the stage area in lieu of skylight by one or more individual vent flues constructed in accordance with the requirements for low temperature chimneys in section C26-710.0, extending above the main roof independently of any other flue and having an aggregate cross-sectional area of one square foot for every one hundred square feet of stage area. The flue opening at the base shall be twice the area of the flue for a minimum height of eight feet and the base shall be protected by wire mesh screens. Each flue shall be connected to power-operated exhaust fans located on the roof or in any intermediate level as approved by the superintendent and provided with gravity dampers in the flue outlets; where a single flue is provided, the fan shall be operated by two electric motors, each of sufficient power to operate the fan independently. Flue connections shall be arranged so as to permit direct passage of the products of combustion to the outer air with a by-pass connection in which the exhaust fan or fans shall be located. An automatic multi-leaf fire damper shall be provided in the direct run of the flue at the by-pass above the inlet to the fan or fans and below the outlet from the fan and arranged to open in case of fire. The fan or fans shall be of aggregate capacity for providing in the stage at least fifteen changes of air exhaust per hour. The fan or fans shall be so arranged that the fan wheel only will be subject to the products of combustion. Prominently labeled manual starting switches and automatic rate-of-rise, heat actuated starting switches for each fan shall be provided and shall be located in a manner acceptable to the superintendent. The source of power supply for operating the fan or fans shall be from the main switch or emergency panel, independent of all other electrical services. Each fan shall be started and its operation observed for not less than five minutes prior to the commencement of each performance.

d. Where there are occupied areas above the stage a gravity exhaust flue may be provided for the stage area in lieu of mechanical exhaust ventilation. The flue shall extend independently of any other flue to and above the roof, having a cross-sectional area of at least one square foot for every ten square feet of stage area, and in accordance with the requirements for low temperature chimneys of section C26-710.0. A skylight conforming to the requirements of subdivisions a, b, and c of this section except that the area shall be at least equal to the area of the flue, shall be provided at the top of the flue.

Sub-Article 5. Protective Curtains, Curtain Supports and Rigging Lofts in Special Occupancy Structures

(12.5). § C26-725.0 Protective Curtains, Curtain Supports and Rigging Lofts in Special Occupancy Structures.—a. The proscenium opening shall be provided with a curtain of incombustible material constructed on a rigid frame approved by the superintendent, having a lap of two feet at the top and eighteen inches at each side, sliding at each side in steel or iron grooves, which shall have a minimum depth of twelve inches. The curtain shall be securely fastened to the proscenium wall and at its lowest position shall rest on masonry at least twelve inches thick extending from the foundation to the curtain, or upon a strip of linoleum, cork or rubber composition directly affixed to such masonry. The footlights shall be placed at least two feet away from the curtain line. The curtain shall be raised only at the commencement of each performance and lowered at the close and shall be operated by approved machinery.

b. Satisfactory proof must be submitted and filed with the application that the curtain is so constructed and mounted as a to prevent the passage of fire, to permit the passage of only a minor amount of smoke, and to show no glow on the auditorium side, when exposed to a temperature rising to seventeen hundred degrees Fahrenheit in thirty minutes.

c. Beams supporting curtain slots in the rigging loft shall be designed to sustain a minimum load of four hundred pounds per linear foot in addition to a uniformly distributed load of fifty pounds per square foot on the rigging loft. Beams supporting headlocks shall be designed to sustain a load of at least twelve hundred pounds per linear foot

vertically, and one thousand pounds per linear foot horizontally. The design of beams supporting the proscenium curtain or curtain sheaves shall provide for an impact allowance of one hundred percent.

d. All girders, beams or platforms over the stage or in the fly galleries shall be of incombustible materials.

Sub-Article 6. Scenery, Fittings and Scene Docks

(12.6). § C26-726.0 Scenery, Fittings and Scene Docks.—a. Stage scenery, curtains and decorations made of combustible material, and woodwork on or about the stage shall be so treated as to satisfy the superintendent that such scenery, curtains and decorations will neither ignite nor actively support combustion.

b. Where the scenery is stored on the premises otherwise than as permitted by subdivision (a) of this section and by section C26-723.0, there shall be provided a scene dock or space adjacent to the stage, constructed with walls, floors and ceilings having a fire resistive rating of at least four hours and connected with the stage by a doorway with a maximum area of eighty square feet protected by automatic doors having a fire resistive rating of one and one-half hours. Scene docks shall be equipped with automatic sprinkler systems and with skylights meeting the requirements of section C26-724.0, as to size and construction. The use of such scene docks for paint bridges shall be permitted.

Sub-Article 7. Dressing Rooms

(12.7). § C26-727.0 Dressing Rooms.—Dressing rooms shall be separated from the stage and auditorium by walls and floors having a fire resistive rating of at least four hours. The walls and floors between dressing rooms and auditorium shall be unpierced. Openings in the dividing walls shall be equipped on both sides with self-closing doors having a fire resistive rating of at least three-quarters of an hour. Dressing rooms located on or above the stage level shall have an independent means of exit directly to the street or to emergency courts or passageways. The maximum distance from a dressing room door to a stairway or passageway to the street shall be thirty-five feet. The area under the stage shall contain no dressing rooms. When dressing rooms are located below the stage level, at least two exits therefrom shall be provided, one of which shall lead directly to the street. Every dressing room door shall be within thirty-five feet of a stairway. Dressing rooms shall be ventilated by windows or skylights opening directly to the outer air or shall be independently ventilated with at least six changes of air per hour. Dressing room furniture and fixtures, other than chairs, shall be incombustible.

Sub-Article 8. Workshops, Storage and Property Rooms

(12.8). § C26-728.0 Workshops, Storage and Property Rooms.—a. Workshops and storage or property rooms shall be located only at the stage level, except as otherwise provided in section C26-723.0, and on the stage side of the proscenium wall. They shall be separated from the stage by solid masonry or reinforced concrete walls having a fire resistive rating of at least four hours. Openings to the stage shall have automatic or self-closing doors having a fire resistive rating of at least three-quarters of an hour on both sides of the wall. Furniture and fixtures, other than chairs, in workshops, storage or property rooms shall be of incombustible material. It shall be unlawful to provide paint bridges.

b. Such shops or rooms shall be provided with windows or fireproof vents to the outer air, of an effective ventilating area of five percent or more of the floor area of each shop or room.

Sub-Article 9. Seats in Special Occupancy Structures

(12.9). § C26-729.0 Seats in Special Occupancy Structures.—a. Seats, except those in boxes, shall be at least thirty-two inches from back to back, and firmly secured to the floor. The maximum number of seats in any row extending from one aisle to another shall be fourteen and the maximum number of seats in any row extending from one aisle to a wall shall be seven. Provided, that if the seatings are fixed chairs with self-raising seats so spaced that when the seats are lowered there is an unobstructed space of not less than sixteen inches horizontal projection measured between two plumb lines between the rows of seats, and provided that along both sides of the theatre at the ends of the rows of seats there are aisles with a minimum width of four feet, and exit doors or openings are provided not more than fifteen feet center to center apart along both sides of the auditorium, the number of seats in a row between such aisles shall not exceed one hundred. The above exit doors or openings shall open on the streets, courts or passageways as required under section C26-731.0.

b. The difference in levels between balcony seating platforms shall not exceed 22½ inches. These platforms shall be at least thirty-two inches wide; except that when the difference in platform levels is more than fifteen inches the platforms shall be at least thirty-six inches wide. Risers of balcony steps in the aisles shall not exceed a maximum height of seven and three-quarters inches.

c. It shall be unlawful to place any stools or seats in any aisle.

Sub-Article 10. Normal Exits in Special Occupancy Structures

(12.10.1). § C26-730.0 Normal Street Exits.—a. Every structure intended to be used for the purposes described in section C26-715.0 unless otherwise specifically provided in this article, shall have means of normal exit on one or more street frontages as hereinafter required.

b. Where there is a grade in excess of five per cent in a street frontage of a theatre, the location of the normal exits on such street frontage shall be left to the discretion of the superintendent.

c. In addition to the emergency exits required by subdivision d of section (C26-731.0 the minimum aggregate width of normal exit doorways for the total number of persons to be accommodated on all tiers shall be at least ten feet and shall be determined from the number of persons to be accommodated as follows: Street normal exit doorways shall be provided at the rate of twenty inches for each one hundred of the first fifteen hundred persons; fifteen inches for each one hundred of the first thousand persons in excess of fifteen hundred; and ten inches for each one hundred persons in excess of twenty-five hundred persons. All normal exit doors shall be located on the street fronts except that one-half of any width in excess of ten feet may be on emergency courts or passageways provided such doors are placed between the rear wall of the auditorium and the last row of seats in the orchestra.

Where theatre is more than ten feet above curb or more than six feet below curb as measured to the level of the space in the rear of the last row of seats in the orchestra or to the level of the cross-over in front of the first riser in a stadium structure, the normal exit doors shall be provided between the lobby and the orchestra instead of on the street fronts, except that one-half of any width in excess of ten feet may be located on emergency courts or passageways, provided such doors are placed in the rear wall or between the rear wall of the auditorium and the last row of seats in the orchestra. In such case all doors shall be fireproof, self-closing, approved for at least one hour fire-resistive rating.

d. The floor level of the space in the rear of the last row of seats in the orchestra or the level of the crossover in front of the first riser in a stadium structure, shall not be more than twenty feet below the curb level. The difference in level between this space and the street level shall be taken up by steps or ramps. It shall be unlawful to locate steps in the middle of any ramp. Steps in front of doorways opening in the direction of egress shall have a platform equal to the swing of the door and at least five feet in width. Where the entrance lobby or lobbies do not lead directly to the rear of the orchestra or the crossover in front of the first riser in a stadium structure, there shall be at least two interior passageways or stairways each not less than four feet in width to the rear of the orchestra or to the crossover of a stadium structure. When the occupancy of the auditorium exceeds two hundred persons, each such passageway or stairway shall be increased in width at the rate of three inches for every one hundred persons or fraction thereof in excess of two hundred persons. Such passageways shall be located in accordance with the requirements of section C26-734.0. The size of steps and risers shall conform to the requirement for balcony stairs in section C26-732.0. Handrails shall be provided in both sides of stairways, projecting not more than three and one-half inches into the required width of such stairways.

e. Theatres may be placed more than ten feet above the curb level or more than six feet below curb level as measured to the level of the space in the rear of the last row of seats in the orchestra or to the level of the crossover in front of the first riser in a stadium structure when in addition to the egress stairways required under section C26-731.0, there shall be a normal exit stairway leading directly from the street to the lobby, for the exclusive use of the theatre. The lobby shall be located on the same story as the orchestra of the theatre and shall be adjacent to the auditorium. This stairway shall have a clear width between stringers of six feet for the first one thousand persons to be accommodated in the entire auditorium plus one foot for each additional three hundred persons or part thereof. In place of this stair, one or more stairs may be provided if the total width of such stairs is not less than required for the one stair and provided no stair is less than four feet in width. Such stairways shall be enclosed in partitions having at least a three hour fire-resistive rating and openings shall be protected by fireproof, self-closing doors having at least a one hour fire-resistive rating. The lobby shall be separated from the stairs as provided for the separation of emergency passageways from stairs in section C26-731.0. All openings into the lobby shall be protected by fireproof, self-closing doors, approved for at least a one hour fire-resistive rating, where the theatre is above or below street level as specified in this subdivision. Also in such cases the lobby shall have a minimum width and height of ten feet and shall have a floor area of not less than one-third of the total seating capacity of the theatre multiplied by one and one-half square feet.

f. Each normal exit entrance doorway shall have a minimum clear width of five feet measured between door stops. When there are no mullions between the leaves of entrance doors and the doors are hung on top and bottom pivots, the doors when opened shall not project more than a total of six inches into the required clear width of the exit. Normal exit doors shall swing outwardly and shall be held in the closed position by panic bolts or other releasing devices arranged to operate by the application of pressure to the inner side of the device.

g. It shall be unlawful to lock doors, used as a means of entrance or exit, during any presentation or at any time when the structure is open to the public.

(12.10.2). § C26-731.0 Emergency Exits from Special Occupancy Structures.—Emergency courts or passageways required for special occupancy structures.—a. Except as otherwise provided in subdivision i of this section and section C26-735.0, every theatre accommodating three hundred or more persons shall have an open court, or a passageway, for emergency use on each side of each tier of the auditorium except that where a theatre is at the street level such court or passageway shall not be required for a side bordering on a street. Such courts and passageways shall lead directly to a street or to the emergency stairs as provided in subdivision j of this section.

(12.10.2.2). b. Design of required courts or passageways for special occupancy structures.

1. The minimum clear width of such emergency courts or passageways shall be six feet and the clear height shall be at least ten feet. Where such courts or passageways lead to a stair, each court or passageway shall have a floor area of not less than one-third of the total seating capacity of the theatre, multiplied by one and one-half square feet.

2. When the occupancy of any tier exceeds six hundred persons, the width of the court or passageway for that tier shall be increased at the rate of one foot for each five hundred persons or fraction thereof.

3. The size of the court from the orchestra shall be calculated independently and where the emergency stairs from above combine with such court, the court shall be increased in width to accommodate the total occupancy served. The width of the court shall mean the clear, unobstructed width.

4. Passageways shall be of materials or assemblies having a fire resistive rating of at least four hours, with solid floors and roof. Where such passageways go through the stage or through other structures but not where the passageway goes through other parts of the same structure, the roof shall be capable of sustaining a uniformly distributed load of five hundred pounds per square foot.

5. Such passageways and courts shall connect to the street at sidewalk level unless connected to the emergency stair as provided in subdivision j of this section. Difference in elevation of floors of such courts and passageways shall be overcome only by ramps having a maximum grade of one in ten or by stairs of maximum height of riser of seven and one-half inches and width of tread of at least ten inches. Where stairs and ramps are used in conjunction such stairs may only be placed at either or both ends of the ramps.

6. Where enclosed passageways are used they shall be vented to the street or outer air in a horizontal direction by means of wire mesh grilles with clear ventilating areas of at least 12 square feet at each end of the passageway or within ten per cent of the length of the passageway from either end. Walls of passageways shall be whitewashed, or finished in materials of a light color, or painted a light color.

7. When the stage exits into such a passageway there shall be between the stage and the passageway a vestibule at least five feet deep extending the full width of the court or passageway and separated from the stage and passageway by self-closing doors having a fire resistive rating of at least one hour.

8. The doors on the orchestra floor opening on the required emergency courts, passageways or streets shall have a minimum clear width of five feet measured between door stops. One such door opening on each required emergency court or passageway or street shall be located not more than thirty-five feet from the first row of seats. The first row of seats shall be that row of seats nearest to the stage, platform, or projection screen. An additional emergency exit on each required emergency court or passageway shall be located not more than fifty feet from the last row of seats. Such emergency exits shall be separated by a distance at least equal to fifty per cent of the distance from the first to the last row of seats. Additional doors shall be provided as necessary so that no seat on the orchestra floor shall be locted more than one hundred and twenty-five feet from an exit or entrance door measured along the line of travel.

9. Where auditoriums are adjacent to any other structure bordering on any street, emergency exits from the auditorium may be by means of passageways through such structures, except when, in the opinion of the superintendent, such occupancy or use of such structures would constitute a hazard.

10. All openings on emergency courts or passageways shall be protected by proof, self-closing doors approved for at least a one-hour fire resistive rating.

(12.10.2.3). c. Use of emergency passageways and courts in special occupa structures.

1. Emergency passageways and courts shall be used exclusively for exit from auditorium and stage and shall be kept free and clear at all times. No openings emergency passageways shall be permitted except openings to the outer air those for doors.

2. Any such passageway or court may be used in common by two or n auditoriums, provided the width is equal to that required for the total number of per to be accommodated in all the auditoriums opening on it.

(12.10.2.4). d. Required number of emergency exits from special occupancy st tures. In addition to the exits normally required under sections C26-730.0 and C26-7 there shall be on each side of of each tier at least two emergency exits opening f the auditorium to the emergency passageways or courts. The doors on such emerg exits shall have a minimum clear width of five feet measured between door s except that on tiers above the orchestra floor requiring only one crossover an promenade, at least one of the required exit doors shall be located at each end o crossover. The swing of such doors shall be in the direction of egress and shall obstruct the clear width of the passageway when fully opened, except for the thick of the door.

(12.10.2.5). e. Required emergency stairways in special occupancy structure

1. From the emergency exits in each tier above the first, interior or ext emergency stairs or emergency platforms shall be provided extending to the side court or passageway. The minimum width of each such stair or platform shall be feet. When the capacity of any tier above the first exceed eight hundred person width of each of the required stairs serving such tiers shall be increased in the portion of one foot for each five hundred persons or fraction thereof in excess of hundred persons. When the stairs or platforms are not extended independently t street court or passageway level, but are combined, the width of each run of shall be increased by fifty per cent of the width of the stairway serving the nex above. From the landing of the stairs at the street court or passageway level a ageway at least as wide as the last run of stairs leading into it, and a minimum feet wide, shall be provided leading to the street or stairway leading to the Hand-rails may project into the required width of stairs a maximum of three an half inches on each side. The ends of hand-rails shall be turned back against wa newels and finished without projections which would act as obstructions. Re stairways shall also comply with the requirements of subdivision f of section C26

2. The maximum height of risers in required stairways shall be eight an half inches, and the minimum depth of tread nine inches, exclusive of nosing.

(12.10.2.6). f. Required size of courts upon inadequate streets. Where a str faces upon a public street narrower than the court which would be required for gency purposes if there were no street, the structure shall be arcaded at the stree so that the combined width of the street and arcade shall be equal to the required of the court which would be required if there were no street.

(12.10.2.7). g. Emergency exits from the stage.—Emergency exits to the pa ways, courts or streets shall be provided on opposite sides of the stage level.

(12.10.2.8). h. Required exits from stage gridirons.—Two means of exit s provided from the stage gridirons. Such exits shall be provided on one side by of a ladder or stairs, extending from the stage floor through the roof from the of the structure and on the other side through a door-way to the outer air and t a ladder or other means to some point having access to the ground.

(12.10.2.9). i. Every theatre accommodating six hundred persons or less s provided with at least one emergency exit from the orchestra floor located one-tenth of the depth of the orchestra from the first to the last row of seats. the orchestra accommodates more than three hundred persons, at least one ad emergency exit shall be provided. These emergency exits are in addition to trance doors of ten feet minimum width as required under section C26-730.0 article. The aggregate width of the emergency exits and the street entrance d feet shall be at least one-twentieth of the total number of persons to be accomm The minimum width of the emergency exit doors shall be five feet and they sh outwardly on a street or an emergency court or passageway leading to a stre court or passageway shall be at least four feet in clear width for the first one persons and the width shall be increased six inches for every additional one persons to be accommodated. Construction of passageways, courts and doo conform with the provisions of the preceding subdivisions of this section.

(12.10.2.10). j. Where a theatre is placed more than ten feet above the curb level or more than six feet below the curb level as measured to the level of the space in rear of the last row of seats in the orchestra or to the level of the crossover in front of the first riser in a stadium structure, passageways or courts shall not be required to extend below or above the auditorium level where at least one emergency stairway is provided from each passageway or court each having a minimum width of six feet and each leading to the street. When the capacity of the theatre exceeds one thousand persons, the width of each such stairway shall be increased in the proportion of one foot for each three hundred persons or part thereof in excess of one thousand. Such stairways shall be enclosed in fireproof material of not less than three hour fire-resistive rating. The size of the treads and risers shall conform to the requirement for emergency stairways in this section. Such stairs shall be used exclusively for the exit from the theatre, and shall be kept free and clear at all times. The stairs shall comply with the requirements of section C26-292.0 except as otherwise provided in this section.

The stairs shall be separated from the emergency court or passageway by fireproof self-closing doors approved for at least a one hour fire-resistive rating, hung to swing in the direction of egress. The aggregate clear width of such doorways shall be not less than the required width of the stair and the width of a single doorway shall not be less than three feet eight inches nor more than five feet. A landing shall be provided between the doors and the first riser, having a width not less than the swing of the largest door but not less than four feet. The doors may be provided with panic bolts. The stairs shall be vented by means of fixed opening or a vertical or horizontal duct, to the outer air, having a minimum crossectional area of at least two square feet. The stairs shall run separately and independently to the street or to an open court leading to the street.

(12.10.3). § C26-732.0 **Balcony Exits and Stairs.**—a. Except as otherwise provided in section C26-735.0, at least two separate and independent stairways, in addition to the emergency stairways required by subdivision e of section C26-731.0, shall be provided for each tier above the auditorium floor. Such stairways shall be located on opposite sides of the auditorium and may connect with the tiers which they serve, by means of mezzanines or other intermediate floors. Where balcony stairs open directly into the auditorium, the exit facilities from the auditorium shall provide for the number of persons using such balcony stairs. The width of balcony stairs which open directly upon the street, court or passageway may be deducted from the required width of main entrance except that the width of main entrance doors shall not be less than ten feet. Required stairways shall connect with only one tier, except when one of the tiers is a part of a stadium theatre and the aisles in that tier are continuous with those in the orchestra floor, and except that required stairways in any type of theatre may open on more than one tier, provided that such required stairways are increased to the width required for a fifty per cent increase in the number of occupants of the lower tier, and this increase shall apply to each tier upon which the stairs open, but in no case need the total width of the stairs exceed that required to accommodate the total number of occupants to be served by these stairways. Required stairways shall be enclosed in the tiers through which they pass by materials or assemblies having a fire resistive rating of at least three hours, but enclosures shall not be required at the upper and lower terminals of balcony stairs. It shall be unlawful to permit any door to open directly on a stairway; a landing at least as wide as the door shall be provided between the door opening and the stairs.

b. The doors on street fronts may be of untreated wood, but all other doors on exit passageways and stairs shall comply with the requirements of article eleven of this title.

c. The maximum height of risers on any balcony stairs shall be seven and one-half inches and the minimum depth of treads in straight balcony stairs shall be ten inches exclusive of nosings. It shall be unlawful to provide circular or winding stairs for the use of the public. When straight stairs return directly on themselves, a landing without steps, the full width of both flights, shall be provided. The outer line of landings shall be curbed to a radius of at least two feet. Stairs turning at an angle shall have a proper landing, without winders, introduced at each turn. It shall be unlawful to introduce winders in stairs when two side flights connect with one main flight; the width of the main flight shall be at least equal to the aggregate width of the side flights. All stairs shall have proper landings introduced at vertical intervals of twelve feet or less. The minimum number of steps in a flight between landings shall be three. Such landings shall be at least four feet in depth.

d. Where the stadium type of design is employed, all portions of the auditorium behind the first perpendicular riser shall be treated as a balcony when the highest row of seats is more than fifteen feet above the lowest point of the crossover in front of the first perpendicular riser. Where the distance between the lowest point of the crossover in front of the first perpendicular riser and the highest level of the stadium floor is between fifteen and twenty feet, an inside stairway shall be provided. Where such distance is over twenty

feet such stadium section shall be treated as a balcony, and if the house already has a balcony the stadium section above fifteen feet shall be treated as another balcony.

e. The minimum width for balcony stairs shall be four feet. When the number of persons to be accommodated on any tier exceeds two hundred, the width of each stair shall be increased in the proportion of three inches for every one hundred persons or fraction thereof in excess of two hundred persons. The maximum width of any stair shall be eight feet. When the occupancy of any tier exceeds eighteen hundred persons, additional stairs shall be provided. The aggregate width of stairs required from any tier shall be divided into substantially equal units, so that the width of the narrowest stair shall be at least two-thirds that of the widest stairs. Hand-rails shall be provided in such stairways and may project a maximum of three and one-half inches into the required width of stairs on each side.

f. Ornamental stairways may be constructed under the following conditions:

1. Such stairways shall be so placed as to leave unobstructed the functioning and use of the required means of egress.

2. Such ornamental stairways shall be separate from such required means of egress.

3. Such stairways shall meet the requirements of sub-division 1 of section C26-292.0, with respect to hand-rails.

g. Stairways serving theatres placed above the curb level as provided in subdivision e of section C26-730.0 may lead directly to the street, courts or passageways or terminate in the lobby in the rear of the orchestra. Where a stairway terminates in the lobby, the lobby shall be connected with the street, courts or passageways by means of doors or passageways having a minimum width of five feet.

(12.10.4.1). § C26-733.0 **Crossovers.**—a. Crossovers in tiers above the orchestra floor.—Crossovers shall be provided in each tier above the orchestra floor as follows:

1. The first crossover shall be seven rows of seats or less from the front of the tier.

2. Additional crossovers shall be provided, each fourteen rows of seats or less from the next lower crossover, except that, if the last crossover is placed at the rear of the tier, there may be sixteen rows of seats between the highest crossover and the next lower crossover. Such crossovers shall be at least four feet wide in the clear and shall be separated from the seating spaces with railings. When but one crossover is required, both emergency exits shall be located at the ends of the crossover. When more than one crossover is required, an emergency exit shall be located at each end of each crossover. When the difference in level between adjacent crossovers is in excess of nine feet, the emergency passageway shall be carried level and independently from each exit to the emergency stairs. Passageways leading to any stairway connecting with any exit shall be at least four feet in width at every point.

(12.10.4.2). b. Crossovers on orchestra floor.—Crossovers shall be provided in the orchestra tier when there are more than four banks of seats, under conditions as follows:

1. The first crossover shall be located approximately one-third of the distance from the last row of seats to the first row of seats, but not less than eighteen rows from the first row of seats, except that where there are not more than twenty-seven rows of seats and not more than four banks of seats no crossover shall be required. The first row of seats shall be that row of seats nearest to the stage, platform or projection screen.

2. Additional crossovers shall be provided, eighteen rows of seats or less intervening between each such crossover and the next lower crossover. For the purposes of this paragraps a cross-aisle or clear space of four feet or more in width and extending from one side wall to the opposite side wall shall be considered a crossover.

3. Where there are five banks of seats the cross-overs shall be formed by spacing the backs of two consecutive rows of seats at least sixty-six inches apart or by providing a clear, unobstructed cross-aisle of at least four feet.

4. Where there are more than five banks of seats the cross-overs shall be formed by spacing the backs of two consecutive rows of seats at least seventy-eight inches apart or by providing a clear, unobstructed cross-aisle of at least five feet in width.

5. The superintendent may, in his discretion, permit cross-overs where cross-overs are not required by this article.

(12.10.5). § C26-734.0 **Vomitories.**—a. The term "vomitory" shall mean an exit from a balcony communicating with a stairway by way of an intermediate floor. At least two vomitories shall be provided for the first one thousand seats or less in a balcony and one for each additional five hundred seats or fraction thereof over one thousand seats. Vomitories shall be located laterally twenty-eight feet or less from the side walls and ninety feet or less apart at the same cross-over level, except that vomitories may be located more than ninety feet apart when the width of the crossovers is increased one inch for each foot of separation in excess of ninety feet; vomitories shall be located on the level of the

lowest crossover and where more than two vomitories and two crossovers are require the vomitories shall be located on the level of the lowest crossover and at alternate cros overs thereafter. When a single vomitory is required at an alternate crossover it shall centrally located.

b. The difference in level, between a crossover and a vomitory passageway servi such crossover, shall be seven feet or less. Such difference in level may be made by steps in the vomitory, provided the width of the crossover, at the vomitory, is creased at least two feet.

c. Each vomitory shall have a width of at least five feet.

d. Vomitories may be omitted when the required aisles connect directly with a pro enade or open space at the rear of the balcony provided such balconies are less than twen four rows deep and there is a difference of twelve feet or less in level between the fro row of seats and the promenade.

e. Stairs may be located at the rear of the balcony in place of an equal number vomitories, provided the top stair landings are connected by a crossover.

(12.10.6). § C26-735.0 Small Balconies.—Balconies having a maximum capacity one hundred fifty seats and also any single balcony in a church used exclusively a place of worship, shall be exempted from the emergency exit requirements; b two stairways each not less than four feet in width or one such stairway and an em gency exit constructed as per section C26-730.0 shall be provided. The emergency exit shall be not less than four feet in width and shall not be required to be more th 11 feet in width. The interior stairways shall terminate at the rear of the seats of tier below or may lead to the street and shall be provided with handrails on both side If an emergency exit door is provided such door shall be of at least one hour fi resistive rating and open outwardly upon a street, passageway or court conformi to the provisions of subdivision i of section C26-731.0. Exterior platforms in cou serving emergency exits shall be at least forty-eight inches in width and fifty-fou inches in length. Exterior emergency stairways not less than forty inches in wid extending to the court level or to the street shall be provided from the platforms. Co struction of emergency stairways and platforms shall conform to the requirements section C26-741.0.

(12.10.7). § C26-736.0 Boxes.—The term "box" shall mean an enclosure havi one fixed or movable seat to each six square feet of floor space, with a maximum of twe seats. When boxes are at the balcony levels they shall be accessible from the aisles from the crossovers. The minimum width of a box entrance shall be three feet. Wh boxes are located at the sides of the proscenium no other means of egress need be provid Boxes located at the sides of the proscenium shall be within forty feet of the proscen wall. The stairs for such boxes shall have a minimum width of two and one-half f and shall lead to the nearest balcony or tier of seats below such boxes.

(12.10.8). § C26-737.0 Diagram of Exits.—A diagram or plan of each tier in auditorium, showing clearly and distinctly all aisles, exits and total number of se on each tier, shall be posted in the office of the premises or printed in black lines any program of the performance, occupying a space on the program of ten squa inches or more.

Sub-Article 11. Aisles

(12.11). § C26-738.0 Aisles.—Aisles shall begin at least three feet wide and sh be increased in width toward the exits in the ratio of one and one-half inches to f running feet. Where exits, corridors, passages or crossover aisles are provided at b ends of any aisle, the aisle may be uniform in width; such uniform width shall be at le three feet plus three-quarters of an inch for each five running feet in such aisle. Whene an aisle borders on a means of entrance the aisle shall have a width of four feet or m for the space required for such entrance doors.

Sub-Article 12. Foyers, Lobbies, Vestibules and Corridors in Special Occupancy Structures

(12.12). § C26-739.0 Foyers, Lobbies, Vestibules and Corridors in Special Occupancy Structures.—The aggregate of the foyers, lobbies, vestibules and corridors tended for the use of the audience, excluding toilet rooms, lounges and other simil spaces or aisle space between seats, shall have one hundred fifty feet of space on ea tier for every hundred persons occupying such tier and shall be able on each tier accommodate the entire number of persons occupying such tier. Such foyers, lobbi vestibules and corridors shall be separated from toilet rooms, lounges and other joining spaces by partitions having a fire resistive rating of at least two hours. T floor space in any mezzanine or intermediate floor connected to any tier by vomitor may be included in computing the required floor space for that tier. Refreshment sta shall be constructed of incombustible materials and shall not obstruct any exits, ais

foyers, lobbies or vestibules. The term refreshment stand shall also include vending machines. Beverages may be heated in refreshment stands, provided the heating is done by electricity only and no gas or other heating materials are used.

Sub-Article 13. Ramps in Special Occupancy Structures

(12.13). § C26-740.0 Ramps in Special Occupancy Structures.—Ramps or inclined planes shall be employed instead of steps to overcome slight differences of level in or between aisles, corridors and passages. Where the total difference in level will cause the gradient of the ramp to be more than one in twelve the excess may be made up by using steps, except in aisles on the orchestra floor. The maximum gradient in aisles on the orchestra floor shall be one in six for the first, second and third rows of seats from the rear; one in seven for the fourth, fifth and sixth rows; one in eight for the seventh, eighth and ninth rows; and one in ten for the remaining rows.

Sub-Article 14. Exterior Platform for Emergency Exits in Special Occupancy Structures

(12:14). § C26-741.0 Exterior Platform for Emergency Exits in Special Occupancy Structures.—a. Where the emergency exits open on exterior platforms, such platform shall have an area of at least thirty square feet for such required emergency opening thereon and shall be at least as wide as the required width of the stairway serving that exit in accordance with section C26-731.0 and no stairway shall start less than two feet from the jamb of the door opening on to it. Stairways enclosed partitions having a fire resistive rating of at least three hours, extending to the ground level or floor level of the side court or passageway shall be provided from these platforms, except that open stairways protected by a roof of incombustible material may be used in place of these enclosed stairways when serving only one tier when having a maximum height of one tier or fifteen feet above the level of the floor a passageway located at the orchestra level. Such open stairways shall be protected throughout to a height of five feet with wire netting or rigid guards as provided in paragraph two, subdivision J of section C26-292.0. The maximum height of risers in stairs shall be eight inches and the minimum depth of tread, exclusive of the nosing, shall be nine inches. Platforms and stairs shall be made of incombustible material and shall have solid risers, treads and platforms. Platforms shall be covered with metal hood or awning.

Sub-Article 15. Guard and Hand-Rails in Special Occupancy Structures

(12.15). § C26-742.0 Guard and Hand-Rails in Special Occupancy Structures.—a. Stairways and platform exits shall be provided on the open side with a guard railing at least four feet high measured vertically from the riser face and with a hand-rail upon both sides.

b. Hand-rails shall be provided on the wall side of balcony wall aisles.

Sub-Article 16. Lighting of Special Occupancy Structures

(12.16.1). § C26-743.0 Adequacy of Lighting in Special Occupancy Structures.—Every portion of any special occupancy structure devoted to the use or accommodation of the public, including all means of exit leading to the streets and all courts, corridors, and passageways, shall be properly lighted during every performance and shall remain lighted until the entire audience has left the premises.

(12.16.2). § C26-744.0 Control of Lights for Corridors and Passageways in Special Occupancy Structures.—Lights in the halls, courts, pasasgeways and in the stairways, corridors, lobby or other part of the structure used by the audience, except the auditorium, shall be on a separate circuit and shall be controlled by a separate switch located in the box office or in the lobby, and when located in the lobby shall be enclosed in a box with a locked cover and such light shall be controlled only from such location. Lighting throughout the passageways shall average not less than 5-foot candles.

(12.16.3). § C26-745.0 Illuminated Exit Signs in Special Occupancy Structures.—Exit and entrance doors shall be marked with illuminated signs containing the word "EXIT" in red letters at least eight inches high. Such signs shall be kept lighted during the performance and at all times when the audience is in the theatre.

Sub-Article 17. Fire-Extinguishing Appliances in Special Occupancy Structures

(12.17). § C26-746.0 General.—Every structure subject to the requirements of this article shall, except as otherwise provided in this section, be equipped with the following fire fighting apparatus:

(12.17.1). 1. Sprinkler systems in special occupancy structures.—

(a) Automatic sprinklers complying with article sixteen of this title shall be placed

under the roof of the stage, under the gridiron, under all fly galleries and bridges and over the stage at such intervals as will protect every square foot of stage surface when sprinklers are in operation. An additional line of sprinkler heads shall be placed on the stage side of the proscenium opening. Automatic sprinklers shall also be placed in the dressing rooms and under the stage and in all work rooms, store rooms and property rooms. Sprinkler systems shall in all other respects comply with article sixteen of this title.

(b) Where two or three theatres under the same ownership or management are built contiguously, one ten thousand gallon tank may be erected in place of a separate tank for each theatre.

(12.17.2). 2. Standpipe systems in special occupancy structures.

(a) Standpipe risers shall be provided, except as provided in section C26-720.0 on every floor and tier, with hose attachments as follows: one on each side of the auditorium in each tier, one in each mezzanine, one on each side of the stage in each tier, one in each tier of dressing rooms, one in the property room, and one in each work room and store room, except when the property room, store room, or work room is within fifty feet of a standpipe hose outlet. Such standpipes shall be kept unobstructed. They shall be supplied by a separate gravity tank except that a single gravity tank or standpipe tank is permitted for adjoining theatres under the same ownership, or by a pressure tank located above the roof and by a fire pump of two hundred fifty gallons per minute capacity, except as provided in paragraph one of section C26-746.0. Standpipe tanks shall be kept constantly filled with water by means of an automatic filling pump capable of delivering at least sixty-five gallons per minute into the tank.

(b) The fire pump shall be automatic in operation and shall be supplied from the street main and be ready for immediate use at all times during any performance in the structure, except that theatres, used exclusively for the exhibition of motion, audible or sound or television pictures which are without stage or platform in excess of ten feet in depth, dressing rooms or scenery, shall not be required to have a fire pump.

(c) The standpipe system shall otherwise comply with article seventeen of this title.

(12.17.3). 3. Hose in Special Occupancy Structures.—There shall always be kept attached to each hose outlet valve, in accordance with this article, a proper and sufficient quantity of hose fitted with regulation fire department type couplings, with a nozzle attached thereto, and a hose spanner at each outlet.

(12.17.4). 4. Hand Fire-Extinguishing Equipment in Special Occupancy Structures.—At least four casks, of approximately fifty gallons capacity, full of water, and two buckets for each cask, shall be kept in readiness for immediate use on the stage. Such casks and buckets shall be painted red and marked with the word "FIRE" in letters, of contrasting color, at least four inches high. Hand pumps or other portable fire-extinguishing fire apparatus and at least four casks and two twenty-five foot hooks, two fifteen foot hooks and two ten foot hooks shall be provided on each tier or floor of the stage. At each required standpipe hose outlet a two and one-half gallon hand extinguisher, one regulation fire axe and two six-foot hooks shall be provided. Two two and one-half gallon hand extinguishers may be substituted for each required cask and its buckets and, if provided, shall be recharged annually, and immediately after any use.

(12.17.5). § C26-747.0 Exempted Structures.—a. Special occupancy structures one-story in height shall not be required to provide a standpipe system.

b. A stadium structure may be deemed to be a one-story structure, provided the seats are so arranged that the floor level of highest row shall be within fifteen feet above the level of the crossover immediately in front of the first riser in the auditorium.

c. A theatre having a stage and dressing rooms and having a seating capacity of six hundred or less shall be exempted from all of the requirements of section C26-746.0 except subdivision 1, sprinkler systems and subdivision four hand fire extinguishing equipment.

(12.17.6). § C26-748.0 Separate Systems for Structures Above Auditoriums.—Where a structure requiring a standpipe system is erected above the auditorium of a special occupancy structure it shall be provided with a standpipe system entirely separate from that provided for the special occupancy structure.

Sub-Article 18. Heating and Cooling Plants and Ventilation in Special Occupancy Structures

(12.18). § C26-749.0 Heating and Cooling Plants and Ventilation in Special Occupancy Structures.—a. It shall be unlawful to locate any steam boiler under any stage or auditorium. Every steam boiler operating at a pressure of ten or more pounds and used for any purpose shall be located outside of that portion of a structure used for special occupancy purposes. The boiler room space shall be enclosed by masonry having a combined fire resistive rating of at least four hours and doorways to the boiler room shall be protected with an automatic and self-closing door assembly having a fire resistive rating of two hours. The self-closing door shall be hung at the outer side of the opening and shall open outwardly. It shall be unlawful to place coils or radiators within seven feet of the floor in any hall or passageway used for exit unless such coils or radiators are placed in recesses covered with grilles. Supply, return or exhaust pipes shall be properly encased and protected where passing through floors or near woodwork and shall be so protected on the stage by means of guards as to prevent scenery from coming in contact with the pipes.

b. Air cooling and air conditioning systems shall be installed in accordance with the rules of the board. Refrigeration systems shall also comply with the applicable provisions of title C of chapter nineteen of the code.

c. Ventilation shall be supplied at the rate of not less than five cubic feet per minute of fresh air per occupant, based on the total occupancy for which the special occupancy structure is designed.

Sub-Article 19. Jurisdiction of the Fire Commissioner Over Special Occupancy Structures

(12.19). § C26-750.0 Jurisdiction of the Fire Commissioner Over Special Occupancy Structures.—The fire commissioner shall enforce all of the provisions of this article, relating to protection against fire and panic, obstruction of aisles, passageways and means of egress, standees, fire prevention and fire-extinguishing appliances, excluding provisions relating to structural conditions.

Sub-Article 20. Existing Special Occupancy Structures

(12.20). § C26-751.0 Saving Clause Relating to Existing Special Occupancy Structures.—Any theatre, opera house, or structure intended to be used for theatrical or operatic purposes, legally constructed and approved for such purposes prior to January first, nineteen hundred thirty-eight, and the Town Hall, located at one hundred thirteen to one hundred twenty-three West Forty-third street, borough of Manhattan, so long as the revenue received for use of such Town Hall shall continue to be applied to public, charitable, social, educational or literary purposes, and provided that the premises of such Town Hall are not used for theatrical or operatic purposes, and any public dance hall approved by the then superintendent or the commissioner having jurisdiction and licensed as a public dance hall prior to January first, nineteen hundred thirty-eight, shall be exempt from the requirements of this article.

Sub-Article 21. Motion Picture Theatres

GROUP 4

Booths for Motion Picture Projecting Machines and Films

(12.21.4.1). § C26-760.0 Booths Required for Motion Picture Machines and Films.—It shall be unlawful to use, in any structure, place of public assembly or entertainment, any cinematograph or other apparatus for projecting motion pictures which uses inflammable films more than ten inches in length, unless such projecting apparatus is enclosed in a booth constructed of incombustible materials as required by section C26-761.0, or section C26-764.0, and the certificate required by section C26-763.0, or section C26-766.0, shall have been issued to the owner or lessee of the premises where the booth is located.

(12.21.4.2). § C26-761.0 Plans, Specifications and Construction of Motion Picture Machine Booths.—The booths required by section C26-760.0, shall be constructed according to plans and specifications approved by the superintendent. Plans and specifications for such booths shall be approved by the superintendent only when they provide substantially for the following requirements:

(12.21.4.2.1). 1. Dimensions of Motion Picture Machine Booths.—Such booths shall be at least seven feet in height. If one machine is to be operated in such booth the floor space shall be at least seven and one-half by ten feet. If more than one machine is to be operated therein, twenty-four additional square feet shall be provided for each additional machine.

(12.21.4.2.2). 2. General Specifications for Motion Picture Machine Booths.—

(a) Permanent booths shall be constructed of incombustible materials having a fire resistive rating of at least three hours.

(b) If temporary booths are constructed of incombustible materials other than masonry or hard asbestos, such booths shall be constructed with angle framework of approved incombustible material. The angles shall be at least one and one-quarter by one and one-quarter by three-sixteenths inches and the adjacent members shall be joined firmly with metal angle plates. The maximum distance between angle members of the framework shall be four feet on the sides and three feet on the front, rear and top of the booth. The sheets of hard asbestos board or other approved incombustible material shall be at least

one-quarter inch thick and shall be securely fastened to the framework with metal bolts or rivets. The incombustible material shall completely cover the sides, top and all joints of the booth. The floor space occupied by the booth shall be covered with incombustible material at least three-eighths of an inch thick.

(c) Booths shall be insulated so as not to conduct electricity to any other part of the structure. Booths shall be provided with two means of exit which shall consist of passageways, stairs or ladders and located one at each end of the booth. One of these means of exit shall be through a door at least twenty-four inches wide and seventy inches high. All such doors shall be self-closing and shall open in the direction of egress.

(d) One operating window shall be provided for each machine and one for each operator. Such windows shall be as small as will permit the necessary service, and shutters of approved incombustible material shall be provided for each window. The shutters shall be so arranged as to close the window openings automatically, in the event of fire, by the operation of approved fusible and manual releasing devices.

(e) Where a booth is built against the exterior wall of a structure, a window or windows shall be permitted in such wall for the comfort of the operator. Booths shall contain an approved box of incombustible material for the storage of films not being used on the projecting machine. Films shall be stored, kept and handled only in projection booths, rewinding rooms or special storage rooms complying with the requirements of title C of chapter nineteen of the code.

(f) Films may be repaired either in the booth or in some other enclosure made of incombustible materials, but the room in which motion picture machines are operated shall be separated from the rewinding and other accessory rooms by fireproof partitions provided with self-closing fireproof doors. Booths in which projecting machines are operated shall be provided with a separate opening or vent flue in the roof, or upper part of the side wall, leading to the outer air from the rewinding room and from the machine room. Such flues shall be at least seventy-eight square inches in cross-section and made of incombustible materials. When booths are in use a current of air at the minimum rate of at least fifty cubic feet per minute shall be maintained through the booth to the outer air, which current shall be sufficient to furnish a complete change of air every ten minutes.

(12.21.4.3). § C26-762.0 Application to Existing Motion Picture Machine Booths.—Booths legally installed and approved before January first, nineteen hundred thirty-eight, shall be exempted from any other requirements of section C26-760.0 through C26-770.0, provided they are constructed of rigid incombustible material so insulated as not to conduct electricity to any other part of the structure, so separated from any adjacent combustible material as to prevent the communication of fire through intense heat in case of combustion within a booth, and comply with the requirements of paragraph two of section C26-761.0, in respect to dimensions, vent flues, windows and doors, and boxes for storage of films.

(12.21.4.4). § C26-763.0 Inspection and Certification for Permanent Motion Picture Machine Booths.—After the construction of a booth has been completed the superintendent shall, within three days after receipt of written notice of that fact, cause such booth to be inspected. If the provisions of section C26-760.0, and section C26-761.0, have been complied with, the superintendent shall issue to the owner or lessee of the premises on which the booth is located a certificate stating that such provisions have been complied with.

(12.21.4.5.). § C26-764.0 Portable Motion Picture Machine Booths for Temporary Exhibitions.—Where motion pictures are exhibited at most three times a week, or as often as daily for one month or less, in educational or religious institutions or in bona fide social, scientific, political or athletic clubs, a portable booth may be substituted for the booth required by section C26-760.0 and C26-761.0. Such portable booths shall be at least six feet high and at least twenty square feet in area, and shall be constructed of hard asbestos board, sheet steel of at least No. 24 U. S. gage, or of other approved incombustible material. Such portable booths shall comply with the requirements of section C26-761.0, with reference to windows and doors. Such booths are exempted from the requirements for vent flues. The floors of such booths shall be lifted at least one-half inch above the permanent support on which they are placed and such greater distance as may be necessary to allow the passage of air between the floor of such booths and the platform on which they rest. Such floors shall be so insulated as to prevent the conduction of electricity to any other portion of the building.

(12.21.4.6). § C26-765.0 Exemptions and Requirements for Miniature Cinematograph Machines.—Miniature motion picture machines, in which the maximum electric current used for the light is three hundred fifty watts, are exempted from the requirements of sections C26-760.0 through C26-764.0. Such miniature machines shall be operated in an approved box of incombustible material constructed with a fusible link or other approved releasing device that will close instantaneously and completely in case of combustion within the box. The light in such miniature machines shall be completely enclosed in a metal lantern box covered with non-removable roof. Miniature motion picture apparatus, which uses only an enclosed incandescent electric lamp and approved acetate of cellulose or slow

burning films and is of such construction that films ordinarily used on full sized commercial picture apparatus cannot be used, is also exempted from the requirements of the above named sections.

(12.21.4.7). § C26-766.0 Inspection and Certification of Portable Motion Picture Machine Booths and Miniature Cinematograph Machines.—Before moving pictures are exhibited with a portable booth under the requirements of section C26-764.0, and before miniature machines without booths are used as permitted under section C26-765.0, a certificate of approval shall be obtained from the superintendent.

(12.21.4.8). § C26-767.0 Motion Picture Machine Booths in Theatres.—Booths in theatres shall be subject to the same requirements as booths in motion picture theatres.

(12.21.4.9). § C26-768.0 Lighting of Motion Picture Theatres.—The lighting of motion picture theatres shall comply with the requirements of sections C26-743.0 through C26-745.0.

(12.21.4.10). § C26-769.0 Application to Existing Motion Picture Theatres.—Motion picture theatres, legally constructed and operated on January first, nineteen hundred thirty-eight, shall comply with the requirements of this article for motion picture theatres, only to the extent ordered by the superintendent unless the seating capacity is increased. Any motion picture theatre in a hotel located at a summer resort, where the seating capacity does not exceed one thousand persons, and in which there is no stage or scenery, and to which no admission fee is charged or exacted, and which is located on the ground floor of such building, and is legally constructed and operated on January first, nineteen hundred thirty-eight, shall comply with the requirements of this article, only to the extent ordered by the superintendent unless the seating capacity is increased. If the seating capacity of any such motion picture theatre, constructed before January first, nineteen hundred thirty-eight, is increased, such theatre shall comply with all the requirements for such theatres.

(12.21.4.11). § C26-770.0 Open Air Motion Picture Theatres.—The seating capacity of each open air motion picture theatre as defined in section B32-22.0 of the code, shall be such as is prescribed by the superintendent. Such theatres shall comply with the following requirements:

(12-21.4.11.1). 1. Aisles.—The number and width of all aisles shall be as prescribed by the superintendent, but aisles shall be at least four feet wide.

(12.21.4.11.2). 2. Exits.—At least two separate exits remote from each other shall be provided, and every exit shall be at least five feet wide. For every two hundred persons to be accommodated in excess of three hundred persons, the total width of exits shall be increased one foot. Exits shall be indicated by signs and red lights. Doors shall open outwardly for their full width.

(12.21.4.11.3). 3. Seats.—Seats shall be stationary, separated thirty-two inches from back to back, and so arranged that the maximum number of seats intervening between any seat and an aisle shall be seven. Chairs shall be securely fastened to a wood or concrete floor, or all chairs in a row shall be fastened together and at least four row shall be securely fastened to one frame. Where refreshments are served, tables and attached chairs or benches used with them shall be permitted.

(12.21.4.11.4). 4. Floors.—Floors shall be constructed either of concrete or wood with sleepers, and shall extend at least five feet from the seats on all sides, provided in the discretion of the superintendent a gravel floor may be substituted for wood or concrete.

(12.21.4.11.5). 5. Additional Requirements for Open Air Motion Picture Theatres. Open air motion picture theatres shall also comply with the requirements of sections C26-760.0 through C26-770.0.

Sub-Article 22. Television Studios

(12.22.1). § C26-770.1 Requirements for Television Studios.—1. Definitions. Television studio means any place in a building from which television broadcasts are made and which contains television equipment, scenery or other paraphernalia, properties, fixtures or other special equipment used for production of television broadcasts in which the use of motion picture film may be an integral part and with or without seating area for an audience. A television studio may include, but shall not be limited to, front and rear screen projection, film recording, kinescope recording, cutting and editing room, developing, screening and viewing rooms, storage rooms and telecine rooms. The televising of special events, such as news, sports, convention or special events of a generally similar nature in any place or building shall not constitute such place or building a television studio.

b. Front or rear screen projection in a television studio means projection of an image either moving or still by film or otherwise on a screen either from the front or rear in conjunction with the production of television broadcasts.

c. Telecine room means an area which is equipped with projection machines, television camera chains and associated equipment whereby images either moving or still, or by film, are transmitted into the television camera.

d. A conventional stage is any stage or floor area used for the production of a show, play or act, where scenery, drops or sets are located within the area or room where the production is made and where there are arrangements to accommodate an audience of more than three hundred persons if the scenery is flown or more than five hundred persons if scenery is not flown except that where the entire studio is sprinklered by a two source automatic wet pipe system of sprinklers the stage or floor area shall not be a conventional stage unless there are arrangements to accommodate an audience of more than six hundred persons if the scenery is flown, or more than one thousand persons if scenery is not flown. However, in spaces in the studio designed to contain technical electronic equipment, such as control rooms, telecine rooms and broadcast equipment rooms, where a two source automatic wet pipe system of sprinklers would be required a CO_2 automatic system may be used in lieu of such wet pipe system.

2. General provisions. a. Television studios shall be exempt from the provisions of article thirteen, sub-articles one to twenty-one, inclusive of this title except that the provisions of sub-division d of section C26-722 shall apply.

b. Every structure used or arranged to be used as a television studio for the accommodation of an audience of less than five hundred persons and in which scenery is not being flown but with provision for scenery or dressing rooms or other studio accessories shall be exempt from the requirements of this article, provided that:

(1) Exit facilities, seats and aisles shall comply with all of the requirements for means of egress prescribed in article seven of this title.

(2) Dressing rooms shall be protected by a sprinkler system supplied from either the house water supply system or a separate source of supply which, in either case, will give the required volume at a pressure of at least fifteen pounds per square inch at the highest line of sprinklers.

(3) Scenery is of incombustible material or flameproofed in accordance with the requirements of the fire commissioner or shall be treated so as neither to ignite nor actively support combustion.

c. Every structure intended to be used or arranged to be used in whole or in part for television studios where any single television studio is used for the accommodation of an audience of more than five hundred persons or for an audience of more than three hundred persons with scenery that is being flown, shall be a class one, fireproof structure, except as otherwise specifically provided in this article, and in addition shall comply with the following requirements:

(1) Exit facilities shall comply with all of the requirements for means of egress prescribed in article seven of this title, and in addition, fixed seats shall comply with the provision of section C26-729.0 and aisles shall comply with the provisions of section C26-738.0, except that there also may be one hundred and fifty portable temporary seats in the production area as part of a production.

(2) Where there is a conventional stage, it shall be enclosed on both sides and rear with partitions having a fire resistive rating of at least four hours, openings in these partitions shall be protected by means of self-closing or automatic protective assemblies having a fire resistive rating of at least one hour, and the proscenium opening shall be equipped with an approved curtain conforming to the provisions of section C26-725.0.

(3) Scenery, drops and valances shall be of incombustible material or flameproofed in accordance with the requirements of the fire commissioner or shall be treated so as neither to ignite nor actively support combustion.

(4) A complete system of automatic sprinklers shall be installed in dressing rooms, property rooms, wardrobe rooms and under the stage roof if any. Where there is a conventional stage a line of automatic sprinklers shall be provided over the proscenium opening on the stage side of the asbestos curtain; and where a two source sprinkler system is not required, the sprinkler system may be supplied from either the house water supply system or a separate source of supply, which, in either case, shall give the required volume at a pressure of at least fifteen pounds per square inch at the highest line of sprinklers.

(5) Telecine rooms, dressing rooms, wardrobe rooms, property rooms, workrooms, and any carpenter shops shall be located outside of the fire resistive partitions enclosing the stage; these rooms shall be enclosed in partitions having a fire resistive rating of at least three hours and openings in such partitions shall be equipped with self-closing or automatic protective assemblies having a fire resistive rating of at least one hour.

(6) Where there is a conventional stage an automatic skylight, of not less than five per cent of the area of the stage between the enclosing partitions and the asbestos curtain line, shall be installed in the roof over the stage, or in place of such skylight, a vent duct, or ducts, of equal area shall be extended from the top of the stage to a point above the roof. If ducts are installed, they may be either open or provided with plain glass dampers held closed by means of fusible links, and having three-quarter inch or smaller mesh wire screens immediately below as approved by the superintendent. These vent ducts shall be enclosed and constructed as required for medium temperature chimneys in section C26-710.0. No other flues or ducts shall be connected to the vent ducts from the stage.

(7) Portable fire appliances in any room where film is handled, stored or used, shall be as prescribed by the fire commissioner.

(8) All members of the audience shall be furnished with seats.

(9) No seats, chairs, stools, or other movable furniture shall be placed in any aisle or passageway leading to a means of egress.

(10) Dry foliage, flowers and branches shall be used as stage setting or scenery only when so treated as to neither ignite nor support combustion.

d. Premises used exclusively for the display of television pictures with an audience capacity of six hundred persons or less and without a stage or platform exceeding five feet in depth and without scenery, or with a platform which complies with subdivision d of section C26-722.0 of the administrative code, shall be rated as a television studio and entitled to the exceptions from the general requirements of article 13 of this title and the exceptions set forth in sub-article twenty-one thereof, but shall be subject to the exit provisions contained in sections C26-754.0 to 759.0 inclusive.

e. Before any premises are converted to, or any structure or part of a structure is used or erected for a television studio, plans drawn to scale specified by the superintendent shall be filed with the department of housing and buildings. Such plans shall show compliance with the administrative code for television studio and shall further show requirements of the administrative code with respect to structural matters, plumbing, heating, ventilating, air conditioning and use and storage of film. The approval of the department of housing and buildings will authorize the use of said premises for such television purposes. The certification by certificate of compliance as set forth in section C26-770.2 or certificates of occupancy of the department of housing and buildings shall be binding upon all licensing authorities for the issuance of licenses and permits.

f. Anything in article thirteen of this title to the contrary notwithstanding, a structure erected to accommodate an audience of more than three hundred persons, but approved for accommodation of an audience of less than three hundred persons under the authority of a certificate of compliance as defined in section C-26-770.2, shall be exempt from the provisions of said article thirteen except as provided in paragraph b. of subdivision two hereof.

g. Television studios shall comply with the requirements for lighting specified in sections C26-743.0 and C26-745.0, and lighting during all productions shall not be less than that specified in section C26-1441.0.

h. Ramps in television studios shall comply with section C26-740.0.

(12.22.2). § C26-770.2 Certificate of Compliance.—Where a theatre or motion picture theatre exists in a structure and a certificate of occupancy has been issued for such use, the theatre or motion picture theatre may be converted to a television studio without the issuance of a new certificate of occupancy. In such case the superintendent may issue a certificate of compliance for the television studio certifying that the television studio conforms to the applicable laws enforced by the department of housing and buildings and a certification in writing by the fire department in the same manner as required for a certificate of occupancy. Upon termination of the use as a television studio, the premises shall be permitted to revert to the former use of theatre or motion picture theatre provided that the arrangement of the theatre, especially in relation to exits, seats, aisles and stage, is substantially the same as the arrangement existing at the time the certificate of occupancy was issued.

Section 2. Saving clause. If any clause, sentence, paragraph, section or part of this article shall be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair or invalidate the remainder thereof, but shall be confined in its operation to the clause, sentence, paragraph, section, or part thereof directly involved in the controversy in which such judgment shall have been rendered.

ARTICLE 14. ELEVATORS

Sub-Article 1. Definitions of Terms in This Article

(13.1.1). § C26-771.0 General.—For the purposes of this article, the words and terms listed in section C26-772.0 through C26-843.0 shall have the meanings therein given.

(13.1.1.1). § C26-772.0 Alteration.—The term "alteration" of an elevator, dumbwaiter or escalator, shall mean a change in the use, classification, operation, control,

motor, brake, character of power supply, capacity, dead weight of car or counter-car safeties or safety devices, for which application is filed in the department under the provisions of this article.

(13.1.1.2). § C26-773.0 **Amusement Device.**—The term "amusement device" shall mean a mechanically or power operated device, used to convey persons in any direction as a form of amusement.

(13.1.1.3). § C26-774.0 **Annunciator, Elevator Car.**—The term "elevator car annunciator" shall mean an electrical device in the car which indicates the landing at which hall buttons have been pressed.

(13.1.1.4). § C26-775.0 **Automatic Push Button or Self-Service Elevator, Electric.**—The term "electric automatic push button elevator" or "self-service elevator" shall mean an elevator which is operated by the passengers by means of momentary pressure of push buttons in the car and halls.

(13.1.1.5). § C26-776.0 **Auxiliary Power Elevator.**—The term "auxiliary power elevator" shall mean an elevator having a source of mechanical power, such as shafting, in common with other machinery.

(13.1.1.6). § C26-777.0 **Bi-Parting Door or Gate.**—The term "bi-parting door or gate" shall mean a vertical-slide, horizontal-slide or swing door or gate consisting of two or more sections so arranged that such sections, or pairs of sections, open away from each other, and are so interconnected that both sections operate simultaneously.

(13.1.1.7). § C26-778.0 **Bottom Clearance.**—The term "bottom clearance" of the elevator car shall mean the vertical distance between the highest point of any obstruction in the pit, exclusive of the compensating device, buffers and buffer supports, and th lowest point on the understructure of the elevator car exclusive of the safeties, car frame channels and guide shoes, when the car floor is level with the lower terminal landing.

(13.1.1.8). § C26-779.0 **Bottom Overtravel.**—a. The term "bottom overtravel" of the elevator car shall mean the distance the car floor can travel between the level of the lower terminal landing and the point at which the fully loaded car rests on the buffers, and shall include the resulting buffer compression.

b. The term "bottom overtravel" of the counterweight shall mean the distance the counterweight can travel between its position when the car platform is level with the supper terminal landing, and the point at which the counterweight rests on the buffers, and shall include the resulting buffer compression.

(13.1.1.9). § C26-780.0 **Buffer.**—The term "buffer" shall mean a device designed to absorb the impact of the car or counterweight at the lower limits of travel.

(13.1.1.10). § C26-781.0 **Car or Counterweight Safety.**—The term "car safety" or "counterweight safety" shall mean a mechanical device attached to the car or counterweight frame to stop and hold the car or counterweight in case of predetermined overspeed, free fall or slackening of the cables.

(13.1.1.11). § C26-782.0 **Car Door or Gate.**—The term "car door or gate" shall mean the door or gate, in or on the elevator car, ordinarily used for entrance and exit.

(13.1.1.12). § C26-783.0 **Car Door or Gate Electric Contact.**—The term "car door or gate electric contact" shall mean a device which opens the control circuit, or an auxiliary circuit, when the car door or gate is open more than one and one-half inches from full closure, and thus prevents any operation of the elevator that moves the car away from the landing.

(13.1.1.13). § C26-784.0 **Car Enclosure or Cab.**—The term "car enclosure" or "cab" of an elevator shall mean the enclosure consisting of railings, doors or gates, walls, and the top or cover built upon the platform.

(13.1.1.14). § C26-785.0 **Car Frame.**—The term "car frame" or "sling" shall mean the supporting frame to which the car platform, the upper and lower sets of guide shoes, and the hoisting cables are usually attached.

(13.1.1.15). § C26-786.0 **Car-Leveling Device.**—The term "car-leveling device" shall mean any mechanism or control which will move the car within a limited zone toward, and stop the car at, such landing. A car-leveling device may also be used for emergency operation of the car throughout its entire travel and for safe-lifting purposes.

(13.1.1.16). § C26-787.0 **Car Platform.**—The term "car platform" shall mean that part of the car floor which directly supports the load.

(13.1.1.17). § C26-788.0 **Chain-Driven Elevator.**—The term "chain-driven elevator" shall mean an elevator machine connected by a chain to a reversible motor or engine.

(13.1.1.18). § C26-789.0 **Continuous Pressure Electric Elevator.**—The term "continuous pressure electric elevator" shall mean an elevator operated by means of pus buttons in the car and at the landing, which elevator requires a button to be he manually in contact to keep the car in motion.

(13.1.1.19). § C26-790.0 **Contract Load.**—The term "contract load" shall mean th load specified in the contract for the purchase of the elevator, or the load specified i the application for the building permit.

(13.1.1.20). § C26-791.0 **Contract Speed.**—The term "contract speed" shall mea the upward speed specified in the purchase contract, or in the application for building permit, to be attained by the elevator with contract load in the car.

(13.1.1.21). § C26-792.0 **Control.**—a. The term "control" of an elevator sha mean the system of regulation by which the starting, stopping, direction, acceleratio speed and retardation of the elevator are governed.

(13.1.1.21.1). b. Controller, Electric Elevator.—The term "electric elevator co troller" shall mean a device, or a group of devices, which serves to govern, in son predetermined manner, the electric power delivered to the apparatus to which it connected.

(13.1.1.21.2). c. Generator-Field Control.—The term "generator-field contro shall mean a system in which control is primarily accomplished by the use of individual generator for each elevator, and in which the voltage applied to the hoistn motor is adjusted by varying the strength of the generator field.

(13.1.1.21.3). d. Multi-Voltage Control.—The term "multi-voltage control" sh mean a system in which control is accomplished primarily by impressing successive on the armature of the hoisting motor a number of substantially fixed voltages su as may be produced by multi-commutator generators common to a group of elevato

(13.1.1.21.4). e. Rheostatic Control.—The term "rheostatic control" shall mean system in which control is accomplished primarily by varying resistance and reactar in the armature and field circuit of the hoisting motor.

(13.1.1.22). § C26-793.0 **Conveyor.**—The term "conveyor" shall mean a dev intended for the continuous movement of materials only, and operating without t services of an operator thereon.

(13.1.1.23). § C26-794.0 **Door Closer.**—The term "door closer" shall mean device, operated by gravity or other means, which will automatically close a d when such device is released by the operator or by automatic means.

(13.1.1.24). § C26-795.0 **Door Operator, Electric Elevator.**—The term "eleva electric door operator" shall mean an electric device for operating the hoistway do or car doors or both.

(13.1.1.25). § C26-796.0 **Double-Belted Elevator.**—The term "double-belted ele tor" shall mean an auxiliary power elevator in which the direction of motion changed without reversal of the prime mover.

(13.1.1.26). § C26-797.0 **Dumbwaiter.**—The term "dumbwaiter" shall mean hoisting and lowering mechanism, equipped with a car which moves in guides substantially vertical direction, the maximum horizontal sectional area of which ca nine square feet, the maximum compartment height of which, if provided with a fi or removable bottom, is four feet, the maximum capacity of which is five hund pounds, and which is used exclusively for carrying freight or materials.

(13.1.1.27). § C26-798.0 **Electric Dumbwaiter.**—The term "electric dumbwai shall mean a dumbwaiter in which the motion of the car is produced by an elec motor directly applied to the dumbwaiter machinery.

(13.1.1.28). § C26-799.0 **Electric Elevator.**—The term "electric elevator" mean an elevator in which the motion of the car is produced by an electric m directly applied to the elevator machinery.

(13.1.1.30). § C26-800.0 **Elevator Car.**—The term "elevator car" shall mean load-carrying unit, including the platform, car frame and enclosure, if any.

(13.1.1.31). § C26-801.0 **Elevator Landing.**—The term "elevator landing" mean that portion of a floor, balcony or platform immediately adjacent to the hoist opening, and used to receive and discharge passengers, freight or materials.

(13.1.1.32). § C26-802.0 **Elevator Machine.**—a. The term "elevator machine" mean the machinery and its equipment used in raising and lowering the elevator

(13.1.1.32.1). b. Geared-Traction Machine.—The term "geared-traction mach shall mean a traction machine which employs gearing between the electric motor the traction sheave.

(13.1.1.32.2). c. Gearless-Traction Machine.—The term "gearless-traction chine" shall mean a traction machine in which the traction sheave and the brake are mounted directly on the electric motor shaft.

(13.1.1.32.3). d. Traction Machine.—The term "traction machine" shall mean an elevator machine in which the motion of the car and counterweight is produced by means of traction between the driving drum, sheave or sheaves and the connecting hoisting cables.

(13.1.1.32.4). e. Winding-Drum Machine.—The term "winding-drum machine" shall mean an elevator machine in which the cables are fastened to and wind on a drum.

(13.1.1.32.5). f. Direct-Drive Machine.—The term "direct-drive machine" shall mean a machine in which the power is transmitted directly to the driving sheave or sheaves without intermediate mechanism or gears.

(13.1.1.32.6). g. Worm-Geared Machine.—The term "worm-geared machine" shall mean a machine in which the power is transmitted to the driving sheaves or drum through worm gearing.

(13.1.1.32.7). h. Spur-Geared Machine.—The term "spur-geared machine" shall mean a machine in which the power is transmitted to the driving sheaves or drum through spur gearing.

(13.1.1.33). § C26-803.0 **Emergency Release.**—The term "emergency release" shall mean a device to make inoperative, in case of emergency, door or gate electric contacts or door interlocks.

(13.1.1.34). § C26-804.0 **Emergency Stop Switch.**—The term "emergency stop switch" or "safety switch" shall mean a device in the car used to cut off the power from the elevator machine independently of the operating devices.

(13.1.1.35). § C26-805.0 **Escalator.**—The term "escalator" shall mean a moving inclined continuous stairway or runway used for raising or lowering passengers.

(13.1.1.36). § C26-806.0 **Final Terminal Stopping Device.**—The term "final terminal stopping device" shall mean an automatic device for stopping the car and counterweight, when traveling at contract speed, within the top clearance and bottom overtravel, independently of the operation of the normal terminal stopping device, and the operating device.

(13.1.1.37). § C26-807.0 **Freight Elevator.**—The term "freight elevator" shall mean an elevator used for carrying freight or materials and on which only the operator and such persons as are necessary for handling the freight or materials are permitted to ride.

(13.1.1.38). § C26-808.0 **Gravity Elevator.**—The term "gravity elevator" shall mean an elevator in which gravity is the source of power.

(13.1.1.39). § C26-809.0 **Hand Power Elevator.**—The term "hand power elevator" shall mean an elevator driven by manual power.

(13.1.1.40). § C26-810.0 **Hoist.**—The term "hoist" shall mean all the machinery, apparatus and equipment, except cranes, used for raising or lowering freight by means of a sling or hook.

(13.1.1.41). § C26-811.0 **Hoistway.**—The term "hoistway" shall mean any shaftway, hatchway, wellhole or other verticle opening or space designed for the operation of an elevator or dumbwaiter therein.

(13.1.1.42). § C26-812.0 **Blind Hoistway.**—The term "blind hoistway" shall mean a hoistway which does not have hoistway doors at every floor.

(13.1.1.43). § C26-813.0 **Hoistway Door or Gate.**—The term "hoistway door or gate" shall mean the hinged or sliding portion of the hoistway enclosure which gives access to the elevator at any landing.

(13.1.1.44). § C26-814.0 **Hoistway-Door or Gate Electric Contact.**—a. The term "hoistway-door or gate electric contact" shall mean a device which opens the control circuit, or an auxiliary circuit, when the hoistway door or gate at which the car is standing is open more than one and one-half inches from full closure, and thus prevents operation of the elevator car away from the landing.

(13.1.1.44.1). b. Door Unit Contact System.—The term "door unit contact system" shall mean a contact system which meets the requirements of this section, but does not require all the hoistway doors to be closed.

(13.1.1.44.2). c. Hoistway Unit Contact System.—The term "hoistway unit contact system" shall mean a contact system which meets the requirements of subdivision "a" of this section, and also requires all hoistway doors to be closed.

(13.1.1.45). § C26-815.0 **Hoistway-Door Interlock.**—a. The term "hoistway-door interlock" shall mean a device, the purpose of which is to prevent the operation of the elevator machine from moving the car away from a landing unless the hoistway door at that landing is locked in the closed position, and to prevent the opening of the hoistway door from the landing side, except by a special key, unless the car is at rest within the landing zone, or is coasting through the landing zone with its operating device in the stop position.

(13.1.1.45.1). b. Door Unit Interlock System.—The term "door unit interlock system" shall mean an interlock system which meets the requirements of subdivision "a" of this section, but does not require all hoistway doors to be locked in the closed position.

(13.1.1.45.2). c. Hoistway Unit Interlock System.—The term "hoistway unit interlock system" shall mean an interlock system which, in addition to fulfilling the requirements of subdivision "a" of this section, will also prevent the operation of the car unless all hoistway doors are locked in the closed position.

(13.1.1.46). § C26-816.0 **Hoistway Enclosure.**—The term "hoistway enclosure" shall mean any structure which separates the hoistway, either wholly or in part, from the floors or landings through which such hoistway extends.

(13.1.1.47). § C26-817.0 **Hydraulic Elevator.**—a. The term "hydraulic elevator" shall mean an elevator in which the motion of the car is produced by liquid under pressure.

(13.1.1.47.1). b. Plunger Elevator.—The term "plunger elevator" shall mean a hydraulic elevator having a ram or plunger directly attached to the under side of the car platform.

(13.1.1.47.2). c. Rope-Geared Hydraulic Elevator.—The term "rope-geared hydraulic elevator" shall mean an elevator in which the motion of the car is produced by multiplying the travel of a piston or ram by a system of sheaves over which the hoisting ropes operate.

(13.1.1.48.1). § C26-818.0 **Installations.**—a. Existing Installation.—The term "existing installation" of an elevator, dumbwaiter or escalator shall mean an installation the application for which was filed with the department before January first, nineteen hundred thirty-eight.

(13.1.1.48.2). b. New Installation.—The term "new installation" of an elevator, dumbwaiter or escalator shall mean a complete elevator, dumbwaiter or escalator installation the application for which is filed with the department after January first, nineteen hundred thirty-eight.

(13.1.1.49). § C26-819.0 **Landing Zone.**—The term "landing zone" shall mean the space within eight inches above or below the landing.

(13.1.1.50). § C26-820.0 **Manually Operated Door or Gate.**—The term "manually operated door or gate" shall mean a door or gate which is opened and closed by hand.

(13.1.1.51). § C26-821.0 **Non-Stop Switch.**—The term "non-stop switch" shall mean a switch, which, when thrown, will prevent the elevator from making hall stops and will automatically transfer hall stop signals to the next car following.

(13.1.1.52). § C26-822.0 **Normal Terminal Stopping Device.**—The term "normal terminal stopping device" shall mean an automatic device for stopping the elevator car within the overtravel independently of the operating device.

(13.1.1.53). § C26-823.0 **Operating Device.**—The term "operating device" shall mean the car switch, push button, rope, wheel, lever, treadles, or similar devices by the use of which the operator can actuate the controller.

(13.1.1.54). § C26-824.0 **Operation.**—a. The term "operation" shall mean the method of actuating the control.

(13.1.1.54.1). b. Automatic Operation.—The term "automatic operation" shall mean operation by means of buttons or switches both in the car and at the landings, the momentary pressing of which buttons or switches will cause the car to start and stop automatically at the floor which corresponds to the button pressed.

(13.1.1.54.1.1). 1. Single Automatic Operation—The term "single automatic operation" shall mean automatic operation by means of one button in the car for each of one button in the car for each landing level served, and one button at each landing, so arranged that if any car or landing button has been pressed, the pressure of any other such button will be without effect on the operation of the car until the response to the first button has been completed.

(13.1.1.54.1.2). 2. Non-Selective Collective Automatic Operation.—The term "non-selective collective automatic operation" shall mean automatic operation by means of one button in the car for each landing level served and one button at each landing, so arranged that all stops registered by the momentary pressure of landing or car buttons are made in the order in which the landings are reached after the buttons have been pressed, irrespective of direction of travel, of the number of buttons pressed or of the sequence in which such buttons are pressed.

(13.1.1.54.1.3). 3. Selective Collective Automatic Operation.—The term "selective

collective automatic operation" shall mean automatic operation by means of one button in the car for each landing level served and by "up" and "down" buttons at the landings, so arranged that all stops registered by the momentary pressure of the car buttons are made as provided in paragraph two of subdivision "b" of this section, but the stops registered by the momentary pressure of the landing buttons are made in the order in which the landings are reached in each direction of travel after such buttons have been pressed; all "up" landing calls are answered when the car is traveling upwards and all "down" landing calls are answered when the car is traveling downwards, except in the case of the uppermost or lowermost calls, which are answered as soon as reached, irrespective of the direction of the car.

(13.1.1.54.2). c. Car-Switch Automatic Floor-Stop Operation.—The term "car-switch automatic floor-stop operation" shall mean operation in which the stop is initiated by the operator from within the car with a definite reference to the landing at which it is desired to stop, after which the slowing down and stopping of the elevator is automatically effected.

(13.1.1.54.3). d. Car-Switch Operation.—The term "car-switch operation" shall mean operation in which the movement of the car is directly and solely under the control of the operator by means of a switch or constant pressure push button or buttons in the car.

(13.1.1.54.4). e. Continuous-Pressure Operation.—The term "continuous-pressure operation" shall mean operation with "up" or "down" buttons or an up and down switch in the car and at each landing, except the terminal landings where one button or switch may suffice, any one of which buttons or switches may be used to control the movement of such car in the direction for which the button is pushed or the switch actuated, but only so long as such button or switch is manually held in the operating position.

(13.1.1.54.5). f. Dual Operation.—Dual operation is a system of operation whereby the control of an automatic operation elevator is arranged so that, on throwing of a transfer switch, the starting of the car is solely under the control of an operator in the car and the car cannot be started from the landing button. Landing stops may be either automatic or under the control of the operator.

(13.1.1.54.6). g. Pre-Register Signalling Operation.—The term "pre-register signalling operation" shall mean operation in which signals to stop are registered in advance by buttons in the car and at the landings; and in which the operator is notified, at the proper point in the car travel, by a signal, visual, audible, or otherwise, to initiate the stop, after which the landing stop is automatic.

(13.1.1.54.7). h. Signal Operation.—The term "signal operation" shall mean operation by means of single button or switches in the car, and up or down direction buttons or switches at the landings by which predetermined landing stops may be set up or registered for an elevator or for a group of elevators; and by which stops set up by the momentary pressure of the car buttons are made automatically in succession as the car reaches those landings, irrespective of the direction of travel or the sequence in which such buttons are pressed; and by which stops set up by the momentary pressure of the "up" and "down" buttons at the landings are made automatically by the first car in the group approaching the landing in the corresponding direction, irrespective of the sequence in which such buttons are pressed; and by which type of operation the car can be started only by means of a starting switch or button in the car.

(13.1.1.55). § C26-825.0 **Overhead Structure.**—The term "overhead structure" shall mean all of the structure and platforms at the top of the hoistway supporting the elevator equipment.

(13.1.1.56). § C26-826.0 **Passenger Elevator.**—The term "passenger elevator" shall mean an elevator designed to carry persons.

(13.1.1.57). § C26-827.0 **Platform Elevator.**—The term "platform elevator" shall mean an elevator the platform of which is supported by ropes at two or more points at or below the platform level, and which elevator is without an underslung frame or sling having guide shoes so arranged as to prevent the tipping of the platform.

(13.1.1.58). § C26-828.0 **Pit.**—The term "pit" shall mean that portion of an elevator hoistway extending below the level of the bottom landing saddle to provide for bottom over-travel and clearance, and for parts which require space below the bottom limit of car travel.

(13.1.1.59). § C26-829.0 **Power Elevator.**—The term "power elevator" shall mean an elevator in which the motive power is produced otherwise than manually or by gravity.

(13.1.1.60). § C26-830.0 **Power-Operated Door or Gate.**—The term "power-operated door or gate" shall mean a door or gate opened and closed by power other than hand-power, gravity, springs, or the movement of the car.

(13.1.1.60.1). 1. Power-Operated Door or Gate, Manually Controlled.—The term "power-operated door or gate, manually controlled" shall mean a door or gate which is opened and closed by power other than hand-power, gravity, springs, or the movement of the car, the movement of which is controlled by the elevator operator.

(13.1.1.60.2). 2. Power-Operated Door or Gate, Automatically Opened.—The term "power-operated door or gate, automatically opened" shall mean a door or gate which is opened by power other than hand-power, gravity, springs, or the movement of the car, the opening of which is initiated by the arrival of the car at or near the landing. The closing of such door or gate may be under the control of the elevator operator or may be automatic.

(13.1.1.60.3). 3. Power-Opened, Self-Closing Door or Gate.—The term "power-opened, self-closing door or gate" shall mean a door or gate which is opened by power other than hand-power, gravity, springs, or the movement of the car, and when released by the operator is closed by energy stored during the operation of opening.

(13.1.1.60.4). 4. Power-Closed Door or Gate.—The term "power-closed door or gate" shall mean a door or gate which is manually opened and is closed by power other than hand-power, gravity, springs, or the movement of the car.

(13.1.1.61). § C26-831.0 **Power-Operated Door or Gate Device.**—The term "power-operated door or gate device" shall mean a device or assemblage of devices to open and close the hoistway door and car door or gate by power other than hand-power, gravity, springs, or the movement of the car.

(13.1.1.62). § C26-832.0 **Self-Closing Door or Gate.**—The term "self-closing door or gate" shall mean a door or gate which is opened manually and closes automatically when released.

(13.1.1.63). § C26-833.0 **Sidewalk Elevator.**—The term "sidewalk elevator" shall mean a sidewalk type freight elevator which serves no floors above the sidewalk or ground level, and which opens outside the structure at its top limit of travel.

(13.1.1.64). § C26-834.0 **Sidewalk Type Elevator.**—The term "sidewalk type elevator" shall mean an elevator the platform of which is supported at two or more points at or below the platform level and which is provided with an underslung frame or sling and guide shoes so arranged as to prevent the tipping of the platform.

(13.1.1.65). § C26-835.0 **Single-Belted Elevator.**—The term "single-belted" elevator shall mean an elevator machine connected by a belt to a reversible motor or engine.

(13.1.1.66). § C26-836.0 **Slack Cable Switch.**—The term "elevator slack cable switch" shall mean a device for automatically cutting off the power in case the hoisting cables become slack.

(13.1.1.67). § C26-837.0 **Steam Elevator.**—The term "steam elevator" shall mean an elevator in which the motion of the car is produced by a steam engine directly applied to the elevator machinery.

(13.1.1.68). § C26-838.0 **Stop Button, Elevator Hall.**—The term "elevator hall stop button" shall mean a push button placed in the elevator hallway, which button when momentarily pressed, automatically causes the elevator to stop at that floor.

(13.1.1.70). § C26-839.0 **Terminal Slow Down Device, Elevator Emergency.**—The term "elevator emergency terminal slow down device" shall mean a device so arranged that when the elevator does not slow down properly when approaching the terminal landings, an emergency retarding force is applied.

(13.1.1.71). § C26-840.0 **Top Clearance.**—a. The term "top clearance" as applied to an elevator car shall mean the distance the car floor can travel above the level of the upper terminal landing without any part of the car or devices attached thereto coming in contact with the overhead structure.

b. The term "top clearance" as applied to an elevator counterweight shall mean the shortest vertical distance between any part of the counterweight structure and the nearest part of the overhead structure or any other obstruction when the car floor is level with the lower terminal landing.

(13.1.1.72). § C26-841.0 **Top Overtravel.**—The term "top overtravel" as applied to an elevator car shall mean the distance the car floor can travel between the level of the upper terminal landing and the point at which the car is stopped by the normal terminal stopping device.

(13.1.1.73). § C26-842.0 **Travel (Rise).**—The term "travel" or "rise" as applied to an elevator or dumbwaiter shall mean the vertical distance between the bottom terminal landing and the top terminal landing.

(13.1.1.74). § C26-843.0 **Underslung Elevator.**—The term "underslung elevator" shall mean an elevator, the platform of which is supported at two or more points at

or below the platform level so arranged as to prevent the tipping of the platform.

Sub-Article 2. Administrative Provisions for Elevators

(13.1.2.1). § C26-844.0 Application and Scope of This Article.—a. Application.—

1. The construction, maintenance, operation, inspections and tests of elevator, dumbwaiter, escalator or amusement device installations shall be as provided in this article and other applicable sections of his title and the rules of the board, except as otherwise provided in subdivision "c" of this section.

2. In the absence of provisions of this title or rules of the board, applicable to the construction, maintenance and operation of:

(a) amusement devices,

(b) devices inclined at an angle of forty-five degrees or less for carrying one or two persons,

(c) elevators used only for handling building materials and workmen during construction,

(d) elevators of capacity exceeding thirty thousand pounds and platform area exceeding three hundred square feet when suspended by cable near each corner of the hoistway and at additional positions, and

(e) stage and orchestra lifts installed after January first, nineteen hundred thirty-eight,

such devices shall be permitted and maintained only when the design, materials, and method of operation are, with a view to safety, approved by the superintendent.

3. The provisions of this article cover the construction, inspection, maintenance and operation of elevators, dumbwaiters, escalators and their hoistways, except devices inclined at an angle of forty-five degrees or less for carrying one or two persons, belt, bucket, scoop, roller or similarly inclined or vertical freight conveyors, telescopic ash hoists, tiering or piling machines, skip hoists, wharf ramps, or apparatus in kindred classes, lift bridges and elevators used only for handling building materials and workmen during construction. The use of such excepted types of apparatus may be permitted in the discretion of the superintendent.

4. Amusement devices, stage and orchestra lifts, and elevators of capacity exceeding thirty thousand pounds and platform area exceeding three hundred square feet when suspended by cables near each corner of the hoistways and at additional positions may be used subject to the discretion of the superintendent.

(13.1.2.2). b. Purpose, Interpretation and Exceptions.—The purpose of this article is to provide reasonable safety. In case of practical difficulty or unnecessary hardship the board may grant exceptions from the literal requirements or permit the use of other devices or methods, but such exceptions may be granted only when it is clearly evident that reasonable safety is secured.

(13.1.2.3). c. Existing Installations.—

1. Existing elevators moved to new hoistways shall comply with the provisions of this article.

2. Equipment legally installed prior to January first, nineteen hundred thirty-eight may be used without being reconstructed. Such elevators shall be maintained by the owner in a safe operating condition.

3. Existing installations may be altered to receive the benefit of any of the provisions of this article, provided the safety requirements of such provisions are met. When an increase is made in the capacity or speed of an elevator or a change is made in the method of its operation, control or classification, the governor or car safety, or both, of such elevator may be continued in use, provided each such governor or car safety meets the requirements of sections C26-989.0 through C26-1004.0 and sections C26-1044.0 through C26-1053.0, except that it shall be unnecessary to meet the requirements of section C26-1009.0.

4. When such alteration consists solely of a change in the character of an electric power supply, the elevator shall be made to conform to additional requirements as follows:

(a) When the change of power supply is from direct current to alternating current, only such additional new parts as are necessitated by the change in the power supply shall be required, except that there shall be provided electrically operated brakes as provided in sections C26-1025.0 and C26-1026.0, and terminal stopping devices as provided in sections C26-1044.0 through C26-1053.0. If existing electric brakes are inadequate in the opinion of the superintendent, such brakes shall be replaced with approved electrically released brakes.

(b) When the change of power supply is from direct current to alternating current and the contract speed of the elevator exceeds one hundred ten feet per minute, there shall be provided a two-speed induction motor and terminal stopping and safety device as provided in sections C26-1044.0 through C26-1053.0, except that when the overhead car and counterweight clearances meet the requirements of subdivisions b and c of section C26-867.0 and the speed of the elevator does not exceed two hundred feet per minute, a one-speed induction motor may be used.

(c) When there is a change in voltage, cycles, or number of phases of an alternating curent supply, or a change from direct current to alternating current, or alternating current to direct current, or to a combination of direct current and alternating current of an elevator, only such electrical equipment or parts thereof of such elevator as are adjusted or altered in such manner as to operate safely and efficiently, may be retained.

5. Ordinary repairs or replacements on existing installations may be made with parts of equivalent material and at least the equivalent in strength and design to those replaced, without complying with the provisions of this article. Damaged or defective parts shall be wholly or partly replaced in the discretion of the superintendent, except that broken parts subject to bending, tension or torsional stresses and parts upon which the support of the car depends shall not be welded.

(13.1.3). § C26-845.0 Certificates.—It shall be unlawful for the owner or lessee to operate or permit the operation or use of any device mentioned in section C26-844.0 until a certificate has been obtained from the superintendent that such device has been inspected and found to be safe. Within a reasonable time after being requested to do so, the superintendent shall inspect any device installed or constructed after January first, nineteen hundred thirty-eight. If such device is found to be safe and in conformity with the provisions of this article and the rules adopted hereunder, a certificate to that effect shall be issued. The superintendent may permit the temporary use of any such device for passenger service or for freight service during construction under authority of a temporary certificate issued by him for each class of service; provided that a notice is conspicuously posted on or in connection with such elevator to the effect that such elevator has not been officially approved.

(13.1.4, last sentence). C26-846.0 Posting of Certificates.—The owner or lessee or agent of either of them shall cause the most recent certificate of inspection to be posted in the elevator car in the manner prescribed by the superintendent.

(13.1.4). § C26-847.0 Record of Passenger Elevators and Escalators.—Every elevator and escalator shall be given a serial number for purposes of identification. In the case of elevators installed after January first, nineteen hundred thirty-eight, such serial number shall be assigned when the first certificate is issued. A docket of all elevators and escalators shall be kept in each borough. Such docket shall give, under the corresponding serial number, a description of the location of any elevator or escalator sufficient for identification, together with information as type of construction, motive power, rise, rated speed, inspection and such other information as the superintendent may deem desirable. The owner or lessee or agent of either of them shall cause such number, together with the most recent certificate of inspection, to be posted in the elevator car in the manner prescribed by the superintendent.

(13.1.5). § C26-848.0 Inspection.—a. The superintendent shall cause all passenger and freight elevators and escalators to be inspected quarterly in accordance with the provisions of this article and the rules of the board.

b. The superintendent shall cause amusement devices to be inspected at least twice a year.

c. Upon notice from the superintendent, any necessary repairs to elevators, escalators or amusement devices shall be made without delay by the owner or lessee. If defects are found which would make the continued use of such elevator, escalator or amusement device dangerous, it shall be unlawful to use such elevator or amusement device until the superintendent certifies that such elevator or amusement device has been made safe. The car safety devices of elevators installed after December twelfth, nineteen hundred thirty-one, shall be tested at least once a year. It shall be unlawful to operate an elevator or escalator without a certificate issued by the superintendent certifying that such elevator or escalator has been inspected. Such certificates shall be issued annually.

(13.1.5 1). § C26-848.1 Fees.—The department, in consideration of the issuance of the certificate mentioned in the preceding section, is hereby authorized to charge an annual fee of ten dollars. The provisions of this section shall not apply to and no fee shall be payable in the case of amusement devices, nor in the case of premises solely and exclusively devoted to charitable, religious or educational purposes.

(13.1.6). § C26-849.0 Riding on Elevators Restricted.—It shall be unlawful for any person, other than the operator or those persons necessary to handle freight, to ride on any elevator other than a passenger elevator, and it shall be unlawful for the owner or lessee of any elevator knowingly to permit any person to ride on any elevator other than a passenger elevator. Every freight elevator shall have the following notice

posted conspicuously thereon: "THIS IS NOT A PASSENGER ELEVATOR. IT IS UNLAWFUL FOR ANY PERSON OTHER THAN THE OPERATOR OR THOSE NECESSARY TO HANDLE FREIGHT, TO RIDE ON THIS ELEVATOR."

(13.1.7). § C26-850.0 Operators.—Every power driven passenger elevator and every power driven freight elevator with a rise of more than one story, except automatic operation and continuous pressure elevators and sidewalk elevators, shall be in charge of a designated competent operator eighteen years of age or more, of reliable and industrious habits, qualified is accordance with the rules of the board, except as specifically provided otherwise in any other law. Operators of amusement devices which require the services of a regular operator shall be at least twenty-one years of age and shall rave secured a certificate of competency from the superintendent. If the superintendent finds that any person engaged in running an elevator or amusement device is incompetent or unqualified, the owner or lessee of such elevator or amusement device shall, upon notice from the superintendent, discontinue the operation of such elevator or amusement device by such operator. It shall be unlawful to employ or permit any person to operate any elevator or amusement device, except as provided in this section, who does not possess the qualifications prescribed therefor by law or the rules of the board.

(13.1.8). § C26-851.0 Accidents.—The owner or lessee or person in charge of any of the devices mentioned in section C26-844.0, shall immediately notify the superintendent of every accident to any person or damage to apparatus on or about or in connection with such device, and shall afford the superintendent every facility for investigating such accident or damage. The superintendent shall make an investigation immediately thereafter, and shall file in the department a full and complete report of such investigation. Such report shall give in detail all material facts and information available and the cause or causes so far as they can be determined. Such report shall be open to public inspection at all reasonable hours. When an accident involves the failure or destruction of any part of the construction or operating mechanism of such a device, it shall be unlawful to use such device until it has been made safe, and the superintendent may, if he deem it necessary, order the discontinuance of such device until a certificate has been issued by him for its use. It shall be unlawful to remove any part of the damaged construction or operating mechanism from the premises until permission to do so has been granted by the superintendent.

Sub-Article 3. Hoistway Construction for Passenger, Freight and Sidewalk Type Power Elevators

GROUP 1

Hoistway Construction

SUB-GROUP 1

Hoistway Enclosures

(13.2.1.1.1). § C26-852.0 Hoistways to be Fire Resistive.—Hoistway enclosures of all elevators, except sidewalk elevators the travel of which is one story or less, shall comply with sections C26-638.0 through C26-647.0, and sections C26-660.0 through C26-665.0, and, in factory buildings, shall also comply with sections two hundred sixty-one and two hundred seventy of the labor law.

(13.2.1.1.2). § C26-853.0 Landing Openings to be Protected.—Landing openings in a fire resistive hoistway enclosure shall be provided with fire resistive doors, panels or fronts which comply with sections C26-638.0 through C26-647.0, and sections C26-660.0 through C26-665.0, and, in factory buildings, with sections two hundred sixty-one and two hundred seventy of the labor law, except that such openings shall first comply with sections C26-896.0. For elevators whose contract load is two thousand pounds or more, the aggregate clear width of the hoistway doors shall be at least thirty inches and the clear height shall be at least seventy-eight inches.

(13.2.1.2.1). § C26-854.0 Use and Enclosure of Non-Fire Resistive Hoistway Enclosures.—a. Non-fire resistive hoistway enclosures shall be permitted only for sidewalk elevators the travel of which is one story or less. Where non-fire resistive construction is permitted, hoistways shall be enclosed in partitions of incombustible material to the full height of the hoistway.

b. The enclosure on the side or sides used for loading or unloading shall be at most five inches from the edge of the car platform. Doors of incombustible material shall be provided in the openings.

(13.2.1.2.2). § C26-855.0 Materials for Enclosures.—a. Non-fire resistive hoistway enclosures shall be building walls, solid or latticed partitions, or of incombustible material, grille work, metal grating, expanded metal or fireproofed wood. Where wire

grille work is used, such wire shall be at least 0.0915 inch in diameter (No. 13 steel wire gage), and the maximum size of mesh shall be two inches. Where expanded metal is used, its minimum thickness shall be 0.094 inch (No. 13 U.S. gage).

b. The maximum spacing between vertical bars shall be one inch, except where such bars are used as furring material in order to comply with section C26-854.0. In such case the maximum spacing between vertical bars shall be four inches.

(13.2.1.2.3). § C26-856.0 Netting Required on Enclosures.—When either of the following conditions exists, the openings in any non-fire resistive enclosures shall be covered with a netting of square mesh, one-half of an inch or less in size. Such mesh shall be made of wire at least 0.0348 inch in diameter (No. 20 steel wire gage):

1. The clearance between such enclosures and any part of the car, counterweight or any sliding landing door is less than one inch.

2. Such enclosure is grille or open work having openings which will pass a one-half inch diameter ball, and the openings in the enclosures are less than six feet above any landing, stairway, floor or platform.

(13.2.1.2.4-13.2.1.1.3). § C26-857.0 Design and Construction of Projections.—Projections and hoistway doors extending inward from the general surface from the hoistway enclosure, and which are opposite a car entrance of an elevator, shall be beveled on the under side or shall be guarded with metal plates, or by fireproofed wood or by wood faced with metal at least 0.125 inch thick (No. 11 U. S. gage). The angle of such bevels or guard plates shall be at least sixty degrees, and preferably seventy-five degrees, from the horizontal. If plates and guards are used, such plates or guards shall be smooth and shall be firmly and permanently fastened to the hoistway enclosure.

(13.2.1.2.5—13.2.1.1.4). § C26-858.0 Recesses.—a. In fire resistive hoistway enclosures, recesses other than landing openings in the general surface of the hoistway enclosure which are opposite a car opening, shall be filled in flush with the general surface of the hoistway, except where the corresponding opening in the car enclosure is provided with solid panel car doors. In non-fire resistive hoistway enclosures, recesses other than landing openings in the general surface of the hoistway enclosure of a freight elevator, which are opposite a car opening, shall be filled in flush with the general surface of the hoistway to comply with section C26-855.0.

b. The soffit of a recess formed by or between vertical bars shall be beveled as specified for projections in section C26-857.0.

(13.2.1.2.6—13.2.1.1.5). § C26-859.0 Strength of Hoistway Enclosure.—The hoistway enclosure adjacent to a landing opening shall be of sufficient strength to support in true alignment the hoistway doors and gates with their operating mechanisms and interlocks.

SUB-GROUP 2

Clearance Between Cars, Counterweights and Hoistway Enclosures of Elevators

(13.2.1.3.1). § C26-860.0 Clearance Between Cars, Enclosures and Counterweights.—The hoistway of an elevator shall have a clearance of at least three-quarters of an inch between the sides of the car and the hoistway enclosure, and a clearance of at least one inch between the car and its counterweights.

(13.2.1.3.2). § C26-861.0 Clearance Between Platforms and Landing Thresholds.—The minimum clearance between the car platforms and the landing saddles shall be one-half of an inch for elevators using side-post construction, and three-quarters of an inch for elevators using corner-post construction. The maximum clearance in each case shall be one and one-half inches.

(13.2.1.3.3). § C26-862.0 Clearance Between Hoistway Enclosure and Loading Side of Car Platform.—The maximum clearance between a hoistway enclosure and a loading side of the car platform opposite a car entrance shall be five inches, except that when the doors are installed wholly whithin the hoistway, the maximum clearance shall be seven and one-half inches.

(13.2.1.3.4). § C26-863.0 Furring.—If furring out shall be necessary to comply with the foregoing requirements, such furring shall conform to section C26-855.0.

(13.2.1.3.5). § C26-864.0 Clearance of Cars in Adjoining Hoistways.—The clearance between cars operated in adjoining hoistways shall be at least two inches.

SUB-GROUP 3

Pits, Overtravel and Clearances

(13.2.1.4.1). § C26-865.0 Pits.—Pits shall be provided at the bottom of all elevator hoistways, except as provided in subdivision d of section C26-1097.0.

(13.2.1.4.2). § C26-866.0 Pit Dimensions.—a. Every pit for sidewalk type or

private residence elevators shall be at least two feet deep measured from the saddle of the lowest landing.

b. Every pit for elevators which have a contract speed of one hundred feet or less per minute, except for sidewalk type and private residence elevators, shall have such a depth that the vertical clearance between the lowest projection under the car platform and any obstruction in the pit shall be at least twenty-four inches when the buffers are fully compressed.

c. Every pit for elevators which have a contract speed exceeding one hundred feet, but not exceeding two hundred fifty feet per minute, where spring buffers are permitted and used, shall be at least three and one-half feet deep measured from the saddle of the lowest landing to the floor of such pit.

d. The pit depth for elevators having a contract speed exceeding two hundred fifty feet per minute, where oil or equivalent buffers are required, shall be at least the sum of the following two distances measured from the saddle of the lowest landing:

1. The overall length of the fully extended buffer, having a buffer stroke as determined by section C26-944.0.

2. The distance between the upper surface of the car platform and the under surface of the buffer strike plate, plus three inches.

e. Additional pit depth shall be provided where necessary to allow clearance for compensating rope sheaves and any vertical movement thereof, and to comply with sections C26-1044.0 through C26-1053.0.

f. When the car rests on the fully compressed buffer, there shall be at least two feet clearance vertically between the lowest projection of the under side of the car platform, except guide shoes, car frame channels and safeties and aprons attached to the sill, and any obstruction in the pit, exclusive of compensating device, buffers and buffer supports. Sidewalk type elevators shall be exempted from the requirements of this division.

g. Ten percent of the total area of the platform may be used for junction boxes or other elevator equipment and such portion of the total area is exempted from the requirements of this section. When the area of the junction boxes or other elevator equipment exceeds ten percent of the total area of the platform, such clearance shall be measured from the under side of such boxes or equipment. The location of such projections shall be subject to the approval of the superintendent. Sidewalk type elevators shall be exempted from the requirements of this subdivision.

h. When practical difficulties make it essential, the pit depth required by this section may be reduced subject to the approval of the superintendent. If such reduction in pit depth involves precompression of either the car or counterweight buffer or both, the amount of precompression so allowed shall not reduce the extension of the buffer plunger to less than fifty percent of the buffer stroke as determined by section C26-944.0, or to less than eighteen inches, whichever is greater, and such amount shall not permit precompression of buffers having a stroke of eighteen inches or less.

i. In no case shall the depth of any depression or trench in the pit be included in the pit depth or clearance.

j. The walls of the pit shall be substantially vertical. The horizontal sectional area of the pit shall include the continuation of the horizontal clearance about the car platform, required to permit the passage of the counterweight and its guide rails, the car guide rails and any cables, ropes or tapes extending below the lower terminal landing saddle.

k. The floor of the pit shall be approximately level. This requirement may be waived if old foundation footings are encountered in a new installation and it is inadvisable to remove such footing, but the maximum encroachment shall be fifteen percent of the cubical contents of the pit. Precautions shall be taken to minimize the hazards of an uneven pit.

(13.2.1.4.3). § C26-867.0 Top Clearances.—a. The top clearances for passenger and freight power elevators, except sidewalk type elevators shall be as prescribed in subdivisions b and c of section C26-867.0.

(13.2.1.4.3.1). b. Car clearance.—

1. When the car is at its top landing, the clear distance between the top of the crosshead of such car and the corresponding point of any obstruction in the hoistway vertically above such crosshead, shall be at least the sum of the following four items:

(a) The clearance between the bottom of the counterweight buffer and its striking block, which shall be at least six inches.

(b) The stroke of the counterweight buffer used.

(c) Two feet, or the distance which any sheave or any other equipment mounted in or on the car crosshead projects above the top of the crosshead, whichever is greater.

(d) One-half the counterweight buffer stroke corresponding to the required governor tripping speed of the car as determined by section C26-944.0.

2. Item 'd' may be omitted if provision is made to eliminate the jump of the car at counterweight buffer engagement.

3. It shall be unlawful to permit any equipment mounted on the car to strike any part of the overhead structure and also it shall be unlawful to permit any equipment on the car to strike any equipment or material located in the hoistway when the car crosshead is a distance equal to item 'c' of subdivision 1 of this section from the nearest obstruction above it.

4. For private-residence elevators the clearance shall be as specified in this section, except that the two foot dimension in item 'c' may be reduced to one foot and item 'd' eliminated, provided that an emergency stop switch is mounted in an accessible location on top of the car.

(13.2.1.4.3.2). c. Counterweight Clearance.—

1. When the car is level with the bottom landing, the clear distance between the top of the counterweight and the corresponding point of any obstruction in the hoistway vertically above it, shall be at least the sum of the following four items:

(a) The clearance between the top of the car buffer and its striking block, which shall be at least three inches.

(b) The stroke of the car buffer used.

(c) Six inches.

(d) One-half the car buffer stroke corresponding to governor tripping speed of the car as determined by section C26-944.0.

2. Item (d) may be omitted if provision is made to eliminate the jump of the counterweight at car buffer engagement.

3. When the pit depth has been reduced as provided for in section C26-866.0, the top clearances may be modified to conform therewith subject to the approval of the superintendent.

(13.2.1.4.4). § C26-868.0 Overtravel for Sidewalk Type Elevators.—An overtravel of at least six inches at the top and at least three inches at the bottom shall be provided for sidewalk type elevators, except as required by section C26-973.0.

SUB-GROUP 4

Hoistway Windows, Bulkheads and Machine Rooms

(13.2.1.5.1). § C26-869.0 Window Entrances to Freight Elevators.—Windows in the hoistway enclosure walls toward which the car of a freight elevator has an entrance, shall, except in the case of elevators having car gates equipped with electric contacts, be provided with vertical bars or gratings having clearances as specified in sections C26-860.0 through C26-864.0. The soffit of the recess formed by or between the vertical bars shall be beveled as specified for projections in section C26-857.0.

(13.2.1.5.2). § C26-870.0 Protection of Hoistway Windows.—Where windows in the hoistway enclosure are less than seven floors above the sidewalk level and less than three floors above the roof of an adjacent structure, such windows shall be fitted with vertical metal bars which are at least five-eighths of an inch in diameter. The maximum spacing between such bars shall be ten inches.

(13.2.1.5.3). § C26-871.0 Access to Machine Rooms, Pits and Overhead Machinery Spaces.—a. Safe and convenient access shall be provided to the machine rooms, pits and overhead machinery and elevator equipment spaces. Where the entrance to machine rooms and overhead machinery spaces is more than five feet above the adjacent floor or roof surface, access shall be provided by means of a metal ladder or stairs. Such ladder or stairs shall have a maximum angle of incline of sixty degrees from the horizontal. Where the difference in level is five feet or less, vertical ladders may be used. Such ladder or stairs shall be fitted with a metal hand-rail above the outside stringers. When the entrance door opens outwards, a platform shall be provided within eight inches below the door sill. Such platform shall be at least two feet wide and shall project at least two feet beyond the lock jamb of the door. A guard rail shall be provided at the edge of such platform, except where the ladder or stairs join such platform.

b. Access to pits over five feet deep may be provided by means of fixed vertical metal ladders. Where the buffer cylinder is over five feet high, a fixed inclined metal ladder shall be provided.

c. It shall be unlawful to use elevator machine rooms and overhead machinery spaces as public thoroughfares. Doors to elevator machine rooms and overhead machinery spaces shall be fitted with locks which will permit the door to be opened from the inside without a key.

d. Where it is impractical to provide access to overhead sheaves and governors from outside the hoistway, access may be provided from within the hoistway, if an

emergency switch, suitably marked, is placed inside the hoistway which switch, when opened, will prevent operation of the elevator during the inspection of the overhead machinery.

(13.2.1.5.4). § C26-872.0 Lighting of Elevator Machinery.—a. Permanent provision for adequate artificial light shall be made in all elevator equipment spaces, machine rooms, pits and spaces for overhead machinery of elevators. Where electric light is available, the extent of illumination shall be based on the use of at least one-half watt per square foot of floor area.

b. The machine room lighting switch, if electric light is used, or the lamp, if electricity is unavailable, shall be within easy reach of the entrance of the machine room.

c. Wherever practical, the elevator service switch and the lighting switch shall be located on the lock jamb side of the machine room entrance door. Both such switches shall be of the enclosed type.

(13.2.1.5.5). § C26-873.0 Head Room in Bulkheads.—Bulkheads of elevators shall be constructed with a minimum head room of six feet above any platform required in sections C26-876.0 through C26-880.0.

(13.2.1.5.6). § C26-874.0 Enclosure of and Access to Elevator Machines.—a. Elevator machines shall be surrounded by substantial grille work or by some other enclosure unless such machines are located in machine, engine or pump rooms where an attendant is in charge, or unless such machines are otherwise secured against unauthorized access.

b. All machine enclosures shall provide at least twelve inches horizontal clearance on at least three sides and so such vertical clearance as is necessary to give access to such parts of the machinery as require maintenance and inspection.

(13.2.1.5.7). § C26-875.0 Guarding of Exposed Moving Machine Parts.—Exposed gears, sprockets, tape sheaves, and ropes and tapes passing through the secondary levels shall be guarded in accordance with the standards prescribed in section C26-892.0.

SUB-GROUP 5

Machine Supports, Loads on Supports and Factors of Safety

(13.2.1.6.1). § C26-876.0 Machine Supports.—Machinery and sheaves shall be supported and held so effectually to prevent any part from becoming displaced. The supporting beams shall be of steel or reinforced concrete. It shall be unnecessary to have beams under machinery supported on an independent foundation or on the floor of the machine room, if such foundation or floor is properly constructed to support the loads.

(13.2.1.6.2). § C26-877.0 Loads on Supports.—Loads on overhead beams and their supports shall be computed as follows:

1. The total load on overhead beams shall be assumed to be equal to the weight of all apparatus resting on such beams plus twice the maximum load suspended from such beams.

2. The load resting on such beams shall include the complete weights of machine, sheaves, controller, and similar equipment. The load suspended from such beams shall include the sum of the tensions of all cables suspended from such beams.

(13.2.1.6.3). § C26-878.0 Hanging of Machinery Underneath Supporting Beams.—It shall be unlawful to hang elevator machinery underneath the supporting beams at the top of the hoistway, except for idler or deflecting sheaves with their guards and frames, devices for limiting or retarding the car speed and their accessories, and overhead sheaves for private residence elevators.

(13.2.1.6.4). §C26-879.0 Factors of Safety.—The factor of safety for overhead beams and their immediate supporting beams, based on the ultimate strength of the material, which, if of steel, shall conform to the standard specifications of the A. S. T. M., D., A7-29, the loads being assumed as in section C26-877.0, shall be at least the following:

1. For Steel 4
2. For Reinforced Concrete 7

(13.2.1.6.5). § C26-880.0 Allowable Deflections:—The allowable deflections of overhead beams and their immediate supports shall be as follows:

1. For overhead machine beams of all alternating current installations, and for direct current installations where the car speed is over one hundred fifty feet per minute, the deflection under static load shall be 1/2,000 of the span or less.

2. For overhead machine beams of direct current installations where the car speed is one hundred fifty feet or less per minute, the deflection under static load shall be 1/1,666 of the span or less.

3. For overhead sheave beams the deflection under static load shall be 1/1,333 of the span or less.

4. For overhead beams immediately supporting the machine beams the deflection under static load shall be 1/1,666 of the span or less.

SUB-GROUP 6

Platforms Under Machinery

(13.2.1.7.1). § C26-881.0 Materials and Strength of Platforms.—a. A flooring of iron, steel, or reinforced concrete, which flooring is capable of sustaining a concentrated load of three hundred pounds on any four square inches of the structure, shall be provided at the top of the hoistway, either immediately below the sheaves or at the level of the top of the machine beams. Sidewalk type elevators, or elevators without sheaves directly over the elevator car shall be exempted from this requirement. It shall be unnecessary for the platform or its supports to be capable of supporting three hundred pounds on every four square inches of its area simultaneously. When a floor of solid construction is used and the shaft extends through the roof, two hundred eighty-eight square inches of ventilation shall be provided. Such openings shall be adequately protected with steel gratings. Rope and rail holes may be considered part of the required area.

b. If the floor consists of a metal bar grating, the mesh or opening between the bars shall reject a ball one and one-half inches in diameter.

(13.2.1.7.2). § C26-882.0 Extent of Grating or Flooring.—The grating or flooring shall fill the entire hoistway when the cross-sectional area is fifty square feet or less; otherwise the platform shall extend at least two feet beyond the general contour of the sheaves or machines, and shall extend to the entrance to the hoistway at or above the level of the platform.

(13.2.1.7.3). § C26-883.0 Hand-Rails and Toeboards Required.—If the platform does not entirely cover the hoistway, the open or exposed sides of such hoistway shall be provided either with a standard hand-rail and toeboard or with a screen and railing at least forty-two inches high.

(13.2.1.7.4). § C26-884.0 Deflecting Sheave Cradles.—Where no slab or grating complying with section C26-881.0, is provided over the entire area of the hoistway below the deflecting or secondary sheaves which extend below the machine level, such sheaves shall be provided with cradles which comply with the requirements for guards prescribed in section C26-892.0. Sidewalk type elevators shall be exempted from the requirements of this section.

SUB-GROUP 7

Stops for Counterweights

(13.2.1.8). § C26-885.0 Stops for Counterweights.—a. Where winding drum machines are used, a permanent beam or bar shall be provided at the top of the counterweight guides and beneath the counterweight sheaves to prevent the counterweights from being drawn into the sheaves. Such beam or bar shall be of such strength that the cables will be pulled out of the sockets before there is any undue deflection of such beam or bar.

b. Such beams or bars shall be so located that the center of resistance is in line with the center of gravity of the counterweight or, if more than one stop is used, such beams or bars shall be located symmetrically with respect to the counterweight.

SUB-GROUP 8

Pipes and Wiring

(13.2.1.9.1). § C26-886.0 Electrical Conductors.—The electrical conductors, installed in or under any elevator or counterweight hoistway, except the flexible cables connecting the car with the fixed wiring, and except the conductors installed under exceptions provided in section C26-887.0, shall be encased in metal conduits or such conductors shall be made of armored cable.

(13.2.1.9.2). § C26-887.0 Electrical Conduits or Cables to be Continuous.—a. It shall be unlawful to install in elevator hoistways any electrical conductors or conduits for furnishing power to elevator hoisting machines or for the control of such hoisting machines, or any other electrical conductors or conduits, except as provided in section C26-886.0, and except in the following cases:

1. Where an existing hoistway is being used;

2. When conductors are used to furnish or control power, light, heat, communication, or signals, for hoistways, for hoistway doors, for car doors, or for cars;

3. When the superintendent approves the installation of other conduits in existing hoistways where space conditions permit.

b. Junction splice boxes or cable support boxes in main elevator feeder runs and other permitted runs shall open outside of the hoistway.

c. Pipes and conduits and armored cables shall be securely fastened to the hoistway construction.

(13.2.1.9.3). § C26-888.0 Pipe Installations.—It shall be unlawful to install soil, waste or vent pipes and pipes conveying gases or liquids which, if discharged into the hoistway, would endanger life, in or under any elevator or counterweight hoistway. Low pressure steam or hot water pipes used only for heating the elevator hoistways may be installed in such hoistways.

(13.2.1.9.4). § C26-889.0 Voltage of Car Control Systems.—It shall be unlawful to use any part of any electric circuit having a rated system or circuit voltage in excess of seven hundred fifty volts direct current, or five hundred fifty volts alternating current, for any control or operating circuit. Circuits of a higher rated system or circuit voltage may be used in machine rooms or bulkheads for the operation of motors, provided that all operating and signal wiring is thoroughly insulated from such power circuits, and provided that all machine frames and hand ropes are permanently grounded.

(13.2.1.9.5). § C26-890.0 Electric Wiring.—Live parts of electrical apparatus in elevator hoistways shall be suitably enclosed to prevent accidental contact. Metal coverings shall be permanently grounded. Wiring shall comply with the requirements of the department of water supply, gas and electricity.

SUB-GROUP 9

Thoroughfares and Occupied Spaces

(13.2.1.10.1). § C26-891.0 Thoroughfares and Occupied Spaces Under Elevator Hoistways or Counterweights.—It shall be unlawful to have thoroughfares or occupied spaces under elevator hoistways or counterweights unless:

1. Buffers are provided conforming to the requirements of sections C26-944.0 through C26-951.0;
2. The car and counterweights are provided with safety devices conforming to the requirements of sections C26-989.0 through C26-1004.0;
3. A structure is provided under the hoistway, which structure is sufficiently strong to withstand without failure the impact of the car with contract load or the impact of the counterweight when either the car or counterweight is descending at contract speed, or at governor tripping speed where a governor-operated safety is used.

GROUP 2

Hoistway Guards and Screens

(13.2.2.1) § C26-892.0 Standard Guards.—a. The standard railings mentioned in this title shall be made of metal and shall be between forty and forty-six inches high and shall have an intermediate rail midway between the top rail and the floor. The uprights and hand-rail shall be made of angles measuring at least two by two inches or the equivalent and the midrail of angles measuring at least one by two inches.

b. The toeboards mentioned in this title shall be made of metal at least as thick as No. 16 U. S. gage, at least six inches high, or such toeboards shall be made of fireproofed wood having dimensions of at least one by six inches.

c. All guards for cables and machinery mentioned in this title shall conform to the safety code for mechanical power-transmission apparatus of the American Standards Association, dated nineteen hundred twenty-seven.

(13.2.2.2). § C26-893.0 Hatch Covers for Sidewalk Elevators.—a. Where the top hatch opening of sidewalk elevators is wholly or partially outside the building wall, the hatch covers shall be of the hinged type or the vertically lifting type and shall be capable of sustaining a live load of three hundred pounds per square foot. The maximum dimensions of sidewalk openings, except by permission of the superintendent, shall be five feet at right angles to and six feet parallel to the building line. The side of the opening nearest the building shall be four inches or less from the building wall, except that where conditions make this impractical such distance may be increased subject to the approval of the superintendent.

b. Where hinged type covers are used, the line of the hinges shall be at right angles to the building line. Where the covers open toward any obstruction, the space between the fully opened cover and such obstruction shall be at least eighteen inches. Where vertically lifting covers are used, there shall be a clearance of at least two feet between the cover and any obstruction above it when the elevator is at the top of its overtravel.

c. Hatch covers shall be self-closing. It shall be unlawful to fasten or to hold open such covers when the car is away from the top landing, except where the hatch opening is in an area inaccessible to the public.

ADMINISTRATIVE BUILDING CODE

d. Where the top hatch opening of sidewalk elevators is wholly inside the building wall, hinged or vertically lifting type covers may be used, or doors may be provided complying with sections C-26-925.0 through C26-932.0, if such doors are provided with interlocks complying with sections C26-907.0 through C26-913.0.

(13.2.2.3.1). § C26-894.0 Counterweight Runway Enclosures.—a. Counterweight Runways Outside of the Hoistway.—Where runways for counterweights are located outside of the elevator hoistway, such runways shall be solidly enclosed throughout their height, except that when the runway is located outside of the structure, such runway shall be enclosed to a height of at least seven feet from the ground.

(13.2.2.3.2). b. Counterweight runways inside of the hoistway.—Each counterweight runway located in the elevator hoistway shall be enclosed from a point twelve inches above the floor of the pit to a point at least seven feet above the floor of its own pit and any other pit adjacent to such counterweight runway, except where compensating chains or cables which practically compensate for the weight of the hoisting cables are attached to the counterweight. In such case, counterweight enclosures may be omitted on the side facing the elevator. Such enclosures shall be made of metal at least as thick as No. 16 U. S. gage.

(13.2.2.3.3). c. Access to Counterweight Runways.—Access shall be provided for inspection, maintenance and repair of all counterweights and cables. Doors to counterweight runway enclosures shall be self-closing. If the counterweight is located in the same hoistway as the car and can be inspected at midtravel from the car, hinged sections shall be unnecessary in the counterweight screen.

(13.2.2.4). § C26-895.0 Cable Enclosures.—Where cables pass through floors outside the hoistway enclosures, such cables shall be guarded to a height of at least six feet from each floor with a standard power-transmission guard. It shall be unlawful to have floor openings greater than is necessary for the free passage of the cables.

GROUP 3

Landings

SUB-GROUP 1

Hoistway Doors for Passenger Elevators

(13.2.3.1.1). § C26-896.0 Automatic Fire Doors Functioning by Heat.—It shall be unlawful for any automatic fire door, the functioning of which is dependent on the action of heat, to lock any landing opening in the hoistway enclosure of any passenger elevator or to lock any exit leading from any hoistway landing door to the outside of the structure.

(13.2.3.1.2). § C26-897.0 Protection of Landing Openings.—a. Landing openings in passenger elevator hoistway enclosures shall be protected by doors sliding horizontally or vertically, or combination sliding and swinging doors, or swinging doors, or by counterbalanced doors.

b. Where vertically sliding or counterbalanced doors are used, the car gate or door and the hoistway doors shall be so interlocked that the car gate or door cannot be opened more than eighteen inches until the landing door is locked in its fully opened position and so that such landing door cannot start to close until the car gate or door is closed to within eighteen inches of full closure. Doors used exclusively for loading or unloading of freight shall be exempted from this requirement.

(13.2.3.1.3). § C26-898.0 Clearances of Hoistway Doors.—a. The maximum distance between the hoistway side of the hoistway door opposite the car opening and the hoistway edge of the landing saddle, shall be four inches.

b. For automatic-operation elevators, the maximum distance between the hoistway side of the hoistway door opposite the car opening and the hoistway edge of the landing shall be one inch for swinging doors and two and one-quarter inches for sliding doors.

c. For existing installation of automatic-operation elevators accessible to the general public, where the clearance exceeds one and one-half inches for swinging doors or two and one-quarter inches for sliding doors, the hoistway door shall be relocated in the hoistway so as to bring the entire hoistway side of the hoistway door within the above required clearance.

Whenever this is not possible the hoistway doors and their bucks shall be replaced with doors that meet the requirements of this title.

d. If the door slides in two or more sections, the specified dimension requirement shall apply to that section which closes against the lock jamb.

e. It shall be unlawful for any hardware, except hardware required for interlocking, indicator and signal devices, to project into the hoistway beyond the line of the landing saddle.

(13.2.3.1.4). § C26-899.0 Hoistway Door Interlocks.—All hoistway door interlocks

used on the hoistway doors of passenger elevators shall conform to sections C26-907.0 through C26-913.0. The hoistway doors of hydraulic passenger elevators shall also be provided with a door-closer or with a device which will compensate for such creeping away of the car from the landing as is caused by leakage in the valve or in the cylinder.

(13.2.3.1.5). § C26-900.0 Emergency Releases Required for Hoistway Doors for Passenger Elevators.—Provision shall be made to render the car operative independent of the position of the hoistway doors in case of fire, panic or other emergencies, by means of an emergency release conforming to sections C26-921.0 through C26-924.0, except that elevators which can be started from a landing shall not be provided with an emergency release unless such elevators are equipped for dual operation, in which case an emergency release shall be installed when a car switch is provided for use by an operator and may be provided on dual operation elevators for use when operation is from the car only by means of buttons and the car can not be started from the landing buttons but such emergency release shall be so arranged than when such elevator operates as an automatic-operation elevator such emergency release shall be inoperative.

(13.2.3.1.6). § C26-901.0 Hand Opening of Hoistway Doors.—a. Hoistway doors shall be arranged to be opened by hand from the hoistway side, except when locked "out of service". It shall be unlawful to lock the main exit doors or the doors at the lower terminal landing "out of service" while the elevator is in operation.

b. Hoistway doors for passenger elevators shall be so arranged that it shall be unnecessary to reach back of any panel, jamb or sash to operate such doors.

c. Horizontally swinging type hoistway doors of automatic operation elevators shall have no hand operated latches or other hand operated door fastening devices. Such doors shall have no knobs or handles on the hoistway side. Key locks may be provided for locking the doors "out of service" subject to the requirements of paragraph a of this section. Such doors shall be equipped with door closers.

d. For existing installations of automatic operation elevators, hand operated latches or other hand operated door fastenings on horizontally swinging type hoistway doors, and knobs or handles on the hoistway side of such doors, shall be removed. Such doors shall be equipped with interlocks and door closers. Key locks may be retained on elevator hoistway doors serving a single tenant exclusively.

(13.2.3.1.7). § C26-902.0 Opening of Hoistway Doors.—If the entire control of a passenger elevator is located on the car, the hoistway doors shall be so arranged that such hoistway doors cannot be opened from the landing side, except as provided in section C26-903.0. If the control is not located entirely on the car, such hoistway doors shall be so arranged that, unless the car is within nine inches of the landing, such doors shall be incapable of being opened from the landing side.

(13.2.3.1.8). § C26-903.0 Emergency Landing Openings and Keys.—a. A service key shall be provided to permit the unlocking and opening of the hoistway door from the landing side provided the car is within the landing zone of that landing. The service key shall be provided for the hoistway door at the landing of each elevator nearest the main entrance to the structure and may be provided at other landings. The service key is not required for elevators having hoistway door interlocks which are automatically unlocked and where the doors are openable from the landing side when the car is within the landing zone.

b. Emergency unlocking devices shall not be provided which will unlock or release from the landing side any hoistway door interlock at any landing when the car is outside the landing zone of that landing, except that for elevators which can be started from a landing, an emergency unlocking device shall be provided to unlock or release from the landing side, irrespective of the position of the car, the hoistway door interlock at the following landings:

1. The first landing above the bottom landing.
2. The bottom landing where the door at this landing is the only means of access to the pit.

c. Keys for unlocking emergency unlocking devices shall be of special shape and of a design which will prevent unlocking or releasing the hoistway door interlock from the landing side by the use of screwdrivers or other common tools or instruments. Where a door escutcheon plate is used to prevent the use of keys other than the specially shaped keys required by this rule, they shall be so designed, installed and secured in place as to prevent their removal from the landing side and so as to reduce to a minimum the possibility of their deformation.

d. Where any elevator is installed in a single blind hoistway there shall be installed at every third floor in the blind portion of the hoistway an emergency door. Such doors shall not be more than thirty-six feet apart. Emergency doors shall conform to the following:

1. They shall be not less than thirty inches wide and six feet six inches high, clear opening.
2. They shall be easily accessible and free from obstruction.
3. They shall be provided with hoistway door interlocks.

e. The person responsible for the maintenance and operation of the elevator (see section C26-1171.0) shall maintain on the premises a key for unlocking the emergency unlocking device. The key shall be kept in a location where it is readily available to authorized persons, but not available to the general public.

(13.2.3.1.9). § C26-904.0 Hangers for Power Operated Hoistway Doors.—Hangers for power operated hoistway doors shall be so designed as to withstand a downward thrust of five times the weight of the door and an upward thrust of four times the weight of the door.

(13.2.3.1.10). § C26-905.0 Hanger Stops and Guards.—Means shall be provided to prevent hangers for all sliding hoistway doors from jumping the tracks. Stops shall also be provided to prevent the hanger carriage from leaving the ends of the track, or suitable stops may be provided on the door only.

(13.2.3.1.11). § C26-906.0 Vision Panels.—a. All manually opened hoistway doors and car doors of elevators which can be operated from outside the hoistway, and all hoistway swing doors, and car doors of elevators in hoistways equipped with swing doors, shall each be provided with a vision panel.

b. Such vision panel in an elevator hoistway door shall be of clear wired plate glass with an area of between eighty and thirty-six square inches. The width of each such panel shall be six inches or more.

c. Each vision panel in an elevator car door shall be of clear wired plate glass or non-shatterable safety glass of a type approved by the superintendent, or shall be a heavy wire mesh or a grille of a type approved by the superintendent. Every wired glass or safety glass vision panel in an elevator car door shall have an area of between eighty and thirty-six square inches. The width of each such panel shall be six inches or more.

d. The height above floor landings of vision panels in hoistway doors shall be as prescribed by the board. Each car door vision panel shall be so located as to provide unobstructed clear vision through both hoistway door and car door vision panels when the car is leveled at the landing.

e. The dimensions and distance above floor landings of all required vision panels, in the hoistway doors of any hoistway, shall be the same throughout the full height of the hoistway.

SUB-GROUP 2

Hoistway Door Interlocks

(13.2.3.2.1). § C26-907.0 Door Unit and Hoistway Unit Systems of Door Interlocks.—a. One of the two following systems of door interlocks shall be used:

1. The door unit system, in which the interlock prevents the operation of the elevator machine from moving the car away from the landing unless the hoistway door, at that landing at which the car is stopping, or is at rest, is locked in the closed position.
2. The hoistway unit system, in which the interlocks prevent the operation of the elevator machine from moving the car away from the landing unless all its hoistway doors are locked in the closed position.

b. All interlocks shall permit the operation of the car when the emergency release is in temporary use, or when the car is being moved by a car levelling device.

c. All interlocks shall prevent the opening of the hoistway door from the landing side, except by a special key, unless the car is at rest within the landing zone; or is coasting through the landing zone with its operating device in the "stop" position.

(13.2.3.2.2). § C26-908.0 Use of the Door Unit System.—The door unit interlock system may be used only where there is a regular operator in the car and where the elevator can be operated only from inside the car.

(13.2.3.2.3). § C26-909.0 Closed Position of Hoistway Doors.—a. For elevators not requiring the presence of an operator in the car, the hoistway door shall be considered in the closed position only when the door is within three-eighths of an inch of contact with the door jamb, or in the case of bi-parting doors, only when such doors are within three-eighths of an inch of contact with each other.

b. For elevators where the hoistway door is not equipped with a door closer, such door shall be considered in the closed position only when the door is within three-eighths of an inch of contact with the door jamb, or in the case of bi-parting doors, only when such doors are within three-eighths of an inch of contact with each other.

c. Where the hoistway door of an elevator requiring the presence of an operator in the car is equipped with a door closer, such door shall be considered to be in the

closed position, and the car may be started, when such door is within four inches of being fully closed against the jamb, or in the case of bi-parting doors, when such doors are within four inches of contact with each other, provided that at this position and any other position up to full closure as defined in this section, such door cannot be opened from the landing side more than four inches from the jamb, or the sections of bi-parting doors more than four inches from each other, and provided further that the door closer is of a type which will eventually close the door to the fully closed position as defined in this section, and lock such door in such position.

(13.2.3.2.4). § C26-910.0 Design of Interlocks.—Interlocks for all hoistway doors shall be so designed that such doors are locked in the closed position as defined in section C26-909.0, before the car can be operated. It shall be unlawful to use as interlocks devices employing locks and contacts of a type where the contact is made when the door is closed and the locking of such door takes place subsequently and all existing self service elevators shall comply with the provisions of this section.

(13.2.3.2.5). § C26-911.0 Use of Springs and Electric Circuits in Interlocks.—The functioning of door interlocks to prevent the movement of the car shall be independent of the action of a spring or springs in tension, or of the closing of an electric circuit. If springs are used, such springs shall be in compression. If an electric circuit is used, the interruption of such circuit shall prevent the movement of the car.

(13.2.3.2.6). § C26-912.0 Tests and Approvals of Interlocks.—Each type and make of door interlock shall be approved by the superintendent on the basis of the engineering tests listed in sections C26-1179.0 and C26-1180.0. Such tests shall be made by or under the supervision of a competent laboratory designated by the board. Minor changes in design may be made without retesting, subject to the approval of the board.

(13.2.3.2.7). § C26-913.0 Identification of Interlocks.—Approved interlocks shall be suitably and plainly marked for identification. The marking shall be permanent and so placed as to be readily visible when such interlocks are mounted in position. Auxiliary appliances forming a part of, or used in conjunction with, an interlock, shall be similarly marked. Such marking shall include the following:

1. Date of official approval and number or designation, if any, of such official approval.
2. Manufacturer's name or trade-mark.
3. Type or style letter or number.
4. Rated voltage.

SUB-GROUP 3

Hoistway Door Electric Contacts

(13.2.3.3.1). § C26-914.0 Door Unit and Hoistway Unit Systems of Contacts.—a. One of the two following systems of door electric contacts shall be used:

1. The door unit system in which the contact prevents the normal operation of the car unless the hoistway door at which the car is standing is in the closed position.
2. The hoistway unit system in which the contact prevents the normal operation of the car unless all its hoistway doors are in the closed position.

b. The contact shall permit the operation of the car when the emergency release is in temporary use, or when the car is being moved by a car-leveling device.

(13.2.3.3.2). § C26-915.0 Use of Door Unit System.—The door unit system may be used only on elevators where there is a regular operator in the car, and where such elevators can be operated only from inside the car.

(13.2.3.3.3). § C26-916.0 Closed Position of Electric Contacts.—Where the hoistway door contacts are not a part of an interlock system, the door shall be considered in the closed position when such door is within two inches of full closure against the jamb.

(13.2.3.3.4). § C26-917.0 Design of Electric Contacts.—Hoistway door contacts shall be so designed that they shall be positively opened by a lever or other device attached to and operated by the door.

(13.2.3.3.5). § C26-918.0 Use of Springs or Electric Circuits in Contacts.—The functioning of hoistway door Electric Contacts to prevent the movement of the car shall be independent of the action of a spring or springs in tension, or of the closing of an electric circuit. If springs are used, such springs shall be in compression. If an electric circuit is used, the interruption of such electric circuit shall prevent the movement of the car.

(13.2.3.3.6). § C26-919.0 Tests and Approvals of Electric Contacts.—a. Each type and make of hoistway door electric contact shall be approved by the superintendent on the basis of the following engineering tests. Such tests shall be made by the board or by or under the supervision of a competent laboratory designated by the board:

1. Endurance test.
2. Current-interrupting test.
3. Test in moist atmosphere.
4. Misalignment test.
5. Insulation test.

b. Such tests shall be made according to the procedure outlined in sections C26-1179.0 and C26-1180.0. Minor changes in design may be made without retesting, subject to the approval of the board.

(13.2.3.3.7). § C26-920.0 Identification of Approved Contacts.—Approved contacts shall be suitably marked for identification as prescribed in section C26-913.0.

SUB-GROUP 4

Emergency Releases

(13.2.3.4.1). § C26-921.0 Location of Emergency Switch.—The emergency release switch shall be in the car.

(13.2.3.4.2). § C26-922.0 Design, Construction and Operation of Release Switch.—a. The switch shall be key operated by means of a tumbler lock of at least the 5 pin type which shall not be master keyed with nor operated by a key which will operate any device or lock other than the switch required by this section except that the same design key may be used to operate the emergency release switches of all elevators.

b. The switch shall be of the continuous pressure type requiring the key to be manually held in the operating position to permit operation of the car with the door unlocked or open and designed to automatically return to the off position when the key is released.

c. The switch shall be so designed as to render the car operative only at its slowest operating speed.

d. The key shall be removable only when the switch is in the off position.

(13.2.3.4.3). § C26-923.0 Location of Key.—The person responsible for the maintenance and operation of the elevator as listed in section C26-1171.0 shall maintain on the premises a key for operating the switch specified in this section in a location readily available only to authorized persons but where it is unavoidable to the general public or to any other persons except maintenance men, repair men or inspectors.

(13.2.3.4.4). § C26-924.0 Tests and Approvals of Emergency Releases.—Each make and type of emergency release shall be tested and approved by the board as to compliance with section C26-922.0, and as to meeting the requirements of section C26-1185.0. Minor changes in design may be made without retesting, subject to the approval of the board.

SUB-GROUP 5

Hoistway Doors for Freight Elevators

(13.2.3.5.1). § C26-925.0 Doors Required.—a. Each landing opening in every freight elevator hoistway enclosure shall be equipped with a door which, if not within the hoistway, shall be set within four inches of the face of the landing saddle. The upper landing of one-story sidewalk elevators is exempted from this requirement.

b. Such doors shall comply with the fire resistive requirements for doors in such enclosures. Landing doors may be of the horizontally or vertically sliding, counterbalanced vertically sliding, combination sliding and swinging, or swinging type.

(13.2.3.5.2). § C26-926.0 Strength of Hoistway Doors.—Every hoistway door in a freight elevator shall be capable of withstanding a force of seventy-five pounds applied perpendicularly to such door at any point without such door being sprung from its guides.

(13.2.3.5.3). § C26-927.0 Size of Hoistway Doors.—When hoistway doors for freight elevators are closed, such doors shall guard the full width of the landing openings and such doors shall extend the full height from the landing saddle to the top of the landing opening.

(13.2.3.5.4). § C26-928.0 Interlocks and Electric Contacts.—a. Hoistway doors for power freight elevators shall be equipped with hoistway door interlocks conforming to sections C26-907.0 through C26-913.0 except that mechanical locks and electric contacts conforming to sections C26-914.0 through C26-920.0, may be used for manually opened vertical sliding counterweighted or vertical sliding bi-parting counterbalanced hoistway doors subject to following conditions:

1. On elevators having a travel of fifteen feet or less on the top and bottom hoistway doors and on the intermediate hoistway doors, if any, of adjacent or reverse landings, the door sills of which are located within four feet of the sill of the top or bottom hoistway doors.
2. On elevators having a travel of more than fifteen feet, for the hoistway door at an adjacent or reverse landing the door sill of which is located not over four feet above the sill of the bottom hoistway door.

b. Mechanical locks and contacts on interlocks shall be used on the bottom hoistway door of sidewalk elevators.

c. Hoistway door electric contacts which are not part of an interlock system shall have the lock or latch and contact arranged so that the door will be in a position to be locked or latched when or before such contact is closed.

d. Hoistway door electric contacts and door locks or latches shall be so located as normally to be inaccessible from the landing side.

(13.2.3.5.5). § C26-929.0 Emergency Releases Required for Hoistway Doors for Freight Elevators.—Provision shall be made to render the car operative independent of the position of the hoistway doors in case of fire, panic or other emergencies, by means of an emergency release conforming to sections C26-921.0 through C26-924.0, except that elevators which can be started from a landing shall not be provided with an emergency release unless such elevators are equipped for dual operation, in which case an emergency release shall be installed when a car switch is provided for use by an operator and may be provided on dual operation elevators for use when operation is from the car only by means of buttons but such emergency release shall be so arranged that when such elevator is operated as an automatic-operation elevator, such emergency release shall be inoperative. Sidewalk elevators shall be exempted from this requirement.

(13.2.3.5.6). § C26-930.0 Vision Panels.—For freight elevators which can be operated from outside of the hoistway, hoistway doors may be provided with a vision panel. Such panels shall be of clear wired glass with a maximum area of eighty square inches.

(13.2.3.5.7). § C26-931.0 Opening of Hoistway Doors.—If the entire control of a freight elevator is located on the car, the hoistway doors shall be so arranged that such hoistway doors cannot be opened from the landing side, except as provided in section C26-932.0. If the control is not located entirely on the car, hoistway doors shall be so arranged that, unless the car is within the landing zone, such doors cannot be opened from the landing side.

(13.2.3.5.8). § C26-932.0 Emergency Landing Openings and Keys.—Emergency landing openings and keys for freight elevators shall be provided in the same manner as required for passenger elevators by section C26-903.0.

SUB-GROUP 6
Door Counterweight Enclosures

(13.2.3.6). § C26-933.0 Door Counterweight Enclosures. — Door counterweights shall run in metal guides from which they cannot become dislodged, or shall be boxed in. The bottoms of such guides or boxes shall be so constructed as to retain such counterweight if the counterweight rope breaks.

SUB-GROUP 7
Landings for Passenger and Freight Elevators

(13.2.3.7.1). § C26-934.0 Landing Saddle. — The landing saddle shall be constructed and maintained in such a manner as to prevent persons from readily slipping thereon.

(13.2.3.7.2). § C26-935.0 Railroad Tracks.—Where there is a railroad track upon any elevator landing, the tops of the rails shall be flush with the floor for a distance of six feet from the threshold.

SUB-GROUP 8
Lighting at Landings

(13.2.3.8). § C26-936.0 Lighting at Landings.—When the car of an elevator is in service at the landing, the landing edges of the saddle and car platform shall be plainly visible. The illumination on the landing saddle shall be at least one foot candle.

Sub-Article 4. Passenger, Freight and Sidewalk Type Power Elevators

GROUP 1
Limitations for Platform and Sidewalk Type Elevators

(13.3.1.1). § C26-937.0 Platform Elevators Unlawful.—It shall be unlawful to use platform elevators.

(13.3.1.2). § C26-938.0 Sidewalk Type Elevators.—a. All sidewalk type elevators shall comply with the requirements of sections C26-937.0 through C26-1096.0, unless specifically exempted.

b. Every sidewalk type elevator shall have a maximum contract speed of thirty-five feet per minute and a maximum platform area of fifty square feet.

GROUP 2
Guides, Buffers and Counterweights for Passenger, Freight and Sidewalk Type Elevators

SUB-GROUP 1
Guide Rails

(13.3.2.1.1). § C26-939.0 Material.—It shall be unlawful to use car or counterweight guide rails made of any material other than steel.

(13.3.2.1.2). § C26-940.0 Fastenings and Joints.—a. All guide rails shall be securely fastened with iron or steel brackets, or their equivalents. Such brackets shall be of such strength, design and spacing that the deflection of guide rails and their fastenings shall be one-quarter of an inch or less under normal operation.

b. When rail brackets used in connection with freight elevators or sidewalk type elevators are so located that such rail brackets receive the full thrust of the guide shoes when the car platform is level with the landing, special attention shall be given to the attachment of the brackets in such cases. Where the distance between rail supports is greater than fourteen feet, the rails shall be suitably backed or bracketed to secure sufficient rigidity for satisfactory operation.

c. Joints of guide rails, except for sidewalk elevators the travel of which is fifteen feet or less, shall be accurately machined with tongue and groove through the webs at right angles to the base and through the flanges parallel to the base, and such joints shall be fitted with fishplates each secured with at least four substantial bolts through each rail; or such joints shall be accurately machined with tongue and groove through the webs and with the backs of the flanges, where the fishplates bear, accurately machined at right angles to the tongue and groove and shall be fitted with finished fishplates each secured with at least four substantial bolts through each rail.

d. Guide rails shall withstand the application of the safety when the safety is stopping a fully loaded car or the counterweight.

(13.3.2.1.3). § C26-941.0 Size of Guide Rail Fastenings and Bottoming of Guide Rails.—a. Guide rails and their fastenings shall be secured in position by clips or through bolts of at least the sizes given in the following table:

Weight of Rails in Pounds per Foot.	Diameter of Bolts in Inches.
6½-7½	½
14	⅝
22½	¾
30	¾

b. The maximum diameter of bolt holes in steel beams for bracket bolts shall be equal to the diameter of the bolt plus one-sixteenth of an inch. Such holes for bolts shall be either drilled, punched or cut with a torch. If cut with a torch, such bolt holes shall be cut of smaller diameter and drifted to the required diameter.

c. The guide rails shall be extended at the top and bottom to prevent the car and counterweight guide shoes from running off the rails within the limits of the bottom overtravel and the top clearance.

(13.3.2.1.5). § C26-942.0 Weight of Steel Guide Rails.—a. The weights of steel guide rails, except for sidewalk elevators the travel of which is fifteen feet or less, shall be at least those given in the following table.

Maximum Permissible Total Weight of Car and Load, or Total Weight of Counterweights per Pair of Rails (Pounds).	Minimum Weight of Each Car Guide Rail (Pounds per Foot).	Minimum Weight of Each Counterweight Guide Rail (Pounds per Foot).		
		With Guide Rail Safeties.	Without Guide Rail Safeties	
			1 to 1 Roping.	2 to 1 Roping.
4,000	7½	7½	6½	6½
15,000	14	14	7½	7½
27,500	22½	22½	7½	14
40,000	30	30	7½	14

b. Where seven and one-half pound rails are effectively bracketed or tied at intervals of six feet or less, the load permitted under the preceding table may be doubled for counterweights with guide rail safeties. Where seven and one-half pound rails are

effectively bracketed or tied at intervals of seven and one-half feet or less, the load permitted under the preceding table may be increased to five thousand pounds for cars with guide rail safeties. Where seven and one-half pound rails are effectively bracketed or tied at intervals of ten feet or less the load permitted under the preceding table may be increased to four thousand five hundred pounds for cars with guide rail safeties.

c. The maximum weights of car and load as given in the preceding table for each pair of guide rails shall apply when only one safety device gripping both rails in a horizontal plane is used. When two such safety devices are used on the same guide rail and such devices are so arranged that both will be applied at practically the same time and with substantially equal retarding force, the total weight may exceed the weight shown in the table but such weight shall in any case be within the maximum weight given in the table multiplied by the following factors based on distance between safeties:

Distance Between Safeties in Feet.	Multiply Maximum Load Given in the Preceding Table by
Car Duplex Safeties.	
18 (or over)	2.0
15	1.83
12	1.67
9	1.50
6	1.33
Counterweight Duplex Safeties.	
15 (or over)	2.0
10	1.67
5	1.33

(13.3.2.1.6). § C26-943.0 Use of Single Pair of Car Guide Rails.—Whenever practicable a single pair of car guide rails shall be used for passenger elevators.

SUB-GROUP 2

Car and Counterweight Buffers

(13.3.2.2.1). § C26-944.0 Required Types of Buffers.—a. Buffers of the spring, oil or equivalent type shall be installed under the cars of all elevators, except sidewalk elevators having a travel of fifteen feet or less.

b. Spring buffers or their equivalent may be used with elevators having a contract speed of two hundred feet or less per minute.

c. Oil buffers or their equivalent shall be used with elevators having a contract speed greater than two hundred feet per minute. The minimum total stroke of oil buffer shall be based on an average retardation of thirty-two and one-fifth feet per second based on governor-tripping speed.

d. Where speed retarding devices independent of normal and final stop switches are provided for retarding the car or counter weight or both to a definite limiting speed before the buffer is engaged, the required corresponding buffer stroke need be based only on retardation from such speed rather than from governor tripping speed. Such speed retarding devices shall be so designed that the retarding force shall be quickly but gradually applied, substantially constant, and so that the retarding distance shall be at least the sliding distance specified in sections C26-1005.0 through C26-1010.0, for under-car safeties. For contract car speeds in excess of five hundred feet per minute, the corresponding reduced buffer stroke shall be at least eighteen inches.

(13.3.2.2.2). § C26-945.0 Oil Gages Required.—Oil buffers shall be provided with means for gaging the amount of oil in them.

(13.3.2.2.3). § C26-946.0 Location of Car Buffers. — Buffers shall be located symmetrically with reference to the center of the car.

(13.3.2.2.4). § C26-947.0 Location of Counterweight Buffers.—Counterweight buffers similar to those required for cars shall be installed symmetrically under the counterweights of passenger and freight elevators.

(13.3.2.2.5). § C26-948.0 Form of Buffer Test.—Buffers shall be tested by running on to them with contract load at contract speed with final limit switches operative, except as follows: If the buffer stroke has been reduced due to the use of a speed retarding device as permitted in section C26-944.0, the car or counterweight shall be run on to the buffer at the speed corresponding to the buffer stroke used.

(13.3.2.2.6). § C26-949.0 Buffer Compression Switch.—Where the car or counterweight oil buffer is compressed more than twenty-five percent of its stroke when the car is level with the lower or upper terminal landing, respectively, buffers shall be provided with a switch which shall prevent movement of the car in a direction to compress

such buffers at a speed greater than one-half of the contract speed until such buffers are restored to their normal position.

(13.3.2.2.7). § C26-950.0 Tests and Approvals of Oil Buffers.—Each type and size of oil buffer used shall be approved by the board on the basis of the engineering tests listed in sections C26-1186.0 through C26-1191.0. Such tests shall be made by or under the supervision of the board, or a competent testing laboratory designated by the board. Approved buffers shall be marked by the manufacturer with the range of speed and load for which such buffers have been approved, the date of approval and the designating number, if any, of the approval.

(13.3.2.2.8). § C26-951.0 Precompression of Oil Buffers. — If spring-return oil buffers are precompressed such buffers shall be so installed that when the car is level with a terminal landing, the remaining buffer stroke shall be fifty percent or more of the gravity stopping distance corresponding to the governor-tripping speed used.

SUB-GROUP 3

Counterweights

(13.3.2.3.1). § C26-952.0 Counterweight Guides and Guide Shoes Required.—Counterweights shall be guided at the top and bottom. The guiding members shall have sufficient strength to withstand the reaction resulting from the normal operation of the counterweight and from the operation of the counterweight safety where such safety is provided. Guide shoes may be provided with non-metallic gibs or rollers of a type approved by the board.

(13.3.2.3.2). § C26-953.0 Clearance Between Counterweights and Protection of Counterweight Cables.—If two counterweights run in the same guides, the car counterweight shall be above the machine counterweight and there shall be a clearance of at least eight inches between such counterweights. The cables of the machine counterweight shall be covered or protected by metal or fibre sleeves firmly attached to the cable. Such sleeves shall be at least six inches longer than the car counterweight. The ends of such sleeves shall be carefully reamed before they are placed on the cables.

(13.3.2.3.3). § C26-954.0 Independent Car Counterweights. — If an independent car counterweight is used, such counterweight shall be of insufficient weight to cause undue slackening in any of the cables during acceleration or retardation of the car.

(13.3.2.3.4). § C26-955.0 Counterweight Tie-Rods and Suspension Members.—Counterweight sections, however carried, shall be secured by at least two tie-rods passing through holes in all the sections, or by other approved means. Such tie-rods and suspension rods shall have lock nuts and cotter pins at each end. Suspension rods shall be free from welds.

GROUP 3

Car Construction and Safeties for Passenger, Freight and Sidewalk Type Elevators

SUB-GROUP 1

Car Construction

(13.3.3.1.1). § C26-956.0 Materials for Car Frames and Platforms.—All elevator cars shall have metal car frames and metal outside frames of platforms. Where wood platform flooring is used, the under side of car platform shall be covered with metal at least as thick as No. 27 U. S. gage, except where fireproofed wood is used, and except for sidewalk elevators the travel of which is one story or less.

(13.3.3.1.2). § C26-957.0 Allowable Working Stresses for Car Frame Members.—The stresses of rolled steel sections or annealed cast steel used in the construction of car frames and platforms, based on the static load imposed on them, shall be within the values given in the following table for steels meeting the standard specifications of the A. S. T. M., D., A 7-29, for steel having an ultimate strength of from fifty-five thousand to sixty-five thousand pounds per square inch for rolled sections or cast steel, and forty-six thousand to fifty-six thousand pounds per square inch for rivets. Elevators of the plunger type which are without counterweights shall be exempted from these requirements.

Passenger Elevators.

Loading.	Maximum Allowable Stress (Pounds per Square Inch).	Basis.
Tension	10,000	Net area
Bending	10,000	Gross section
Shear on shop rivets	8,000	Net area

Bearing of shop rivets	16,000	Net area
Shear on bolts in clearance holes	7,000	Gross section
Bearing on bolts in clearance holes	14,000	Gross section
Bolts or threaded portions of rods in tension	6,000	Gross section
Compression	11,700-49 L/R	Gross area

Freight Elevators.

Tension	12,000	Net area
Bending of car frame member and platform framing at entrance	12,000	Gross section
Bending of platform stringers	15,000	Gross section
Shear on shop rivets	9,500	Net area
Bearing of shop rivets	19,000	Net area
Shear on bolts in clearance holes	8,000	Gross section
Bearing of bolts in clearance holes	16,000	Gross section
Bolts or threaded portions of rods in tension	8,000	Gross section
Compression	14,000-59 L/R	Gross area

L = effective free length of member in inches.
R = least radius of gyration in inches.

(13.3.3.1.3). § C26-958.0 Special Steels.—For steels of greater strength the allowable working stresses may be increased proportionately, based on ultimate strength.

(13.3.3.1.4). § C26-959.0 Use of Cast Iron and Cast Steel.—It shall be unlawful to use cast iron in the construction of any member of car frames or platforms which is subject to tension, torsion or bending, except for compensating cable anchorages, releasing carriers and guide shoe stands. Plunger heads in tension shall be of cast steel.

(13.3.3.1.5). § C26-960.0 Use of Other Materials Than Steel.—When material other than steel is used in the construction of car frames or platforms, the maximum allowable working stress shall be thirteen percent of the ultimate strength of the material for passenger elevators and fifteen and three-fifths percent for freight elevators.

(13.3.3.1.6). § C26-961.0 Reductions in Section and Reinforcement of Holes.—Local reductions in section of a member in bending through bolt holes for the fastening of hoist-rope or compensating rope hitches, and for the fastening of auxiliary apparatus on the crosshead or safety plank, and for the fastening of sheave boxes, and the fastening of the platform to the safety plank, may be disregarded. Holes in webs of crossheads for sheave pins shall be reinforced by means of a plate at least fifty percent thicker than the web and riveted to such web.

(13.3.3.1.7). § C26-962.0 Deflection of Crosshead and Safety Planks.—a. The deflection of crosshead and safety planks shall be one eighth of an inch or less for each ten feet of span under static conditions with the contract load substantially uniformly distributed over the car platform, except for sidewalk elevators the travel of which is fifteen feet or less.

b. Where the span is other than ten feet, deflection shall be computed in direct proportion to the length of the span.

(13.3.3.1.8). § C26-963.0 Slenderness ratio.—The slenderness ratio, L/R, for members not normally subject to compression shall be within two hundred; for members normally subject to compression such ratio shall be within one hundred twenty, except for sidewalk elevators the travel of which is fifteen feet or less. Loadings resulting from buffer or safety operation are abnormal loadings.

(13.3.3.1.9). § C26-964.0 Treatment of Occasional Stresses.—The stresses which occur when the load is moved from the hoistway landing to its proper position on the car of freight elevators, especially heavy duty freight elevators, may be dealt with as stresses which occur only occasionally in conjunction with the maximum live load, and may exceed the stresses given in section C26-957.0 for freight elevators, provided that the deflection of car frame or platform members is considered.

(13.3.3.1.10). § C26-965.0 Car Platform Aprons.—a. When car leveling devices are used, the car platform shall be provided with a substantial vertical apron, flush with the outer edge of the platform extending a sufficient distance below the car floor so that there shall be no horizontal opening into the hoistway while the car is within the landing zone and the hoistway door is fully or partially open.

b. An apron shall be provided on the car of each automatic-operation elevator. Such apron shall extend at least nine inches below the top of the car floor for the full width of the opening.

(13.3.3.1.11). § C26-966.0 Bow Irons and Stanchions for Sidewalk Elevator Hatch Covers.—a. Sidewalk elevators using hinged hatch covers shall be provided with bow irons at least seven and one-half feet high, except that, where it shall be necessary to permit the closing of such covers, the superintendent may permit lower bow irons.

b. Sidewalk elevators which use vertically lifting covers shall be provided with stanchions framed together at the upper ends. Such stanchions shall be of sufficient strength to lift and support the hatch cover. Stanchions shall be provided with suitable buffer springs, and shall be of such height as to permit the sidewalk hatch cover to be completely closed when the car platform is level with the first landing below the sidewalk.

(13.3.3.1.12). § C26-967.0 Guide Shoes for Sidewalk Type Elevators.—a. Guide shoes for all sidewalk elevators, except plunger elevators, shall be at least twenty-four inches long unless two sets of shoes are used and spaced at least eighteen inches on centers.

b. Where vertical lift covers are used on sidewalk elevators, the vertical distance between the centers of the guide shoes remaining on the guide rails when the car platform is level with the sidewalk shall be at least one-third of the height of the hatch cover stanchions.

c. Where single guide shoes twenty-four inches long are used, six inches of the shoe may be off the rails when the platform is level with the top landing.

(13.3.3.1.13). § C26-968.0 Railroad Track in Elevator Cars.—If there is a railroad track on the elevator car, the tops of the rails shall be flush with the car floor.

(13.3.3.1.14). § C26-969.0 Lighting in Elevator Cars.—All elevator cars, except sidewalk elevators, shall be lighted at all times when in use. Electric lights shall be used if available. The minimum illumination shall be one foot candle at the landing edge of the car platform. A light socket or receptacle shall be provided under the car platform and on top of the car for inspection purposes in all elevators, except sidewalk elevators

(13.3.3.1.15). § C26-970.0 Use of Glass in Elevator Cars.—It shall be unlawful to use glass in elevator cars, except to cover certificates, directories, lighting fixtures and appliances necessary for the operation of the car and as a vision panel in the car door. It shall be unlawful to use any piece of glass exceeding one square foot in area unless such glass is laminated or is otherwise shatterproof, but the maximum total area of such glass used in such car in connection with lighting fixtures, whether in one or more pieces, shall be four square feet.

(13.3.3.1.16). § C26-971.0 Design of Lighting Fixtures for Passenger Elevators.—a. In passenger elevators, all lighting devices, or luminaires, provided with glass or metal shades, or reflectors, shall be of the railroad-train-lighting type with integral base, husk and spring-clamp holder. If suspended glass bowls or glass plates are used, such bowls or plates shall rest in, and be fastened to, a metal supporting ring provided with at least three-point suspension. It shall be unlawful to drill such glass bowls or plates for attachment to ring suspensions.

b. Glass bowls larger than ten inches in diameter shall be of laminated or otherwise shatterproof glass, or such bowls shall be surrounded by a guard made of wire at least 0.0286 inch in diameter (No. 22, steel wire gage) and of a mesh which will reject a one-half inch diameter ball. Guards shall be securely fastened to the holder or suspension.

c. It shall be unnecessary for bare electric light bulbs to have guards.

SUB-GROUP 2

Car Compartments

(13.3.3.2). § C26-972.0 Car Compartments.—a. If a passenger or freight elevator car has more than one compartment, each compartment shall be equipped with an operating device. There shall be an operator in each compartment which is in use, and such operator shall have exclusive control of that car door or gate and hoistway door; and it shall be impossible to start the car unless both operating devices are in the starting position.

b. When any compartment is out of use, its car door or gate shall be locked in the closed position, and when such door or gate is so locked, the car may be started with the operating device in such compartment in the "off" position.

c. Each compartment shall be equipped with an emergency stop switch and with an emergency release effective for the door or gate of that compartment and the corresponding hoistway door.

d. Each compartment shall be provided with the emergency exits required by sections C26-973.0 through C26-987.0, and the upper compartment shall have a trap door in the floor connecting with the top exit of the compartment below. Special freight elevators upon which no persons are permitted to ride shall be exempted from this requirement.

e. Two single elevators may be used in a single hoistway, provided that both such elevators are equipped with all the safeguards required by this title for a single elevator, both with relation to each other and to top and bottom terminals and provided that an

installation of the same type has satisfactorily met such tests as may be required by the superintendent.

SUB-GROUP 3

Car Enclosures

(13.3.3.3.1). § C26-973.0 **Car Enclosures Required.**—a. Cars for passenger elevators shall be enclosed at the top and sides, except at the opening necessary for entrance or exit, and except for emergency exits.

b. Cars for feright elevators shall be enclosed at the sides, except at the opening necessary for loading and unloading, with solid enclosures to a height of at least six feet or to the crosshead if such crosshead is lower. The section of such car enclosures opposite the counterweight shall extend to the crosshead or car top as provided in section C26-975.0.

c. Cars for sidewalk elevators shall be enclosed at the sides, except at the openings used for loading and unloading, to a height of at least six feet above the platform, except that where the travel is less than seven and one-half feet, the height of the enclosure may be reduced subject to the approval of the superintendent.

d. Tops shall be unnecessary on sidewalk elevators. It shall be unlawful to use tops on sidewalk elevators unless the clearance between the top and any obstruction above such top when the car is at the limit of its top overtravel is at least two feet.

(13.3.3.3.2). § C26-974.0 **Deflection and Securing of Enclosures.**—It shall be unlawful for any part of a power elevator car enclosure either to deflect so as to reduce the actual running clearance below the amount specified by section C26-860.0, or to exceed a deflection of one-quarter of an inch when subjected to a force of seventy-five pounds applied horizontally at any point. Such car enclosures shall be secured to the car floor and sling in such a manner that such enclosures cannot work loose or become displaced in ordinary service.

(13.3.3.3.3). § C26-975.0 **Materials and Design.**—a. If any enclosures, including the top, sides and car doors for passenger and freight elevators, except sidewalk elevators the travel of which does not exceed one story, are made of non-fireproof wood or other combustible material, such enclosures shall be covered on the exterior, including the top, with sheet metal at least No. 27 U. S. gage. It shall be unlawful to have any openings in the sides or top of passenger elevator car enclosures except openings required for entrance and ventilation and emergency exits. Vent openings less than seven feet above the car platform shall reject a ball two inches in diameter.

b. Power freight elevator car enclosures shall be of metal fastened to a substantial metal frame properly reinforced and braced so as to comply with section C26-974.0, and such enclosures shall be at least equal to No. 14 U. S. gage sheet steel (0.078 inch) in strength and stiffness.

c. The portion of the enclosure opposite the counterweight above the six-foot level may be of open-work which will reject a ball two inches in diameter.

d. It shall be unlawful to use cast iron for car tops.

(13.3.3.3.4). § C26-976.0 **Number of Entrances to Elevator Cars.**—It shall be unlawful to have more than two entrances to an elevator car, except that where conditions make additional openings essential, such additional openings may be provided at the discretion of the superintendent.

(13.3.3.3.5). § C26-977.0 **Access to Hand Ropes on Freight Elevators.**—If the car enclosure on a freight elevator is cut away to provide access to the hand rope, such enclosure shall be cut low enough to prevent injury to the operator's hand.

(13.3.3.3.6). § C26-978.0 **Tops or Covers for Freight Elevator Cars.**—a. All freight elevator cars, except sidewalk elevators as provided in section C26-973.0, and except the ends of freight elevator platforms twelve or more feet long where there are no openings above the lowest landing, shall be equipped with solid top covers or wire grille work having a mesh made of wire at least 0.135 inch in diameter (No. 10 steel wire gage) or its equivalent, which wire grille work will reject a ball one and one-half inches in diameter. Such top or cover shall be sufficiently strong to sustain a load of one hundred fifty pounds applied on any four square inches. It shall be unnecessary for the top and its supports to be capable of supporting one hundred fifty pounds on every four square inches of its area simultaneously.

b. Where no car gate is provided, the front section of the elevator car top shall be hinged along a line approximately eighteen inches from the front of the car. Additional hinged panels may be provided if desired.

c. Where a freight elevator car is entirely enclosed, except the sides used for loading and unloading, and the top is unprovided with a hinged section, an emergency exit shall be provided in the top as required by section C26-979.0.

13.3.3.3.7). § C26-979.0 Emergency Exits from Passenger Elevator Cars.—a. Each passenger elevator car shall be provided with an emergency exit located in the top of the car. When the space between the car enclosure and the nearest wall surface exceeds eight inches, a guard rail to the level of the top of the crosshead shall be provided on that side of the enclosure roof where such emergency exit is located.

b. When no side emergency exit panel is required under this section, suitable means, accessible only from the top of the car, shall be provided to permit the car occupants to reach the roof of the car, such as a rope ladder enclosed in a metal box without a latch and with one end of the ladder securely fastened to the car structure.

c. Where there is an elevator in an adjacent hoistway without intervening enclosures, counterweight or similar obstruction and the distance between the car platforms does not exceed three (3) feet, an emergency exit or exits shall also be located in the side of the car adjacent to each such adjoining car. Where the distance between car platforms exceeds three (3) feet, side exits are prohibited.

d. Top emergency exits shall be at least sixteen inches wide and at least four hundred square inches in area, except that where the reduced size of the car platform area makes it impossible to install exits of the size specified, the superintendent may permit smaller exits, but in any case the minimum dimensions of such exits shall be fourteen by twenty-two inches.

e. Top exit panels shall be held in place by thumb screws so arranged that the exit covers can be readily opened from both the inside and outside of the car. If the cover is not hinged, such cover shall be secured to the car by a length of chain.

f. Top exit covers shall open outward. Any equipment and working platform mounted above the top of the car shall be so located as not to obstruct access to or from the top emergency exit. If a working platform is placed so as to cover any of the required area of the top emergency exit, such platform shall be provided with a trap door, without a catch, opening upward.

g. Side emergency exits shall comply with the following requirements:

1. Shall be of the hinged type.
2. Shall open only into the car.
3. Shall be not less than fourteen inches in width and shall extend from the floor or base moulding to a clear height of not less than five feet.
4. Shall be so located that the exits in adjacent cars are directly opposite each other and so that passageway of persons is not obstructed by hoisting or counterweight ropes, carframe members or by fixed elevator equipment.
5. Shall be provided with lock bars at the top and bottom and one side which will hold the door securely closed.
6. Lock bars to be operated from inside of car only by a special shaped removable wrench or key and from outside the car by a non-removable handle.
7. In elevators with automatic operation in multiple dwellings the exit door shall in addition be provided with a tumbler type lock of at least the five pin type, operated from inside the car by means of a special shaped removable key and from outside the car by means of a non-removable handle.
8. The person responsible for the maintenance and operation of the elevator (per section C26-1171.0) shall maintain on the premises the lock bar key or wrench and the tumbler type lock key. Such wrenches or keys shall be kept where they are readily available to qualified persons in case of emergency but where they are unavailable to the general public.
9. No handrail or other obstructions on the inside of the car enclosure shall interfere with or prevent the opening of the exit door from the inside or outside.
10. Shall be provided with car door electric contacts conforming to sections C26-982.0 through C26-985.0.
11. Shall conform to section C26-974.0 as regards deflection.

(13.3.3.3.8). § C26-980.0 **Car Doors or Gates Required.**—a. A car door or gate shall be provided at each entrance on all passenger and freight elevator cars, except freight elevators operated from the car and handling motor vehicles or hand trucks of two thousand pounds capacity. Sidewalk elevator cars shall have a gate on the sides used for loading or unloading at the sidewalk level, which gate shall extend from the car platform to the top of the enclosure. Each car door or gate shall be provided with a car door or gate electric contact complying with sections C26-982.0, through C26-985.0.

b. In passenger and freight elevators which are operated without the presence of an operator in the car, all power car doors or gates, other than doors or gates closed by hand, shall be driven by a mechanism so designed and set that the force necessary to prevent the closing of such door or gate shall be less than thirty pounds, and such mechanism shall further be so designed and set that the computed kinetic energy of the door or gate plus all parts connected rigidly thereto, computed for the average closing speed, shall be less than five foot pounds, provided that if such mechanism also closes the hoistway door, the total computed kinetic energy shall be less than seven foot pounds.

c. In automatic-operation passenger elevators having power closed, power operated,

automatically released self-closing car doors or gates, and manually closed or self-closing hoistway doors, the closing of such car door or gate shall be prevented unless such hoistway door is in the closed position.

d. When car doors or gates for freight elevators are closed, such doors or gates shall guard the full opening to a height of six feet, or to the top of the enclosure.

e. A weight used to close a car door or gate automatically shall run in metal guides from which such weight cannot become dislodged, or such weight shall be boxed in. The bottoms of the guides or boxes shall be so constructed as to retain the weight if the rope breaks.

f. When car doors or gates for passenger elevators are closed, such doors or gates shall guard the full height and width of the opening.

g. The car door or gate in automatic-operation elevators shall be so located with respect to the car platform sill that the total distance from the face of the hoistway door to the face of such car door or gate shall be five and one-half inches or less.

h. Where such car door consists of two or more sections, the five and one-half inch dimension requirement shall apply to the section nearest to the edge of such car platform sill.

i. Where the hoistway door consists of two or more sections, the five and one-half inch dimension requirement shall apply to that section which closes against the lock jamb.

j. It shall be unlawful for any electric automatic push button passenger elevator car to have an open grille in its door, or for the opening of any such elevator car to be equipped with a car gate, except that where the enforcement of this requirement in a structure erected before January first, nineteen hundred thirty-eight, would be impracticable or would impose a hardship, the superintendent may approve the use of a car gate of a suitable type.

k. When the superintendent has approved car gates of the scissors or pantograph type for passenger elevators, such car gates shall be of such design that, when fully expanded, such car gates will reject a ball three inches in diameter. In freight elevators, except sidewalk elevators, such gates, when fully expanded, shall reject a ball four and one-half inches in diameter.

l. The openings between vertical bars in the gate of sidewalk elevators shall be eighteen inches or less when the gate is full expanded.

(13.3.3.3.9). § C26-981.0 Sliding Car Doors and Hangers for Power Operated Car Doors.—a. Sliding car doors may be solid, or may be provided with open grille or bars which shall reject a ball three inches in diameter, or may be provided with glass vision panels in accordance with section C26-970.0. Open grilles or bars may extend the full height of the door panel.

b. Sliding car doors shall be guided top and bottom.

c. Hangers for power operated car doors shall be so designed as to withstand a downward thrust of five times the weight of the door and an upward thrust of four times the weight of the door.

(13.3.3.3.10). § C26-982.0 Requirements for Electric Contacts.—a. An electric contact on the car door or gate shall prevent the operation of the car unless such door or gate is within one and one-half inches of full closure against the nearest face of the jamb except that in elevators requiring the presence of an operator in the car, where such car door or gate is provided with a door closer and the requirements specified in section C26-909.0 are fully met, such electric contact on such car door or gate may permit the starting of such car when such door or gate is within four inches of full closure against the nearest face of the jamb.

b. Such car door or gate electric contact shall permit the operation of the car when the emergency release is in temporary use or when such car is being moved by a leveling device.

(13.3.3.3.11). § C26-983.0 Design of Contacts.—Car door or gate contacts shall be designed so that such contacts are positively opened by a lever or other device attached to and operated by the door or gate.

(13.3.3.3.12). § C26-984.0 Use of Springs or Electric Circuits in Contacts.—The functioning of a car door or gate contact to prevent the movement of the car shall be independent of the action of a spring or springs in tension, or of the closing of an electric circuit. If springs are used, such springs shall be in compression. The interruption of such electric circuit shall prevent the movement of the car.

(13.3.3.3.13). § C26-985.0 Tests and approvals of Contacts.—a. Each type and make of car door and gate contact shall be tested and approved by the board on the basis of the following engineering tests. Such tests shall be made by or under the supervision of the board or of a competent testing laboratory designated by the board. Approved contacts shall be suitably marked for identification.

1. Endurance test.
2. Current-interrupting test.
3. Test in moist atmosphere.

4. Misalignment test.
5. Test of insulation.

b. Such tests shall be made according to the procedure prescribed in section C26-1179.0. Minor changes in design may be made without retesting, subject to the approval of the board.

(13.3.3.3.14). § C26-986.0 Car Door or Gate Releases Prohibited. — Emergency releases shall not be provided for car doors or gates, except where a car door is operated by the same power door operator as the hoistway door, provision shall be made to render the car operative independent of the position of the car door by means of the emergency release required by section C26-900.0.

(13.3.3.3.15). § C26-987.0 Protection of Cars Operating in Hoistways Outside of the Structure.—When freight elevator cars operate in hoistways outside the structure, which hoistways are enclosed only at the ground landing, such cars shall be protected on the exposed side or sides by independently operated gates equipped with electric contacts.

SUB-GROUP 4

Cars Counterbalancing One Another

(13.3.3.4). § C26-988.0 Cars Counterbalancing One Another.—It shall be unlawful to arrange elevator cars so that such elevator cars counterbalance one another.

SUB-GROUP 5

Cars and Counterweight Safeties and Speed Governors

(13.3.3.5.1). § C26-989.0 Requirements for and Application of Car Safeties.—a. All elevator cars suspended by cables, except sidewalk elevators the travel of which is fifteen feet or less, shall be provided with a car safety or safeties attached to the car frame. When one safety is used, such safety shall be located beneath the car frame. When duplex safeties are used, at least one of such safeties shall be located beneath the car frame. Such safety or safeties shall be capable of stopping and sustaining the car with contract load.

b. It shall be unlawful for the application of such safety or safeties to cause the car platform to become out of level in excess of one-half of an inch per foot measured in any direction.

c. When such car safety or safeties apply, no decrease in the tension of the governor cable or motion of the car in the descending direction shall release the car safety or safeties.

d. Car safeties shall be operated by speed governors, except that broken rope type car safeties may be used for:

1. Sidewalk elevators having a travel between fifteen and thirty-five feet;
2. Freight elevators inside the building having a travel of fifteen feet or less, a maximum contract speed of thirty-five feet per minute, and a maximum platform area of fifty square feet;
3. Private residence elevators.

(13.3.3.5.2). § C26-990.0 Requirements for and Application of Counterweight Safeties.—a. Counterweight safeties shall be capable of stopping and sustaining the weight of the counterweight.

b. It shall be unlawful for the application of counterweight safeties to cause the counterweight frame to become out of level in excess of one-half of an inch per foot in any direction.

c. When any counterweight safety is applied, no decrease in the tension of the governor cable or motion of the counterweight in the descending direction shall release the counterweight safety.

d. Counterweight safeties shall be operated by speed governors, except as provided in section C26-992.0.

(13.3.3.5.3). § C26-991.0 Design of Car and Counterweight Safeties.—a. Sleeve bearings for car and counterweight safety drums and screw shafts shall be of non-ferrous material.

b. Jaws and other parts of car and counterweight safeties of the sliding type, if made of forged steel of an ultimate strength of at least fifty-five thousand pounds per square inch and cast steel of an ultimate strength of at least sixty-five thousand pounds per square inch, may, in action, be stressed to seventeen thousand pounds per square inch. For steels of greater strength, the allowable stress may be increased proportionately, based on ultimate strength.

c. Car and counterweight safeties may be released by reversing the direction of motion of the machine.

(13.3.3.5.4). § C26-992.0 Application of Governor Controlled Safeties.—a. For contract speeds of seven hundred feet per minute and less, the car speed governor shall

be set to cause the application of the safety at a speed between thirty-three and one-third percent and fifteen percent above the contract speed, except that no governor shall be required to trip at less than one hundred seventy-five feet per minute. For contract speeds exceeding seven hundred feet per minute, the top limit for application of the safety shall not exceed twenty-five percent above contract speed.

b. The counterweight safety, if provided, may be operated by the same governor and governor rope used to operate the car safety, provided such car safety complies with the requirements for and application of counterweight safeties. Provision shall be made to cause the application of the counterweight safety at a speed greater than the car safety, but at ten percent or less above the speed at which the car safety applies. Broken rope safeties of the instantaneous type may be used on counterweights within the limits of the following table:

Contract Speed in Feet Per Minute	Total Weight of Counterweight in Pounds.
250	2,000
200	3,000
160	4,000
125	5.000

(13.3.3.5.5). § C26-993.0 Recognized Types of Safeties.—a. Safeties shall be classified as follows:

1. Type I, instantaneous.
2. Type W.C., wedge clamp, with constant retarding force.
3. Type G.W.C., gradual wedge clamp, with gradually increasing retarding force.
4. Type F.G.C., flexible guide clamp, with constant retarding force.

b. Each safety shall be marked for identification, preferably with letters cast on the safety jaws.

c. The distance between the safety jaws shall be at least the thickness of the guide rail plus three-thirty-seconds of an inch, and the jaws shall not drag against the rail.

(13.3.3.5.6). § C26-994.0 Marking of Safeties.—Safeties shall be marked by the manufacturer with the range of weight and speed for which such safeties are designed; such range of weight shall include the complete car structure, the safety, the contract load in the car, and all moving equipment, the weight of which is borne by such safety.

(13.3.3.5.7). § C26-995.0 Instantaneous Safeties.—a. Instantaneous safeties of the broken rope type shall be used only in accordance with section C26-989.0.

b. Governor controlled safeties of the instantaneous type may be used on the cars and counterweights of elevators having a contract speed of one hundred feet per minute or less, provided that the elevator speed is one hundred ten feet per minute or less on uptravel with the contract load in the car. On overspeed such safeties shall be applied by the governor. On the parting of the hoisting cables such safeties shall apply instantly and independently of the speed action of the governors.

(13.3.3.5.8). § C26-996.0 Safeties for Ascending Cars.—It shall be unlawful to have car safeties for stopping ascending cars. If an ascending car is to be stopped on account of overspeed, a safety shall be applied to the counterweight for such purpose. The car safety may be permitted to stop the ascending car above the upper terminal landing, providing that the retardation of the ascending car under such conditions is within thirty-two and one-fifth feet per second. The governor may open the motor circuit and apply the brake in case of overspeed in the up direction.

(13.3.3.5.9). § C26-997.0 Location of Governor.—a. The governor shall be so located that it cannot be struck by the car in case of overtravel and so that there is sufficient space for full movement of governor parts.

b. It shall be unlawful to use clips to hold governor supports.

(13.3.3.5.10). § C26-998.0 Opening of Motor Control and Brake Control Circuits.—Where governor controlled safeties are used, the motor control circuit and the brake control circuit shall be opened, before or at the time the governor trips, by a switch located on the governor or car safety device.

(13.3.3.5.11). § C26-999.0 Materials, Design and Replacement of Governor Cables.—a. Governor cables shall be of iron, steel, monel metal, or phosphor bronze. Such cable shall be at least three-eighths of an inch in diameter. It shall be unlawful to use tiller rope construction for governor cables. A suitable cable of corrosion-resisting metal, such as bronze or monel metal, shall be used on the safety drum.

b. Replacements for governor cables shall be of the same size, material and construction as the cable originally furnished by the manufacturer, except that where a cable of different material or construction is employed, a test of the car or counterweight safety shall be made with the new cable to demonstrate that such cable will successfully operate the safety.

c. Governor ropes shall run clear of governor jaws during the normal operation of the elevator.

d. The size, material and construction of the governor rope, together with the proper tripping speed of the governor, shall either be stamped on the governor stand or on a brass plate attached to such stand in letters at least one-quarter of an inch in height.

(13.3.3.5.12). § C26-1000.0 Operation of the Governor.—a. The arc of contact between the governor rope and its driving sheave shall, in conjunction with a tension device, provide sufficient traction to cause proper operation of the governor.

b. The design and length of governor jaws shall be such as to avoid serious cutting, tearing, or deformation of the rope from the operation of the safety.

c. Except in instantaneous type safeties, the governor shall so function that the safety rope will pull through the governor jaws when a stress exceeding that required to operate the safety is applied so as to stop the car.

d. Each gear driven fly-ball type governor shall have a guard over the sheave and exposed gears. It shall be unlawful to have guards completely covering such governor.

(13.3.3.5.13). § C26-1001.0 Slack Cable Devices.—a. Winding drum machines shall be provided with a slack cable device which will cut off the power and stop the elevator machine if the car is obstructed in its descent.

b. Slack cable switches shall be so constructed that they will not automatically reset when the slack in the cable is removed.

(13.3.3.5.14). § C26-1002.0 Application of Car Safeties.—It shall be unlawful to use car safeties which depend for their application upon the completion or maintenance of an electric circuit. Car safeties shall be applied mechanically.

(13.3.3.5.15). § C26-1003.0 Use of Gripping Surfaces of Safeties.—It shall be unlawful to use the gripping surfaces of car or counterweight safeties to guide the car or counterweights.

(13.3.3.5.16). § C26-1004.0 Pawls and Ratchets.—It shall be unlawful to use pawls and ratchets as a safety device.

SUB-GROUP 6
Car Safety Test

(13.3.3.6.1). § C26-1005.0 Car Safety Test Required.—a. An overspeed test with contract load in the car shall be made of the safeties of each new elevator before such elevator is placed in regular service, except that governor controlled instantaneous type safeties shall be tested at contract speed, the governor being tripped by hand, and broken rope instantaneous type safeties shall be tested by obtaining the necessary slack rope to cause them to function. Wedge clamp, gradual wedge clamp and flexible guide clamp safeties, shall be tested to determine whether such safety will operate within the allowable limits of the maximum and minimum stopping distances. Over speed tests shall be made with cables attached and with all electric apparatus intact, except for the overspeed contact on the governor.

b. Where the contract load is unable to bring about overspeed in alternating current elevators, the safety governor shall be tripped by hand at maximum obtainable speed.

c. It shall be unlawful to make any test of the safeties with the safe lifting load in the car.

(13.3.3.6.2). § C26-1006.0 Maximum and Minimum Stopping Distances of Wedge Clamp Safeties.—The maximum and minimum stopping distances of car and counterweight safeties of the wedge clamp type, with constant retarding force, shall be as provided in table 1.

TABLE 1.

Maximum and Minimum Stopping Distances of Wedge Clamp Safeties With Constant Retarding Force

Governor Tripping Speed in Feet Per Minute.	Maximum Distance Cars With Contract Load and Counterweights.		Minimum Distance Cars With Contract Loads and Counterweights.		Minimum Distance Cars With 150-Pound Load.	
	Feet	Inches	Feet	Inches	Feet	Inches
175	1	5	0	11	0	10
200	1	6	1	0	0	10
250	1	8	1	2	0	11
300	2	0	1	4	1	0

Governor Tripping Speed in Feet Per Minute.	Maximum Distance Cars With Contract Loads and Counterweights.		Minimum Distance Cars With Contract Load and Counterweights.		Minimum Distance Cars With 150-Pound Load.	
	Feet	Inches	Feet	Inches	Feet	Inches
350	2	5	1	5	1	2
400	2	9	1	7	1	3
450	3	4	1	9	1	4
500	3	11	2	0	1	5
550	4	6	2	4	1	6
600	5	3	2	6	1	7
650	6	0	2	8	1	9
700	6	9	3	0	1	10
750	7	7	3	4	2	0
800	8	7	3	7	2	3
850	9	6	3	11	2	5
900	10	7	4	4	2	7
950	11	9	4	8	2	9
1,000	13	0	5	1	3	0
1,050	14	3	5	6	3	3
1,100	15	7	6	0	3	6
1,150	17	0	6	6	3	8
1,200	18	6	7	0	4	0
1,250	20	0	7	7	4	4
1,300	21	8	8	2	4	6
1,350	23	4	8	8	4	9
1,400	25	0	9	4	5	1
1,450	26	6	9	11	5	5
1,500	28	3	10	6	5	8

(13.3.3.6.3). § C26-1007.0 **Maximum and Minimum Stopping Distances of Gradual Wedge Clamp Safeties.**—The maximum and minimum stopping distances of car and counterweight safeties of the gradual wedge clamp type, with increasing retarding force, shall be as provided in table 2.

TABLE 2

Maximum and Minimum Stopping Distances of Gradual Wedge Clamp Safeties With Increasing Retarding Force

Governor Tripping Speed in Feet Per Minute.	Maximum Distance Cars With Contract Loads and Counterweights.		Minimum Distance Cars With Contract Load and Counterweights.		Minimum Distance Cars With 150-Pound Load.	
	Feet	Inches	Feet	Inches	Feet	Inches
175	6	3	1	10	1	4
200	6	4	1	11	1	4
250	6	7	2	1	1	5
300	6	11	2	3	1	6
350	7	4	2	4	1	7
400	7	10	2	6	1	8
450	8	4	2	8	1	9
500	8	10	2	10	1	10
550	9	5	3	1	2	0
600	9	11	3	4	2	1
650	10	6	3	7	2	3
700	11	1	3	10	2	4
750	11	8	4	3	2	6
800	12	3	4	6	2	8
850	12	9	4	10	2	9
900	13	5	5	4	3	0
950	14	1	5	8	3	4
1,000	14	8	6	2	3	6
1,050	15	4	6	7	3	9
1,100	16	0	7	1	4	0
1,150	16	7	7	6	4	4
1,200	17	3	8	0	4	7
1,250	17	11	8	6	4	10

Governor Tripping Speed in Feet Per Minute.	Maximum Distance Cars With Contract Loads and Counterweights.		Minimum Distance Cars With Contract Load and Counterweights.		Minimum Distance Cars With 150-Pound Load.	
	Feet	Inches	Feet	Inches	Feet	Inches
1,300	18	6	9	0	5	1
1,350	19	2	9	7	5	5
1,400	19	10	10	1	5	8
1,450	20	6	10	7	5	11
1,500	21	2	11	2	6	2

(13.3.3.6.4.). § C26-1008.0 **Maximum and Minimum Stopping Distances of Flexible Guide Clamp Safeties.**—The maximum and minimum stopping distance of car and counterweight safeties of the flexible guide clamp type, shall be as provided in table 3.

TABLE 3

Maximum and Minimum Stopping Distances of Flexible Guide Clamp Safeties

Governor Tripping Speed in Feet Per Minute.	Maximum Distance Cars With Contract Load and Counterweights.		Minimum Distance Cars With Contract Load and Counterweights.		Minimum Distance Cars With 150-Pound Load.	
	Feet	Inches	Feet	Inches	Feet	Inches
175	0	9	0	6	0	5
200	0	10	0	7	0	5
250	1	4	0	8	0	6
300	1	7	0	9	0	7
350	2	0	0	11	0	7
400	2	5	1	1	0	8
450	2	10	1	4	0	9
500	3	5	1	6	0	11
550	4	1	1	8	1	1
600	4	10	1	11	1	3
650	5	7	2	3	1	4
700	6	4	2	6	1	6
750	7	3	2	9	1	8
800	8	2	3	1	1	10
850	9	3	3	6	2	0
900	10	3	3	11	2	3
950	11	7	4	4	2	5
1,000	12	8	4	8	2	7
1,050	14	0	5	3	2	9
1,100	15	2	5	8	3	0
1,150	16	6	6	2	3	3
1,200	18	0	6	8	3	6
1,250	19	6	7	3	3	9
1,300	21	2	7	8	4	0
1,350	23	0	8	3	4	4
1,400	24	8	8	10	4	8
1,450	26	4	9	6	4	11
1,500	28	1	10	1	5	2

(13.3.3.6.5). § C26-1009.0 **Pull-out of the Governor Cable.**—For elevators having a contract speed of four hundred seventy-five feet per minute or more, the pull-out of the governor cable from its normal running position before the safety jaw begins to apply pressure to the guide rails, shall be thirty inches or less.

(13.3.3.6.6). § C26-1010.0 **Stopping Distance.**—The term "stopping distance" shall mean the actual slide as indicated by the marks on the rails.

SUB-GROUP 7

Capacity and Loading

(13.3.3.7.1). § C26-1011.0 **Contract Load of Elevators.**—a. The contract load of a passenger elevator in pounds shall be at least the amount given in table 4.

b. The minimum contract load of freight elevators in business buildings, public buildings, residence buildings and mixed occupancy buildings shall be determined on

the basis of table 4 for passenger elevators, except elevators used for lifting automobiles and carriages and elevators not traveling above the street level. The minimum contract load of freight elevators in warehouses and all elevators not traveling above the street levels, except automobile and carriage elevators, shall be determined on the basis of fifty pounds per square foot for the first one hundred square feet of platform area and twenty-five pounds for each additional square foot. The minimum contract load of elevators lifting automobiles and carriages shall be determined on the basis of fifty pounds per square foot for the first eighty square feet of platform area and twenty pounds for each additional square foot.

TABLE 4

Capacity and Loading for Passenger Elevators.

Area in Sq. Ft.	Unit Load in Pounds Per Sq. Ft.	Total Capacity.	Area in Sq. Ft.	Unit Load in Pounds Per Sq. Ft.	Total Capacity.
1	61	61	33	80	2,640
2	62	123	34	81	2,740
3	62	187	35	81	2,839
4	63	252	36	82	2,934
5	64	318	37	82	3,034
6	64	386	38	82	3,131
7	65	455	39	83	3,229
8	66	526	40	83	3,332
9	66	597	41	84	3,436
10	67	670	42	84	3,536
11	68	746	43	85	3,638
12	68	820	44	85	3,744
13	69	896	45	86	3,850
14	70	974	46	86	3,954
15	70	1,053	47	86	4,058
16	71	1,133	48	87	4,164
17	71	1,214	49	87	4,265
18	72	1,296	50	87	4,370
19	73	1,379	55	89	4,900
20	73	1,464	60	91	5,448
21	74	1,550	65	92	6,000
22	74	1,637	70	94	6,550
23	75	1,723	75	95	7,117
24	75	1,810	80	96	7,680
25	76	1,900	85	97	8,245
26	77	1,989	90	98	8,793
27	77	2,082	95	99	9,357
28	78	2,173	100	99	9,900
29	78	2,265	105	100	10,448
30	79	2,358	110	100	10,967
31	79	2,452	115	100	11,488
32	80	2,547	120	100	12,000

c. For all passenger and freight elevators having effective platform areas of more than one hundred twenty square feet, except elevators used for lifting automobiles and carriages, elevators not traveling above the street level and freight elevators in warehouses, the contract load shall be at least one hundred pounds per square foot.

(13.3.3.7.2). § C26-1012.0 Posting of Information.—a. A metal plate showing the contract load of the elevator in pounds shall be fastened in a conspicuous place in all passenger elevator cars. Such information shall be stamped, etched or raised on the surface of such plate in letters at least one-quarter of an inch high.

b. The inspection certificate posted in passenger elevator cars as required in section C26-846.0 shall state the allowable number of passengers permitted to be carried by the elevator equal to its rated load in pounds divided by one hundred fifty.

c. A similar metal data plate shall be placed upon the cross-head of each passenger and freight elevator and on the bow iron or frame of each sidewalk type elevator, bearing the following information:

1. The weight of the complete car, including the safeties.
2. The contract speed, in feet per minute, at which the elevator is designed to travel. Sidewalk type elevators shall be exempted from this requirement.

ADMINISTRATIVE BUILDING CODE

3. The cable data required by section C26-1084

d. The capacity of freight elevators shall be indicated in a conspicuous place in the car in letters and figures at least one inch high by the word "CAPACITY" followed by figures giving the contract load in pounds.

(13.3.3.7.3). § C26-1013.0 Carrying of Passengers on Freight Elevators.—a. It shall be unlawful to use new freight elevator installations to carry passengers, unless such elevators conform to all the requirements of this article for passenger elevators.

b. Passengers may be carried on existing freight elevators provided such elevators conform in all respects to the requirements for existing passenger elevators.

(13.3.3.7.4). § C26-1014.0 One Piece Loads on Elevators.—Passenger and freight elevators may be used for carrying safes or other one piece loads greater than the contract load of the elevator, provided that:

1. A locking device shall be provided which will hold the car at any landing independently of the hoisting cables while the safe or other object is being loaded or unloaded.
2. The locking device shall be so designed that it cannot be unlocked unless the entire weight of the car and load is suspended on the cables.
3. The wrench or other device for operating the locking device shall be removable.
4. The locking device shall be designed to withdraw the bars should it come in contact with the landing locks if the car is operated on the up motion.
5. A metal plate bearing the words "Capacity Lifting Safes" followed by figures giving the capacity in pounds for lifting safes for which the machine is designed, shall be provided in the elevator car. Such information shall be stamped, etched or raised on the surface of such plate in letters at least one-quarter of an inch high.
6. The car platform, car frame, sheaves, shafts, cables and locking device shall be designed for the specified capacity lifting safes with a factor of safety of at least five.
7. The car safeties shall be designed to stop and hold the specified capacity lifting safes with the cables intact.
8. Where there is a passageway under the hoistway, the machine shall be designed to operate with the capacity lifting safes at slow speed and the car safety shall be designed to stop and hold the car and capacity lifting safes independently of the cables.
9. Additional counterweights shall be added for traction machines so that the total overbalance is at least equal to forty-five percent of the capacity lifting safes.

(13.3.3.7.5). § C26-1015.0 Locking Device Required.—The locking device specified in section C26-1014.0 shall be provided for any passenger elevator installed for carrying safes or other one piece loads where the weight of such safes or one piece loads is seventy-five per cent or more of the contract load.

(13.3.3.7.6). § C26-1016.0 Maximum Capacity Lifting Safes.—The maximum capacity lifting safes of any traction elevators shall be one and one-third times the contract load of the elevator.

(13.3.3.7.7). § C26-1017.0 Special Switches.—Elevator machines equipped for carrying safes or other concentrated loads greater than the contract load of the elevator shall be provided with special switches near the machine for operating under such conditions.

SUB-GROUP 8

Contract Load Test

(13.3.3.8). § C26-1018.0 Contract Load Test.—a. A test of every new elevator shall be made with contract load in the car. Such test shall be made under the supervision of the superintendent before such elevator is placed in regular service.

b. The brakes, limit switches, buffers, car safety and speed governor shall be caused to function in each test, and approval of any elevator shall be granted only upon satisfactory completion of such test.

GROUP 4

Machines, Stopping Devices, Control and Operation

SUB-GROUP 1

Machines and Machinery

(13.3.4.1.1). § C26-1019.0 Design of Drums and Sheaves.—a. Drums and leading sheaves shall be of cast iron or steel, and shall have finished grooves. Such grooves may be faced with materials other than iron and steel if such materials have sufficient traction. "U" grooves shall be at most one-sixteenth of an inch larger than the cables.

b. Hoisting rope sheaves for traction machines shall have sheave grooves so designed that the traction will not be materially decreased by the wear of the grooves.

c. The diameters of sheaves or drums for hoisting counterweight cables shall be forty or more times the diameter of the cable except that a ratio of thirty times the diameter of the cable shall be permissable for private residence elevators. Sidewalk elevators shall be exempted from this requirement. Where conditions make impractical the use of sheaves or drums of such size, the superintendent may permit the use of smaller diameter sheaves or drums. Openings in drums shall be drilled at an angle of less than forty-five degrees with the run of the rope and shall be provided with a rounded corner with a radius equal to at least that of the rope.

(13.3.4.2.2). § C26-1020.0 Factors of Safety.—The factors of safety based on the static loads (the contract load plus the weight of car, cables, counterweights, and similar parts) to be used in the design of elevator hoisting machines shall be at least eight for wrought iron or steel, and ten for cast iron, cast steel or other materials.

(13.3.4.1.3). § C26 1021.0 Set Screw Fastenings.—It shall be unlawful to use set screw fastenings instead of keys or pins except where the connection is not subject to torque.

(13.3.4.1.4). § C26-1022.0 Friction Gearing or Clutch Mechanisms for Elevators.—a. It shall be unlawful to use friction gearing or clutch mechanisms for connecting the drums or sheaves to the main driving gear.

b. All existing elevator installations except freight elevators not carrying operators shall comply with the provisions of this section.

(13.3.4.1.5). § C26-1023.0 Use of Belt or Chain-driven Machines or Auxiliary Power Elevators.—a. It shall be unlawful to use belt or chain-driven machines or auxiliary power elevators.

b. All existing passenger elevator installations shall comply with the provisions of this section.

(13.3.4.1.6). § C26-1024.0 Cast Iron Toothed Worm Gears.—It shall be unlawful to use worm gearing with cast iron teeth.

(13.3.4.1.7). § C26-1025.0 Brakes Required.—a. Winding drum and traction machines shall be equipped with brakes which are applied automatically by springs or gravity when the operating device is at the "stop" position. Electric elevator machines shall be equipped with electrically released brakes.

b. It shall be unlawful to release brakes before power has been applied to the motor.

(13.3.4.1.8). § C26-1026.0 Action of the Brake Magnet.—a. No single ground, short-circuit or counter-voltage shall prevent the action of the brake magnet from allowing the brake to set in the intended manner during normal operation.

b. No motor-field discharge, counter-voltage, single ground or accidental short-circuit shall retard the action of the brake magnet in allowing the brake to set during emergency stops.

SUB-GROUP 2

Hydraulic Elevator Machines

(13.3.4.2.1). § C26-1027.0 Construction of Hydraulic Elevator Machines.—Hydraulic elevator machines, whether of the vertical or horizontal type, shall be so constructed and so roped that the piston will be stopped before the car can be drawn into the overhead work. Stops of ample strength shall be provided to bring the piston to rest when under full pressure without causing damage to the cylinder or cylinder head.

(13.3.4.2.2). § C26-1028.0 Metal Guide Rails and Shoes Required for Traveling Sheaves.—Traveling sheaves for vertical hydraulic elevators shall be guided. Guide rails and guide shoes shall be of metal.

(13.3.4.2.3). § C26-1029.0 Side Frames and U-strap Connections.—a. Side frames of traveling sheaves for vertical hydraulic elevators shall be either structural or forged steel.

b. It shall be unlawful to use the construction commonly known as the "U-strap connection" between the piston rods and the traveling sheaves.

(13.3.4.2.4). § C26-1030.0 Equalizing Crossheads and Washers.—a. Where more than one piston rod is used in a vertical pulling type hydraulic elevator, an equalizing crosshead shall be provided for attaching the rods to the traveling sheave frame so as to insure an equal distribution of load on each rod.

b. Equalizing or cup washers shall be used under the piston rod nuts to insure a true bearing.

(13.3.4.2.5). § C26-1031.0 Gas Releases.—Cylinders of hydraulic elevator machines shall be provided with means for releasing air or other gas.

(13.3.4.2.6). § C26-1032.0 Factor of Safety and True Bearing of Piston Rods of Hydraulic Elevators.—Piston rods of tension type hydraulic elevators shall have a factor of safety of at least eight, based on the cross-sectional area at the root of the thread. A true bearing shall be maintained under the nuts at both ends of the piston rods to prevent eccentric loading on the rods.

(13.3.4.2.7). § C26-1033.0 Outlets of Pressure Tanks.—Outlets of pressure tanks shall be so located as to prevent the entrance of air or other gas into the elevator cylinder.

(13.3.4.2.8). § C26-1034.0 Packing of Automatic Stop Valves.—Automatic stop valves for elevators shall either be packed with cup leathers, or some other means shall be used to prevent sticking of the valve stems.

(13.3.4.2.9). § C26-1035.0 Relief Valves.—Each pump connected to the pressure tank of a hydraulic elevator shall be equipped with a relief valve. Such valve shall be so installed that it cannot be shut off. Such relief valve shall be of sufficient size and so set as to pass the full capacity of the pump at full speed without exceeding the safe working pressure of the pump or tank. Such relief valve shall be piped to discharge into the discharge tank or the pump suction. Two or more relief valves may be used to obtain the capacity.

(13.3.4.2.10). § C26-1036.0 Automatic By-passes.—Elevator pumps, unless equipped with pressure regulations which control the motive power, shall be equipped with automatic by-passes.

(13.3.4.2.11). § C26-1037.0 Pressure Tanks.—Pressure tanks shall be made and tested in accordance with the requirements for unfired pressure vessels of the American Society of Mechanical Engineers' Boiler Code, nineteen hundred thirty.

(13.3.4.2.12). § C26-1038.0 Gages.—a. Each pressure tank shall be provided with a water gage glass having brass fittings and valves. Such gage glass shall be attached directly to such tank and shall be so located as to show the level of the water when the tank is more than half filled.

b. Each pressure tank shall have a pressure gage which will indicate the pressure correctly to at least one and one-half times the normal working pressure allowed in the tank. Such gage shall be connected to the tank by a brass or other corrosion resisting pipe in such a manner that the gage cannot be shut off from the tank, except by a cock with a "T" or lever handle, such "T" or lever being set in line with the direction of the flow. The cock shall be in the pipe near the gage.

c. Pressure tanks shall be provided with a one-quarter of an inch pipe size valved connection so that an inspector's gage may be attached while the tank is in service.

(13.3.4.2.13). § C26-1039.0 Vacuum Relief Valves.—a. Pressure tanks which may be subject to vacuum shall be provided with one or more vacuum relief valves.

b. Vacuum relief valves shall have openings of sufficient size to prevent the collapse of the tank if a vacuum occurs. If necessary, more than one vacuum relief valve may be used to obtain sufficient capacity.

(13.3.4.2.14). § C26-1040.0 Inspection of Pressure Tanks.—Pressure tanks shall be so located and supported that the entire exterior may be inspected.

(13.3.4.2.15). § C26-1041.0 Discharge Tanks.—Discharge tanks which are open to the atmosphere shall be so designed that when such tanks are completely filled, the factor of safety shall be at least four, based on the ultimate strength of the material. Discharge tanks shall be covered to prevent the entrance of foreign material and shall be provided with a suitable vent to the atmosphere.

(13.3.4.2.16). § C26-1042.0 Hydraulic Elevators Operated by Steam or Gas.—When hydraulic elevators are operated from a pressure tank and the fluid pressure is obtained by directly admitting steam, air or other gas to such tank, such elevators shall comply with all the rules governing hydraulic elevators.

(13.3.4.2.17). § C26-1043.0 Design of Plunger Elevators.—In the design of plunger elevators adequate provision shall be made to stop the plunger as well as the car.

SUB-GROUP 3

Terminal Stopping and Safety Devices

(13.3.4.3.1). § C26-1044.0 Normal Terminal Stopping Devices Required.—All elevators shall be provided with upper and lower normal terminal stopping devices. Such devices shall be so arranged as to stop the car automatically from any speed attained in normal operation within the top and bottom overtravel independent of the operating devices, the final terminal stopping device and the buffers, except that in the case of hand rope or rod operating devices, the normal terminal stopping device may operate in conjunction with such operating devices.

(13.3.4.3.2). § C26-1045.0 Installation of Normal Terminal Stopping Devices.—Normal terminal stopping devices shall be installed as follows:

1. All electric elevators having winding drum machines, except sidewalk type elevators and except elevators operated by hand rope, wheel or lever devices, shall hav stopping switches, on the car or in the hoistway, operated by the movement of the car.

2. All electric elevators having traction machines, except elevators operated by hand rope devices, shall have stopping switches on the car, or in the machine room, or in the hoistway. Such switches shall be operated by the movement of the car. Where such stopping devices are located in the machine room, an automatic safety switch shall be provided which will stop the machine if the driving member should fail.

3. All electric elevators with hand rope or rod operating devices shall have stop balls securely fastened to the rope or rod, which stop balls shall be so arranged as to center the operating device. If winding drum machines are used, such elevators, except sidewalk elevators, shall also have an additional device to center the operating device automatically.

4. Hydraulic elevators having a contract speed in excess of one hundred feet per minute shall have an automatic stop valve independent of the normal control valve or valves operated either by the car or by the machine.

5. Hydraulic elevators having a contract speed of one hundred feet per minute or less with hand rope or rod operating devices shall have stop balls on the operating device.

6. Electric elevators having winding drum machines with lever or wheel operating devices shall have a device to center the operating device automatically.

7. Electric sidewalk type elevators having winding drum machines and hand rope or pull chain operating devices shall have a stopping device on the machine and on the operating device.

8. Electric sidewalk type elevators having winding drum machines and either automatic or continuous pressure operation shall have a stopping device on the machine and in the hoistway. Such stopping devices may control the same switches only when two or more separate and independent switches are provided, two of which switches shall be closed to complete the motor and brake circuit in each direction of travel.

(13.3.4.3.3). § C26-1046.0 Final Terminal Stopping Devices Required.—a. All electric elevators, except sidewalk type elevators, shall be provided with upper and lower final terminal stopping devices. Such stopping devices shall be arranged to stop the car and counterweight automatically from contract speed within the top clearance and bottom overtravel, independently of the operation of the normal terminal stopping devices and the operating device, but with buffers operative. Auxiliary stopping devices for the car and counterweight shall be used when necessitated by this requirement.

b. Final limit switches and oil buffers shall be so located that the engagement of the buffer and the opening of the limit switch will occur as simultaneously as possible. When spring buffers are provided, the final limit switches shall be opened before the buffer is engaged.

c. Where means are provided to prevent jumping of the car or counterweight, it shall only be necessary that the limit switch open before the buffer is fully compressed.

(13.3.4.3.4). § C26-1047.0 Installation of Final Terminal Stopping Devices.—Final terminal stopping devices shall be installed in connection with all electric elevators, except sidewalk type elevators, as follows:

1. Electric elevators having winding drum machines shall have stopping switches on the machines and mounted in the hoistway. Such switches shall be operated by the movement of the car.

2. Electric elevators having traction machines shall have stopping switches mounted in the hoistway and operated by the movement of the car.

3. The final terminal stopping devices shall depend upon the interruption of one or more electric circuits. The conductors for such circuits shall be stationary. It shall be unlawful for such conductors to be carried through the car traveling cables.

(13.3.4.3.5). § C26-1048.0 Action and Switches of Final Terminal Stopping Devices.—a. The final terminal stopping device shall act to prevent the car from moving in either direction. The normal and final stopping devices may control the same switches on the controller only when two or more separate and independent switches are provided, two of which switches shall be closed to complete the motor and brake circuit in each direction of travel. When two-phase or three-phase alternating current is used to operate the elevator, such switches shall be of the multi-pole type. In the case of hand rope rod, wheel or level operating devices, the normal and final terminal stopping devices may control the same switch on the controller.

b. When the final terminal stopping device controls the same controller switch

or switches as the operating device or the normal terminal stopping device, such final stopping device shall be connected into the control circuit on the opposite side of the line.

(13.3.4.3.6). § C26-1049.0 Prohibited Types of Final Terminal Stopping Devices.—It shall be unlawful to use chain, rope or belt driven machine final terminal stopping devices for elevators having winding drum machines.

(13.3.4.3.7). § C26-1050.0 Automatic Terminal Stopping Devices Required.—All electric elevators having winding drum machines driven by two-phase or three-phase alternating current motors, except elevator machines with alternating current motors and direct current brakes and direct current main line or potential switches controlled by final terminal hoistway stopping switches, shall have the main line circuit to the motor and brake directly opened either by contacts in the machine stop-motion switch or by hoistway limit switches operated by a cam attached to the car. The opening of such contacts shall take place before, or simultaneously with, the opening of the final terminal stopping device and such opening shall prevent movement of the machine in either direction.

(13.3.4.3.8). § C26-1051.0 Enclosure of Terminal Stopping Switches.—Normal and final terminal stopping devices on the car or in the hoistway, shall be of the enclosed type.

(13.3.4.3.9). § C26-1052.0 Mounting of Terminal Stopping Devices.—Normal and final terminal stopping devices on the car or in the hoistway shall be securely mounted in such a manner that the movement of the switch lever or roller to open the contacts shall be as nearly as possible in a direction at right angles to a line drawn between the faces of the car guide rails.

(13.3.4.3.10). § C26-1053.0 Location of Operating Cams.—The cams for operating the terminal stopping switches shall be of metal and shall be so located and of sufficient length to maintain the switch in the open position when the car is in contact with the overhead structure or when such car is resting on the fully compressed buffer with the overhead structure and the buffer in their normal position.

SUB-GROUP 4

Operation and Control

(13.3.4.4.1). § C26-1054.0 Maximum Speed for Direct Hand Operated Elevators.—It shall be unlawful to operate elevators, having a contract speed in excess of one hundred feet per minute, by direct hand operated ropes, cables or rods.

(13.3.4.4.2). § C26-1055.0 Maximum Speed of Elevators Operated by Wheels or Levers; Marking of Hydraulic Elevator Operating Devices.—a. It shall be unlawful to operate any elevators, having a contract speed in excess of one hundred fifty feet per minute, except hydraulic elevators, by wheel or lever mechanisms.

b. Hydraulic elevators operated by a wheel operating device shall be provided with an indicating device in the car to show the position of the control valve. Such device shall be marked and shall indicate "up", "down" and "off". Such wheel operating device shall be marked to indicate the direction of motion.

(13.3.4.4.3). § C26-1056.0 Access to Operating Ropes or Cables from Outside of the Hoistway.—It shall be unlawful to operate elevators by a rope or cable, access to which is obtained from the outside of the hoistway.

(13.3.4.4.4). § C26-1057.0 Overhead Tension Weights.—Overhead tension weights for hand ropes shall be secured by chains or cables attached to the weights and to a suitable anchorage.

(13.3.4.4.5). § C26-1058.0 Hand Rope Guards.—Guards shall be installed which will keep the hand ropes on the sheaves.

(13.3.4.4.6). § C26-1059.0 Centering Devices Required.—Freight elevators, except sidewalk type elevators, operated by means of a direct operated hand rope, shall be provided with a centering device which will insure the operating mechanism being placed in the stop position when it is desired to stop the car.

(13.3.4.4.7). § C26-1060.0 Arrangement and Number of Operating Devices.—a. The handle of every car switch operating device shall be arranged to return to the stop position and lock there automatically when the hand of the operator is removed.

b. Where more than one operating device is used in a car, except in automatic operation elevators, the operating devices shall be so interlocked that only one such device can be used at a time. If a single operating device is used, it shall be so located as to be near the car opening serving the greatest number of landing openings.

(13.3.4.4.8). § C26-1061.0 Emergency Stop Switches.—a. For electric elevators, an emergency stop switch, which will cut off the source of power, shall be provided in the car adjacent to the operating device. If the stop button of an automatic operation

or continuous pressure operation elevator is a red button marked "stop", such button may be used as the emergency stop switch.

b. Where electric elevators have winding drum machines, one lead to the emergency stop switch shall be run to the car through a separate and independent traveling cable.

c. The emergency stop button or emergency stop switch in each self-service elevator in a multiple dwelling shall be so connected and arranged that the operation of the emergency stop button or emergency stop switch will cause the alarm bell to ring and to continue ringing until stopped by resetting of the alarm bell circuit outside of the car, except that when an additional alarm bell located outside of the shaft, the bell system may be arranged to ring only during the period when the elevator remains stationary either because of operating the emergency stop switch or the emergency stop button. This provision shall apply to both present existing and new installations except that when materials to effect compliance in existing installations are unobtainable due to Federal Government wartime emergency restrictions, the department shall defer enforcement until the said materials are obtainable.

(13.3.4.4.9). § C26-1062.0 Disconnecting Switch Required.—a. A manually operated multi-pole disconnecting (service) switch shall be installed in the main line of electric elevator machinery.

b. Such switch shall be so located as to be adjacent to, and visible from, the elevator machine or motor generator set. It shall be unlawful to make any provision for closing the disconnecting switch from any other part of the building. When practicable, such switch shall be located in the machine room at the lock-jamb side of the entrance door.

(13.3.4.4.10). § C26-1063.0 Independent Breaks Required With Metal-to-Metal Contacts.—Where gravity or spring opened metal-to-metal contacts, or a combination of the two, are used on controller switches for stopping elevator machines, at least two independent breaks shall be provided.

(13.3.4.4.11). § C26-1064.0 Use of Springs or Electric Circuits as Circuit Breakers.—Breaking the circuit to stop an automatic control elevator at the terminals shall be independent of the operation of springs in tension or the completion of another electric circuit. If springs are used, such springs shall be in compression. The interruption of the electric circuit shall prevent the movement of the car.

(13.3.4.4.12). § C26-1065.0 Grounding of Frames.—The frame of the electric elevator machine, the frame of the controller, the operating rope if used, and the frames of electric appliances in or on the elevator car, shall be effectively grounded.

(13.3.4.4.13). § C26-1066.0 Enclosure of Slack Cable Switches.—The electric slack cable switches shall be enclosed.

(13.3.4.4.14). § C26-1067.0 Forbidden types of Control Systems.—a. It shall be unlawful to use control systems which depend on the completion or maintenance of an electric circuit for the interruption of the power and for the application of electro-mechanical brakes at the terminals, for the operation of safeties or the closing of a contactor by an emergency stop button. Dynamic-braking and speed control devices are exempted from these requirements.

b. It shall be unlawful to install or to continue in use on any passenger elevator a movable platform which will permit the operation of the elevator with either the car gate or car door open.

(13.3.4.4.15). § C26-1068.0 Arrangement of Operating Levers.—Car switch and hand operating levers shall be so arranged that the movement of the lever toward the opening which the operator usually faces will cause the car to descend and the movement of the lever away from such opening will cause the car to ascend.

(13.3.4.4.16). § C26-1069.0 Rope Locks Required.—All freight elevators operated by hand ropes shall be equipped with rope locks for holding the car at any landing, except:

1. Sidewalk type elevators;
2. Elevators equipped with an emergency switch;
3. Elevators equipped with interlocks or electric contacts.

(13.3.4.4.17). § C26-1070.0 Operation of Directional Switches or Operating Valves on Passenger Elevators.—On mechanically operated passenger elevators, the operation of directional switches or operating valves shall not depend solely upon belts or upon cast or malleable iron chains. If a hand rope is used, the cable shall be securely anchored to the operating sheave or drum.

(13.3.4.4.18). § C26-1071.0 Automatic Fire Alarm Circuit Breakers.—It shall be unlawful to use a circuit breaker operated automatically by a fire alarm system to cut off the power, or to interrupt the operating circuit of a passenger elevator.

(13.3.4.4.19). § C26-1072.0 Automatic Operation Elevators.—Automatic operation

elevators, except sidewalk elevators the travel of which is one story or less, shall comply with the following requirements:

1. If the car has started for a given landing, it shall be impossible for an impulse to be given from any landing to send the car in the reverse direction until such car has reached the destination corresponding to the first impulse. The car may be stopped at any intermediate landing to take on or discharge passengers or attendants going in the original direction.

2. If the car has been stopped to take on or to discharge passengers or freigh and such car is to continue in the direction determined by the first impulse, the ca may be started by the closing of the car gate.

3. It shall be impossible to start the car under normal operation unless every hoistway door is closed and locked in the closed position. It shall be unlawful to use devices employing locks and contacts of a type where the contact is made when the door is closed and the locking of the door takes place subsequently.

4. Passenger elevators in multiple dwellings shall not be provided with operating buttons at any landing which will send the car to any other landing.

5. An inspector's switch shall be installed on the controller to render all landing buttons inoperative, and when the opening of the emergency stop switch or button does not cancel all registered car and hall calls, the inspector's switch on the controller shall also render all car buttons inoperative and there shall be furnished in the car an "up" and "down" inspection switch or button which will enable the inspector to operate the elevator in either direction as long as the switch or button is held in contact. The terminal floor buttons may be used as inspection buttons in lieu of separate "up" and "down" buttons.

(13.3.4.4.20). § C26-1073.0 Continuous Pressure Operation.—It shall be unlawful to use continuous pressure operation for passenger elevators, except when such elevators are provided with all of the safety devices required for automatic operation elevators.

(13.3.4.4.21). § C26-1074.0 Polyphase Alternating Current Motors.—Each electric elevator driven by a polyphase alternating current motor shall be provided with a device which will, except in the case of alternating current motors used in motor generator sets, prevent the starting of the motor if the phase rotation is in the wrong direction, or if there is failure in any phase.

(13.3.4.4.22). § C26-1075.0 Starting of Electric Elevators After Failure of Power.—a. Electric elevators operated by hand cables, lever or wheel operating devices, shall be so arranged that, in case of failure of power, or the opening of car gate, landing door or limit switches, it will be necessary to return the operating device to the "off" position before the elevator can again be started.

b. All existing electric elevators operated by hand cables, lever or wheel operative devices and which are equipped with electric brakes as required in section C26-1025.0 shall comply with the provisions of this section.

(13.3.4.4.23). § C26-1076.0 Use of Overload Circuit Breakers and Rectifiers.—a. If an overload circuit breaker is used for a direct current rheostatic control electric elevator the wiring shall be so arranged that the circuit of the brake magnet coil is opened at the same time that the line circuit is opened.

b. Where a direct current elevator motor, or motors, derive current from an alternating current power source through a non-rotating rectifying unit, means shall be provided to absorb a sufficient amount of the energy regenerated by the motor, or motors, under overhauling load conditions to prevent any elevator from attaining at any time more than 115 per cent of contract speed.

c. Where a change in power supply from direct current to alternating current is made to an existing direct current elevator and a non-rotating type of rectifying unit is used to supply direct current to the elevator motor, or motors, the requirements of subdivision b of this section shall apply.

(13.3.4.4.24). § C26-1077.0 Operation of Sidewalk Elevators.—The operation of power sidewalk elevators through openings in the sidewalk or other areas accessible to the public protected by hinged doors or vertical lifting covers, shall conform to the following:

1. The elevator shall be operated through the opening, in both the up and down direction, only from the sidewalk or other area. The operation to be by means of a detachable flexible cord, five feet or less in length, with up and down continuous pressure type operating buttons on the free end.

2. A special type plug receptacle for connecting the cord shall be mounted in a weatherproof box and shall be installed above the sidewalk or other area on the side of the building wall eighteen inches or less horizontally distant from one side of the opening.

3. Operating buttons may be provided in the elevator car and at any landings

below the top landing provided that such buttons shall operate the car only when it is not in contact with the doors or cover at the sidewalk or other area.

4. All operating buttons used shall be of the continuous pressure operation type and it shall be possible to operate car when it is in contact with the sidewalk doors or cover only by means of the up and down buttons on the flexible cord specified in subdivision 1 of this rule.

5. The flexible cord shall be removed from the wall receptacle as soon as the elevator has come to a stop at the top or bottom and shall not be left where it can be used by unauthorized persons.

(13.3.4.4.25). § C26-1078.0 Installation of Condensers and Other Devices which will Interfere with the Safe Operation of the Elevator.—It shall be unlawful to install any condensers, the installation, operation or failure of which will hold in any magnet or keep alive any circuit so as to interfere with safe operation of any elevator apparatus, or to install any other devices or equipment, not provided for in this code, the installation or operation of which will interfere with the safe operation thereof.

SUB-GROUP 5

Limits of Speed

(13.3.4.5.1). § C26-1079.0 Maximum Speed of Freight and Passenger Elevators.—The maximum contract speed of passenger and freight elevators, except as otherwise specified in sections C26-1080.0 through C26-1082.0, shall be limited only by the top and bottom clearances as determined by sections C26-865.0 through C26-868.0.

(13.3.4.5.2). § C26-1080.0 Maximum Speed of Sidewalk Type Elevators.—The maximum contract speed of sidewalk type elevators shall be thirty-five feet per minute.

(13.3.4.5.3). § C26-1081.0 Maximum Speed of Freight Elevators Without Regular Operators.—The maximum contract speed of freight elevators without a regular operator, except sidewalk type elevators, shall be one hundred feet per minute, unless such freight elevators are provided with automatic operation or continuous pressure operation.

(13.3.4.5.4). § C26-1082.0 Maximum speed of Continuous Pressure Operation Freight Elevators.—The maximum contract speed of electric freight elevators with continuous pressure operation, except sidewalk type elevators, shall be one hundred fifty feet per minute.

GROUP 5

Cables and Signal Systems for Elevators

SUB-GROUP 1

Cables

(13.3.5.1.1). § C26-1083.0 Materials for Cables.—Car and counterweight cables shall be iron or steel without covering, except that where liability to excessive corrosion or other hazard exists, marline covered cables may be used for freight elevators. It shall be unlawful to use marline covered cables for passenger elevators. It shall be unlawful to use chains for hoisting, except for sidewalk elevators the travel of which is fifteen feet or less.

(13.3.5.1.2). § C26-1084.0 Information on Data Plates.—a. Where winding drum machines are used, the data plate required in section C26-1012.0 shall include the following cable information:

Cable Specifications.

Cable.	Number.	Diameter in Inches	Rated Ultimate Strength in Pounds.
Hoisting	..	....	.....
Car Counterweight	..	....	.....
Machine Counterweight	..	....	.....

b. Where traction machines or drum machines without counterweights are used, the data plate required in section C26-1012.0, shall include the following cable information:

Cable Specifications.

Cable.	Number.	Diameter in Inches	Rated Ultimate Strength in Pounds.
Hoisting Cables	..	....	.....

c. Where hydraulic machines are used, the data plate required in section C26-1012.0, shall include the following cable information:

Cable Specifications.

Cable.	Number.	Diameter in Inches	Rated Ultimate Strength in Pounds.
Hoisting	..	....	.....
Car Counterweight	..	....	.....

d. In addition a metal tag shall be attached to the cable fastenings. The diameter, rated ultimate strength and material of the cable, and the date of the cable installation, shall be given on such tag.

(13.3.5.1.3). § C26-1085.0 Load Limit for Cables of Unknown Strength.—Where the rated ultimate strength and material of the cable are unknown, the loads shall be limited to the loads allowed for iron cable of the same diameter.

(13.3.5.1.4). § C26-1086.0 Factors of Safety.—a. The factors of safety based on static loads for car and counterweight cables for elevators shall be at least those given as corresponding to the contract speed of the car in tables 5 and 6.

b. The factor of safety based on static loads for chains used for hoisting sidewalk elevators shall be at least five, and for cables, seven.

TABLE 5

Factors of safety for hoisting and counterweight cables for passenger elevators

Car Speed in Feet Per Minute	Factors of Safety	Car Speed in Feet Per Minute	Factors of Safety	Car Speed in Feet Per Minute	Factors of Safety
50	7.5	550	10.5	1,050	11.65
100	7.85	600	10.7	1,100	11.7
150	8.25	650	10.85	1,150	11.725
200	8.5	700	11.0	1,200	11.75
250	8.85	750	11.1	1,250	11.775
300	9.2	800	11.2	1,300	11.8
350	9.5	850	11.3	1,350	11.825
400	9.8	900	11.4	1,400	11.85
450	10.0	950	11.5	1,450	11.875
500	10.3	1,000	11.6	1,500	11.885

TABLE 6

Factors of safety for hoisting and counterweight cables for freight elevators

Car Speed in Feet Per Minute	Factors of Safety	Car Speed in Feet Per Minute	Factors of Safety	Car Speed in Feet Per Minute	Factors of Safety
50	6.7	400	8.7	1,000	10.3
100	7.0	450	8.9	1,100	10.4
150	7.5	500	9.1	1,200	10.5
200	7.6	600	9.5	1,300	10.5
250	7.9	700	9.8	1,400	10.6
300	8.2	800	10.0	1,500	10.6
350	8.4	900	10.2		

(13.3.5.1.5). § C26-1087.0 Number and Diameter of Cables and Computed Load.—a. The number and diameter of the cables shall be determined by using the factor of safety found in section C26-1086.0 together with the rated ultimate strength of the cable. The computed load on the cables shall be the weight of the car, plus its contract load, plus the weight of the hoisting cables and the compensation, minus the weight of the independent car counterweight, if any.

b. The minimum number of hoisting cables used with traction elevators shall be three, except that private residence elevators shall have at least two hoisting cables. The minimum number of cables used with winding drum elevators shall be two car hoisting cables and two cables for each counterweight used.

c. It shall be unlawful to use hoisting ropes less than one-half of an inch in diameter for elevators, except that where conditions make it impractical to use one-half inch rope, the superintendent may permit the use of rope seven-sixteenths of an inch in diameter, and except that for private residence elevators, hoisting cables at least three-eighths of an inch in diameter may be used. The ratio of cable diameter to sheave or drum diameters shall comply with the requirements of section C26-1019.0.

(13.3.5.1.6). § C26-1088.0 Anchoring of Cables to Winding Drums.—Cables anchored to winding drums shall have at least one turn of cable on the winding drum when the car or counterweight has reached the extreme limit of its overtravel.

(13.3.5.1.7). § C26-1089.0 Lengthening or Repairing Cables by Splicing Unlawful. It shall be unlawful to repair or to lengthen any car or counterweight cables by splicing.

(13.3.5.1.8). § C26-1090.0 Securing Winding Drum Ends of Cables.—The winding drum ends of car or counterweight cables shall be secured by clamps on the inside of the drums or by one of the methods specified in the following paragraphs for fastening cables to cars or counterweights.

(13.3.5.1.9) § C26-1091.0 Fastening Car and Counterweight Ends of Cables.—a. The car and counterweight ends of cables shall be fastened by individual tapered babbitted sockets, or by other methods approved by the superintendent, except that it shall be unlawful to use spliced eyes and return loops. Other fastenings may be used for compensating counterweight cables and for plunger elevators.

b. Adjustable shackle rods shall be used to attach cables to cars and counterweights in such a manner that all portions of the cable, except the portion in the socket, shall be readily visible.

c. It shall be unlawful to use cable equalizers or their fastenings, unless they have been previously approved by the board on the basis of tests conducted by or under the supervision of the board or on the basis of tests made in a competent laboratory designated by the board for such tests. Approval shall be withheld from such equalizers and their fastenings, unless the tests shall have indicated that the equalizer and its fastenings in its several parts and assembly has a strength of at least ten per cent in excess of the minimum cable strength required by section C26-1087.0.

(13.3.5.1.10). § C26-1092.0 Method of Socketing Cables.—a. If a babbitted socket is used, the length of such socket shall be at least four and three-quarter times the diameter of the cable. The hole at the small end shall be as given in the following table:

Nominal diameter of cable in inches	Maximum inside diameter of small end of cable socket
¼ to ⅞ inclusive	$\frac{1}{16}$ of an inch larger than actual cable diameter
½ to ¾ inclusive	$\frac{3}{32}$ of an inch larger than actual cable diameter
⅞ to 1⅛ inclusive	⅛ of an inch larger than actual cable diameter
1¼ to 1½ inclusive	$\frac{5}{16}$ of an inch larger than actual cable diameter

b. The small end of the socket shall be free from cutting edges. The hole at the large end of the socket shall be at least two and one-quarter times the diameter of the cable. Every socket shall be drop-forged steel or a steel casting. The socket shall be of such strength that the cable will break before the socket is perceptibly deformed.

c. The ends of wire rope to be socketed shall be served with three seizings at each side of any point at which the rope is to be cut.

d. Only annealed iron wire shall be used as seizing wire. The wires shall be wound tight and even. The twisted ends of the seizings shall be so placed that they fall into the valleys between strands and away from the ends of the rope.

e. The first two seizings shall be at least one-half of an inch long, and the third seizing shall be at least three-quarters of an inch long. The first seizing shall be close to the cut and the second seizing shall be spaced within two and one-quarter inches from the first seizing. The third seizing shall be at a distance from the second seizing equal to the length of the socket.

f. For larger cables longer seizings than above specified shall be provided.

g. It shall be unlawful to use tape as a substitute for annealed iron wire seizing.

h. The ropes thus served shall be slipped sufficiently into the socket for manipulating. After the first two seizings are removed, the strands shall be opened up and the hemp center shall be cut out as closely as possible to the remaining seizing.

i. All grease shall be wiped off the extended strands, and the lubricant shall be carefully removed by washing with a suitable solvent, preferably non-flammable. The ends of the strands shall then be bent in and bunched close together, and the rope shall be pulled back as far as possible so that the strands rest in the basket with the third seizing slightly projecting outside of the mouth of the socket.
least six inches in diameter and shall be so located as to be clearly audible in some

j. When the socket is thus made ready for pouring the babbitt, the socket shall be warmed and shall be held in a position which is vertical and truly axial with the rope to be socketed. Tape or waste may be wound around the rope at the base of the socket to prevent the metal from seeping through, but such tape or waste must

be removed after the babbitt has cooled off. Only pure babbitt, free of dross, sha be used, and such babbitt shall be heated to a temperature which is just sufficient . produce fluidity.

k. If the original and uniform relation of tension obtained by correct manufacture is undisturbed, it shall be an indication that the seizing and socketing has been done properly; any loss of rope lay shall be a clear indication of careless seizing and socketing.

(13.3.5.1.11). § C26-1093.0 Reroping and Shortening of Cables.—Whenever an elevator is reroped or its ropes are shortened, the top car and counterweight clearances shall be at least those specified in section C26-867.0.

SUB-GROUP 2

Emergency Signals

(13.3.5.2.1). § C26-1094.0 Emergency Signals or Telephones Required.—Automatic operation passenger or freight elevators, except sidewalk elevators the travel of which is fifteen feet or less, shall be provided with an audible emergency signal or, except in automatic self-service elevators in multiple dwellings, with a telephone. Such emergency signal shall be operative from the car and shall be located outside of the hoistway. The emergency alarm shall be a bell of at least six inches in diameter and shall be so located as to be clearly audible in some space or room in which an employee is ordinarily located.

(13.3.5.2.2). § C26-1095.0 Telephone Connection Required.—Passenger elevators in private residences shall be provided with a telephone permanently connected to a central exchange and with an emergency alarm bell as provided in section C26-1094.0.

(13.3.5.2.3). § C26-1096.0 Signal Systems on Elevator Hoistways.—The hoistway of every elevator, except automatic operation, continuous pressure operation and sidewalk elevators and except installations in retail establishments where the elevator regularly stops each time it reaches each landing it services, shall be provided with a signal system by means of which system signals can be given from any landing whenever the elevator is desired at that landing. Signalling systems shall be maintained in effective operating condition. The requirements of this section shall apply to all existing installations.

Sub-Article 5. Hand Power Elevators

GROUP 1

Hoistway Construction

(13.4.1.1.1). § C26-1097.0 Fire Resistive Hoistway Enclosures.—a. Hoistways to Be Fire Resistive.—Hoistway enclosures of all elevators, except sidewalk elevators, the travel of which is one story or less, shall comply with sections C26-638.0 through C26-647.0, and sections C26-660.0 through C26-665.0, and, in factory buildings, with the provisions of the labor law, and in multiple dwellings, with the provisions of the multiple dwelling law.

(13.4.1.1.2). b. Landing Openings to Be Protected.—Landing openings in a fire resistive hoistway enclosure shall be provided with the resistive doors, panels or fronts which comply with sections C26-638.0 through C26-647.0, and sections C26-660.0 through C26-665.0, and, in factory buildings, with sections two hundred sixty-one and two hundred seventy of the labor law, except that such openings shall first comply with section C26-896.0. For elevators whose contract load is two thousand pounds or more, the aggregate clear width of the hoistway doors shall be at least thirty inches and the clear height shall be at least seventy-eight inches.

(13.4.1.1.3). c. Strength of Hoistway Enclosure.—The hoistway enclosure which is adjacent to a landing opening shall be of sufficient strength to support in true alignment the hoistway doors with their operating mechanism.

(13.4.1.1.4). d. Pits.—It shall be unnecessary to have pits at the bottom of hand power elevator hoistways.

(13.4.1.1.5). e. Ramps.—When ramps are used, such ramps shall be the same width as the entrance door, and shall be inclined at a rate of five inches or less per foot and shall have a flat surface of at least two inches at the top.

(13.4.1.2). § C26-1098.0 Non-Fire Resistive Hoistway Enclosures. a. General.—Non-fire resistive hoistway enclosures shall be permitted only for sidewalk elevators the travel of which is one story or less. Where non-fire resistive construction is permitted, hoistways shall be enclosed to a height of six feet, except on the sides used for loading or unloading.

(13.4.1.2.1). b. Materials, for Enclosures.—

1. Enclosures shall be building walls, solid or latticed partitions, or of incom-

bustible material, grille work, metal grating, expanded metal or fireproofed wood. Where wire grille work is used, the wire shall be at least 0.0915 inch in diameter (No. 13 steel wire gage), and the maximum size of mesh shall be two inches. Where expanded metal is used, its minimum thickness shall be 0.094 inch (No. 13 U. S. gage).

2. The maximum spacing between vertical bars shall be one inch.

(13.4.1.3.1). § C26-1099.0 **Clearance Between Cars and Hoistway Enclosures.**—a. Clearance Between Car Platforms and Landing Saddle.—The maximum clearance between the car platform and the landing saddle shall be three inches for freight elevators and two inches for passenger elevators, except that where the operating rope is located at the side of the platform, such clearance shall be one inch or less.

(13.4.1.3.2). b. Clearance Between Hoistway Enclosure and Loading Side of Car Platform.—The maximum clearance between a hoistway enclosure and a loading side of the car platform opposite a car entrance shall be five inches, except that when the doors are installed wholly within the hoistway, the maximum permissible clearance shall be seven and one-half inches.

(13.4.1.4). § C26-1100.0 **Overtravel for Hand Elevators.**—An overtravel of at least eighteen inches shall be provided at the top for all hand elevators, except sidewalk elevators. It shall be unnecessary to have any overtravel at the bottom.

(13.4.1.5.1). § C26-1101.0 **Machine Supports, Loads on Supports and Factors of Safety.** a. Machine Supports.—Machinery and sheaves shall be supported and held so as effectually to prevent any part from becoming displaced. The supporting beams shall be of steel or reinforced concrete. It shall be unnecessary to have any beams under machinery supported on an independent foundation or on the floor of the machine room, if such foundation or floor is properly constructed to support the loads.

(13.4.1.5.2). b. Loads on Supports.—Loads on overhead beams and their supports shall be computed as follows:

1. The total load on overhead beams shall be assumed to be equal to the weight of all apparatus resting on such beams plus twice the maximum load suspended from such beams.

2. The load resting on such beams shall include the complete weights of machine, sheaves and similar equipment. The load suspended from such beams shall include the sum of the tensions of all cables suspended from such beams.

(13.4.1.5.3). c. Hanging of Machinery Underneath Supporting Beams.—It shall be unlawful to hang elevator machinery underneath the supporting beams at the top of the hoistway, except for idler or deflecting sheaves with their guards and frames, and devices for limiting or retarding the car speed and their accessories.

(13.4.1.5.4). d. Factors of Safety.—The factor of safety for overhead beams and their immediate supporting beams, based on the ultimate strength of the material which, if of steel, shall conform to the standard specifications of the A. S. T. M., D., A7-29, the loads being assumed as in subdivision b of section C26-1101.0, shall be at least the following:

1. For steel 4
2. For reinforced concrete 7

(13.4.1.6). § C26-1102.0 **Gratings Under Machinery.**—A metal grating capable of supporting fifty pounds per square foot shall be installed under the overhead machinery. Openings in such gratings shall reject a ball one and one-half inches in diameter.

(13.4.1.7). § C26-1103.0 **Thoroughfares Under Elevator Hoistways or Counterweights.**—It shall be unlawful to have thoroughfares or occupied spaces under hoistways or counterweights, unless there is a structure under the hoistway or counterweight, which structure is sufficiently strong to withstand the impact of the car with contract load, or the impact of the counterweight, when either is dropped freely in its guides from the upper limit of overtravel; provided that, for cars or counterweights equipped with broken rope safeties and speed retarders, the impact shall be computed for the maximum attainable speed.

GROUP 2

Hoistway Guards and Screens

(13.4.2.1). § C26-1104.0 **Hatch Covers for Sidewalk Elevators.**—a. Where the top hatch opening of sidewalk elevators is wholly or partially outside of the building wall, the hatch covers shall be of the hinged type or the vertically lifting type and shall be capable of sustaining a live load of three hundred pounds per square foot. The maximum dimensions of sidewalk openings, except by permission of the superintendent, shall be five feet at right angles to and six feet parallel to the building line. The side of the opening nearest the building shall be four inches or less from the

building wall, except that where conditions make this impractical, such distance may be increased subject to the approval of the superintendent.

b. Where hinged type covers are used, the line of the hinges shall be at right angles to the building line. Where the covers open toward any obstruction, the space between the fully opened cover and such obstruction shall be at least eighteen inches. Where vertically lifting covers are used, there shall be a clearance of at least two feet between the cover and any obstruction above it when the elevator is at the top of its overtravel.

c. Hatch covers shall be self-closing. It shall be unlawful to fasten or to hold open such covers when the car is away from the top landing, except where the hatch opening is in an area inaccessible to the public.

d. Where the top hatch opening of sidewalk elevators is wholly inside the building wall, hinged or vertically lifting type covers may be used, or doors may be provided complying with sections C26-1106.0 through C26-1113.0. Such doors shall be so arranged that they can only be opened or unlocked from the outside of the hoistway when the car is at the landing.

e. An electric waterproof signal gong, at least four inches in diameter, shall be provided and such gong shall ring before the hatch covers at the sidewalk begin to open. A warning sign shall be mounted on the building ten feet or less above the sidewalk. Such sign and bell shall conform to the rules of the board.

(13.4.2.2). § C26-1105.0 **Counterweight Runways Outside of the Hoistway.**—Where runways for counterweights are located outside of the elevator hoistway, such runways shall be solidly enclosed throughout their height, except that when the runway is located outside of the building, such runway shall be enclosed to a height of at least seven feet from the ground.

GROUP 3

Hoistway Doors for Hand Power Elevators

(13.4.3.1). § C26-1106.0 **Automatic Fire Doors Functioning by Heat.**—It shall be unlawful for any automatic fire door, the functioning of which is dependent on the action of heat, to lock any landing opening in the hoistway enclosure of any passenger elevator or to lock any exit leading from any hoistway landing door to the outside of the structure.

(13.4.3.2). § C26-1107.0 **Protection of Landing Openings.**—a. Landing openings in hoistway enclosures shall be protected by sliding or swing doors. Such doors shall comply with the fire resistive requirements for doors in such enclosures.

b. In addition to such doors, landing openings in hoistway enclosures, except enclosures for one-story sidewalk elevators, shall be furnished with gates at least thirty inches high which gates close when the car leaves the landing, unless the landing doors are made in two parts, one part above the other, with the lower part extending at least thirty inches above the floor, and with such lower part so arranged as to open only after the upper part has been opened and to be closed before the top part can be closed.

(13.4.3.3). § C26-1108.0 **Opening of Hoistway Doors.**—It shall be unlawful for hoistway doors of elevators serving more than two floors to be capable of being opened from the landing side unless:

1. The word "elevator" is conspicuously displayed on the landing side of the doors, and

2. Unless the hoistway door is equipped with two spring locks or latches, one of which is at least six feet above the floor.

(13.4.3.4). § C26-1109.0 **Hanger guards and stops.**—Means shall be provided to prevent hangers for all sliding hoistway doors from jumping the tracks. Stops shall also be provided to prevent the hanger carriage from leaving the ends of the track, or suitable stops may be provided on the door only.

(13.4.3.5). § C26-1110.0 **Vision Panels.**—For elevators which can be operated from outside of the hoistway, hoistway doors may be provided with a vision panel. Such panels shall be of clear wired glass with a maximum area of eighty square inches.

(13.4.3.6). § C26-1111.0 **Strength of Hoistway Doors.**—Every hoistway door shall be capable of withstanding a force of seventy-five pounds applied perpendicularly to such door at any point without such door being sprung from its guides.

(13.4.3.7). § C26-1112.0 **Size of Hoistway Doors.**—When hoistway doors are closed, such doors shall guard the full width of the landing openings and shall extend the full height from the landing saddle to the top of the landing opening.

(13.4.3.8). § C26-1113.0 **Door Counterweight Enclosures.**—Door counterweights shall run in metal guides from which they cannot become dislodged, or shall be boxed in. The bottoms of such guides or boxes shall be so constructed as to retain such counterweight if the counterweight rope breaks.

GROUP 4

Car Construction and Safeties

(13.4.4.1.1). § C26-1114.0 Car Construction. a. Car enclosures.—

1. All cars, except for sidewalk elevators, shall be enclosed on the top and sides, except at the openings necessary for entrance and exit. Enclosures shall be solid or of openwork rigidly braced with steel. Where slats, bars or wire mesh are used, the openings shall reject a ball two inches in diameter. Where sheet metal is used, it shall be at least as thick as No. 16 U. S. gage. Where wire mesh is used, the wire shall be at least 0.135 inch in diameter (No. 10 steel wire gage). An enclosure shall deflect only one-quarter of an inch or less when a force of seventy-five pounds is applied perpendicularly to the enclosure at any point. The car enclosure shall be securely fastened to the car platform or frame so that such enclosure cannot work loose or become displaced in ordinary service.

2. Cars for sidewalk elevators shall be enclosed to the spring of the bow iron on such sides as are not used for entrance but such cars shall be enclosed to a height of at least four feet above the platform. If the enclosure is open-work of bars, slats or wire mesh, the openings shall reject a ball four inches in diameter. Wire mesh enclosures shall be of wire at least 0.0915 inch in diameter (No. 13 steel wire gage).

(13.4.4.1.2). b. Car Frames and Platforms.—

1. Car frames and platforms shall be of metal or sound seasoned wood. Such platforms shall be designed with a factor of safety of at least four for metal, and a factor of at least six for wood, on the contract load uniformly distributed. The frame members shall be securely bolted and braced and shall be provided with guide shoes.

2. Guide shoes for sidewalk elevators of the two point suspension type shall be at least twelve inches long unless two sets of shoes, spaced eighteen inches on centers, are used. Where the four point suspension type of elevator is used, guide shoes shall be at least four inches long.

(13.4.4.1.3). c. Use of Glass in Hand Power Elevators.—It shall be unlawful to use any glass in elevator cars, except to cover certificates, directors, lighting fixtures and appliances necessary for the operation of the car. It shall be unlawful to use any piece of glass exceeding one square foot in area unless such glass is laminated or is otherwise shatterproof, but the maximum total area of such glass used in such car in connection with lighting fixtures, whether in one or more pieces, shall be four square feet.

(13.4.4.1.4). d. Protection of Cars Operating in Hoistways Outside of the Structure.—When elevator cars operate in hoistways outside of the structure, which hoistways are enclosed only at the ground landing, such cars shall be protected on the exposed sides by independently operated gates or by self-closing gates.

(13.4.4.2). § C26-1115.0 Car Compartments.—Hand elevator cars upon which persons are permitted to ride shall have only one compartment.

(13.4.4.3). § C26-1116.0 Car Safeties.—If the rise of an elevator exceeds fifteen feet, such elevator shall be equipped with an approved safety device attached to the underside of the car, which safety device will immediately stop and hold the car and contract load, if the suspension means breaks.

(13.4.4.4.1). § C26-1117.0 Capacity and Loading. a. Minimum contract load of passenger elevators.—The contract load of passenger elevators shall be at least fifty pounds per square foot of platform area inside of the car enclosure.

(13.4.4.4.2) b. Information Plate Required.—A metal plate shall be fastened in a conspicuous place in the elevator car and shall bear the following information, in at least one-quarter inch letters or figures, stamped, etched or raised on the surface of the plate:

1. The contract load of the elevator in pounds:

2. The maximum number of passengers to be carried, based on one hundred fifty pounds per person in the case of a passenger elevator.

(13.4.4.4.3). c. Tests.—A contract load test of every new hand power elevator as to operation of the car safety, brake and speed retarding devices shall be made before such elevator is placed in regular service.

GROUP 5

Guides, Buffers and Counterweights

(13.4.5.1). § C26-1118.0 Guide Rails.—Car and counterweight guide rails shall be of steel for elevators in structures of Class 1 or Class 2 construction and for elevators where the car travel exceeds thirty-five feet and for all sidewalk elevators. Where steel guide rails are not required, they shall be of steel or wood. Joints in steel rails shall be either tongued and grooved or doweled and fitted with splice plates. Joints

in wood rails shall be tongued and grooved or doweled and screwed to backing pieces or brackets. Guide rails shall be securely fastened with through bolts, wood screws or clips of such strength, design and spacing that the maximum deflection of the guide rails and their fastenings under normal operation shall be one-quarter of an inch or less, particularly where in contact with the guide shoe when the car is at the landing. Guide rails shall withstand the application of the safety when the safety is stopping either a fully loaded car or the counterweight. The guiding surfaces of the guide rails for elevators requiring safeties shall be finished smooth. Guide rails shall be bottomed on suitable supports and extended at the top to prevent guide shoes running off in case the overtravel is exceeded.

(13.4.5.2). § C26-1119.0 Car and Counterweight Buffers.—a. Car buffers of the spring type or their equivalent shall be installed in the pits of passenger elevators.

b. Buffers shall be located symmetrically with reference to the center of the car.

(13.4.5.3). § C26-1120.0 Counterweights.—a. Counterweights shall run in guide rails and shall not be boxed unless incombustible material is used for such boxing.

b. Sections of counterweights for passenger elevators, whether carried in frames or otherwise, shall be secured by at least two tie-rods passing through holes in the section. The tie-rods shall have lock nuts at each end. Such lock nuts shall be secured by cotter pins.

GROUP 6

Machines and Suspension Members

SUB-GROUP 1

Machines and Machinery

(13.4.6.1.1). § C26-1121.0 Brakes Required.—Elevators shall be equipped with a hand brake operating in both directions of motion or a combined automatic brake and speed retarder operating in both directions of motion, except when motive power is derived through use of a self-locking or non-overhauling worm gear drive.

(13.4.6.1.2). § C26-1122.0 Factors of Safety.—The factors of safety based on the static loads to be used in designing parts of hoisting machines shall be at least eight for wrought iron or steel, and ten for cast iron or other materials.

(13.4.6.1.3). § C26-1123.0 Set Screw Fasteners.—It shall be unlawful to use set screw fastenings instead of keys or pins, except where the connection is not subject to torque.

(13.4.6.1.4). § C26-1124.0 Suspension of Sheaves or Idlers.—It shall be unlawful to suspend sheaves or idlers in cast iron stirrups from the under side of the supporting beams.

(13.4.6.1.5). § C26-1125.0 Conversion to Power Elevator Unlawful.—It shall be unlawful to equip a hand power elevator machine with any means or attachment for applying any other power, unless such elevator is completely converted into a power elevator complying with the requirements for power elevators.

(13.4.6.1.6). § C26-1126.0 Rope Gripping Attachments or Clutch Mechanisms.—It shall be unlawful to apply power to hand elevators by means of rope gripping attachments or clutch mechanisms.

SUB-GROUP 2

Suspension Members

(13.4.2.6.2.1.). § C26-1127.0 Suspension Fastening Tag.—A metal tag stating the sizes, rated ultimate strength and material of the suspension and the date of its installation, shall be attached to the suspension fastening.

(13.4.6.2.2). § C26-1128.0 Suspension Members and Factor of Safety.—a. The number of suspension members for both car and counterweight shall be at least two. Suspension members shall be of iron, steel or marline covered.

b. The factor of safety used in determining the size of the suspension member shall be at least five, based on the weight of the car and its contract load.

(13.4.6.2.3). § C26-1129.0 Adjustment of Suspension Members.—Suspension members shall be so adjusted that either the car or the counterweight shall bottom before the counterweight or the car strikes any part of the overhead structure.

(13.4.6.2.4). § C26-1130.0 Securing of Suspension Members.—a. Suspension members secured to a winding drum shall have at least one complete turn of the suspension member around the winding drum when the car or counterweight has reached the extreme limit of its overtravel.

b. The drum end of cables shall be secured by clamps or sockets inside the drum.

(13.4.6.2.5). § C26-1131.0 Platform Elevators.—It shall be unlawful to use platform elevators for passenger service. The maximum travel of a platform elevator shall be fifteen feet and the maximum platform area shall be fifty square feet.

SUB-ARTICLE 6

Dumbwaiters

GROUP 1

Hoistway Construction

(13.5.1.1.1). § C26-1132.0 **Fire Resistive Hoistway Enclosures.**—a. Hoistways to Be Fire Resistive.—Hoistway enclosures of all dumbwaiters, except dumbwaiters the travel of which is one story or less, shall comply with sections C26-638.0 through C26-647.0, and sections C-26-660.0 through C-26-665.0, and, in factory buildings, with the provisions of the labor law, and in multiple dwellings with the provisions of the multiple dwelling law.

(13.5.1.1.2). b. Landing Openings to Be Protected.—Landing openings in a fire resistive hoistway enclosure shall be provided with fire resistive doors, panels or fronts which comply with sections C-26-638.0 through C-26-647.0, and sections C26-660.0 through C26-665.0, and, in factory buildings, with the provisions of the labor law.

(13.5.1.2.1). § C26-1133.0 **Use of Non-Fire Resistive Hoistway Enclosures.**—a. Non-fire Resistive Enclosures.—Non-fire resistive hoistway enclosures shall be permitted only for dumbwaiters the travel of which is one story or less. When non-fire resistive enclosures are permitted, hoistways for power dumbwaiters shall be enclosed to the full height of the hoistway, except on the sides for loading or unloading.

(13.5.1.2.2). b. Enclosure of Hoistway Sides Used for Loading and Unloading.—The hoistways of power dumbwaiters shall be enclosed from floor to ceiling, except for the landing openings.

(13.5.1.2.3). c. Materials for Enclosures.—

1. Enclosures shall be building walls, solid or latticed partitions, or of incombustible material, grille work, metal grating, expanded metal or fireproofed wood. Where grille work is used, the wire shall be at least 0.0915 inch in diameter (No. 13 steel wire gage) and the maximum size of mesh shall be two inches. Where expanded metal is used, its minimum thickness shall be 0.094 inch (No. 13 U. S. gage).

2. The maximum spacing between vertical bars shall be one inch.

(13.5.1.2.4). d. Netting Required on Enclosures.—When either of the following conditions exists, the openings in the enclosures shall be covered with a netting of square mesh, one-half of an inch or less in size, made of wire at least 0.0348 inch in diameter (No. 20 steel wire gage):

1. The clearance between the enclosure and any part of the car, counterweight or any sliding landing door is less than one inch.

2. The enclosure is grille or open work having openings which will pass a one-half inch diameter ball, and the openings in the enclosure are less than six feet above any landing, stairway, floor or platform.

(13.5.1.3.1). § C26-1134.0 **Supports and Factors of Safety.** a. Machine Supports.—Machinery and sheaves shall be so supported and held as effectually to prevent any part from becoming displaced. The supporting beams shall be of steel or reinforced concrete. It shall be unnecessary to have beams under machinery supported on an independent foundation or on the floor of the machine room, if such foundation or floor is properly constructed to support the loads.

(13.5.1.3.2). b. Loads and Supports.—Loads on overhead beams and their supports shall be computed as follows:

1. The total load on overhead beams shall be assumed to be equal to the weight of all apparatus resting on such beams plus twice the maximum load suspended from such beams.

2. The load resting on such beams shall include the complete weights of machine, sheaves, controller and similar equipment. The load suspended from such beams shall include the sum of the tensions of all cables suspended from such beams.

(13.5.1.3.3). c. Factors of Safety.—The factor of safety for overhead beams and their immediate supporting beams, based on the ultimate strength of the material which, if of steel, shall conform to the standard specifications of the A. S. T. M., D., A7-29, the loads being assumed as in subdivision b of this section shall be at least the following:

1. For steel 4
2. For reinforced concrete 7

(13.5.1.4). § C26-1135.0 **Thoroughfares and Occupied Spaces Under Dumbwaiters and their Counterweights.**—a. It shall be unlawful to have thoroughfares or occupied spaces under hoistways of dumbwaiters or their counterweights, unless there is a structure under the hoistway sufficiently strong to withstand the impact of the car with contract load, or the impact of the counterweight, when either the car or counterweight is dropped freely in its guides from the upper limit of overtravel; provided that, for cars or counterweights equipped with governor operated safeties, the impact shall be computed for governor tripping speed.

b. When broken rope safeties are used, the impact shall be computed for a free drop of the car from one-third of its travel.

(13.5.1.5). § C26-1136.0 **Counterweight Runway Enclosures.**—Where runways for counterweights are located outside of the dumbwaiter hoistway, such runways shall be solidly enclosed throughout their height, except that when the runway is located outside of the structure, such runway shall be enclosed to a height of at least seven feet from the ground.

(13.5.1.6). § C26-1137.0 **Cable Enclosures.**—Where cables of power dumbwaiters pass through floors outside the hoistway enclosures, such cables shall be guarded to a height of at least six feet from each floor with a standard transmission guard. It shall be unlawful to have floor openings greater than is necessary for the free passage of the cables.

GROUP 2

Landings

SUB-GROUP 1

Doors at Dumbwaiter Landings

(13.5.2.1.1). § C26-1138.0 **Doors Required on Dumbwaiter Landing Openings.**—Landing openings in power dumbwaiter enclosures and in fire resistive enclosures for hand power dumbwaiters shall be equipped with doors.

(13.5.2.1.2). § C26-1139.0 **Doors at Power Dumbwaiter Landings.**—Hoistway doors for power dumbwaiters shall be equipped with electric contacts and locks which will prevent the operation of the machine while any hoistway door is open, and which will prevent the opening of the door unless the car is at a landing.

GROUP 3

Dumbwaiter Construction

SUB-GROUP 1

Car Construction

(13.5.3.1.1). § C26-1140.0 **Strength and Stiffness.**—Dumbwaiter cars shall be of such strength and stiffness that they will not deform appreciably if the load leans or falls against the sides of the car.

(13.5.3.1.2). § C26-1141.0 **Materials and Construction.**—a. Cars shall be made of wood, fireproofed wood or metal, and shall be reinforced at the point of suspension.

b. Metal cars, if sectional, shall be rigidly riveted, welded or bolted together. Cars may be provided with hinged, removable or movable shelves and, such cars may have such other sectional parts as are desired.

(13.5.3.1.3). § C26-1142.0 **Allowable Loads.**—a. Dumbwaiter cars, machines and suspension means shall at least be capable of sustaining the contract load.

b. Cars having a platform area of four square feet or more shall be capable of sustaining the loads given in the following table, but the motive power may be insufficient to raise the structural capacity load.

Minimum Allowable Dumbwaiter Capacities Corresponding to Effective Platform Area.

Horizontal Area in Square Feet.	Structural Capacity in Pounds.
4	100
5	150
6.25	300
9	500

(13.5.3.1.4). § C26-1143.0 **Information Plate.**—A metal plate bearing the name of the manufacturer and the contract load shall be placed in a conspicuous place in the dumbwaiter car and on the machine.

SUB-GROUP 2

Dumbwaiter Machines

(13.5.3.2.1). § C26-1144.0 **Fastenings and Factors of Safety.**—Dumbwaiter ma-

chines shall be securely fastened to their supports. The factors of safety, based upon the ultimate strength of the material, and the contract load plus the weight of the car, suspension means, counterweights, and similar apparatus to be used in the design of dumbwaiter machines shall be at least six for steel, and nine for cast iron or other materials. It shall be unlawful to use set screw fastenings, or pins driven at right angles to the shaft, in place of keys or pins, except where the connection is not subject to torque.

(13.5.3.2.2). § C26-1145.0 Suspension of Sheaves or Idlers.—It shall be unlawful to suspend sheaves or idlers in cast iron stirrups from the under side of the supporting beam.

SUB-GROUP 3

Guides

(13.5.3.3.1). § C26-1146.0 Material for Guides.—Guides shall be of maple or other hardwood or metal, except that metal guides shall be used where the travel exceeds four floors or fifty feet and, in structures of Class 1 or Class 2 construction.

(13.5.3.3.2). § C26-1147.0 Fastenings and Joints of Guides.—a. Guides shall be rigidly secured to the hoistway, and the joints of metal guides shall be fitted with splice plates. Joints in wood guides shall be tongued and grooved or doweled and screwed to backing pieces or brackets.

b. One set of guides may be used for both the car and the counterweight.

SUB-GROUP 4

Counterweights

(13.5.3.4).§ C26-1148.0 Counterweights.—a. Sectional counterweights for hand dumbwaiters and power dumbwaiters having a contract load of less than one hundred pounds and a contract speed of less than one hundred feet per minute shall be carried in suitable frames.

b. Sections of counterweights for power dumbwaiters having a capacity exceeding one hundred pounds or a speed exceeding one hundred feet per minute, shall be secured by at least two tie-rods passing through holes in all sections, unless suitable counterweight frames or boxes are provided. Such tie-rods shall have lock nuts at each end. Such lock nuts shall be secured by cotter pins.

SUB-GROUP 5

Suspension Means

(13.5.3.5.1). § C26-1149.0 Required Suspension Means.—a. Suspension means for dumbwaiters shall be of metal, except that any manually operated dumbwaiter with a car area of two square feet or less may have suspension means of hemp.

b. Where suspension means of metal are exposed to corrosive elements, such suspension means shall be provided with an approved protective covering.

c. Where steel cable is used for suspension means, the ends shall be babbitted in sockets.

d. Suspension means may consist of a single member.

(13.5.3.5.2). § C26-1150.0 Factor of Safety.—a. The minimum factor of safety of the suspension means for power dumbwaiters shall be at least the values given in the following table corresponding to the contract speed of the car.

b. The minimum factor of safety of suspension means for hand power dumbwaiters shall be five.

c. The minimum factor of safety for tapes shall be twenty-five percent greater than that given in the following table:

TABLE 7.

Factors of Safety for Cables.

Contract Speed	Factor of Safety	Contract Speed	Factor of Safety	Contract Speed	Factor of Safety
50	5.2	250	6.	450	7.
100	5.4	300	6.3	500	7.3
150	5.6	350	6.5	550	7.5
200	5.8	400	6.8	600	7.7

(13.5.3.5.3). § C26-1151.0 Number and Size of and Computed Load on Suspension Means.—The number and size of the suspension means shall be determined by using the factor of safety found in section C26-1150.0, and the rated ultimate strength of the

suspension means. The computed load on the suspension means shall be the sum of all suspended weights, plus the contract load.

(13.5.3.5.4). § C26-1152.0 Lengthening or Repairing of Suspension Means by Splicing Unlawful.—It shall be unlawful to lengthen or to repair the car or counterweight suspension means of dumbwaiters by splicing.

(13.5.3.5.5). § C26-1153.0 Securing of Winding Drum Ends of Suspension Means.—a. The winding drum ends of the car and counterweight suspension means shall be secured by clamps or sockets inside the winding drum.

b. Suspension means secured to a winding drum shall have at least one turn on the winding drum when the car or counterweight has reached the extreme limit of its overtravel.

GROUP 4

Speed, Control and Safeties for Power Dumbwaiters

(13.5.4.1.1). § C26-1154.0 Speed and Control.—a. Maximum Speed for Dumbwaitwaiters Controlled by Hand Ropes.—The maximum speed for power dumbwaiters controlled by hand ropes shall be fifty feet per minute.

(13.5.4.1.2). b. Guards Required.—Guards shall be installed which will keep the ropes on the sheaves, unless means are used to maintain the hand ropes in proper tension automatically.

(13.5.4.1.3). c. Brakes Required.—All power dumbwaiters, except hydraulic dumbwaiters, shall be equipped with brakes which are automatically applied when the power is cut off the motor.

(13.5.4.2). § C26-1155.0 Slack Cable Devices Required.—Power dumbwaiters shall be provided with an approved device which will cut off the power and stop the machine if the car is obstructed in its descent.

(13.5.4.3). § C26-1156.0—Terminal Stops.—Power dumbwaiters shall be provided with means, independent of manual operation, to stop the car automatically at each terminal within the limits of overtravel.

GROUP 5

Tests

(13.5.5). § C26-1157.0 Tests.—Tests of the car with contract load shall be made on all dumbwaiter before such dumbwaiters are placed in service.

Sub-Article 7. Escalators

GROUP 1

Escalator Construction

(13.6.1.1). § C26-1158.0 Angle of Inclination.—The maximum angle of inclination of an escalator shall be thirty degrees from the horizontal.

(13.6.1.2). § C26-1159.0 Width of Escalators.—a. The width of an escalator shall be measured between the balustrading at a vertical height of twenty-four inches above the nose line of the treads.

b. Escalators shall be between twenty-four and forty-eight inches wide.

c. Escalators shall have a horizontal tread formation.

(13.6.1.3.1). § C26-1160.0 Balustrading.—a. Form and Changes in Width of Balustrade.—1. Escalators shall be provided on each side with solid balustrading. On the escalator side the balustrading shall be smooth, without depressed or raised paneling or molding except for necessary protective moldings parallel to the run of the steps and vertical moldings used to cover panel joints. Moldings shall not project more than one-quarter inch beyond the face of the balustrading and shall be beveled the full depth of the molding. It shall be unlawful to use glass panels for balustrading except that approved tempered glass not less than one-quarter inch shall be permitted.

2. It shall be unlawful to have abrupt changes in the width between the balustrading on the two sides of the escalator. Should any change in width be necessary, the maximum change shall be eight per cent of the greatest width.

3. In changing from the greater to the smaller width, the maximum change in the direction of the balustrading shall be fifteen degrees from the line of the escalator travel.

4. Where the intersection of the outside balustrade or deck board and the ceiling or soffit is within twenty-four inches of the centerline of the handrail, a solid guard shall be provided in the intersecting angle. The vertical face of the guard shall project at least fourteen inches horizontally from the apex of the angle. The

exposed edge of the guard shall be rounded to eliminate shear hazard. Guards may be of glass if shatterproof.

b. Handrail Required.—1. Each balustrading shall be equipped with a hand rail moving at the same speed and in the same direction as the travel of the escalator.

2. Each moving hand rail shall extend at normal hand rail height not less than twelve inches beyond the line of the comb plate teeth at the upper and lower landings.

3. Hand or finger guards shall be provided at the point where the hand rail enters the balustrading.

(13.6.1.4). § C26-1161.0 Treads and Landings.—a. Step treads shall be horizontal. Step treads, comb-plates and landing plates shall be of incombustible material and shall afford secure foothold. Landing plates shall extend to the end of the hand rail newel or newel skirt.

b. The maximum rise of any step shall be eight and one-half inches and the minimum depth of any tread shall be fifteen and three-quarters inches.

c. The maximum clearance between treads on the horizontal run shall be one-eighth inch.

d. The tread surface of each tread shall be slotted in a direction parallel to the travel of the escalator. Each slot shall be not more than a quarter-inch wide, nor less than three-eighths of an inch deep, and the distance from center to center of adjoining slots shall be not more than three-eighths of an inch.

e. The distance measured horizontally between the top of the tread and the skirt shall not exceed one-eighth inch.

f. There shall be a comb-plate at the entrance and exit of every escalator. The combplate teeth shall be meshed with and set into the slots in the surface of the tread, so that the points of the comb-teeth are always below the top surface surface of the treads. Comb-plates shall be adjustable both horizontally and vertically. Sections forming the comb-plate teeth shall be arranged so as to readily be replaceable without the use of special tools.

g. Clear and unobstructed access and egress shall be provided for each escalator.

h. When the nose-line of a step at the lower end of a descending escalator is twelve (12) inches from the line of the comb-plate teeth, the step tread surface shall be not more than one-half (½) inch above the surface of the preceding step and the nose-line shall be not less than four (4) inches from the line of the comb-plate teeth when the step becomes level with the plane upon which it will enter the comb-plate.

(13.6.1.5.1). § C26-1162.0 Strength of Trusses or Girders.—a. Factor of Safety.—The factor of safety to be used in the design of escalator trusses or girders shall be at least five, based on the static loads.

(13.6.1.5.2). b. Design of Trusses or Girders.—Escalator trusses or girders shall be so designed that they will safely retain the steps and running gear in case of failure of the track system to retain such running gear in its guides.

(13.6.1.6). § C26-1163.0 Track Arrangement.—The track arrangement shall be designed to prevent the displacement of the treads and running gear if a tread chain breaks.

(13.6.1.7). § C26-1164.0 Capacity and Loading.—a. The contract load, in pounds. on an escalator shall be computed by the following formula:

$$\text{Contract load} = 4.6\ WA$$

b. In such formula, W is the width of the escalator in inches and A is the horizontal projected length in feet of the exposed treads. The contract load shall be expressed in pounds.

GROUP 2

Safety Requirements for Escalators

(13.6.2.1). § C26-1165.0 Limits of Safety.—The maximum permissible speed of an escalator, measured along the angle of inclination shall be one hundred twenty-five feet per minute, except that if the line of entrance and exit is not in the vertical plane of travel, the maximum permissible speed shall be one hundred feet per minute.

(13.6.2.2). § C26-1166.0 Application of Power.—a. Each escalator shall be driven by an individual electric motor, except that two or more escalators placed side by side and operated as a single unit may be driven by one motor.

b. Chains shall have a factor of safety of at least ten, except that where the chain is composed of cast steel links thoroughly annealed, the factor of safety shall be at least twenty.

(13.6.2.3.1). § C26-1167.0 Escalator Safeties.—a. Brakes required.—Every escalator shall be provided with an electrically released, mechanically applied brake which shall automatically stop the escalator, with contract load, when the power is interrupted from any cause.

(13.6.2.3.2). b. Emergency stop button or switch.—

1. An emergency stop button or other type of switch accessible to the public shall be conspicuously located at the top and bottom of each escalator landing. Stop buttons or switches shall be guarded against accidental contact, but break-glass covers shall not be used.

2. The operation of either one of these buttons or switches shall open the power circuit, apply the brakes and stop the escalators. It shall be impossible to start an escalator by means of such buttons or switches.

3. Such buttons or switches shall be marked "STOP BUTTON" or "EMERGENCY STOP."

4. Starting switches shall be of the key operated type, and shall be so located that the person operating them has an unobstructed view of the escalator runway.

(13.6.2.3.3). c. Safety mechanisms on ascending and reversible escalators.—Each escalator operating in the ascending direction shall be equipped with a safety mechanism so that in case of accidental reversal of the escalator, the power shall be shut off, the brake applied and escalator stopped. On a reversible escalator such safety mechanism shall be arranged to be inoperative when the escalator is descending, and such mechanism shall be arranged to be operative when the escalator is ascending.

(13.6.2.3.4). d. Speed governors.—Escalators shall be provided with a safety mechanism which will open the power circuit, apply the brake and bring the escalator to a gradual stop, in case the speed exceeds the normal running speed by forty percent, except that such safety mechanism may be made operative at a speed less than forty percent in excess of the normal running speed.

(13.6.2.3.5). e. Safety device to operate when tread chains break.—Each escalator shall be provided with a safety device which will open the power circuit in case a tread chain breaks.

(13.6.2.3.6). f. Retention of tension weights.—Where escalators are equipped with tightening devices which operate by means of tension weights, provision shall be made to retain such weights in the escalator truss in case the weights should fall.

(13.6.2.4.1). § C26-1168.0 Landing and Machine Room Lights and Access.—a. When an escalator is in service the step treads, the top and bottom comb-plate edges and the landing area shall be illuminated. The intensity of the illumination shall be not less than two-foot candles.

b. Suitable lights which can be lighted without passing over or reaching over any part of the machinery shall be provided in every escalator machine room.

c. Access to interior of the escalator.—Reasonable access to the interior of the escalator shall be provided for inspection and maintenance.

(13.6.2.5). § C26-1169.0 Marking of Escalators.—Each escalator shall be marked by the manufacturer with the contract load and contract speed for which that size and type of escalator has been tested and approved in accordance with section C26-1192.0. Such marking shall be accepted in lieu of actual load tests made on each escalator installation.

(13.6.2.6). § C26-1170.0 Tests and Approvals of Escalators.—a. Before any escalator of any contract load and type is put in service the superintendent shall test an escalator of the same load and type with contract loads on the basis of the engineering tests listed in section C26-1192.0. Such test shall be made in a structure or in the manufacturer's shop.

b. Each escalator installation shall be tested in the field without load in accordance with section C26-1192.0.

Sub-Article 8. Inspection, Maintenance and Operation

GROUP 1

Inspection and Maintenance

(13.7.1.1.1). § C26-1171.0 Responsibility.—a. Responsibility of Owner.—The owner of the structure, in which an elevator, escalator or dumbwaiter is installed, shall be responsible for the safe operation and proper maintenance of such elevator, escalator or dumbwaiter, after such elevators, escalator or dumbwaiter has been approved by the superintendent.

(13.7.1.1.2). b. Responsibility for inspection and maintenance.—The owner of the structure, in which an elevator, escalator or dumbwaiter is installed, or his duly appointed agent shall cause periodic inspections to be made of all parts of each

elevator, escalator and dumbwaiter installation. Such owner or agent shall maintain all parts of such elevator, escalator and dumbwaiter installation in proper working order in accordance with the provisions of this title and the rules of the board.

(13.7.1.2). § C26-1172.0 Inspection.—a. All hoistway doors, car gates, interlocks, contacts, control apparatus, controllers, automatic stops, limit stops, car and counterweight cables, safeties, guide rails, buffers, elevator machines and the lighting of the cars and of the machine rooms, in passenger and freight elevator installations, shall be thoroughly inspected by the superintendent at least four times a year.

b. Plunger shoes, by-passes and piston-rods of hydraulic elevators shall be exposed and thoroughly cleaned by the owner and inspected by the superintendent at least once in three years.

c. Pressure and discharge tanks of hydraulic elevators shall be thoroughly cleaned by the owner and inspected by the superintendent at least once in three years.

d. Car and counterweight safeties and oil buffers shall be inspected periodically to determine the condition of the visible sliding surfaces and the visible working parts. Tests of safeties shall be made at least once in two years. Governor controlled safeties shall be tested at the lowest operating speed and with fifty percent of the contract load. Broken rope instantaneous type safeties may be tested without load.

(13.7.1.3). § C26-1173.0 Maintenance.—a. Cables, guides and all parts of machinery shall be kept well lubricated. The oil in bearings and gear casings shall be renewed every six months.

b. Pressure tanks of hydraulic elevators shall be tested at least once every three years with a hydrostatic pressure of fifty percent in excess of the maximum working pressure.

(13.7.1.4). § C26-1174.0 Care or Installation.—a. Elevator hoistways and pits shall be kept clean. It shall be unlawful to use elevator pits for storage or for the accumulation of rubbish.

b. Material which is not a permanent part of the elevator equipment shall be kept off the top or cover of an elevator car.

c. It shall be unlawful to substitute any wire or current carrying device for the proper fuse or circuit breaker in an elevator circuit.

d. Freight elevators shall have legible signs posted in the car and at each landing prohibiting unauthorized persons from riding in or on the elevator car.

e. The water level in the pressure tank of a hydraulic elevator shall be maintained at two-thirds of the capacity of the tank.

GROUP 2

Qualifications and Duties of Elevator Operators

(13.7.2.1). § C26-1175.0 Qualifications of Operators.—Elevator operators shall be at least eighteen years of age, free from serious physical or mental defects and shall be selected with consideration of their ability to perform their duties in a careful and competent manner.

(13.7.2.2). § C26-1176.0 Training of Operators.—Before a new operator is placed in charge of a passenger elevator, he shall have had sufficient previous experience or training under the direction of a competent instructor.

(13.7.2.3). § C26-1177.0 Instructions to Operators.—Elevator operators shall be instructed:

1. To be sure that the control mechanism is in the "stop" position before they close the service switch.
2. To report any defects promptly to the person in charge.
3. Not to make any repairs, adjustments or replacements.
4. To carry no passengers or freight while inspections, repairs or adjustments are in progress and to operate the car only in response to directions from the inspector or person in charge. To move the car when any person is in the pit or on top of the car, only as such person may direct.
5. Not to ride in the elevator or allow others to ride therein while a safe or other heavy object in excess of the rated capacity of the elevator is being carried.
6. That it is unlawful to use any hand elevator for carrying safes or other concentrated loads greater than the normal rated capacity of such elevator.
7. That hoistway doors must always be locked in the closed position and car doors or gates must be closed before the car is started.
8. To keep car doors or gates closed while the elevator is in motion, and, where no car doors or gates are provided, to keep passengers away from the open edge of the car platform.
9. To limit the number of passengers to the rated capacity of the car and to prevent crowding.

10. Not to reverse the control suddenly, but to stop before reversing.
11. To move the control mechanism to the "stop" position on approaching terminal landing without waiting for the terminal stopping device to come into action
12. To move the control mechanism to the "stop" position and to start the car in the usual manner upon return of the power, if the power goes off while the car is in motion.
13. To stay on the car if the car refuses to stop, since the car will be stopped by the application of the safeties or by the automatic terminal stops at either end of the hoistway, if the car attains excessive speed of descent.
14. To call for the person in charge and to operate the machine only at his direction if the car should stop suddenly.
15. To return the control to the "stop" position, if the car fails to start. To remove part of the load and try the controller if the car is apparently overloaded. If the car fails, to return the controller to the "stop" position and to notify the engineer or other qualified person.
16. To lock the hand rope on hand rope controlled cars before allowing freight to be loaded or unloaded.
17. To familiarize themselves with the emergency devices, to understand their functions and to know how to operate them.
18. Never to leave the car in the ordinary course of operation, nor leave the control mechanism operative unless the landing door is closed and locked and the car door or gate is closed.
19. Always to leave a hydraulic elevator, operated by a lever, at the lower landing with the lever in the position for down motion.

GROUP 3

Carrying of Freight or Passengers on Top of Elevator Cars

(13.7.3). § C26-1178.0 Carrying of Freight or Passengers on Top of Elevator Cars.—It shall be unlawful to carry freight or passengers on top of an elevator car.

Sub-Article 9. Tests and Approvals

GROUP 1

Tests of Interlocks

(13.8.1). § C26-1179.0 General.—a. Hoistway door interlock devices shall be examined with respect to their proper performance of the prescribed functions at temperatures from twenty-five to one hundred forty degrees Fahrenheit (minus four to sixty degrees Centigrade). Where the functioning of any such device might be affected by a change of temperature, and coefficients of thermal expansion of the affected parts are known or measured, the effect of temperatures may be computed and tests need be carried out at only one temperature.

b. For interlocks employing a single switch, operated by wire or tape, to protect several hoistway doors, the master switch shall be marked with the physical properties of the wire or tape used, and the certificate of approval shall cover the allowable maximum length of tape or wire of a given material which may be used with the device.

c. Interlocks shall have electrical parts connected in series in a circuit in which two amperes is flowing from a source of two hundred twenty volts direct current. During the tests described in sections C26-1180.0, C26-1182.0 and C26-1183.0, the electrical circuit shall be closed, but such circuit shall not be broken at the contact within the device on each cycle of operation.

d. A separate device shall be used in each of the tests described in sections C26-1180.0, C26-1182.0 and C26-1183.0.

(13.8.1.1). § C26-1180.0 Endurance Test.—In order to satisfy the endurance test, the interlock device with initial lubrication and adjustment only shall complete one hundred thousand cycles of operation without failure of any kind and without evident indication of approaching failure. If an interlocking device is not a complete and separate unit for each hoistway door, but includes any part which is common to the interlock operation of more than one hoistway door, that portion of such device shall complete four hundred thousand additional cycles of operation, a total of five hundred thousand cycles, without failure of any kind and without evident indication of approaching failure.

(13.8.1.2). § C26-1181.0 Current Interruption Test.—In order to satisfy the current interruption test, one thousand cycles of operation shall be performed by the device used in section C26-1180.0, while making and breaking the circuit at the contact within such device.

(13.8.1.3). § C26-1182.0 Tests in Moist Atmosphere.—In order to satisfy the test in moist atmosphere, prior to such test, the device, fully lubricated, shall be given a wearing-in run of ten thousand cycles. The interlocking device, except self-lubricating bearings and bearings of a type which do not require frequent replacement of lubricant, shall then be taken apart and freed of lubricant by washing in gasoline. After it is reassembled, such device shall be subjected continuously for seventy-two consecutive hours in a closed hoistway, to an atmosphere saturated with a three and one-half percent solution of sodium chloride. Such device shall be operated for only ten consecutive cycles at the end of each of the first two twenty-four hour periods and shall be exposed to the air for an additional twenty-four hours without failing in such a manner as to create an unsafe condition. After such device has been lubricated, it shall without adjustment and without further attention, complete fifteen thousand cycles of operation without failure of any kind.

(13.8.1.4). § C26-1183.0 Tests Without Lubrication.—In order to satisfy the test without lubrication, prior to such test, the device, fully lubricated, shall be given a wearing-in run of ten thousand cycles. The interlocking device, except self-lubricating bearings and bearings of a type which do not require frequent replacement of lubricant, shall then be taken apart and freed of lubricant by washing in gasoline. After it is reassembled, such device shall, without any other attention than the usual initial adjustment, that is, without adjustment especially made to meet the conditions of this particular test, and without any further attention, complete twenty-five thousand cycles of operation without failure of any kind, and without any evident indication of approaching failure.

(13.8.1.5). § C26-1184.0 Misalignment Test.—a. In order to satisfy the misalignment test, when the car cam, or other equivalent device used in making the misalignment test has been displaced horizontally from its normal position, that is, the position in which it was when the device was installed, such device shall operate successfully in the following successive manners:

1. In a direction perpendicular to the edge of the landing, backward one-quarter of an inch, forward one-quarter of an inch;
2. In a direction parallel with the edge of the landing, to the right one-quarter of an inch, to the left one-quarter of an inch.

b. For horizontal sliding doors the device shall operate successfully:

1. When the bottom of the hoistway door has been displaced horizontally from its normal position in a direction perpendicular to the edge of the landing, backward one-quarter of an inch, forward one-quarter of an inch;
2. When the top of the hoistway door has been displaced horizontally from its normal position in a direction perpendicular to the edge of the landing, backward one-eighth of an inch, forward one-eighth of an inch.

(13.8.1.6). § C26-1185.0 Insulation Test.—Insulation of electrical parts shall be tested with a sixty cycle effective voltage twice the rated voltage plus one thousand volts, applied for one minute.

GROUP 2

Tests of Oil Buffers

(13.8.2). § C26-1186.0 General.—Each type and size of oil buffer shall be subjected to and shall meet the requirements of the following tests:

1. Retardation test.
2. Oil leakage test.
3. Churning test.
4. Plunger-return test.
5. Test for lateral movement of plunger.

(13.8.2.1). § C26-1187.0 Retardation Test.—a. The buffer shall be installed upon a suitable foundation so that the axis of the cylinder is vertical. Such buffer shall be filled with oil provided by the manufacturer.

b. An elevator car of suitable size shall be dropped freely in its guides upon the buffer, from two different heights as specified below. The method shall be as follows:

1. The travel of the car after it comes in contact with the plunger, and the travel of the plunger for its entire stroke, shall be recorded by a drum chronograph or by other approved means. The error in the time readings, by any method, shall be five one-thousandths of a second or less.
2. The velocity and the retardation of the car shall be computed from the time-travel curve, and plots shall be made of the car travel, car velocity and car retardations, together with the pressure-time curve. The manufacturer shall be furnished with copies of each curve.

Schedule of Drops

Test	drop in inches, bottom of car to striker or top of buffer	Total load in pounds, weight of car plus loading
A	S (the effective stroke of the buffer in inches)	1. Manufacturer's rated minimum. 2. Manufacturer's rated maximum. 3. 110 per cent manufacturer's rated maximum.
B	Buffer stroke under 24 inches....51S 24 inches to 30 inches.....56S Exceeding 30 inches.....64S	1. Manufacturer's rated minimum. 2. Manufacturer's rated maximum. 3. 110 per cent manufacturer's rated maximum.

c. Every acceleration peak having a duration greater than one-twenty-fifth of a second shall be two and one-half times gravity (eighty and one-half feet per second) or less for tests A-1 and A-2 and B-1 and B-2. The results of tests A-3 and B-3 shall be recorded for the purpose of examination to detect any abnormal performances. Upon completion of all tests every part of the buffer shall be without any deformation or injury.

(13.8.2.2). § C26-1188.0 Oil Leakage Test.—The oil leakage test shall be made simultaneously with the retardation tests. The oil level in the buffer, when filled prior to the test, shall be carefully marked. At the completion of the six drops, three different loads at each of two speeds, the buffer shall be allowed to stand one-half of an hour in order to permit the return of the oil to the reservoir and to permit the escape of any entrained air. After such time, the oil level shall again be measured. The oil level at the completion of these tests shall be less than one-sixteenth of an inch lower than the level at the start of the test for each foot of buffer stroke.

(13.8.2.3). § C26-1189.0 Churning Test.—a. In the churning test, the time of the buffer stroke after the car has dropped a distance equivalent to the stroke of the buffer, shall be determined either from the chronograph or other approved record or by means of an automatic timer. Any automatic timing device which is used shall be accurate, shall have the minimum possible lag, and shall be capable of being read to one one-hundredth of a second.

b. The car, with cables attached, shall then be run on to the buffer at approximately one-half the velocity used in retardation test B, at intervals of one minute until ten such strokes have been made. The oil shall then be examined for foam. No oil foam shall appear on the outside of the buffer after such test. Immediately upon completion of the ten strokes at one-half speed, another free-fall equivalent to the buffer stroke shall be made, and the time of such stroke shall be taken. The time of such second free-fall test shall be at least seventy-five percent of the time of the drop test made prior to the churning.

(13.8.2.4). § C26-1190.0 Plunger-return Test.—In the buffer test, the buffer shall not stick on the return stroke after removal of the load. If such buffer does stick, the manufacturer shall submit either a duplicate buffer or a new pressure cylinder and piston, and a second test shall be run on such equipment. If sticking again results, the buffer shall be rejected.

(13.8.2.5). § C26-1191.0 Test for Lateral Movement of the Plunger.—The lateral movement of the top of the plunger shall be accurately measured while the buffer casing is clamped or otherwise securely fastened to a firm base as the plunger head is being moved from its extreme right to the extreme left in a vertical plane. This total movement shall be divided by two to determine the movement from the vertical position. The maximum movement from the vertical shall be one-sixteenth of an inch per foot of buffer stroke.

GROUP 3

Escalator Tests

(13.8.3). § C26-1192.0 Escalator Tests.—Each size and type of escalator shall be subjected to the following tests:

(13.8.3.1). 1. Speed Tests.—The application of the overspeed safety device shall be obtained by causing the escalator to travel at the governor tripping speed as specified in subdivision d. of section C26-1167.0. In the case of an escalator driven by an alternating current motor, the governor may be tripped by hand while the escalator is traveling at its normal rate of speed.

(13.8.3.2). 2. Reversal Tests.—The application of the reversal safety device re-

quired by subdivision c. of section C26-1167.0, shall be obtained by manually opening the non-reversing device contact

(13.8.3.3). 3. Broken Chain Tests.—The application of the broken chain safety device required by subdivision c. of section C26-1167.0, shall be obtained by operating the safety by hand.

(13.8.3.4). 4. Miscellaneous Safety Devices.—Brake and emergency stop buttons or switches shall be tested to determine whether such buttons or switches function properly.

Sub-Article 10. Manlifts

(13.9.1). § C26-1192.10 Definitions.—a. A manlift is a device consisting of a power-driven endless belt provided with steps or platforms and handholds attached to it for the transporation of personnel from floor to floor.

b. A handhold is a device attached to the belt to assist a passenger in maintaining balance.

1. Open type. One which has a handgrip surface fully exposed.

2. Closed type. A cup-shaped device in which the handgrip surface is available only in the direction of travel and is covered on the opposite run.

c. Limit switch. A device the purpose of which is to cut off the power to the motor and apply the brake to stop the carrier in the event that a loaded step passes the top terminal landing.

d. A step (platform) is a passenger carrying unit.

e. Rated speed is the speed for which the device is designed and installed.

f. The factor of safety is the ratio of the ultimate strength of the material to the allowable stress when a part is subjected to full load operation.

(13.9.1.1). § C26-1192.11 Application.—Manlifts may be constructed only in commercial garages, where the cars are parked only by employees of the garage. Manlifts shall be used to carry only the garage employees and shall not be available to the general public and, if located in parts of buildings to which the public has access, such manlift or manlifts shall be located in an enclosure protected by self-closing spring-locked doors. Keys to such doors shall be limited to employees.

(13.9.1.2). § C26-1192.12 Scope and Purpose.—a. This sub-article applies to the construction, maintenance, inspection, and operation of manlifts in relation to accident hazards to employees. Manlifts covered by this scope consist of platforms or brackets mounted on, or attached to an endless belt, cables, or chains, or similar method of suspension; such belt, cables, or chains operating in a substantially vertical direction and being supported by, and driven through, pulleys, sheaves, or sprockets at the top and bottom. These manlifts are intended for conveyance of persons only. It is not intended that this scope cover moving stairways, elevators with enclosed platforms ("Paternoster" elevators), gravity lifts, nor conveyors used only for conveying materials.

b. The purpose is to provide reasonable safety for life and limb. In case of practical difficulty or unnecessary hardship the enforcing authority may grant exceptions from the literal requirements or permit the use of other devices or methods, but only when it is clearly evident that reasonable safety is thereby secured.

(13.9.1.3). § C26-1192.13 Floor Openings.—a. Allowable size. Floor openings for both the "up" and "down" runs shall be not less than 28 inches nor more than 36 inches in width for a 12-inch belt, not less than 34 inches nor more than 38 inches for a 14-inch belt, and not less than 36 inches nor more than 40 inches for a 16-inch belt and shall extend not less than 24 inches, nor more than 28 inches from the face of the belt.

b. Uniformity. All floor openings for a given manlift shall be uniform in size and shall be approximately circular, and each shall be located vertically above the opening below it.

(13.9.1.4). § C26-1192.14 Landings.—a. Vertical clearance. The clearance between the floor or mounting platform and the lower edge of the conical guard above it shall be not less than 6 feet, 8 inches. Where this clearance cannot be obtained no access to the manlift shall be provided and the manlift runway shall be enclosed where it passes through such floor.

b. Clear landing space. The floor space adjacent to the floor openings shall be free from obstruction and kept clear at all times.

c. Lighting of landings. Adequate lighting, not less than 3-foot candles shall be provided at each floor landing at all times when the lift is in operation.

d. Landing surface. The landing surface at the entrances and exits to the manlift shall be so constructed and maintained as to provide safe footing at all times with a coefficient of friction of not less than 0.5.

e. Emergency landings. 1. Where there is a travel of 50 feet or more betwee floor landings, one or more emergency platforms shall be provided so that there wi be a landing, either floor or emergency, for every 25 feet or less of manlift travel.

2. Such emergency landings shall be accessible from both runs of the manlift and shall give access to the ladder required in section C26-1192.20.

3. Emergency platforms shall be completely enclosed with a standard railing and toeboard.

(13.9.1.5). § C26-1192.15 Floor Opening Guards.—a. On the ascending side of the manlift all landings shall be provided with a bevel guard or cone meeting the following requirements:

1. Slope. The cone shall make an angle of not less than 45 degrees with the horizontal. An angle of 60 degrees or greater shall be used where ceiling heights permit.

2. Extent. The lower edge of this guard shall extend at least 42 inches outward from any handhold on the belt. It shall not extend beyond the upper surface of the floor above.

3. Material and construction. The cone shall be made of not less than No. 18 U. S. gage sheet steel or material of equivalent strength or stiffness. The lower edge shall be rolled to a minimum diameter of ½ inch and the interior shall be smooth with no rivets, bolts or screws protruding.

(13.9.1.6). § C26-1192.16 Protection of Entrances and Exits.—a. Guardrail requirement. The entrances and exits at all floors or landings affording access to the manlift shall be guarded by a maze (staggered railing) or a handrail equipment with self-closing gates, unless enclosed as provided in subdivision g of this section or unless enclosed as a shaft.

b. Construction. The guardrails shall be provided with toeboards and shall be not less than forty-two inches in height, shall be constructed of steel or other metal and shall be constructed in a substantial manner.

c. Gates. Gates, if used, shall open outward and shall be self-closing. Corners of gates shall be rounded.

d. Maze. Maze or staggered openings shall offer no direct passage between enclosure and outer floor space.

e. Rails shall be located at least 2 feet from edge of opening measured at right angles to the face of the belt. The intersection of the top rail and the end post at openings shall be a bend or standard long sweep "ell".

f. Except where building layout prevents, entrances at all landings shall be in the same relative position.

g. Enclosure. Manlifts shall be enclosed in those parts of structures to which the public has access, from floor to ceiling with a wire mesh guard or grill of not less than number 10 U. S. gage steel wire or its equivalent, located not less than four feet from the lift belt, with a self-closing door equipped with a key-operated springlock, hung to swing, away from the manlift. Keys to such gates shall be restricted to the operating personnel. Where a manlift is enclosed as a shaft, the enclosure shall be at least four feet from the lift belt.

(13.9.1.7). § C26-1192.17 Guards for Openings.—a. Construction. The floor opening at each landing shall be guarded on sides not used for entrance or exit by a standard railing and toeboard or by panels of wire mesh of not less than No. 10 U. S. gage, expanded metal of not less than No. 13 U.S. gage or sheet metal of equivalent strength or metal on a frame of angle iron not less than 1¼-inch by 1¼-inch by ⅛-inch or of 1¼-inch iron pipe.

b. Height and Location. Such rails or guards shall be at least 42 inches in height on the up-running side and 66 inches on the down-running side. If a guardrail is used the section of the guard above the rail may be of the construction specified in paragraph a. above or may consist of vertical or horizontal bars which will reject a ball 6 inches in diameter. Rails or guards shall be located not more than 2 feet from the edge of the floor opening.

(13.9.1.8). § C26-1192.18 Bottom Arrangement.—a. Bottom landing. At the bottom landing the clear area shall be not smaller than the area enclosed by the guardrails on the floors above, and any wall in front of the down-running side of the belt shall be not less than 48 inches from the face of the belt. This space shall not be encroached upon by stairs or ladders.

b. Location of lower pulley. The lower (boot) pulley shall be installed so that it is supported by the lowest landing served.

c. Mounting platform. A mounting platform shall be provided in front or to one side of the up-run at the lowest landing, unless the floor level is such that the follow

ing requirement can be met: The floor or platform shall be at or above the point at which the upper surface of the ascending step assumes a horizontal position.

(13.9.1.9). § C26-1192.19 Top Clearances.—a. Clearance from floor. A top clearance shall be provided of at least 11 feet above the top terminal landing. This clearance shall be maintained from a plane through each face of the belt to a vertical cylindrical plane having a diameter 2 feet greater than the diameter of the floor opening, extending upward from the top floor to the ceiling on the up-running side of the belt. No encroachment of structural or machine supporting members within this space will be permitted.

b. Pulley clearance. 1. There shall be a clearance of at least 5 feet between the center of the head pulley shaft and any ceiling obstruction.

2. The center of the head pulley shaft shall be not less than 6 feet above the top terminal landing.

(13.9.1.10). § C26-1192.20 Emergency Exit Ladders.—a. Where required. A fixed metal ladder accessible from both the "up" and "down" run of the manlift shall be provided where the vertical distance between landings exceeds 20 feet.

b. Construction. Such ladder shall be in accordance with the existing state laws for ladders except that enclosing cages shall not be provided. In the absence of state ladder requirements the following is recommended:

1. Metal side rails when made of mild steel or wrought iron shall not be less than 9/16 inch in cross-section for lengths 12 feet and under, and not less than ¾ inch in cross-section for lengths over 12 feet with a minimum thickness not less than ⅜ inch. These dimensions are based upon the removal of not more than ½ inch of material for the attachment of the steps. Where more material is removed from the side rails for step attachments or when side rails are made of other metal or shapes, they shall be equivalent thereto in strength. Manlift supporting members may be used as side rails if desired.

2. Metal rungs of solid round steel shall have a minimum center diameter of ⅝ inch and tenon diameter of ½ inch.

3. Metal rungs when made of pipe shall not be smaller than 1 inch standard steel pipe.

4. Metal rungs when made of angle section shall have minimum dimensions of ¾ inch by ¾ inch by ⅛ inch.

5. Metal treads if used shall have a width as specified in the following table. In cross-section metal treads shall be a channel or equivalent section equal in strength to support 250 pounds applied to the middle of the tread without appreciable deflection.

Length of treads (inches)	Width (inches)
Up to and including 16	3
Over 16, up to and including 20	3¼
Over 20, up to and including 24	3½
Over 24, up to and including 28	4
Over 28, up to and including 32	4½

(13.9.1.11). § C26-1192.21 Illumination.—a. General. Both runs of the manlift shall be illuminated at all times when the lift is in operation. An intensity of not less than 1 foot-candle shall be maintained at all points.

b. Control of illumination. Lighting of manlift runways shall be by means of circuits permanently tied in to the building circuits (no switches), or shall be arranged to be turned on by the starting switch controlling the manlift motor, or shall be controlled by switches at each landing. Where separate switches are provided at each landing, any switch shall turn on all lights necessary to illuminate the entire runway.

(13.9.1.12). § C26-1192.22 Machines.—a. Types. Machines shall be of the direct-connected type or shall be driven by multiple V-belts. Cast-iron gears shall not be used.

b. Brake. A mechanically-applied, electrically-released brake shall be applied to the motor shaft for direct-connected units or to the input shaft for belt-driven units. The brake shall be capable of stopping and holding the manlift when the descending side is loaded with 250 pounds on each step.

c. Belt. 1. Material. The belt shall be of hard-woven canvas, rubber-coated canvas, leather, or other material meeting the strength requirements of section C26-1192.22 c (3) and having a coefficient of friction such that when used in conjunction with an adequate tension device it will meet the brake test specified in section C26-1192.22 b.

2. Width. The width of the belt shall be not less than 12 inches for a total travel not exceeding 100 feet, not less than 14 inches for a travel greater than 100 feet but not exceeding 150 feet, and 16 inches for a travel exceeding 150 feet.

3. Strength. The strength of the belt shall be not less than 1,500 pounds per inch of belt width for belts having a distance between pulley centers not in excess of 100 feet and 1,800 pounds per inch of belt width for belts having a distance between pulley centers of over 100 feet but not in excess of 200 feet; for over 200 feet, 2,450 pounds per inch of belt width.

4. Belt Fastenings. Belts shall be fastened by a lapped splice or shall be butt-spliced with a strap on each side of the belt. For lapped splices, the overlap of the belt at the splice shall be not less than 3 feet where the total travel of the manlift does not exceed 100 feet and not less than 4 feet if the travel exceeds 100 feet. Where butt splices are used the straps shall extend not less than 3 feet on one side of the butt for a travel not in excess of 100 feet, and 4 feet for a travel in excess of 100 feet. For 12-inch belts, the joint shall be fastened with not less than 20 special elevator bolts, each of a minimum diameter of ¼ inch. These bolts shall be arranged symmetrically in five rows so arranged as to cover the area of the joint effectively. The minimum number of bolts for a belt width of 14 inches shall be not less than 23 and for belt widths of 16 inches, the number of bolts shall be not less than 27.

5. Pulleys. Drive pulleys and idler ("boot") pulleys shall have a diameter not less than given in table 1.

Table 1

Belt construction	Minimum strength (pounds per inch of width)	Minimum pulley diameter (inches)
5 ply	1,500	20
6 ply	1,800	20
7 ply	2,100	22

(The above values are based on 32 ounce duck: 300 pound per linear inch per ply.)

d. Pulley protection. The machine shall be so designed and constructed as to catch and hold the driving pulley in event of shaft failure.

(13.9.1.13). § C26-1192.23 Speed.—a. Maximum speed. No manlift designed for a speed in excess of 80 fpm shall be installed.

b. All manlifts in a given building or plant should run at approximately the same speed.

(13.9.1.14). § C26-1192.24 Platforms or Steps.—a. Minimum depth. Steps or platforms shall be not less than 12 inches nor more than 14 inches deep, measured from the belt to the edge of the step or platform.

b. Width. The width of the step or platform shall be not less than the width of the belt to which it is attached.

c. Distance between steps. The distance between steps shall be equally spaced and shall be not less than 16 feet measured from the upper surface of one step to the upper surface of the next step above it.

d. Angle of step. The surface of the step shall make approximately a right angle with the "up" and "down" run of the belt, and shall travel in an approximately horizontal position with the "up" and "down" run of the belt.

e. Surfaces. The upper or working surfaces of the step shall be of a material having inherent nonslip characteristics with a coefficient of friction not less than 0.5, or shall be covered completely by a nonslip tread securely fastened to it.

f. Strength of step supports. When subjected to a load of 400 pounds applied at the approximate center of the step, step frames or supports and their guides shall be of adequate strength to:

1. Prevent the disengagement of any step roller.
2. Prevent any appreciable misalignment.
3. Prevent any visible deformation of the step or its support.

g. Prohibition of steps without handholds. No step shall be provided unless there is a corresponding handhold above or below it meeting the requirements of section C26-1192.25. If a step is removed for repairs or permanently, the handholds immediately above and below it shall be removed before the lift is again placed in service.

(13.9.1.15). § C26-1192.25 Handholds.—a. Location. Handholds attached to the belt shall be provided and so installed that they are not less than 4 feet nor more than 4 feet 8 inches above the step tread. These shall be so located as to be available on both the "up" and "down" run of the belt.

b. Size. The grab surface of the handhold shall be not less than 4½ inches in width. Fastenings for handholds shall not come within one inch of the edge of the belt.

c. Strength. The handhold shall be capable of withstanding without damage a load of 300 pounds applied parallel to the run of the belt.

d. Prohibition of handhold without steps. No handhold shall be provided without a corresponding step. If a handhold is removed permanently or temporarily, the corresponding step and handhold for the opposite direction of travel shall also be removed before the lift is again placed in service.

e. Type. All handholds shall be of the closed type.

(13.9.1.16). § C26-1192.26 Up Limit Stops.—a. Requirements. Two separate automatic stop devices shall be provided to cut off the power and apply the brake when a loaded step passes the upper terminal landing. One of these shall consist of a switch mechanically operated by the belt or step roller. The second may consist of any of the following:

1. Roller switch placed above and out of line with the first limit switch.

2. Photocell and light source ("electric eye").

3. A switch actuated by a lever, rod, or plate, the latter placed above the head pulley so as to just clear a passing step.

b. Manual reset location. After the manlift has been stopped by this device it shall be necessary to reset the automatic stop manually. The device shall be so located at the top landing that a person resetting it shall have a clear view of both the "up" and "down" runs of the manlift. It shall not be possible to reset the device from any step or platform.

c. Cut-off point. The device shall function so that the manlift will be stopped before the loaded step has reached a point 24 inches above the top terminal landing.

d. Electrical requirements. 1. Where such switches open the main motor circuit directly they shall be of the multiple type.

2. Where photoelectric devices are used they shall be so designed and installed that the failure of the light source, or of the light sensitive element, or of any other vacuum tubes employed in the circuit will result in shutting off the power to the driving motor.

3. Where flammable vapors or dusts may be present all electrical installations shall be in accordance with national electrical code requirements for such locations.

4. Unless of the oil-immersed type, controller contacts carrying the main motor current shall be copper to carbon, except where the circuit is broken at two or more points simultaneously.

(13.9.1.17). § C26-1192.27 Emergency Stop.—a. Requirement. An emergency stop means shall be provided.

b. Location. This stop means shall be within easy reach of the ascending-descending runs of the belt.

c. Operation. This stop means shall be so connected with the control lever or operating mechanism that it will cut off the power and apply the brake when pulled in the direction of travel.

d. This stop may consist of a cotton rope with a wire center, manila or sisal rope, or may be made up of suitable lengths of metallic pipe or tubing. If rope is used, it shall be not less than ⅜ inch in diameter. Wire rope, unless marlin-covered, shall not be used.

e. Normal stopping use. This emergency stop may be used for normal stopping and starting where the manlift does not run continuously.

(13.9.1.18). § C26-1192.28 Factor of Safety.—All parts of the machine shall have a factor of safety of 6 based on a load of 200 pounds on each horizontal step on the "up" and "down" runs.

(13.9.1.19). § C26-1192.29 Instruction and Warning Signs.—a. Instruction signs at landings or on belt. Signs of conspicuous and easily read style giving instructions for the use of the manlift shall be posted at each landing or stenciled on the belt.

1. Size and legibility. Such signs shall be of letters not less than 1 inch in height and of a color having high contrast with the surface on which it is stenciled or painted (white or yellow on black or black on white or gray).

2. Inscription. The instructions shall read approximately as follows:

"Face the Belt."
"Use the Handhold."
"To Stop—Pull Rope."

b. Top floor warning sign or light.

1. Requirement. At the top floor an illuminated sign shall be displayed bearing the following wording: "Top Floor—Get Off."

2. Size of letters. Signs shall be in block letters not less than 2 inches in height.

3. Color. Letters shall be red on a white background.

4. Location. This sign shall be located within easy view of an ascending passenger and not more than 2 feet above the top terminal landing.

5. Alternate warning light. As an alternate for the sign required by section C26-1192.29 (1) above, a red light of not less than 40-watt rating may be provided immediately below the upper terminal landing and so located as to shine in a passenger's face will be accepted.

c. Visitor warning. 1. Requirement. A conspicuous sign having the following legend, "Employees Only—Visitors Keep Off—Use By Visitors Unlawful," shall be displayed at each landing.

2. Size of letters. Sign shall be of block letters not less than 2 inches in height and shall be of a color offering high contrast with the background color.

3. Color. Letters shall be red on a white background.

(13.9.1.20). § C26-1192.30 Carrying of Materials and Tools.—a. No freight or packaged goods shall be carried on any manlift.

b. No pipe, lumber, or other construction materials shall be handled on any manlift.

c. No tools except those which will fit entirely within a pocket in usual working clothes shall be carried on any manlift except as provided in section C26-1192.30 (d) below.

d. Tools may be carried in a canvas bag having dimensions not larger than 11 inches by 13 inches and provided with carrying loops or handles. Such bag shall be provided with a leather bottom. Such bag shall not be provided with shoulder straps but shall be carried in the passenger's hand while he is riding the manlift.

(13.9.1.21). § C26-1192.31 Acceptance Tests.—a. Up capacity. The manlift with 200 pounds on each horizontal step of the "up" run shall show no appreciable slip of the belt when:

1. Standing.

2. Running at rated speed.

b. Down capacity, brake. The manlift with 200 pounds on each horizontal step of the "down" run shall show no appreciable slip of the belt when:

1. Standing.

2. Running at rated speed.

The brake shall stop and hold the belt with test load.

c. Loaded step deflection. Each step shall be subject to a 400-pound proof load applied to the center of the step with the machine stationary. The guides shall not be displaced and there shall be no visible deformation or misalignment of the step or its support during the test.

d. Strength of handhold. Each handhold shall support a load of 300 pounds without appreciable deformation or injury to its fastenings. Test to be made with machine stationary.

e. Final limit stop. The "up" final limit shall be tested by placing a weight of 100 pounds on the approximate center of the step or platform and running the machine in the "up" direction until the lift is stopped by the limit stop.

f. Emergency stop. The machine shall be stopped on both the "up" and "down" run by means of the emergency stop.

g. Speed. Speed shall be taken and checked against specified (rated) speed. It shall not exceed the rated speed by more than 10 per cent when running empty.

(13.9.1.22). § C26-1192.32 Periodic Inspection.—a. Frequency. All manlifts shall be inspected by a competent designated person at intervals of not more than 30 days.

b. Items covered. This periodic inspection shall cover but is not limited to the following items:

Steps	Warning signs and lights
Step fastenings	Signal equipment
Rails	Drive pulley
Rail supports and fastenings	Bottom (boot) pulley and clearance
Rollers and slides	Pulley supports
Belt and belt tension	Motor
Handholds and fastenings	Driving mechanism
Floor landings	Brake
Guardrails	Electrical switches
Lubrication	

c. Inspection log. A written record shall be kept of findings at each inspection. Records of inspection shall be made available to inspectors of the department.

(13.9.1.23). § C26-1192.33 Rules and Regulations.—The commissioner shall have the power to promulgate such rules and regulations as may be necessary to enforce the foregoing provisions.

ARTICLE 15. PLUMBING AND GAS PIPING

Sub-Article 1. Definitions of Plumbing Terms

(14.1). § C26-1193.0 Definitions of Plumbing Terms.—For the purposes of this article, the words and terms listed in sections C26-1194.0 through C26-1219.0, shall have the meanings therein given.

(14.1.1). § C26-1194.0 Branch.—The term "branch" shall mean that part of a piping system which extends from the main to fixtures on two or less consecutive floors.

(14.1.2). § C26-1195.0 Caliber or Size of Pipes and Tubes.—The term "caliber" or "size" of a pipe or tube shall mean the nominal internal diameter of such pipe, except that for brass and copper tubing, and brass and copper pipe of other than iron pipe sizes, such terms shall mean the outside diameter.

(14.1.3). § C26-1196.0 Dead End.—The term "dead end" shall mean a branch which is terminated at a developed length of two feet by a fitting not used for admitting liquids to the pipe.

(14.1.4). § C26-1197.0 Developed Length.—The term "developed length" of a pipe shall mean the length along the center line of the pipe and fittings.

(14.1.5). § C26-1198.0 Drainage System.—The term "drainage system" shall mean that part of a plumbing system which receives, conveys and removes liquid and water-carried wastes and storm water.

(14.1.6). § C26-1199.0 Gas Piping.—The term "gas piping" shall mean the installation, repair, replacement and relocation of pipes, fixtures and other apparatus for distributing the gas supplied by a Public Utility for illumination or fuel in any premises.

(14.1.7). § C26-1200.0 House Drain.—The term "house drain" shall mean that part of the lowest piping of a house drainage system which receives the discharge from soil, waste and other drainage pipes and conveys such discharge by gravity to the house sewer and which piping ends at the outside of the front wall of the structure, vault, area or other extension.

(14.1.8). § C26-1201.0 Leader.—The term "leader" shall mean any vertical line of storm water piping.

(14.1.9). § C26-1202.0 Local Ventilating Pipe.—The term "local ventilating pipe" shall mean a pipe on the fixture side of the trap through which pipe vapors or foul air are removed from a room or fixture.

(14.1.10). § C26-1203.0 Main.—The term "main", when applied to any system of horizontal, vertical or continuous piping, shall mean that part of such system to which fixtures are connected directly or through branch pipes.

(14.1.11). § C26-1204.0 Plumbing.—The term "plumbing" shall mean the installation, repair, replacement and relocation of the pipes, fixtures and other apparatus for bringing in and distributing the water supply, removing liquid and water-carried wastes, removing rain water and other liquid drainage and preventing trap siphonage and back pressure.

(14.1.12). § C26-1205.0 Plumbing Fixture.—The term "plumbing fixture" shall mean a receptacle intended to receive and discharge water or other liquid, or water-carried waste into a drainage system.

(14.1.13). § C26-1206.0 Plumbing System.—The term "plumbing system", when applied to a structure, shall include the water supply distributing pipes, the fixtures and fixture traps, the soil, waste and vent pipes, the house drain and house sewer and the storm water system, with their devices, appurtenances and connections within the structure and adjacent premises, except that such term shall not include the hot water distribution piping of a hot water heating system or connections between various pieces of apparatus of a boiler plant, engine room machines, air conditioning and refrigerating systems, but such term shall include the primary water supply to any of the excepted systems or equipment and the main drains or wastes from such excepted systems or equipments.

(14.1.14). § C26-1207.0 Pool.—The term "pool" shall mean a swimming plunge bath or other bath designed to accommodate more than one bather at a time.

(14.1.15). § C26-1208.0 Sewers—House, Private, Public, Sanitary and Storm.—a. The term "house sewer" shall mean that part of a house drainage system which extends from the house drain to a connection with a public sewer, private sewer or an approved sewage disposal plant and which conveys the drainage of but one plot.

b. The term "private sewer" shall mean a sewer which complies with the provisions of section 82d9-5.0 of the code.

c. The term "public sewer" shall mean a sewer constructed and operated by the city.

d. The term "sanitary sewer" shall mean a sewer designed or used to carry liquid or water-borne wastes from plumbing fixtures.

e. The term "storm sewer" shall mean a sewer carrying rain or sub-surface water.

(14.1.16). § C26-1209.0 Soil Pipe.—The term "soil pipe" shall mean any pipe which conveys to the house drain the discharge of water-closets or the discharge of other fixtures receiving fecal matter.

(14.1.17). § C26-1210.0 Stack.—The term "stack" shall mean any vertical line of soil, waste or vent piping.

(14.1.18). § C26-1211.0 Sub-house Drain.—The term "sub-house drain" shall mean that portion of a drainage system which cannot drain by gravity into the sewer.

(14.11.1, paragraph four, first sentence) § C26-1212.0 Sub-House Drainage System.—The term "sub-house drainage system" shall mean piping for a system such as is described in section C26:1315.0.

(14.1.19). § C26-1213.0 Trap.—The term "trap" shall mean a fitting or device so constructed as to prevent the passage of air or gas through a pipe or fixture, without materially affecting the flow of sewage or waste water.

(14.1.20). § C26-1214.0 Trap Seal.—The term "trap seal" shall mean the vertical distance between the crown weir and the dip of the trap.

(14.1.21). § C26-1215.0 Vent Pipe.—The term "vent pipe" shall mean any pipe provided to ventilate a house drainage system and to prevent trap siphonage and back pressure.

(14.1.22). § C26-1216.0 Waste Pipe.—The term "waste pipe" shall mean any pipe which receives the discharge of any fixture, except water-closets and all other fixtures receiving fecal matter, and conveys such discharge to a house drain, or a soil or waste stack.

(14.1.23). § C26-1217.0 Waste Pipe, Indirect.—The term "indirect waste pipe" shall mean a waste pipe which fails to connect directly with a house drain or a soil or waste stack.

(14.1.24). § C26-1218.0 Water Distribution Pipe.—The term "water distribution pipe" shall mean a pipe which conveys water to be used for plumbing systems in any part of premises.

(14.1.25). § C26-1219.0 Water Service Pipe.—The term "water service pipe" shall mean that portion of the water pipe which supplies one or more structures, and which pipe extends from the public or private main in the street to a main stopcock or valve inside the structure or to the point where the water supply is fully metered.

Sub-Article 2. General Plumbing Regulations

(14.2.1). § C26-1220.0 Sanitary Drainage.—In every structure in which the disposal of liquid or water-borne wastes or drainage is required, provision shall be made for conveying such wastes to a sewer. Where a sewer is not available, provision shall be made for disposing of such wastes by a method approved by the superintendent. Every such structure shall have its sanitary drainage system independently connected to a sewer or disposal system but, at the discretion of the superintendent, structures on the same lot or plot and under the same ownership, may be connected

to the same sewer or disposal system. Where the street is without a public sewer, the superintendent may permit a row of dwellings to be served by a private sewer, under such conditions as he may deem adequate.

(14.2.2). § C26-1221.0 Storm Water Drainage.—Provision shall be made in every structure for conveying storm water to a sewer. Where a storm or combined sewer is not available, provisions shall be made for disposing of such storm water by a method approved by the superintendent. When a sewer is installed subsequent to the completion of an existing private dwelling, conveyance of storm water thereto may be waived in those parts of the city where the soil is of good porosity, provided the superintendent is satisfied that the roof drainage will not flow onto adjoining property or across a city sidewalk, or that such drainage is adequately contained by dry wells located at least eight feet from such private dwelling and from the side and rear lot lines, and will not discharge into or interfere with septic tanks, cesspools, seepage pits, tile fields, or any part of a private sewage disposal system, or is adequately disposed of by a drain constructed of heavy cast iron in accordance with section 227.0 of this title. Such waiver shall be effective only during the period that the property remains improved with private dwellings. Nothing in this local law shall be construed as relieving the owners of the property of the obligation of paying the assessments for benefit imposed for the construction of the sewer provided for in the approved drainage plan.

(14.2.2.1). § C26-1221.1 Drainage of Garages.—1. (1) Application and definitions. The provisions of this section shall apply to all garages whether built in, attached to or isolated from a one or two-family dwelling erected on the same lot or plot and to driveways providing entrance to or egress from such garages.

(2) The term "lot" as used in this section shall mean a lot or plot on which a one or two-family dwelling is located and the terms "lot line" and "lot lines" shall mean the line or lines bounding such lot or plot.

2. When there is no storm water or combined sewer in the streets in front of or adjacent to any such lot, the finished floor level of any accessory garage as described in section 1 of this act shall be not more than eighteen (18) inches below the lowest level of the proposed or established street grade directly in front of or adjacent to the lot, depending upon which street provides entrance to such garage.

(a) When the furthermost wall of any such garage is distant more than one hundred and thirty (130) feet from the center line of the street on which the lot fronts, the elevation of the floor of such garage shall be increased one-eight (⅛) inch for each one (1) foot of distance in excess of said one hundred and thirty (130) feet.

(b) When any such garage is served by a driveway extending across the rear of the lot and serving other garages, the surface of such garage floor shall be at least six (6) inches above the surface of the driveway directly in front of the entrance door.

(c) A common driveway serving more than two (2) garages, each of which is erected on the same lot with a one- or two-family dwelling, as described in section 1, and which driveway extends across the rear portion of such lots approximately parallel to the rear lot lines and is directly connected to one or two streets, shall at no point on its surface be more than twenty-four (24) inches below the lowest level of the proposed or established street grade directly in front of or adjacent to such lot.

3. When there is a storm water or combined sewer in any street in front of or adjacent to any such lot built in conformity with an adopted or proposed public drainage plan, the finished floor level of any accessory garage, as described in section 1, shall be at an elevation above the top of such sewer at least one-eighth (⅛) inch for each foot of distance measured horizontally from the center line of such sewer to the furthermost wall of such garage plus twelve (12) inches.

(a) When there is a storm water or combined sewer in any street in front of or adjacent to any such lot built in conformity with an adopted or proposed public drainage plan, the finished surface of a common driveway, such as described in section 2 (c) hereof, which serves any such accessory garages, shall be built at an elevation not less than six (6) inches below the floor level of such garages.

4. Construction.—All garage floors and driveways shall be constructed of plain concrete laid on firm soil or rock.

All such garage floors shall be not less than four (4) inches thick and driveways serving more than two (2) garages shall be at least seven (7) inches thick and shall be provided with expansion joints along both the side and rear lot lines but in no instance shall such joints be located more than fifty (50) feet apart.

5. Drainage.—Drainage of ramps leading to garages shall in no instance begin or terminate at a point within the street area and driveways leading to such ramps shall be provided with adequate drains connected to storm water or combined sewers when such sewers are available for use. When there are no such sewers available,

driveways shall be served by adequate dry wells constructed on each lot and approved by the department.

Driveways for the common use of two (2) or more garages constructed below the street level shall be provided with a drain on and for each separate lot. Such driveways shall be so constructed that the surface of the portion on each lot will be properly pitched toward its drain and in cases where a storm water or combined sewer is not available, a drywell of adequate size shall be provided on each separate lot to receive the drainage from such lot.

Where substantial differences in elevation of the surrounding streets are encountered, the superintendent shall have power to grant modifications within the spirit and intent of this act.

(14.2.3). § C26-1222.0 Materials and Arrangement of Plumbing Systems.—The kind and quality of materials for plumbing systems and the arrangement, installation and construction of such systems, shall be in accordance with this title and the rules of the board.

(14.2.4). § C26-1223.0 Water Supply.—Every structure intended for human occupancy shall be provided with a supply of pure and wholesome water. It shall be unlawful to connect such pure water supply with any unsafe water supplies or to cross connect such pure water supply to any drainage system. Every structure shall be provided with a supply of water sufficient to keep the plumbing fixtures sanitary. Where supply from water mains in the street is available, each such structure shall be adequately supplied with water from such mains.

(14.2.5). § C26-1224.0 Plumbing Fixtures.—Every structure intended for human occupancy shall be provided with a sufficient number of suitable plumbing fixtures. Such fixtures shall be generaly located within the structure, as required by the rules of the board.

(14.2.6). § C26-1225.0 Replacements and Alterations in Plumbing System.—A plumbing system lawfully installed before January first, nineteen hundred thirty-eight, may be either replaced or altered to an extent involving fifty per cent or less of such plumbing system without being made to comply with this title, provided that the system is repaired or altered in a safe and sanitary manner to the satisfaction of the superintendent. If any replacements or alterations involve more than fifty per cent of the fixture units and the piping used in connection therewith in the system, such whole system shall be made to comply with this title, except that any fixture may be replaced with another fixture of similar capacity and purpose without regard to the preceding limitations of this section.

(14.2.7) § C26-1226.0 Cesspools, privy vaults and septic tanks.—a. Cesspools, privy vaults and septic tanks may be constructed only by special permission of the superintendent except that during construction work, privy vaults of a temporary nature may be constructed without such permission where street sewers are available.

b. Cesspools, privy vaults and septic tanks shall be constructed in a manner approved by the superintendent.

c. It shall be unlawful to use cesspools as privy vaults or to use privy vaults as cesspools. Cesspools, privy vaults and septic tanks shall be located at least fifteen feet from any structure and shall be located on the same lot as the structure which they are to serve.

d. As soon as sewers are vailable, the drainage system, including leaders, drains, cesspools, privy vaults and septic tanks, shall be connected in accordance with the rules of the board; every cesspool or privy vault shall be emptied, cleaned, disinfected and filled with fresh earth.

e. The board shall have power to grant exemptions to subdivision a of this section in cases where houses or buildings are already constructed and the board finds that it will be impractical to connect the storm water drains and leaders in the storm sewers and that proper drainage is otherwise provided for.

Sub-Article 3. Quality and Weights of Materials for Plumbing Systems

(14.3.1). § C26-1227.0 General Requirement for Quality of Plumbing Systems.—All materials used in any part of a drainage or plumbing system shall be free from defects.

(14.3.2). § C26-1228.0 Vitrified Clay Sewer Pipe.—Vitrified clay sewer pipe and fittings shall conform to the standard specifications for clay sewer pipe of the A.S.T.M., D., C 13-35.

(14.3.3). § C26-1229.0 Cast Iron Water, Soil and Waste Pipe and Fittings.—a. Cast iron soil and waste pipe and fittings for drainage and venting shall be uncoated and shall otherwise conform to the standard specifications for cast iron soil pipe and fittings of the American Standard Cast Iron Soil Pipe and Fittings, D; A401-1935,

except that spigot end may be either with or without a bead, and shall conform to Commercial Standard CS-188-59.

b. Such cast iron soil pipe shall be uncoated "extra heavy" pipe and, including the hub, shall have at least the following average weight per laying length of five feet.

Size in Inches	Weight in Pounds Single Hub Pipe	Double Hub Pipe
2	25	26
3	45	47
4	60	63
5	75	78
6	95	100
8	150	157
10	215	225
12	270	285
15	375	395

(14.3.4). § C26-1230.0 **Wrought Iron Pipe.**—a. Wrought iron pipe shall conform to the standard specifications for welded wrought iron pipe of the A.S.T.M., D., A 72-33, and shall be galvanized.

b. Such pipe shall have a least the following average thickness and weight per linear foot:

Diameter in Inches.	Thickness in Inches.	Weight per Linear Foot in Pounds.
⅛	0.109	0.85
¼	0.113	1.13
½	0.133	1.68
¾	0.140	2.28
1	0.145	2.72
1¼	0.154	3.65
1½	0.203	5.74
2	0.216	7.57
2½	0.226	9.11
3	0.237	10.79
3½	0.258	14.62
4	0.280	18.97
5	0.322	28.55
6	0.365	40.48
8	0.375	49.56
10		
12		

(14.3.5). § C26-1231.0 **Steel Pipe.**—a. Steel pipe shall conform to the standard specifications for welded and seamless steel pipe of the A.S.T.M., D., A 120-36, and shall be galvanized.

b. Steel pipe shall have at least the same average thicknesses and weights per linear foot as prescribed for wrought iron pipe in section C26-1230.0.

(14.3.6). § C26-1232.0 **Lead Pipe—Sizes and Weights.**—a. Lead pipe shall be of the best quality of drawn pipe, with the minimum weights per linear foot given in the following table:

Lead Soil, Waste, Vent or Flush Pipes, Including Bends and Traps

Internal Diameter, Inches.	Weights per Foot. Pounds.	Ounces.
1	2	..
1¼	2	8
1½	3	..
2	4	..
3	6	..
4	8	..

b. Lead water supply pipes shall be of the quality and weight known commercially as Grade AA for pressures less than eighty pounds; for pressures of eighty pounds or more, lead water supply pipe shall be Grade AAA.

c. The minimum weights and thicknesses of Grade AA and Grade AAA lead water supply pipes shall be in accordance with the following table:

Internal Diameter, Inches.	Grade AA Thickness in Inches.	Grade AA Weight Per Linear Foot in Pounds.	Grade AAA Thickness in Inches.	Grade AAA Weight Per Linear Foot in Pounds.
⅛	.218	2.00	.256	2.50
¼	.188	2.00	.256	3.00
⅜	.200	3.00	.231	3.50
½	.231	3.50	.293	4.75
¾	.246	4.75	.298	6.00
1	.257	6.00	.319	7.75
1¼	.288	8.00	.386	11.25
1½	.375	13.75	.504	19.50
2				

(14.3.7). § C26-1233.0 **Sheet Lead.**—Sheet lead shall weigh at least four pounds per square foot.

§ C26-1234.0 **Brass Pipe.**—a. Threaded Brass Pipe.

1. Brass pipe, when used with threaded fittings, shall conform to the standard specifications for brass pipe, standard sizes of the A.S.T.M., D., B43-33, except that the minimum proportion of copper shall be sixty per cent.

2. Such pipe shall have at least the following average thickness and weight per linear foot:

Diameter in inches	Thickness in inches	Weight per linear foot in pounds
⅛	0.09	0.612
¼	0.107	0.911
⅜	0.114	1.24
½	0.126	1.74
¾	0.146	2.56
1	0.150	3.04
1¼	0.156	4.02
1½	0.187	5.83
2	0.219	8.31
2½	0.25	10.85
3	0.25	12.29
3½	0.25	13.74
4	0.25	15.40
4½	0.25	18.44
5	0.312	30.9
6	0.365	45.2
8	0.375	55.3
10		
12		

b. Unthreaded Brass Pipe.

1. Brass pipe, when used unthreaded and with faced fed silver brazed joints or approved welded joints, shall have a copper content of at least eighty-five per cent, and shall conform to the specifications for threaded pipe, or to the following specifications:

Diameter in inches	Thickness in inches	Weight per linear foot in pounds
⅛	.065	.472
¼	.065	.600
⅜	.065	.763
½	.065	.968
¾	.065	1.235
1	.065	1.423
1¼	.065	1.791
1½	.068	2.278
2	.083	3.384
2½	.095	4.427
3	.107	5.610
3½	.132	8.555
4	.158	12.193
5	0.205	20.598
6	0.256	32.059
8	0.313	46.500
10		
12		

§ C26-1235.0 Copper Pipe.—a. Threaded Copper Pipe.

1. Copper pipe, when used with threaded fittings, shall conform to the standard specifications for copper pipe, standard sizes of the A.S.T.M., D., B42-33.

2. Such pipe shall have at least the following average thickness and weight per linear foot:

Diameter in inches	Thickness in inches	Weight per linear foot in pounds
⅜	0.09	0.64
½	0.107	0.95
¾	0.114	1.30
1	0.126	1.85
1¼	0.146	2.69
1½	0.150	3.20
2	0.156	4.23
2½	0.187	6.14
3	0.219	8.75
3½	0.25	11.41
4	0.25	12.94
4½	0.25	14.46
5	0.25	16.21
6	0.25	19.41
8	0.312	31.600
10	0.365	46.200
12	0.375	56.500

b. Unthreaded Copper Pipe.

1. Copper pipe, when used unthreaded and faced fed silver joints or approved welded joints, shall conform to the specifications for threaded pipe or to the following specifications:

Diameter in inches	Thickness in inches	Weight per linear foot in pounds
⅜	.065	.483
½	.065	.613
¾	.065	.780
1	.065	.989
1¼	.065	1.26
1½	.065	1.45
2	.065	1.83
2½	.068	2.32
3	.083	3.45
3½	.095	4.52
4	.107	5.72
5	.132	8.73
6	.158	12.44
8	0.205	21.018
10	0.256	32.713
12	0.313	47.500

(14.3.10). § C26-1236.0 Threaded Fittings.—a. Plain, screwed fittings shall be made of cast iron, galvanized malleable iron, brass, bronze or copper and shall be of at least standard weight and dimensions.

b. Drainage fittings shall be recessed type of cast iron, galvanized malleable iron, brass, bronze or copper, and shall have a smooth interior waterways and the threads shall be tapped so that branches shall have a uniform grade of at least one-eighth of an inch per foot.

c. The galvanizing of malleable fittings shall be in accordance with the requirements for galvanizing wrought iron pipe in section C26-1230.0.

d. Cast iron screwed drainage fittings shall conform to the American standard specifications for cast iron screwed fittings, B 16, d-27, for one hundred twenty-five pound steam fittings.

(14.3.11). § C26-1237.0 Clean-outs.—The bodies of clean-out ferrules shall be made of standard pipe sizes, conforming in thickness to the requirements for pipe and fittings of the same metal, and such bodies shall extend at least one-quarter of an inch above the hub. The clean-out cap or plug shall be of heavy brass at least one-eighth inch thick and such cap or plug shall be provided with a raised solid, square or hexagonal nut at least one inch high. Such nut shall have a diagonal of at least one and one-half inches or a recessed socket for removal. The engaging part shall have at least six threads of standard iron pipe size and shall be tapered.

(14.3.12). § C26-1238.0 Materials for House Sewers.—House sewers shall be constructed of extra heavy cast iron pipe installed in conformity with the standards of the borough president, except that in the case of the house sewers of one or two-family dwellings, vitrified clay sewer pipe or approved reinforced concrete pipe may be used when the ground is neither made nor filled in and when the pipes are at least three feet below the surface and in the opinion of the superintendent there is no danger of settlement by frost or from any other cause.

(14.3.13). § C26-1239.0 Plumbing Material Within Buildings.—Drainage and vent piping within structures shall be of extra heavy cast iron, galvanized steel or galvanized wrought iron, lead, brass or copper, singly or in combination, except that it shall be unlawful to use galvanized steel or wrought iron pipe underground. The maximum developed length to which lead pipe may be used in connection with any one fixture shall be five feet.

(14.3.14). § C26-1240.0 New Plumbing Materials.—Other materials than those authorized may be used provided that such materials have been tested and approved in accordance with the rules of the board.

(14.3.15). § C26-1241.0 Prohibited Plumbing Fittings.—It shall be unlawful to use double hubs or sleeves on soil or waste lines. It shall be unlawful to drill or tap house drains, soil waste, or vent pipes, or to use saddle hubs or bands.

Sub-Article 4. Joints and Connections in Plumbing Systems

(14.4.1). § C26-1242.0 Tightness of Plumbing Joints and Connections.—Joints and connections shall be made gas and water tight.

(14.4.2). § C26-1243.0 Joints in Vitrified Clay Pipe.—Joints in vitrified clay sewer pipe shall be firmly packed with oakum or hemp and shall be secured with cement mortar or asphaltic compound at least one inch deep.

(14.4.3). § C26-1244.0 Caulked Joints.—Joints for bell and spigot metal drainage and vent pipe shall be firmly packed with picked oakum or hemp and shall be secured with molten lead. At least twelve ounces of fine, soft pig lead shall be used for each inch in diameter of the pipe used. Lead shall be run in one pouring and caulked tight. Lead joints for water supply piping shall conform to the regulations of the department of water supply, gas and electricity.

(14.4.4). § C26-1245.0 Caulking Ferrules and Soldering Nipples.—a. Brass caulking ferrules shall be either of the best quality of cast brass or cold drawn seamless tube ferrules, with weights and dimensions in accordance with the following table:

Pipe Size, inches	Actual Inside diameter, inches	Length, inches	Weight	
			Pounds	Ounces
2	2¼	4½	1	..
3	3¼	4½	1	12
4	4¼	4½	2	8

b. Soldering nipples shall be of brass pipe, iron pipe size, or heavy cast brass, of at least the following weights:

Diameter, in inches	Weights, ounces
1¼	6
1½	8
2	14

Diameter, in inches	Weights	
	Pounds	Ounces
2½	1	6
3	2	..
4	3	8

c. Soldering bushings shall be of brass pipe, iron pipe size, or heavy brass or copper.

(14.4.5). § C26-1246.0 Screw Joints.—a. Screw joints shall be tapered with the threads sharp and true and all burrs due to cutting shall be reamed out smooth.

b. Where fitting compounds, red lead, white lead, or other joint materials are used in making up threaded joints, such materials shall be applied to the male threads only.

(14.4.6). § C26-1247.0 Wiped Solder Joints.—Joints in lead pipes or between lead pipe and brass or copper pipes, ferrules, soldering nipples, bushings or traps, in all cases, shall be full wiped joints, either manufactured or made in the field, with an exposed surface of the solder on each side of the joint of at least three-quarters of an inch, and a minimum thickness at the thickest part of the joint of three-eighths of an inch. It shall be unlawful to use overcast or cup joints.

(14.4.7). § C26-1248.0 Joints of Lead to Cast Iron, Steel or Wrought Iron.—Joints of lead to cast iron, steel or wrought iron shall be made by means of a caulking ferrule, soldering nipple or bushing.

(14.4.8). § C26-1249.0 Fixture Flanges.—Flanges to receive fixture outlets shall be at least three-sixteenths of an inch thick and shall be made of brass or bronze.

(14.4.9). § C26-1250.0 Water-closet, Pedestal Urinal and Trap, and Standard Slop Sink Connections.—The connections between drainage pipes and water-closets, floor outlet slop sinks, pedestal urinals and earthenware trap standards, shall be made by means of brass flanges caulked to the drainage pipes. Such connections may be wiped or soldered to lead pipes. Such connections may be bolted to the earthenware with an approved gasket or washer between the earthenware and the connection. Floor outlet connections shall be set on an approved floor slab or ring made of materials impervious to moisture.

(14.4.10). § C26-1251.0 Slip Joints and Unions.—Slip joints or unions shall be permitted only in trap seals or in the inlet side of the trap, except that where it is impracticable to provide otherwise for expansion in stacks of unusual height, the superintendent may permit the use of an approved type of expansion joint which comprises in part a slip joint.

(14.4.11). § C26-1252.0 Roof Joints.—Where the pipes pass through roofs, the joints shall be made watertight by the use of copper, lead or cast iron plates or flashings.

(14.4.12). § C26-1253.0 Expansion and Contraction in Vertical Plumbing Pipes.—In structures exceeding one hundred fifty feet in height, adequate means shall be provided for taking care of the expansion and contraction of all vertical lines of pipe.

(14.4.13). § C26-1254.0 Welding of Plumbing Joints and Connections.—a. Joints and connections for water or gas pipe made of brass, copper, black steel or black wrought iron, or combinations of these materials, may be made by welding.

b. It shall be unlawful to weld any galvanized pipe, cast iron pipe or drain, soil or vent pipe of any material.

c. The electrodes, welding wire and welding rods used in welding shall meet the requirements of section C26-324.0. Welding shall be done in accordance with the American Standard Code for pressure piping B 31.1-1935. Contractors desiring to use welding shall be required to satisfy the superintendent as to their ability to produce joints and connections.

d. Silver brazing of standard brass pipe fittings to copper or brass pipes shall be accepted where the face fed alloy is inserted into a space between the inside face of the hub of the standard fitting and the exterior surface of the pipe. Such silver brazing alloy shall have a melting point greater than one thousand degrees fahrenheit.

Sub-Article 5. Traps and Clean-Outs

(14.5.1). § C26-1255.0 Fixture Traps, Where Required.—Each fixture shall be separately trapped as near to such fixture as possible, except that a battery of two or three laundry trays, one sink and two laundry trays, or two compartment sinks may connect with a single trap when the outlets of such types of fixtures are two inches or less. Traps shall be as near to the fixture as possible, but such traps shall in any case be within two feet developed length from the outlet of such fixture. It shall be unlawful to discharge the waste from a bathtub or other fixture into the water-closet trap or bend. It shall be unlawful to double trap fixtures.

(14.5.2). § C26-1256.0 Design of Traps.—Traps shall be self-cleaning and water-sealed and shall have a scouring action. Traps for bathtubs, lavatories, sinks and other similar fixtures, shall either be integral or shall be of lead, brass, cast iron or galvanized malleable iron. Traps shall have a full size bore, smooth interior waterway such that a solid ball, one-quarter inch smaller in diameter than the specified diameter of the trap, will pass freely from the outlet end entirely through the seal of the trap. The minimum diameter of traps for fixtures shall be that diameter given for the soil or waste branch in section C26-1292.0, except that in the case of water-closets, the

required minimum shall be two and one-half inches. In cases other than fixtures, the size of the trap shall be the same as the size of the discharge pipe connecting thereto.

(14.5.3.) § C26-1257.0 Water Seal.—Fixture traps shall have a water seal of at least two inches. All other traps shall have a water seal of at least three inches.

(14.5.4). § C26-1258.0 Setting and Protection of Traps.—Traps shall be set true with respect to their water seals and shall be protected from frost and evaporation.

(14.5.5). § C26-1259.0 Back-water Valves.—Back-water valves shall have all bearing parts made of corrosion resisting metal and such valves shall be so constructed as to insure a positive mechanical seal and remain closed, except when discharging wastes. Back-water valves shall be of types approved by the board.

(14.5.6. §C26-1260.0 Prohibited Traps.—It shall be unlawful to use masons' traps or catch basins inside of buildings, traps with partitions, bell, pot, bottle or "D" traps or traps depending for their seal upon the action of movable parts or concealed interior partitions, except that bell traps may be used on refrigerator safes and receptors. Traps having covers, hand holes or clean-outs held in place by lugs or bolts acting as interceptors for grease, plaster or similar substances, may be used if such traps are approved by the board.

(14.5.7). § C26-1261.0 Clean-outs Required.—Easily accessible cleanouts shall be provided at the foot of each vertical waste, soil stack or inside leader, on all hand holes of running traps, on all exposed or accessible fixture traps, except earthenware traps, and at each change of direction of horizontal run. Clean-outs shall be of the same nominal size as the pipes up to four inches, and such cleanouts shall be at least four inches for larger pipes. The maximum distance between the clean-outs in horizontal soil lines shall be fifty feet.

(14.5.8). § C26-1262.0 Clean-outs Equivalents.—Any floor or wall connection of fixture traps when bolted or screwed to the floor or wall shall be regarded as a clean-out.

Sub-Article 6. Hangers and Supports for Plumbing Piping

(14.6.1). § C26-1263.0 Vertical Piping.—Vertical piping shall be securely supported at the base at maximum intervals of every other floor, provided that such maximum interval is twenty-five feet or less.

(14.6.2). § C26-1264.0 Horizontal Piping.— Horizontal piping shall be securely supported at maximum intervals of ten feet.

(14.6.3). § C26-1265.0 Hangers.—Hangers shall be made of metal of heavy pattern and shall be securely attached to the building construction.

(14.6.4). § C-26-1266.0 Bases of Risers and Horizontal Runs.—Bases of risers and horizontal runs in cellars may be supported on substantial masonry piers.

(14.6.5). § C26-1267.0 Pipes in the Ground.—Pipes in the ground shall be laid for the entire length on a firm bed.

Sub-Article 7. Water Supply and Distribution

(14.7.1.1) § C26-1268.0 Service Pipes.— a. Street Connections.— House service pipes shall be connected to the street mains by taps, or wet connections and stopcocks or valves placed under the sidewalk at the curb, in compliance with the rules and under the supervision of the department of water supply, gas and electricity.

(14.7.1.2). b. Stopcock or Valve.—A separate stopcock or valve shall be placed upon the service pipe inside the front wall and within two feet of the point of entrance.

(14.7.1.3). c. Sizes of Water Pipes.—

1. The diameter of street service pipe shall be as required by the department of water supply, gas and electricity.
2. The minimum diameter of all riser lines in plumbing systems shall be three-quarters of an inch, except that one-half inch lead, copper or brass pipes may be used.
3. Every portion of a water distribution system shall be of such pipe sizes and arrangement as will insure an adequate supply of water to each plumbing fixture served, and in the case of water-closets and urinals, the supplies to such fixtures shall be adequate to flush each fixture fully.
4. Water-closets shall be supplied with water either from water closet tanks or from flush valves where the water pressure is sufficient to insure adequate supply. Flush valves, equipped with approved vacuum breakers; and tanks, equipped with approved vacuum breaker type ball cocks, shall be supplied from risers and branches from which other supply branch may be taken. No flush valve supply riser shall be less than one and one-quarter inches in diameter and where the number of flush valves supplied is more than two, such riser shall be at least one and one-half inches in diameter. No main branch to flush valves shall be less than one and one-quarter inches in diameter, with individual branches of not less than one inch diameter, except

that in private dwellings of not over two stories in height the superintendent may, in his discretion, permit a reduction in the size of risers and branches. When it is permissible to supply flush valves equipped with approved vacuum breakers; and water closet tanks equipped with approved vacuum breaker type ball cocks, from other than gravity tanks, they shall be supplied from risers and branches from which other supply branches may be taken.

(14.7.1.4). d. Materials for Water Supply Pipes.—

1. Water supply pipes for plumbing systems shall be lead, galvanized wrought iron or steel, copper, brass, or cast iron, galvanized cast iron, or galvanized malleable iron fittings.

2. It shall be unlawful to distribute water through pipes or fittings previously used for any other purpose.

(14.7.2). § C26-1269.0 Stopcocks or Valves on Water Supply Pipes.—Separate stopcocks or valves, always accessible shall be placed at the foot of each riser line; and in structures other than residence structures occupied exclusively by one or two families, or having less than sixteen sleeping rooms, such stopcocks or valves shall be placed on each branch line from the riser for each isolated fixture or group of fixtures; except that only one such stopcock or valve shall be required for all the fixtures contained in a single apartment, suite, store or loft occupied by one tenant when all such fixtures are supplied from one branch line. Such stopcock or valve may be located outside of the apartment, suite, store or loft which it serves.

(14.7.3). § C26-1270.0 Sizes of Water Supply Branches.—Water supply branches to fixtures shall have a minimum diameter of three-eighths of an inch when such branches are made of lead, copper or brass and a minimum diameter of one-half of an inch when such branches are made of other material, except when such branches are connected to flush valves. Water supply branches connected to flush valves shall have a minimum diameter of one inch for waterclosets and a minimum diameter of three-quarters of an inch for urinals.

(14.7.4). § C26-1271.0 Hot Water Supply Systems.—a. Where hot water supply systems are installed, the hot water riser shall be covered with approved insulating material unless the hot and cold water risers are six inches or more apart.

b. In all buildings which are more than four stories in height and which are supplied with hot water, and in all other buildings where the developed length of the hot water piping from the source of hot water supply to the extreme fixture supplied exceeds one hundred feet, a hot water return circulation system shall be installed. The circulation return shall in all cases be one-half inch or more in diameter.

(14.7.5). § C26-1272.0 Relief Valves for Hot Water Systems.—An approved type of pressure relief valve shall be provided in each hot water supply system. Such relief valve shall be so located that there is no shut-off valve, meter or check valve between the water heating boiler or device and the relief valve.

(14.7.6.1). § C26-1273.0 House Supply Tanks.—a. House Supply Tanks Required. —When the water pressure is insufficient to supply all fixtures freely and continuously, a house supply tank shall be provided, which tank shall be adequate to supply all fixtures amply and at all times.

(14.7.6.2). b. Supply of House Tanks.—House supply tanks shall be supplied from the street pressure or, when necessary, by power pumps; when such tanks are supplied from the street pressure, ball locks shall be provided.

(14.7.6.3). c. Design of House Supply Tanks.—

1. Gravity house supply tanks shall be built of wood or steel, or of wood lined with tinned and planished copper and such tanks shall be supported on steel beams. Such tanks shall be provided with suitable covers.

2. Pressure tanks shall be cylindrical closed pressure vessels and shall be built of steel, unless otherwise specifically approved by the superintendent. Such tanks shall be designed for at least the water working pressures under which they are to operate.

(14.7.6.4.). d. Overflow Pipes for House Supply Tanks.—Overflow pipes for gravity tanks shall discharge, whenever possible above and within six inches of the roof. Where such discharge is impossible, such overflow pipes shall be trapped and discharged over an open water supplied sink three and one-half feet or less above the floor, or connected through a check valve to a leader. It shall be unlawful to connect overflow pipes with any part of the plumbing, except as provided above. Overflow pipes shall be at least one commercial size larger than the supply pipe, but where the capacity of tanks is five hundred gallons or more, the minimum size of such pipes shall be four inches.

(14.7.6.5). e. Emptying Pipes for House Supply Tanks.—

1. Emptying pipes shall be provided and discharged as required for overflow pipes in subdivision d of this section.

2. Each tank shall be provided with emptying pipes having the following minimum diameters:

(a) Two and one-half inches for a tank of five thousand or more gallons capacity.

(b) Three inches for a tank of more than five thousand gallons and ten thousand gallons or less capacity.

(c) Four inches for a tank of more than ten thousand gallons capacity.

3. Each emptying pipe shall be equipped with a valve of the same diameter as the pipe.

(14.7.7). § C26-1274.0 Protection of Plumbing Systems Against Freezing.—Concealed water pipes, storage tanks, flushing cisterns, and exposed pipes or tanks subject to freezing temperatures, shall be effectively protected against freezing.

(14.7.8). C26-1275.0 Air Chambers.—Self-closing devices shall be provided with air chambers complying with the rules of the department of water supply, gas and electricity.

Sub-Article 8. Plumbing Fixtures

(14.8.1) § C26-1276.0 Materials for Plumbing Fixtures. — a. Plumbing fixtures shall be made of impervious materials with a smooth surface which shall be easily kept clean.

b. Water-closet bowls and traps shall be made of glazed vitreous earthenware, in one piece, and shall be of such form as to hold a sufficient quantity of water, when filled to the trap overflow, to prevent fouling of surfaces, and such bowls and traps shall be provided with integral flushing rims so constructed as to flush the entire interior of the bowl.

c. It shall be unlawful to use rubber connections on flush pipes.

d. Urinals shall be made of glazed earthenware.

(14.8.2.1). § C26-1277.0 Water-closets.—a. Outside Location of Water-closets prohibited.—Water-closet accomodations in structures erected after January first, nineteen hundred thirty-eight, shall be placed inside of the structures which they serve, except as provided in section C26-1226.0 for temporary privies, or privies to be used where no public sewer is available. Whenever a street sewer connection is available, it shall be unlawful to replace an outside water-closet with an outside water-closet.

(14.8.2.2). b. Prohibited Types of Water-closets.—

1. It shall be unlawful to have pan, plunger, offset washout and washout, or other water-closets having unventilated spaces or walls which are not thoroughly washed out at each flushing.

2. Long hopper closets may be permitted only when the superintendent is convinced that there is exposure to frost.

(14.8.2.3). c. Flushing and Overflow of Water-closets.—

1. Every water-closet or urinal shall be flushed from a separate flush tank, the water from which is used for that purpose only, or such water-closet or urinal shall be flushed through an approved flush valve, as provided in subdivision c of section C26-1268.0.

2. It shall be unlawful to connect water-closets or urinals directly to a water supply system, except through approved flush valves so located as to prevent pollution of the water supply.

3. Overflows of flush tanks may discharge into water-closets or urinals, but it shall be unlawful to connect such overflows with any part of the drainage system.

(14.8.2.4). d. Iron and Automatic Flush Tanks.—Iron and automatic flush tanks for water-closets and urinals may be used only by special permission of the superintendent and with the approval of the department of water supply, gas and electricity.

(14.8.2.5). e. Flush Tank Lining.—The lining of water-closets and urinal flush tanks made of wood or other absorbent material shall be of at least ten-ounce copper.

(14.8.2.6). f. Flush Pipe Sizes.—Water-closet flush pipes shall be at least one and one-quarter inches in diameter and urinal flush pipes shall be at least one inch in diameter. Such pipes may be of copper tubing at least 0.0313 inch in thickness (No. 22 U. S. gage). Flush pipes shall be of non-ferrous metal.

(14.8.2.7). g. Wood Enclosure for Plumbing Fixtures.—Fixtures shall be devoid of permanent wood enclosures.

(14.8.2.8). h. Anti-siphon Devices.—Wherever the supply to a fixture is introduced into such fixture below the overflow level, such supply shall be provided with an approved vacuum breaker which will prevent the siphoning of water from such fixture into the supply piping.

(14.8.2.9). i. Capacity of flush tanks.—Each water-closet and urinal shall be supplied with a volume of water adequate to flush and clean the fixture and to refill

the trap seal at each flushing, and flush tanks shall be of sufficient capacity to supply the required volume.

(14.8.3.1). § C26-1278.0 Swimming Pools.—a. Construction of Swimming Pools.—Pools shall be built water tight. The inside surface shall be made of a smooth, non-absorbent material with rounded corners, and shall be so constructed as to be easily cleaned.

(14.8.3.2). b. Drainage of Swimming Pools.—

1. Pools shall be provided with a drain outlet so located that the entire pool can be emptied. Pools shall also be supplied with an overflow at the high water line. Such drain shall be at least three inches in diameter and shall be trapped before connecting with the drainage system. The trap shall be vented. Such overflow shall be connected to the inlet side of the trap and on the sewer side of the valve on the emptying drain. Drain and circulating outlets shall be fitted with a device to reduce the vortex. The spaces around the pool shall be drained in such a manner as to prevent the water from draining into the pool. Such spaces may pitch into drained gutters built into the sides of the pool. The drains in the gutters may also serve as overflows.

2. The size of the drain and vent connections shall be determined by the capacity of the pool when filled to the overflow level.

3. The diameter of the trap shall be at least the diameter of the drain pipe.

(14.8.3.3). c. Circulation of Water in Swimming Pools.—

1. Pools shall be equipped to provide a continuous supply of clear wholesome water at the rate of twenty gallons per hour for each bather using the pool in any one hour. The supply may be either fresh water from an approved water supply system, or such supply may be recirculated if approved means are provided for filtering and sterilizing the water before such water is reintroduced into the pool. The inlets shall be located so as to circulate the water over the entire area of the pool.

2. The piping of recirculating systems shall be kept entirely separate from the city or domestic supply system.

(14.8.3.4). d. Sterilizing and Filtration Equipment for Swimming Pools.—Sterilizing and filtration equipment shall be adequate to keep pool in a sanitary condition at all times.

(14.8.3.5). e. Shower Baths and Toilet Facilities.—Adequate shower bath and toilet accomodations, conveniently located for the use of the bathers, shall be provided for all pools.

(14.8.3.6). f. Cleaning of Swimming Pools.—Swimming pools shall have their interior surfaces thoroughly cleaned at such intervals as the superintendent may prescribe but in any event, all interior surfaces shall be thoroughly cleaned each time the pool is drained.

(14.8.3.7). g. Sign Indicating Maximum Approved Capacity.—There shall be placed above each swimming pool at a location designated by the superintendent, a conspicuous sign bearing a legend stating the maximum number of persons permitted to use the pool in any one hour. The sign shall be of a form and type prescribed by the superintendent.

(14.8.4). § C26-1279.0 Number of Toilet Fixtures Required.—a. Every office building, school, store, warehouse, manufacturing establishment or other structure, where workmen or workwoman are or will be employed, shall be provided with at least one water closet.

b. Water-closets shall be provided for each sex according to the following table. The number of water-closets to be provided for each sex shall in every case be based upon the maximum number of persons of that sex employed at any one time on the given floor, or floors, or in the structure for which such closets are provided.

Number of persons	Number of closets	Ratio
1– 15	1	1 for 15
16– 35	2	1 for 17½
36– 55	3	1 for 18⅓
56– 80	4	1 for 20
81–110	5	1 for 22
111–150	6	1 for 25
151–190	7	1 for 27⅐

Thereafter, water closets shall be provided at the rate of one closet for every thirty persons, except that in schools designed for a minimum occupancy of four hundred pupils, at least one toilet fixture shall be provided for each forty pupils and in toilets

for boys, at least one-quarter of the fixtures shall be water-closets.

c. Whenever a urinal is supplied, one closet less than the required number may be provided for males when more than thirty-five are employed, except that the number of closets in such cases shall be at least two-thirds of the number given in the above table.

d. For dwellings to be occupied by one or two families, at least one water-closet shall be provided for each family in the apartment occupied by such family. Where there are more than two families provision shall be made as required in the multiple dwelling law.

e. Places of public or semi-public assembly accomodating large numbers of persons, shall be provided with a sufficient number of water-closets and urinals as directed by the superintendent. Such water-closets and urinals shall be in an accessible location and shall be provided with signs plainly indicating their purpose.

(14.8.5). § C26-1280.0 Location of Toilet Fixtures.—a. Water-closets shall be readibly accessible to the persons using them. It shall be unlawful to locate water-closets more than one floor above or below the regular working place of the persons using them, except that the superintendent may determine the location of water-closets in warehouses, garages, and similar structures of low occupancy.

b. The requirement of this section as to location shall be inapplicable when passenger elevators are provided in sufficient numbers and employees are permitted to use such elevators in going to the toilet room floors.

Sub-Article 9. Drainage and Venting of Plumbing Systems

(14.9.1). § C26-1281.0 Protection of Pipes Against Breakage and Corrosion.—Pipes passing under or through walls shall be protected from breakage. Pipes passing through or under cinder concrete or other corrosive material shall be protected against external corrosion in accordance with the rules of the board.

(14.9.2). § C26-1282.0 Protection of Stacks.—Soil or waste stacks shall be installed inside of the structure.

(14.9.3). § C26-1283.0 Prohibited Plumbing Connections.—It shall be unlawful to make any waste connection to a bend of a water-closet or similar fixture. It shall be unlawful to use oil or waste vents as soil or waste pipes.

(14.9.4). § C26-1284.0 Changes in Direction in Plumbing Systems.—Changes in direction shall be made by the appropriate use of forty-five degrees wyes, half wyes, long sweep quarter bends, sixth, eighth or sixteenth bends, or long turn tee-wye fittings, except that short turn tee-wye fittings may be used on vertical stacks. Fittings other than the above may be used if such fittings are approved in accordance with the rules of the board. All quarter bends shall be long turn. Tees and crosses may be used in vent pipes.

(14.9.5). § C26-1285.0 Grade of Horizontal Drainage Piping.—Horizontal drainage piping shall be run in practical alignment and at a uniform grade of at least one-eighth of an inch per foot.

(14.9.6). § C26-1286.0 Old House Drains and Sewers.—Old house drains and house sewers may be used for connections to new structures or new plumbing only when such drains and sewers are found, on examination, to conform in all respects to the requirements of the borough president and the rules of the board.

(14.9.7. § C26-1287.0 House Drains for Rear Buildings.—When a structure stands in the rear of another structure on the same interior lot, and a private sewer is unavailable or cannot be constructed, the house drain of the front structure may be extended to the rear, and the whole considered as one house drain.

(14.9.8). § C26-1288.0 Location of House Sewers.—It shall be unlawful to lay house sewers within ten feet of any foundation or property line unless such sewers are constructed of cast iron pipe.

(14.9.9). § C26-1289.0 House Traps and Fresh Air Inlets.—a. Every structure in which plumbing fixtures or leaders are installed, shall be provided with a house trap. Such trap shall be located on the house drain near the front wall of the structure inside of the property line and on the sewer side of all connections, except a connection used to receive the discharge from a sewer lift, oil separator, blow-off pipe or leaders. If such trap is placed outside of a house or below a cellar floor, such trap shall be made accessible in a masonry manhole, with an approved cover.

b. A fresh air inlet pipe shall be provided for each house drain discharging directly into a house trap. Such fresh air inlet pipe shall connect with such house drain just ahead of the house trap and such inlet pipe shall be of a diameter at least half the diameter of the house drain, where such inlet pipe connects thereto but in any case not less than three inches (3") and shall extend to the outer air and terminate in an open end at least six inches above grade. Such open end shall be protected

by a perforated metal plate permanently fixed in the mouth of the inlet. Such metal plate shall have a clear ventilating area at least equal to the area of the pipe.

c. It shall be unlawful to use curb boxes or similar devices with gratings placed in sidewalks as fresh air inlets.

d. In all new one and two family dwellings constructed so that the level of the lowest floor is less than 7 feet no inches above mean high water level, and drains or sanitary plumbing fixtures are installed in such cellar or basement, a back-water valve approved by the Board of Standards and Appeals shall be installed.

Back-water valves shall be located either inside at the front wall when such front wall is at or near the building line or outside the building when the front wall is set back from the building line. Such back-water valves shall be on the sewer side of the house trap. Back-water valves shall be accessible for maintenance and servicing.

(14.9.10). § C26-1290.0 Floor Drains.—a. Floor drains shall be permitted only when it can be shown to the satisfaction of the superintendent that their use is absolutely necessary.

b. Cellar or basement floor drains or groups of drains shall connect into a trap or traps of adequate size. Such traps shall be so constructed that they can be readily cleaned. The venting of such traps shall be unnecessary. The drain inlet shall be so located that it is at all times in full view. When such drains are subject to back flow or back pressure, they shall be equipped, subject to the approval of the superintendent, with adequate backwater valves of a type approved by the board. The maximum distance from the trap to any floor drain shall be fifteen feet.

c. Floor drains located more than one story above the lowest part of the house drain shall be connected to the sanitary system and shall be provided with a re-vent and a properly controlled water supply connection four feet or less above the drain. Shower bath drains, drains in floor urinals or any other drain used as a part or in connection with a plumbing fixture, shall be considered a plumbing fixture. Floor drains in garages or other structures where such drains receive the discharge of oils and similar substances, shall be installed as provided in section C26-1296.0 and section C26-1313.0.

(14.9.11). § C26-1291.0 Fixture Units.—a. The following table based upon the rate of discharge from a lavatory as the unit shall be employed to determine fixture equivalents.

One lavatory or wash basin	1
One bathtub	2
One laundry tray	2
One sink (except slop sink)	2
One combination fixture	3
One urinal	3
One shower bath	2
One floor drain	2
One slop sink	3
One water-closet	6
One slop sink with flushing rim	6
One drinking fountain	½
One dental cuspidor	½
One bathroom group containing one water-closet, one lavatory and one bathtub, with or without shower or one shower stall	6
One bathroom group containing one water-closet, one lavatory, one bathtub and one shower	7
Sterilizers with ½ inch waste connections	½
Each 1,000 gallons of capacity of a swimming pool	1

b. For fixtures other than those mentioned in the above list, the number of units shall be established by the size of the waste connections on the following basis:

Size of Waste Outlet in Fixtures.	Number of Units.
½ inch, ¾ inch, less than 1 inch	½
1 inch	1
1¼ inches	2
1½ inches	3
2 inches	5½
2½ inches	8
3 inches	15
4 inches	30
5 inches	50
6 inches	80
8 inches	160

c. Where the term "water-closet" is used in sections C26-1291.0 through C26-1295.0 it shall include bed pan washers, hoppers and similar fixtures receiving fecal matter.

(14.9.12). § C26-1292.0 Minimum Size of Individual Soil and Waste Branches.—a. Minimum sizes of soil or waste branches to individual fixtures shall be in accordance with the following table:

Water-closet	3 inches
Floor drains	3 inches
Urinal	2 inches
Slop sink	3 inches
Sink (except slop sink)	2 inches
Bath tub	1½ inches
Laundry tray	1½ inches
Shower bath	2 inches
Lavatory	1½ inches
Drinking fountain	1½ inches
Dental cuspidor	1½ inches
Sterilizers with ½ inch waste outlet	1½ inches
Combination fixture (laundry tubs and kitchen sinks)	2 inches

b. The size of any stack, house drain and house sewer shall be at least that of the largest branch connected to it.

(14.9.13). § C26-1293.0 Branch Soils and Wastes.—The required size of branch soils and wastes receiving the discharge of two or more fixtures, shall be determined on the basis of the total number of fixture units drained by branch soils and wastes, in accordance with the following table:

Maximum Number of Fixture Units Permitted.	Maximum Number of Water-Closets Permitted.	Diameter of Branch.
2	..	1½ inches
9	..	2 inches
20	..	2½ inches
35	1	3 inches
100	11	4 inches
250	28	5 inches

(14.9.14). § C26-1294.0 Soil and Waste Stacks.—a. Soil or waste stacks shall extend through the roof undiminished in size as such size is established at the base, and such stacks shall also meet the requirements of section C26-1307.0.

b. Soil and waste stacks shall be as direct as possible, and such stacks shall be free from sharp angles and turns. The required size of a soil or waste stack shall be independently determined by the fixture units connected to such stack and the total length, in accordance with the following table:

Sizes of Stacks.

Maximum Number of Fixture Units Permitted.	Maximum Number of Water-Closets Permitted.	Diameter of Stacks	Maximum Developed Lengths.
4	..	1½ inches	50 feet
14	..	2 inches	75 feet
36	..	2½ inches	100 feet
90	1	3 inches	150 feet
400	40	4 inches	300 feet
1,000	120	5 inches	500 feet
1,800	200	6 inches	Unlimited
3,500	400	8 inches	Unlimited
5,000	600	10 inches	Unlimited

c. When the above table calls for a stack four inches or more in diameter which does not receive the discharge of any water-closet, the diameter may be reduced one size without changing the loading or the developed length.

d. It shall be unlawful to discharge water-closets into a stack less than three inches in diameter. It shall be unlawful to discharge more than one water-closet into a three-inch stack or branch.

e. The size of the horizontal run from the base of the soil or waste stack to the house drain, shall be in accordance with the table for sanitary house drains i

section C26-1295.0, except that the size shall be at least that of the largest stack connected to such horizontal run.

(14.9.15).§ C26-1295.0 Size of House Drains and House Sewers.—a. The required size of sanitary house drains and sanitary house sewers shall be determined on the basis of the total number of fixture units drained by them, in accordance with the following table:

Sanitary System Only.

Maximum Number of Fixture Units Permitted.	Diameter of House Drain in Inches.
2	1½
9	2
25	2½
70	3
200	4
400	5
660	6
1,500	8
2,800	10
5,000	12

b. The minimum size of a house drain receiving the discharge of a water-closet shall be four inches in diameter, continued full size to all vertical stacks receiving the discharge of a water-closet.

c. House drains receiving the discharge of any plumbing fixture shall be connected to at least one stack with a minimum diameter of three inches and extend through the roof.

(14.9.16). § C26-1296.0 Oil Separators.—a. When the liquid wastes from any structure consist wholly or in part of volatile, inflammable oil, and an oil separator is required by law, the fixtures receiving such wastes shall be connected to an independent drainage system discharging into such separator. Every oil separator shall have an individual three-inch vent extending from the top of such separator to the outer air at a point at least twelve feet above street level.

b. The discharge from the oil separator shall be either independently connected to the sewer or to the sewer side of the house trap.

c. A separator shall be accepted in lieu of a house trap.

d. A fresh air inlet shall be provided from the drain at the inlet side of the separator to the outer air and such inlet shall terminate with the open end at least six inches above grade. The diameter of such inlet pipe shall be equal to the diameter of such drain but in any case such diameter shall be three inches or more.

e. The horizontal drain and one riser shall be at least three inches in diameter. Risers shall be carried full size through the roof.

f. Oil separators shall be installed in accordance with the rules of the board.

(14.9.17). § C26-1297.0 Acid Systems.—a. It shall be unlawful to discharge into the regular plumbing system any acids or liquids of any kind which may be injurious to such system. Such acids or liquids shall be discharged through an independent system directly to the sewer. Piping for both drainage and vents shall be of acid resisting material approved by the superintendent.

b. The superintendent may, however, permit the discharge, into the regular plumbing system, of chemically neutralized acid waste or other liquids which would otherwise be injurious to the system, if in his opinion, the treatment of these liquids renders them no more harmful than regular waste and drainage.

(14.9.18). § C26-1298.0 Combined Storm and Sanitary Drainage Systems.—a. Whenever a combined storm and sanitary drainage system is employed, the required sizes of all parts of such system shall be determined by adding to the drained area an allowance in square feet for each fixture unit on the sanitary system, except that combined sanitary and storm house sewers shall be at least four inches in size. Such allowance shall be determined in accordance with the following table:

Add to the drained area the following number of square feet:

30 for each of the first 6 fixture units;
20 for each of the next 4 fixture units;
14 for each of the next 10 fixture units;
9 for each of the next 10 fixture units;
6 for each of the next 1,470 fixture units;
5 for each of the next 1,500 fixture units;
4 for each of the next 2,000 fixture units;
3 for each fixture unit thereafter.

b. The required sizes of the sanitary system and the storm system up to their point of junction may be independently determined from the tables applying to these separate systems.

c. The required sizes of storm water house drains, house sewers and all other storm water piping, shall be determined on the basis of the total drained area in horizontal projection, in accordance with the following table:

Diameter of Pipe in Inches.	Maximum Drained Area in Square Feet. A Fall, ⅛ Inch to a Foot	B Fall, ¼ Inch to a Foot.	C Fall, ½ Inch to a Foot.
2	250	350	500
2½	450	600	900
3	700	1,000	1,500
4	1,500	2,100	3,000
5	2,700	3,800	5,500
6	4,300	6,100	9,000
8	9,600	13,000	19,000
10	16,500	24,000	35,000
12	27,000	40,000	56,000

d. The size of the horizontal run from the base of the leader to the house drain, including the trap, shall be in accordance with the above table.

e. Leaders shall be at least of the size required in Column C of the above table.

(14.9.19). § C26-1299.0 Drainage of Yards, Areas and Roofs.—Except for driveway or a paved area pitched toward an unpaved area which will accommodate the rainfall on the same lot of a fully detached one or two family dwelling erected prior to the enactment of this section, areas, yards, courts and court yards, if paved, together with all roofs, shall be drained into a storm sewer or combined sewer. When drains used for such purpose are connected with the combined sewer, such drains shall be effectively trapped. One trap may serve all such connections. All traps shall be protected against frost. It shall be unlawful to drain such areas, yards, courts, court yards, and roofs into sewers intended for sewage only.

(14.9.20). § C26-1300.0 Leaders.—Every building shall be provided with gutters and leaders for disposing of water from the roof in such manner as to prevent injury to the walls and foundations, except that the superintendent, in his discretion, may grant permission for the omission of gutters and leaders, in special cases. When such gutters or leaders are omitted, the surface of the ground adjacent to the foundation walls shall be graded so as to prevent injury to the walls and foundations.

(14.9.21). § C26-1301.0 Prohibited Connections With Leaders.—It shall be unlawful to use leaders as soil, waste or vent pipes, or to use soil, waste or vent pipes as leaders, except as provided in subdivision d of section C26-1273.0, and in section C26-1314.0.

(14.9.22). § C26-1302.0 Protection of Traps by Vents.—a. Every fixture trap shall be protected against siphonage and back pressure. Every fixture trap shall be individually vented, except as otherwise provided in this section and except that the topmost fixture may be without a vent if such fixture is within two feet of the main waste or soil stack. It shall be unlawful to install crown vents.

b. In schools, traps of sinks in chemical laboratories may be installed without vents provided that:

1. Traps are of deep seal type.

2. Wastes are connected to an independent stack of acid resisting materials which serves chemical laboratory fixtures on not more than two floors and which extends without other connections to an independent house trap and house sewer, except that all similar laboratory stacks may be connected into a single line which is connected through the independent house trap to the street sewer.

(14.9.23). § C26-1303.0 Vent Pipe Grades.—Vent and branch vent pipes shall be free from drops or sags or such pipes shall be so graded and connected as to drip back by gravity to a soil or waste pipe. Where vent pipes connect to a horizontal soil or waste pipe, the vent branch shall be taken off above the center line of the pipe and the vent pipe shall rise vertically or at an angle of forty-five degrees to the vertical before offsetting horizontally or connecting to the branch, main waste or soil vent.

(14.9.24). § C26-1304.0 Distance of Vent From Trap Seal.—The maximum distance from the vent intersection with the waste or soil pipe to the dip of the trap shall be two feet developed length. The vent opening from the soil or waste pipe,

except for water-closets and similar fixtures, shall be above the dip of the trap. Branch vent lines shall be kept above the tops of all connecting fixtures, in order to prevent the use of vent pipes as soil or waste pipes.

(14.9.25). § C26-1305.0 **Main Vents to Connect at Base.**—a. Main vents or vent stacks shall connect at their base to the main soil or waste pipe at least three feet below the lowest vent branch. The size of such connection shall be as required by section C26-1306.0. Such stacks shall extend undiminished and unincreased in size above the roof or such stacks shall be reconnected with the main soil or waste stack at least three feet above the highest fixture branch. The pipe above the intersection shall be increased as required by section C26-1306.0.

b. Wherever possible, the base of the vent stack shall receive the wash of the adjoining soil or waste.

(14.9.26). § C26-1306.0 **Required Size of Vents.**—a. The required size of the vent shall be determined on the basis of the size of the soil or waste stack, the number of fixture units connected to the vent and the developed length of the pipe, in accordance with the following table. Vents shall be at least one and one-half inches in diameter. The diameter of every vent stack shall be at least one-half the diameter of the soil or waste stack served. In determining the developed length of vent pipes, the vent stack and branches shall be considered continuous.

Vent Stacks and Branches.

Diameter of Pipe	Maximum Number of Fixture Units Permitted	Maximum Developed Length in Feet for Each Size
1½ inches	6	25
2 inches	40	60
2½ inches	72	100
3 inches	120	150
4 inches	250	250
5 inches	500	300
6 inches	1,250	400
8 inches	2,400	unlimited
10 inches	3,000	unlimited
12 inches	5,000	unlimited

b. Where main stacks are grouped together at the top of a structure into one pipe which extends through the roof, such combined vent shall be at least equal in area to seventy-five percent of the sum of the areas of the stacks connecting into such combined vent.

(14.9.27). § C26-1307.0 **Roof Vent Extensions and Terminals.**—a. Roof extensions of soil and waste stacks, or roof vents, shall be run at full size at least one foot above any roof pitched at an angle of thirty degrees or more from the horizontal. Such extensions shall be run full size at least four feet above any roof pitched at an angle of less than thirty degrees from the horizontal. Such extensions shall be run at least five feet where the roof is used for any purpose other than weather protection.

b. If the roof terminal of any vent, soil or waste pipe, is within ten feet of any door, window, scuttle or airshaft, such roof terminal shall extend at least three feet above such opening.

c. When soil waste or vent pipes are extended through the roof, they shall be at least four inches in size. Pipes smaller than four inches shall be provided with a proper increaser located just below the roof line.

(14.9.28). § C26-1308.0 **Location of Windows in Relation to Vent Stacks.**—In the event that a structure is built higher than a structure erected before January first, nineteen hundred thirty-eight, it shall be unlawful for the owner of such higher structure to locate windows within ten feet of any existing vent stack on such lower structure, unless the owner of such higher structure shall defray the expenses of, or shall himself make, such alterations as are necessary to conform the vent stacks on such lower structure with the provision of this title.

(14.9.29). § C26-1309.0 **Vents Not Required.**—Vents may be omitted on leader traps, back-water valves, subsoil catch basin traps, or drinking fountains as described in section C26-1312.0.

(14.9.30). § C26-1310.0 **Local Vent Connections.**—a. Local vent pipes may be installed.

b. Local vent pipes from fixtures, when installed, shall be entirely distinct from other ventilating ducts, flues, or pipes in the structure.

c. Local vent pipes in which condensation may collect shall be provided with drips. Such drips shall either be connected as an indirect waste or shall be connected to the house side of a fixture trap.

(14.9.31). § C26-1311.0 **Offsets in Soil, Waste, and Vent Stacks.**—When cast iron bell and spigot pipe is used, offsets in soil and waste stacks above the highest fixture connection, and offsets in vent stacks and connections of such vent stacks to a soil or waste pipe at the bottom, or to the house drain, shall be made at an angle of at least forty-five degrees to the horizontal, except that where it is impractical, because of structural conditions, to provide a forty-five degree angle, the superintendent may permit a reduction in the angle under such conditions as he may prescribe.

Sub-Article 10. Refrigerator, Industrial, Safe and Special Wastes

(14.10.1). § C26-1312.0 **Indirect Wastes.**—a. Bar sinks, soda fountains and drinking fountains may be installed with indirect wastes. Where kitchen fixtures, refrigerators, ice boxes or receptacles wherein food is stored, are not water supplied, drips therefrom shall be installed with indirect wastes. Kitchen and similar equipment which is not water supplied shall be installed in indirect wastes.

b. Indirect wastes which receive the discharge from fixtures on more than three floors or which exceed one hundred feet in length shall be extended through the roof.

c. Fixtures connected to indirect wastes shall be trapped, but it shall be unnecessary to vent such fixtures.

d. Indirect wastes shall discharge into a water supplied, trapped and vented sink, floor drain, funnel or other approved receptacle.

e. The size of indirect waste pipes shall be the same as fixed by section C26-1294.0, except that the size of indirect wastes receiving drinking fountains only may be fixed by the number of fixtures connected, without regard to the developed length.

f. Drip pipes from refrigerators, ice boxes or receptacles where food is stored shall be installed as indirect wastes, and such drip pipes shall discharge into a safe pan, receptor, floor drain or sink. The waste from such safe pans or receptors, shal be trapped with traps approved for such use. The piping shall be installed witl clean-outs on horizontal runs.

g. The waste pipe from a refrigerator safe or receptor shall be at least one inch in diameter. When such pipe is installed as a stack with branches on separat floor, such pipe shall have a minimum diameter of one and one-quarter inches. Suc pipe shall be of brass, copper or galvanized wrought iron.

(14.10.2). § C26-1313.0 **Industrial Wastes.**—Wastes from hospitals, chemica plants, laundries, abattoirs, or any other industrial wastes, which in the opinion o the superintendent are detrimental to the public sewer system or public health, sha be treated inside of the structures as directed by the superintendent, before suc wastes are discharged into the sewer. At the time of the filing of plumbing plan for any hospital, chemical plant, laundry, abattoir or any similar industrial structur a statement shall be filed as to what substances, ingredients or matter other tha the usual wastes from the human body, will be discharged into the sewer.

(14.10.3). § C26-1314.0 **Overflow and Emergency Drains.**—a. Overflow and drai pipes from expansion tanks, filters, drip pans, cooling jackets, sprinkler systems an similar equipment and from the exhaust of a water lift, shall discharge upon tl roof, or shall be trapped into an open fixture or shall discharge as for refrigerat wastes. With the express permission of the superintendent, such pipes, if provide with a check valve, may be connected to a leader.

b. It shall be unlawful to make connections between water supply pipes a the sanitary system.

Sub-Article 11. Special Conditions

(14.11.1). § C26-1315.0 **Drainage Below Sewer Level.**—a. The drainage from su parts of the drainage systems as lie below the crown levels of the street sewer a also from such parts as cannot drain by gravity into the sewer shall be disposed through a system of sub-house drains and shall be lifted by approved means into t sewer.

b. The discharge from any sump or receiving tank required by this article to airtight and vented, shall be connected with the house sewer on the street side of t house trap and the inlet to such sump or receiving tank shall be provided with house trap and fresh air inlets as provided in section C-26-1289.0 except as to locati

c. The discharge from any sump or receiving tank not required by this arti to be air-tight and vented, shall discharge into a house drain ahead of the house or i the house sewer on the street side of the house trap.

d. Piping for a sub-house drainage system shall be installed in accordance w

the requirements for gravity systems. The lifting equipment shall be considered the equivalent of the house sewer.

e. Sub-house drains shall discharge into an air-tight sump or receiving tank so located as to receive the sewage by gravity. From the sump or receiving tank, the sewage shall be lifted and discharged by pumps, pneumatic ejectors or equally efficient devices automatically operated. When the lifting device forms a trap, an additional trap on the drain may be omitted, but all fixtures and equivalent devices shall be trapped. When sub-drains do not receive the discharge of plumbing fixtures other than cellar floor drains or drips from machinery, it shall be unnecessary for the sump or receiving tank to be air-tight or vented.

(14.11.2). § C26-1316.0 Venting of Ejector Systems.—The venting of sub-house drainage systems shall be as described under (a) and (b) as follows, depending upon whether the system is atmospheric or pneumatic:

(a) The vents of sub-house drainage systems may be connected to the vents of the gravity systems.

(b) When an atmospheric system is used and the sewage is discharged by means of pumps, the sewage receiving tank shall be provided with a three-inch vent pipe which may be connected to the gravity vent system, provided such system is three inches or larger.

(c) When a pneumatic system is used and the sewage is discharged by means of air pressure, the mechanism for the relief of such air pressure in the closed sewage receptacle shall have valves, piping and connections which form part of the sewage ejector device, of sufficient size to relieve the ejector pot to atmospheric pressure in not more than ten seconds. The minimum size for such valves, piping and relief connections in no case shall be less than one and one-quarter inches in diameter. Such pneumatic sewage ejector relief device shall have an independent vent line not less than three inches in diameter connected thereto and carried independently to the roof, terminating in the same manner as required for vent pipes in Section C26-1307.0.

(14.11.3). § C26-1317.0 Motors, Compressors and Air Tanks for Sub-House Drainage Systems.—Motors, compressors, control panels and air tanks shall be so located as to be open for inspection and repair at all times.

(14.11.4). § C26-1318.0 Sub-Soil, Foundation, Clear Water and Absorption Tile Drains.—Sub-soil drains, where installed, shall discharge into a silt interceptor or sand trap. The piping from such interceptor, if connected to the house drain, shall be provided with an approved back water valve and trap, both accessibly located. The discharge shall be connected behind a leader or area drain trap. The material for sub-soil drains shall be clay pipe laid with open joints, or perforated horseshoe tile.

(14.11.5). § C26-1319.0 Sub-Soil Drains Below Sewer Level.—Sub-soil drains below the sewer and cellar floor drains or drips from machinery shall be discharged into an independent sump or receiving tank. The contents shall be automatically lifted and discharged into a leader or into a storm water drainage system on the inlet or outlet side of the trap. The discharge of automatic systems shall be protected against back pressure.

(14.11.6). § C26-1320.0 Condensers and Blow-Off Tanks.—It shall be unlawful to connect a steam exhaust, boiler blow-off or drip pipe with the house drain. Such pipes shall discharge directly into a condensing tank properly connected to the house sewer. In low pressure steam systems the condensing tank may be omitted, but the waste connection must otherwise be as required in this article.

Sub-Article 12. Tests of Plumbing Systems

(14.12.1). § C26-1321.0 Tests of Plumbing Systems Required.—a. Every part of any drainage or vent piping shall be subjected to a water test before any such part is concealed or built in. After all the plumbing fixtures have been set, the entire drainage and vent system shall be subjected to a final smoke test.

b. The equipment, materials, power and labor necessary for such tests shall be furnished by, and at the expense of, the plumber.

c. Such tests shall be witnessed by duly qualified inspectors of plumbing who are authorized by the superintendent. Every part of the drainage and vent piping shall be approved by the superintendent both as to installation and tests if such installation tests are satisfactory.

d. If any house drainage or plumbing system or any part thereof is covered before it has been regularly inspected, tested and approved as prescribed in this article, such system or part thereof shall be uncovered upon the direction of the superintendent.

e. If the inspection or test shows any defects, such defects shall be corrected

and such inspection and tests shall be repeated until the superintendent is satisfied with the results of such inspection or tests.

f. When the plumbing system has been satisfactorily completed and finally tested, a certificate of approval shall be issued by the superintendent to the plumber.

(14.12.2.1). § C26-1322.0 Methods of Testing Plumbing Systems.—a. Duration of Plumbing System Tests.—Tests shall be applied for a length of time sufficient to permit a thorough inspection.

(14.12.2.2). b. Water Test.—

1. The water test shall be applied to every part of the entire sanitary drainage, venting and storm water drainage systems. Each system may be tested in its entirety or in sections. All openings in the piping shall be tightly closed.

2. If a single test is to be applied to the entire system, such system shall be filled with water to the point of overflow above the roof.

3. If the system is tested in sections, each opening, except the highest opening of the section being tested, shall be tightly plugged and each section shall be filled with water; but every section shall be tested with at least a ten-foot head of water. In testing successive sections, at least the upper ten feet of the next lower section shall be retested, so that every joint or pipe in the structure, except the uppermost ten feet of the system, shall have been subjected to a test of at least a ten-foot head of water.

(14.12.2.3). c. Air Test.—An air test in lieu of a water test shall be accepted only when express permission is obtained from the superintendent. When such a test is permitted, all parts of the plumbing piping shall be tested to a pressure of five pounds of air per square inch and shall be proved tight under such pressure.

(14.12.2.4). d. Smoke Test.—Fixture, leader, drain and house traps shall be filled with water, and a thick, penetrating smoke, produced by one or more approved smoke machines, shall be introduced into the entire system. As the smoke appears at the stack openings on the roof, such openings shall be tightly closed and a pressure equivalent to a one-inch water column shall be applied.

Sub-Article 13. Gas Piping

(14.13.1). § C26-1323.0 General Provisions for Gas Piping.—Gas supply and distribution pipes shall be made of suitable material. Such pipes shall have tight joints. When the gas piping system is completed, it shall be tested in accordance with the rules of the board.

(14.13.2). § C26-1324.0 Gas Service Connection.—a. Each and every gas service connection which is hereafter brought into a structure shall be fitted with an approved lubricated type shut-off stopcock or shut-off valve or equivalent so designed and constructed as to preclude the core from being blown out by the pressure of the gas in such pipe. Such stopcock or shut-off valve shall be placed in an accessible position immediately inside of the wall through which such connection enters and on the street side of the gas meter and of the gas regulator, if any. Each such existing gas service connection carrying gas at a pressure in excess of one pound per square inch and not now provided with such type stopcock or shut-off valve shall be so equipped before July 1, 1948. Each and every gas service connection which is hereafter installed through a building wall, shall be protected with a suitable wall sleeve which shall extend at least four inches beyond the outer side of the wall and at least one inch beyond the inner side of the wall and which shall be sealed at both ends to prevent the entry of water.

b. In all high pressure areas, the gas company concerned shall at least once each and every year, inspect the stopcock or shut-off valves to insure that they are all in good working order and ready for immediate use.

c. All materials used in the installation of stopcock or shut-off valves shall be approved by the commissioner. All matters in relation to stopcock or shut-off valves not covered by this section shall be determined by the Commissioner.

d. No gas service shall enter a structure constructed on or after the first day of July nineteen hundred forty-nine at a horizontal distance of less than ten feet from the cellar termination of a stairway nor shall any gas meters or gas pressure regulators be located at a lesser distance from such stairway termination, except that, where the width of the building is such that the required ten feet distance cannot be obtained, gas services, meters and regulators (where required) shall be at the maximum distance practicable from such stairway termination.

e. Any requirements of this section shall be in addition to, and not in substitution for, any other requirements prescribed by existing laws or regulations.

f. Any person or persons who shall violate any of the provisions of this section, upon conviction thereof, shall be punishable by a fine of not more than $500, or imprisonment for sixty (60) days, or both.

(14.13.2.1). § C26-1324.1 Gas Regulator and Gas Regulator Vent Outlets.—Each and every existing or hereafter installed gas service connection supplying gas into any building or premises at a pressure in excess of one pound to the square inch shall be provided with a device which will reduce the pressure of such gas prior to entering the meter in the said building or premises to not more than one-half pound per square inch, except that the commissioner may permit a higher pressure for commercial or industrial use. Each such device or regulator shall be provided with a ventilating pipe which shall lead directly to the outer air, and said outlet, where practicable, shall not be located under a window or any opening leading back into the premises. It shall be unlawful for any person to cover over, plug up or otherwise obstruct any gas regulator vent outlet. A gas vent identified by suitable marking shall be attached to the outlet on the outside of the building.

(14.13.2.2). § C26-1324.2 Outside Gas Cut-off.—a. Hereafter it shall be unlawful to convey manufactured, mixed or natural gas at a pressure in excess of one pound to the square inch into any building, place or premises through a pipe or conduit hereafter constructed unless a cut-off valve or cock and housing assembly of a type approved by the commissioner is installed in such pipe or conduit outside of the building.

b. Each such cut-off valve or cock shall be installed in an approved protective housing. A cover, securely fastened and easily identifiable, shall be provided for the housing. Such cover shall be flush with the surface of the ground and kept in the clear at all times so as to be accessible for immediate use. If a building, place or premises is supplied directly from a gas main in a public street and the curb valve or cock required by section 734 (5)-1.1 of the code is within one hundred feet of the building, the requirements of this section shall be construed as being satisfied.

c. Such cut-off valve or cock shall be capable of being readily operated by removing the cover of the housing and inserting a portable key over the operating nut of the valve or cock.

(14.13.3). § C26-1325.0 Gas Meter Location.—Meters shall be located as near as practicable to the point of entrance of the service and, where possible, such meters shall be located in the cellar or basement, except by special permission from the superintendent. The meter locations shall be clean, dry and free from steam or chemical fumes. Such meters shall be protected against extreme cold or heat, shall be properly ventilated, and shall be readily accessible for reading and inspection.

(14.13.4). § C26-1336.0 Gas Pipe.—All steel gas pipes hereafter installed shall conform to the standard specifications of the A.S.T.M. Designation, A-53-47, A-120-47, A-135-46, or A-139-46. Wrought iron pipes shall conform to the standard specifications of A.S.T.M. Designation, A72-45; cast iron pipes to A.S.T.M. Designation, A-44-41; copper pipes to A.S.T.M. Designation B-42-49; brass pipes to A.S.T.M. Designation, B-43-49. Piping shall be at least ⅜-inch in diameter. Cast iron pipe shall be permitted only in underground installations outside of any structure.

(14.13.5). § C26-1327.0 Gas Pipe Fittings.—Fittings hereafter installed shall be malleable iron, steel or brass and shall be either screwed or welded type or flanged type with approved type gasket. Right and left couplings may be used. Ground joint unions and approved type compression couplings may be used on gas piping from the gas service stopcock or valve to and including the gas meter outlet. Ground joint unions may be used also between an appliance shut-off valve or stopcock and the appliance. Approved type compression couplings may be used on gas piping buried outside of buildings. It shall be unlawful to use gasketed unions or running threads. Any flexible range connector, or other fitting, approved by the board of standards and appeals may be used. Nothing in this section shall be construed as prohibiting the installation and use of any type of fitting approved by the board for use between the point at which a gas service enters the structure and the meter to which the service connects when installed by persons or corporations subject to the jurisdiction of the public service commission of the state of New York.

(14.13.6). § C26-1328.0 Gas Pipe Stopcocks and Valves.—Stopcocks and valves hereafter installed shall be of approved types. Stopcocks and valves shall be tight. The stopcocks on branches shall be provided with "T" handles and shall be capable of being operated by the building occupants.

(14.13.7). § C26-1329.0 Installation of Gas Piping.—a. All pipes shall be run straight without sags or traps and shall be so pitched as to drain back to the riser and from the riser to the meter. Drops shall be secured with at least one solid metal strap.

b. A drip pocket consisting of a nipple screwed into the bottom of each riser and provided with a cap shall be installed at the base of each gas riser and at all lower points of the gas distribution system.

c. Gas piping outside a structure hereafter installed shall be installed not less than two feet below ground. In a case where exact compliance with this rule would be unusually difficult, the superintendent may permit a modification, provided the piping is otherwise adequately protected. Any piping which is exposed to outdoor temperatures or installed underground with a cover of less than two feet, shall be protected against frost. Where piping is laid in concrete, such piping shall be coated with a preservative paint. Where corrosive conditions exist, the pipe shall be protected in an approved manner.

d. Branch outlet pipes shall be taken from the top or sides of the horizontal lines and not from the bottom.

(14.13.8). § C26-1330.0 Gas Pipe Outlets.—Outlets from concealed piping shall extend one inch through the finished ceiling or wall. Either the outlet fitting or the pipe shall be securely fastened to the wall or stud. All outlets shall be capped until the fixtures are attached.

(14.13.9). § C26-1331.0 Gas Pipe Sizes.—Piping systems shall be so proportioned as to give an adequate volumetric flow of gas to all lighting, cooking and heating fixtures or appliances which are supplied or intended to be supplied from the piping system.

(14.13.10). § C26-1332.0 Gas Range Outlets and Stopcocks.—The minimum diameter of outlets for gas ranges shall be three-quarters of an inch. All gas ranges and heaters shall have a straightway stopcock or valve on each branch supply to such devices.

(14.13.11). § C26-1333.0 Gas Brackets and Fixtures.—a. Gas brackets and fixtures shall be so placed that the burners are a minimum of three feet below any ceiling or woodwork, except that where proper protection is furnished by a shield, the distance may be eighteen inches or more.

b. It shall be unlawful to use swinging or folding gas brackets.

c. Gas brackets on any lath and plaster partition or on any woodwork, shall be at least five inches in length, measured from the burner to the plastered surface or woodwork.

(14.13.12). § C26-1334.0 Test of Gas Piping.—After all house piping is installed, the plumber shall make air pressure tests on the house piping and the service piping he has installed. When such piping is installed to operate with a gas pressure of one pound per square inch or less, the test pressure shall be equal to a column of mercury six inches in height. When such piping is installed to operate at pressures in excess of one pound per square inch, the test pressure shall be at least ten pounds per square inch higher than the maximum expected pressure. The maximum expected pressure on the gas service piping installed by the plumber shall be obtained from the utility company serving the area, and the maximum expected pressure on the house piping from the owner of the building. The required test pressures shall be maintained for at least ten minutes and tests shall be performed in the presence of an inspector of the department. It shall be unlawful to cover any piping, or connection to such piping of any meter, or gas appliance until it has been satisfactorily tested as prescribed above. Nothing in this section shall be construed as requiring a plumber to test any piping installed by persons or corporations subject to the jurisdiction of the public service commission of the state of New York.

(14.13.13). § C26-1335.0 Establishing Gas Supply.—It shall be unlawful for any utility company to supply gas to any building, place or premises in which new meters, other than replacements are required until a certificate of approval of the gas installation from the department is filed with such utility company. Said certificate shall be issued only when the gas piping complies with all applicable provisions of this chapter.

ARTICLE 16. SPRINKLER SYSTEMS

(15.1). § C26-1336.0 Installation of Sprinkler Systems.—a. General.—Sprinkler systems required to comply with any provision of law or installed to obtain advantages under any provision of law shall be installed in accordance with the requirements of this article and the rules of the board.

(15.1.1). b. Filing and Approval of Plans for Automatic Sprinkler Systems.—

1. Before any automatic or non-automatic sprinkler equipment is installed, plans of the proposed equipment shall be submitted to the department for approval. Such plans shall be accompanied by an application for a permit and by specifications, on suitable forms adopted as standard forms by the commissioner, in such manner as may be prescribed by the commissioner.

When the equipment to be installed is an addition to an existing installation, enough of the old system shall be indicated on the plans to make all conditions clear.

2. It shall be unlawful to commence any sprinkler work required or voluntary, until the plans and application have been approved and a permit for the proposed work has been issued by the superintendent.

3. Applications, specifications and plans shall be filed only by the owner or his duly authorized agent.

4. After examination of the application, specifications and plans, the superintendent shall promptly notify the applicant, in writing, of approval or disapproval. In the case of disapproval, the superintendent shall list his criticisms and objections and such changes in plans as may be necessary to make such plans conform to the provisions of this title and to the rules of the board. When the applicant has fully corrected his plans, and has satisfactorily answered all the objections raised, such applicant shall be notified that his application and plans are approved. The superintendent may require the applicant to file a maximum of two sets of clean, correct plans on cloth before issuing a permit for the proposed work to proceed. If the structure is equipped with an approved stand-pipe system, the plans shall include a notation to such effect.

(15.2). § C26-1337.0 Scope of Plans for Sprinkler Systems.—a. The plans for sprinkler systems shall be drawn to an indicated scale of at least one-eighth of an inch to one foot. The plans shall give the name of the owner of the property, the correct address of the property, the name and address of the applicant, and the points of the compass.

b. The plans shall show the floors of the structure and a longitudinal section or cross-section of the structure with story heights, and the essential features of construction of the structure, including the size, location and direction of joists, timbers, beams or other structural members, and walls, partitions and such other information as may be necessary.

c. The plans shall show the sizes and locations of the water supplies, and the location, spacing, number and type of sprinklers. The plans shall show the approximate location and the correct size of all feed mains, risers and connections and any valves placed therein. Such plans need show only the essential features of the equipment.

d. The application forms signed by the applicant, shall contain a statement that the equipment will be installed as shown on the approved plans, and that all details not required to be shown on the plans will be installed in accordance with the requirements of this article and the rules of the board.

e. Plans for non-automatic dry-pipe systems shall also indicate the number, type and location of the automatic fire alarm devices required.

f. Equipment for sprinkler systems shall be installed in accordance with such approved plans, unless amended plans are filed at a later date by the owner or his duly authorized agent. When such amended plans are approved, the installation shall be made in accordance with such plans. Amendment need not be filed where changes involve ten or less sprinklers or where minor adjustments are required by field conditions, provided the protection in the area affected is not impaired.

g. Where additions or alterations to an existing sprinkler system involves not more than twenty heads in a fire area an application shall be filed by the contractor stating the number of heads to be installed or relocated.

(15.3). § C26-1338.0 Test of Sprinkler Systems.—When a sprinkler system is entirely completed in accordance with the approved plans, application shall be made to the fire department for inspection and a hydrostatic pressure test of the completed installation. The test shall be conducted at the owner's risk, by his representative and before a representative of the fire department. The fire commissioner shall notify the superintendent in writing of the results of the inspection and test. When the sprinkler equipment is approved the applicant shall be so advised in writing by the superintendent.

(15.4). Definition of Sprinkler Systems.—A "sprinkler system" shall consist of a system of piping connected to one or more acceptable sources of water supply, provided with distributing devices so arranged and located as to discharge an effective spray over the interior of the building area.

(15.5.1). § C26-1339.0 Classification of Sprinkler Systems by Type.—For the purpose of this article, sprinkler systems shall be classified as:

1. Automatic Wet Pipe Sprinkler Systems.—Automatic wet pipe sprinkler systems are those systems in which all pipes and sprinkler heads are at all times filled with water or other approved liquids.

(15.5.2). 2. (a) Automatic Dry Pipe Sprinkler Systems.—Automatic dry pipe sprinkler systems are those systems in which the pipes and sprinkler heads are filled with air, either compressed or at atmospheric pressure, and the water supply is controlled by a dry pipe valve as defined in subdivision h of section C26-1365.0.

(b) Combined Dry Pipe and Pre-action Systems—Combined dry and pre-action systems are those systems in which the dry pipe valves will operate as both type A and type B dry pipe valves as described in subdivision h of section C26-1365.0.

(15.5.3). 3. Non-automatic Sprinkler Systems.—(a) Non-automatic sprinkler systems are those systems in which all pipes and sprinkler heads are maintained dry, the only water supply of which is a Siamese fire department hose connection.

(b) An approved automatic fire alarm system, connected to the fire department headquarters, or to an approved central station of one of the fire alarm companies whose sole business is fire protection service, shall be provided in connection with each required non-automatic sprinkler system.

(15.5.4). 4. Deluge System.—A system employing open sprinklers or a combination of open and closed sprinklers attached to a piping system connected to a water supply through a valve which is opened by the operation of a heat responsive system installed in the same areas as the sprinklers. When this valve opens, water flows into the piping system and discharges from all opened sprinklers attached thereto.

(15.6). § C26-1340.0 Approved Devices for Sprinkler Systems.—Siamese connections, fire pumps and their control devices, check, control and other valves, pipe line fittings and other units of equipment and accessories in sprinkler systems, shall be of approved makes and shall be as classified for the water pressures or other operating and service conditions to which they will be subjected. Approved devices shall include those approved by the board at any time, or those tested and approved by any nationally recognized standard testing laboratory which possesses adequate equipment, experience and competency in this field.

(15.7). § C26-1341.0 Water Supply for Sprinkler Systems.—a. General.—Approved sources of water supply shall be classified as "automatic" and "auxiliary." Capacities of automatic sources specified in sections C26-1342.0, C26-1345.0, C26-1346.0 and C26-1347.0 are for ordinary hazard occupancies. For light hazard occupancies these shall not be less than 50 per cent of the requirements for ordinary hazard. For extra hazard they shall not be less than 150 per cent of the requirements for ordinary hazard.

(15.7.1). b. Automatic Sources of Water Supply for Sprinkler Systems.—Automatic sources of water supply for sprinkler systems shall include a gravity tank, pressure tank, automatic fire pump or direct connection to the public water system.

(15.7.2). c. Auxiliary Sources of Water Supply for Sprinkler Systems.—Auxiliary sources of water supply for sprinkler systems shall include a manually actuated fire pump or Siamese fire department connection.

(15.7.3). d. Combination Sprinkler and Standpipe Tanks.—Tanks used to provide the required primary water supply to a standpipe system may also be used as a supply for an automatic sprinkler system in the structure as provided in section C26-1409.0.

(15.7.4). e. Non-automatic Sources of Water Supply for Sprinkler Systems.—Non-automatic sources of supply for sprinkler systems shall include Siamese fire department hose connections.

(15.8.1). § C26-1342.0 Gravity Tanks for Sprinkler Systems.—a. Capacity and Elevation of Gravity Tanks.—

1. Gravity tanks for sprinkler systems shall contain an available quantity of water sufficient to supply twenty-five per cent of the number of sprinkler heads in the average protected fire area for twenty minutes, and in any case at least five thousand gallons. Where there are more than two hundred and not more than four hundred sprinklers in such average protected fire area, the available quantity of water in excess of 20,000 gallons need not be greater than an amount sufficient to supply twelve and one half per cent of the sprinklers in excess of two hundred in such average protected fire area for a period of twenty minutes. If the number of sprinklers in such average fire area exceeds four hundred, the available quantity of water in excess of 30,000 gallons need not be greater than an amount sufficient to supply six and one fourth per cent of the sprinklers in excess of four hundred in such average protected fire area for a period of twenty minutes. The bottom of such tanks shall have an elevation of at least twenty feet above the highest line of sprinklers supplied from such tank. It shall be unnecessary to elevate gravity tanks above the highest sprinklers in pent houses or bulkheads having an area of less than twenty-five hundred square feet, exclusive of mechanical equipment rooms, unless such pent houses or bulkheads contain a hazardous occupancy or are used for the storage of highly combustible material.

2. Where a tank supplies both sprinklers and yard hydrants, the capacity of such tank shall be at least thirty thousand gallons, and the bottom of such tank shall be at least seventy-five feet above the ground level.

3. Were a tank capacity in excess of thirty thousand gallons is required by this title, the amount of water required shall be provided in separate tanks not grouped together, except when tanks of unlimited capacities are supported on structures altogether independent of buildings and except that the superintendent may, in his discretion, permit grouping of tanks in specific cases.

(15.8.2). b. Means of Filling for Gravity Tanks.—

1. Gravity tanks shall be filled at the rate of at least sixty-five gallons per minute. Tank may be filled through a by-pass around the check valve in the discharge pipe, which by-pass shall be at least two inches in diameter. Such piping shall have therein an approved outside screw and yoke gate valve on either side of a check valve, the O.S.&Y. valves shall be kept closed except when the tank is being filled.

2. Where separate filling lines are used the filling pipe shall be carried up inside the frostproof casing as provided in paragraph one of section C26-1343.0, and may extend through the tank bottom to discharge at the top of the tank above full water level, except where the tank is located on an independent structure. The portion of such pipe inside the tank shall be of brass or copper or other non-corrosive material.

3. It shall be unlawful to feed tanks through sprinkler lines, except as otherwise provided.

4. The sprinkler and standpipe tanks may be fed from a common source of supply, either a pump or a direct service main connection, provided that there are separate feed mains from the basement or lowest story and a control valve in each feed line. Gravity tanks and pressure tanks for sprinkler supply may be fed through one riser common to both tanks, if an O.S.&Y. control valve is provided in the branch to each tank.

(15.8.3). c. Overflow Pipes for Gravity Tanks.—

1. An overflow pipe shall be provided on each gravity tank. Such pipe shall be at least one size larger than the filling pipe but in any case such pipe shall be three inches or more in diameter.

2. The top of such overflow pipe shall be at least one inch below the bottom of the spider rod hole in a steel tank for the bottom or the bottom of the flat cover joists of a wood tank, but in any case such top shall be three inches or more below the top of the tank proper.

3. The overflow pipe may extend through the bottom of the tank provided the portion inside the tank is of brass or copper or other non-corrosive metal and without joints, or such pipe may extend through the side of the tank. For tanks over roofs, overflow pipes shall terminate twenty-four inches above the roof and shall be fitted with a ninety degree elbow to discharge horizontally.

(15.8.4). d. Emergency Drains for Gravity and Pressure Tanks.—

1. Each gravity tank and each pressure tank shall be provided with an emergency drain four inches in diameter except that if a pressure tank is located on the lowest floor of the building or at grade or below grade outside the building a two inch drain may be accepted.

2. Such drain shall be equipped with a gate valve and arranged to discharge horizontally twenty-four inches above the roof. When such tank or tanks are located on a separate structure independent of buildings, such drain connections shall be allowed to discharge at a level twenty-four inches above the ground. The valve controlling the emergency drain of such tanks on a separate structure shall be located three feet or less above the ground level. Emergency drain piping from the tank up to and including the drain control valve shall be protected from freezing in an approved manner.

3. The water in all gravity tanks shall, at all times, be maintained at a temperature between forty degrees Fahrenheit and one hundred degrees Farhrenheit.

4. Where direct heating of the water in a gravity tank is necessary to obtain the required temperature, the method of heating shall be in accordance with the rules of the board.

5. If tanks are in an adequately heated enclosure, interior heating of such tanks may be omitted. Tank enclosures shall be properly lighted and drained, and the pipes properly flashed.

(15.9). § C26-1343.0 Frost Protection for Sprinkler Systems.—Pipes, fittings and valves exposed to freezing temperature, unless used in a dry pipe system or a system filled with calcium chloride solution or other approved non-freezing solution, shall be frostproofed by either hair felt and builders' paper or by wood boxing or equivalent protection, in accordance with the following specifications:

(15.9.1). 1. **Insulation Against Frost.**—a. The discharge, fill, overflow and heating pipes of each tank, if not within an enclosure in which the temperature is maintained at forty degrees Fahrenheit or more at all times, shall each be frost-proofed in one of the following manners:

1. Each pipe shall be painted with two coats of red lead in linseed oil with a small percentage of litharge as a hardener; such pipe or group of pipes shall then be successively covered with: one wrapping of waterproof building paper; three layers of one-inch thick hair felt, each such layer wrapped with waterproof building paper;

a covering jacket of eight-ounce or heavier canvas securely sewed in place; two coats of waterproof paint applied to such canvas jacket.

2. Each pipe or group of pipes shall be surrounded by wooden boxing consisting of an inner layer of at least five-eighths of an inch of matched sheathing separated by a two-inch air space from an outer layer made of two thicknesses of such sheathing with insulating paper between.

3. As otherwise provided in the rules of the board.

(b) All exterior surfaces of frostproofing shall be painted with at least two coats of waterproof paint except as otherwise prescribed in the rules of the board.

(15.9.2). 2. Fire Protection of Wood Boxing.—If tank connections are frostproofed by wood boxing and are exposed to ignition from adjoining buildings, such wood boxing shall be covered by from three-quarters of an inch to one inch of cement plaster, consisting of one part of standard cement and three parts of clean sharp sand, with at most fifteen percent of slaked lime added; the plaster shall be applied to at least No. 28 U.S. gage approved expanded metal lath, securely fastened to the wood boxing, or by at least No. 24 U.S. gage, corrosion resisting metal, securely fastened in place, by one-half inch locked joints and copper or brass nails.

(15.9.3). 3. Penstock Type of Discharge.—

(a) Frostproofing may be omitted if the penstock type of tank discharge, thirty-six inches or more in diameter, is used, provided approved internal heating connections are installed. Painting shall be the same as that applied to the tank.

(b) It shall be unlawful to use the penstock type of discharge when the tank is over the roof of a structure.

(15.10). § C26-1344.0 Tank Ladders and Supports.—a. Easy access to the top of each tank shall be provided by means of a ladder constructed as described in section C26-1417.0.

b. Tanks shall be constructed according to the requirements of this title and supporting structures shall be approved by the superintendent. Tanks not enclosed and exposed to the weather shall be covered with a double roof of acceptable construction consisting of a tight flat cover of matched boards and above this a conical roof which shall be covered with an approved roofing.

(15.11). § C26-1345.0 Pressure Tanks for Sprinkler Systems.—a. Pressure tanks shall contain sufficient water to supply twelve and one-half per cent of the number of sprinklers in the average protected fire area for twenty minutes, but there shall be at least three thousand gallons of water for a wet pipe system where supplemented by an auxiliary water supply, and at least five thousand gallons of water for a dry pipe system. Where there are more than two hundred and not more than four hundred sprinklers in such average protected fire area, the available quanity of water in excess of 10,000 gallons need not be greater than an amount sufficient to supply six and one-fourth per cent of the sprinklers in excess of two hundred in such average protected fire area for a period of twenty minutes. If the number of sprinklers in such average protected area exceeds four hundred, the available quantity of water in excess of 15,000 gallons need not be greater than an amount sufficient to supply three per cent of the sprinklers in excess of four hundred in such average protected fire area for a period of twenty minutes. If there is a secondary supply consisting of a gravity tank or tanks, as specified in C26-1342.0; a city connection or connections as specified in C26-1346.0 or an automatic fire pump, as specified in C26-1347.0, the total available quantity of water in the pressure tanks need not exceed 15,000 gallons. The maximum gross capacity of a single pressure tank shall be nine thousand gallons. Each such tank shall be kept at a maximum of two-thirds full of water; a minimum of one-third of its capacity shall be filled with air under a minimum pressure of seventy-five pounds per square inch. Each such tank shall be so proportioned and located that a pressure of at least fifteen pounds per square inch will be available on the highest line of sprinklers below the main roof, when all the water has been discharged from the tank.

b. Tank supports shall be figured on the basis of the tanks being full of water plus the weight of the tanks.

c. The tank shall be supplied with water through a fixed pipe, independent of the sprinkler piping, at least two inches in size. The water supply and connection shall be capable of supplying the tank at a rate of at least sixty-five gallons per minute without reducing the pressure in the tank. The tank shall have a fixed water level plate on the end of the tank opposite the gauge glass, or other acceptable device, to indicate the level of the water in the tank.

d. The air compressor shall be of sufficient capacity to deliver at least sixteen cubic feet of free air per minute for tanks up to seventy-five hundred gallons total capacity and at least twenty cubic feet per minute for larger sizes.

(15.12). § C26-1346.0 Public Water System Connection for Sprinkler Systems.—a. General—A direct connection to a city water main shall be acceptable as a supply to automatic sprinklers, provided it is capable of maintaining a pressure of at least fifteen pounds per square inch at the top of the highest sprinkler riser, with five hundred gallons of water flowing per minute at a two and one-half inch outlet from a hydrant at the street level within two hundred-fifty feet of the structure. The hydrant test shall be made between the hours of eight a. m. and five p. m. on a working day. If the pressure found in this test is insufficient to comply with the above requirement a minimum of twelve pounds per square inch at top of the highest sprinkler riser may be accepted provided all piping in the affected area and supply piping thereto four inches and under are increased one pipe size.

(15.12.1). b. Size of connections.—Subject to the requirements of the department of water supply, gas and electricity, the size of each connection shall be as large as that of the main riser, except that two six-inch connections, when taken from separate street mains, shall, at the option of the owner, be accepted in lieu of one eight-inch connection and, except in sprinkler systems in multiple dwellings, at least four inches and shall have a conveniently accessible shut-off valve fixed to it. Such valve shall be located under the sidewalk in a flush sidewalk box, of approved type, located within two feet and on the street side of the property line or, as otherwise acceptable to the superintendent. The purpose of such shut-off valve shall be clearly indicated on a sign as required by section C26-1346.0 sub-division (c)2. A four-inch, a six-inch or an eight-inch tap in a street main shall, if immediately increased to the next larger size, be considered the equivalent of a six-inch, eight-inch or ten-inch connection, respectively, or an eight-inch tap shall, if immediately increased to twelve-inch be considered the equivalent of a twelve-inch connection.

(15.12.2). c. Location of shut-off valves.

1. The location of the shut-off valve shall be indicated by an easily legible sign placed on the structure directly opposite the sidewalk flush box.

2. This sign shall have a white background with one-inch red letters, bearing the following inscription: "AUTOMATIC SPRINKLER SHUT-OFF VALVE . . . FEET OPPOSITE THIS SIGN."

3. Where the design or decoration of the front of a building may be marred by a white and red sign, the superintendent may permit the use of a brass, bronze or other metal sign with one inch letters, raised or counter-sunk one-eighth of one inch.

(15.12.3). d. House service water supply connections.—A house service water supply connection may be taken from the sprinkler water supply connection to the city main on the inlet side of the fire meter, up to one and one-half inches in diameter for a four-inch connection, and two inches in diameter for a six-inch or larger connection.

(15.12.4). e. Water Main Data.—The department of water supply, gas and electricity shall upon application and payment of such department's charge furnish a certificate to the owner or his agent stating the size of street main or mains, distance to and size of mains from which it or they are fed, the location of control valves, the static pressure on the hydrant nearest the premises and the residual pressure in the street main taken on a hydrant near the premises when the flow from the nearest hydrant is equal to the flow required under this section.

(15.12.5). f. Booster Pump Required.—Where the pressure from the city water supply is insufficient to comply with the requirements of this article, but is sufficient to give at least five pounds at the highest line of sprinklers as determined by test, an automatic, electrically driven pump installed for the purpose of boosting or increasing the city water pressure in the sprinkler system, may be accepted under the following conditions:

1. Pumps shall be of approved centrifugal type, capable of delivering at least 250 gallons of water per minute in light hazard occupancy, 500 gallons of water per minute in ordinary hazard occupancy and 750 gallons of water per minute in extra hazard occupancy at a pressure of at least twenty-five pounds at the top of the highest sprinkler riser.

2. Pumps shall be maintained under approved automatic control with *closed circuit* supervisory attachment acceptable to the superintendent. The supervisory attachments shall be directly connected to a local watch engineer's office, where a competent supervisor is in attendance during twenty-four hours of each day, or directly connected to the central station of an operating fire alarm company, whose sole business is fire protective service, and which is directly connected to fire department headquarters. The supervisory alarm service shall be arranged to provide positive indication at central office or sprinkler alarm panel board that pump has operated and whenever the source of electrical supply has failed. The acceptance of local supervisory service is entirely in the discretion of the superintendent.

3. Such pumps shall also comply with the requirements of section C26-1347.0, except that no enclosure will be required.

(15.13). § C26-1347.0 Fire Pumps for Sprinkler Systems.—a. An approved fire

pump or pumps for sprinkler systems shall receive water supply from an independent suction tank or a direct connection to the city water main or other approved source capable of supplying the pump at its rated capacity for sixty minutes. The rated capacity of the pump shall be at least five hundred gallons per minute, and shall be sufficient to supply twenty-five per cent of the number of sprinklers in the average protected fire area at an average discharge of twenty gallons per minute per sprinkler at a pressure of at least twenty-five pounds per square inch on the highest line of sprinklers. This regulation shall not require a pump of capacity larger than 1,000 gallons per minute except when supplying yard hydrants.

b. Fire pumps shall be located in a room constructed of materials or assemblies having a fire resistive rating of at least one hour, properly heated, ventilated, lighted and drained, with all openings shut off by approved fire doors. The pump room shall be accessible to the street level by means of a fireproof cut-off passage or stairway, or a direct opening from the street. Pumps shall be set on approved concrete foundations, extending at least twelve inches above the floor level. The pump may be located in a room or area containing other mechanical equipment, except when, in the opinion of the superintendent, the nature of the other equipment is such as to render such location dangerous or otherwise undesirable.

c. A reliable source of energy for driving the pump shall be provided. For steam pumps, provision shall be made for sufficient steam power to operate the pumps at full rated capacity, and a steam pressure of at least fifty pounds shall be maintained at the pumps at all times. Where there is more than one boiler, the pipes and valves shall be so arranged as to permit the cutting out of any one boiler without interrupting the steam supply to the pump from the other boilers.

d. Where electric current is taken from an approved underground or overhead public service, it shall be considered an acceptable source of power supply.

e. Where the power supply is from overhead lines and can be obtained from two separate street feeders adjacent to the property, two separate and distinct services shall be installed.

f. Power lines shall be protected by approved conduits from a point where they enter the structure to the control panel in the pump room.

g. Private power plants shall be located in cut-off rooms constructed of materials or assemblies having a fire resistive rating of at least four hours with openings in fire walls shut off by approved automatic fire doors.

(15.13.1). h. Transmission Lines.—The lines between the power plants and the pump room shall be of such number, so arranged, and so located as to minimize the chance of interrupting service to the motor, due to accident to the lines. All wiring in the pump room shall be in approved conduits.

(15.13.2). i. Load and Voltages.—

1. Each line between the power plant and pump room shall be of such size that the load carried will be within its safe carrying capacity as fixed in title B of chapter thirty of the code.

2. Where direct current motors are used, the voltage at the motors shall not drop more than five per cent below the voltage rating of the motors when the pumps are being driven at rated output, pressure and speed, and the lines between motors and power stations are carrying their peak loads. When alternating current motors are used, the voltage at the motors under such conditions shall not drop more than eight per cent below the voltage rating of the motors.

(15.13.3). j. Overload Protective Devices.—

1. The overload protective devices at the power plants, and where provided at various points on the lines, shall be of such rating and so set that they will open the circuit only under short circuit conditions.

2. An approved circuit breaker, set at one hundred percent above the circuit breaker on the pump control panel, shall be installed in a protecting steel cabinet, at a point where feed lines for the pump enter the structure.

(15.13.4). k. Transformers.—Transformers, when installed, shall comply with title B of chapter thirty of the code.

(15.14). § C26-1348.0 Sprinkler Discharge.—For computing the capacity of water supplies other than at the fire pump, standard one-half inch sprinkler heads shall be assumed to have an average discharge of twenty gallons per minute.

(15.15). § C26-1349.0 Fire Area.—a. For the purposes of this article, a fire area is any floor space, enclosed on all sides by exterior walls or fire walls or a combination of both, constructed in accordance with article eleven of this title, and sections C26-412.0 through C26-467.0.

b. The number of sprinklers in the average protected fire area shall be determined by the number of sprinklered fire areas or stories in such structure. In determining the required capacity of water supplies, the number of sprinklers in the average

protected fire area may exclude those located in low positions, such as under benches, low shelves, closets and platforms and in blind spaces. No fire area or story with a net area of less than thirty per cent of the typical floor shall be used in averaging the number of sprinklers required.

(15.16). § C26-1350.0 Fire Department Connection.—a. Every automatic or nonautomatic sprinkler system shall be provided with at least one approved two-way Siamese hose connection.

b. Structures facing on only one street shall have a Siamese hose connection for each two hundred fifty feet or fraction thereof of street frontage of the protected structure.

c. Structures at the corner of two intersecting streets shall have a Siamese hose connection on each street front of the protected structure when continuous frontage is over two hundred fifty feet, or when the shortest frontage is over twenty-five feet.

d. Structures fronting on two streets *not intersecting* shall have one Siamese hose connection for each two hundred fifty feet, or fraction thereof of each street frontage of the protected structure.

e. Structures fronting on more than two streets where frontage is continuous shall have two Siamese hose connections where the total frontage is three hundred feet or less. Where the total frontage is greater than three hundred feet, there shall be one Siamese hose connection on each street frontage. When street frontages are not continuous there shall be at least one Siamese hose connection on each street frontage.

f. Piping from the Siamese connection to the sprinkler riser, or trunk main shall be four inches in diameter when supplying a four-inch riser or feed main, but need not be more than five inches in diameter when supplying larger riser or feed mains. When more than one Siamese is required the piping from each Siamese connection need not exceed 4 inches in diameter.

g. Siamese hose connections installed after January first, nineteen hundred thirty-eight, except those for fire boat use, shall be three inch, female connections. Siamese hose connections on piers, warehouses, and similar structures, intended for fire boat use, shall be at least three and one-half inch female connections with standard fire department threads.

h. It shall be unlawful to make fire boat connections to a sprinkler equipment supplied with water directly from a city main containing potable water.

i. The Siamese hose connection shall be placed between eighteen inches and three feet above the sidewalk or in other locations acceptable to the superintendent, in a horizontal position accessible to the fire department. Each inlet shall be provided with a clapper valve machined to a true face.

j. If not of the flush type, at least three feet shall be maintained between the centers of automatic sprinkler and standpipe Siamese hose connections.

k. Each Siamese hose connection shall be designated by raised letters at least one inch in height, cast in the fitting in a clear and prominent manner and showing the service designated. If the entire structure is sprinklered the fitting shall be marked "Auto Spkr." Where only a portion of the building is protected a metal sign indicating the portion protected shall be securely fastened to or above the Siamese connection. When areas protected are scattered throughout premises, the sign shall read "Part Sprinklered." Siamese connections for structures erected after January first, nineteen hundred thirty-eight, shall be placed in a wall recess of ample size to preclude projection of Siamese connections beyond the property line and to permit the convenient attachment of fire department hose, or shall be the flush type of Siamese hose connection.

1. Where structural conditions prevent the installation of wall or flush type Siamese, the superintendent may permit sidewalk riser to be used. Where this type installation is used or a defective sidewalk riser is replaced, brass or other non-corrosive material must be used.

m. In each fire department hose connection there shall be an approved straightway check valve installed in a horizontal position; the piping shall be arranged to drain between the check valve and the Siamese connection by an approved ball drip, having a three-quarter inch pipe connection, or by a three-quarter inch gate valve with outlet plug.

n. The caps of each automatic sprinkler Siamese connection shall be painted green and the entire Siamese connection of a nonautomatic sprinkler system shall be painted aluminum.

(15.17.1). § C26-1351.0 Automatic Sprinkler Systems Classified by Sources.—a. One Source Systems.—The term "one source system" shall mean a system supplied with water from any one of the automatic sources specified in section C26-1341.0.

(15.17.2). b. Two Source Systems.—The term "two source system" shall mean a system supplied with water from a combination of any two of the automatic sources;

two pressure or two gravity tanks with a total water capacity twice that required for a one source supply shall be accepted as a two source system. Direct connection to the city water supply on two different streets, so located that the closing of the controlling valve on one main will leave the main on the other street open, shall be accepted as a two-source system; a direct connection to the city water supply with either a gravity tank or a pressure tank, shall be accepted as a two source supply.

(15.17.3). § C26-1351.1 Sprinkler Systems Classified by Occupancies.—a. Light hazard occupancies: This class includes buildings housing occupancies such as:

Apartments	Colleges and universities	Hotels	Prisons
Asylums	Dormitories	Institutions	Public buildings
Churches	Dwellings	Libraries	Rooming houses
Clubs	Hospitals	Museums	Schools
		Office buildings	Tenements

1. The rules for installation of sprinkler systems in light hazard occupancies shall apply to all portions of the occupancies listed above or similar light hazard occupancies, except that in certain sections of the above occupancies such as attics, basements, kitchens, laundries, storage areas and work rooms, ordinary hazard spacing with light hazard pipe sizing and water supplies shall be required.

2. The rules for installation of sprinkler systems in light hazard occupancies may also apply in small stores and similar occupancies incidental to the properties listed above, provided such occupancies do not individually exceed 3,000 square feet in floor area in any one store in any floor and provided floor openings are properly protected.

3. It is important that sprinkler systems designed for light hazard occupancies shall not be installed in any building, the occupancy of which is likely to be changed subsequently to a classification not so listed.

b. Ordinary hazard occupancies: This class includes buildings housing occupancies such as:

Abrasive works
Automobiles, garages, sales and service
Bakeries
Beverage manufacturing
Bleacheries
Boiler houses
Bottling works
Breweries
Brick, tile, and clay storage and manufacturing
Canneries
Cement plants
Cereal mills
Chemical works—Low hazard
Chemical works—Ordinary hazard
Clothing factories
Cold storage warehouses
Confectionery products mfg.
Cotton and woolen mills
Dairy products mfg. and processing
Distilleries
Dry cleaning except those using volatile inflammable oils
Dyeing and print works
Electric generating stations
Flour mills
Foundries
Fur processing
Glass and glass products factories
Grain elevators, tanks, and warehouses
Ice manufacturing
Laundries
Leather goods mfg.
Lithographing
Macaroni factories
Machine shops
Meat packing and curing
Mercantiles
Metal working
Millinery manufacturing
Mining properties
Paper and pulp mills
Pharmaceutical mfg.
Piers and wharves
Power plants
Printing and publishing
Restaurants
Rope, cordage and twine factories
Shoe factories
Slaughter houses
Smelters
Steel mills
Sugar refining
Tanneries
Television studios
Textile knitting and weaving mills
Theatres and auditoriums
Tire manufacturing
Tobacco products mfg.
Warehouses and storage
  General
  Household furniture
  Tobacco
Watch and jewelry manufacturing
Waterworks and pumping stations
Wineries

Where hazards in those buildings or portions of buildings of the above occupancies are severe as determined by the fire commissioner, extra hazard rules shall apply.

c. Extra hazard occupancies: This class includes only those buildings or portions of buildings housing occupancies where the hazard is severe as determined by the fire commissioner.

These include occupancies such as:

Aircraft hangars
Chemical works—using volatile inflammable oils
Cotton picker and opening operations
Dry cleaning plants in which volatile inflammable oils are used
Explosives and pyrotechnics manufacturing
Linseed oil mills
Linoleum and oil cloth manufacturing
Oil refineries
Paint shops
Pyroxylin plastic manufacturing and processing
Shade cloth manufacturing
Solvent extracting
Varnish works

—and other occupancies involving processing, mixing, storage and dispensing of volatile flammable liquids. Storage garages shall not be included in this classification.

(15.18). § C26-1352.0 Sprinkler Spacing.—A. General Sprinkler heads shall be spaced as hereinafter provided.

(15.18.1). B. Sprinkler spacing in heavy timber or mill construction.—1. Under heavy timber or mill construction ceilings of smooth solid plank and timber construction, with five- to twelve-foot bays, one line of sprinklers shall be placed in the center of each bay and the maximum permissible distance between the heads on each line shall be:

a. For standard one-half inch heads—

1. With light hazard occupancy, the protection area allotted per sprinkler shall not exceed 168 square feet with the distance between lines and between sprinklers on lines not in excess of 14 feet.

With ordinary hazard occupancy, the protection area allotted per sprinkler shall not exceed 100 square feet with the distance between lines and between sprinklers on lines not in excess of 12 feet. The following table gives the proper spacing of sprinklers on lines in bays of given width. Measurements should be taken from center of beams or trusses.

8 feet in 12-foot bays;
9 feet in 11-foot bays;
10 feet in 10-foot bays;
11 feet in 9-foot bays;
12 feet in 6- to 8-foot bays.

With extra hazard occupancy, the protection area allotted per sprinkler shall not exceed 80 square feet with the distance between lines and between sprinklers on lines not in excess of 10 feet.

b. For approved type one-inch heads—for light and ordinary hazards:

20 feet in 5- to 12-foot bays

c. For approved type one and one-quarter inch heads for light and ordinary hazards:

25 feet in 5- to 12-foot bays

d. For spray sprinklers see section C26-1352.2.

2. Measurements shall be taken from center to center of timbers.

(15.18.2). C. Sprinkler spacing under ceilings of modified or semi-mill construction.

1. This is a modified form of standard mill construction in which the bays usually are from three to seven feet wide and beams are supported on girders. Where bays are less than three feet wide this shall be treated as open joist construction.

2. Where girders and beams are framed into each other the construction is designated as panel construction. Under such construction sprinkler branch lines usually shall be run at right angles to the beams or panels.

3. Where beams are six-inch by twelve-inch or smaller, including thickness of nailing strips on steel beams, sprinklers may be placed under beams and in bays, depending on the width of bays and distance between girders, occupancy and other conditions. Sprinklers shall be "staggered" on adjacent branch lines. Where beams are larger than six-inch by twelve-inch, including thickness of nailing strips on steel beams, sprinklers shall be placed in the bays. Sprinklers shall be staggered in alternate bays or arranged "two and one" depending upon width of bays and distance between girders.

a. With standard one-half inch heads:

1. With light hazard occupancy, the protection area allotted per sprinkler shall not exceed 144 square feet with the distance between lines and between sprinklers on lines not in excess of fourteen feet.

2. With ordinary hazard occupancy, the protection area allotted per sprinkler shall not exceed 90 square feet with the distance between lines and between sprinklers on lines not in excess of ten feet.

Where lines are run in beam panels sprinklers may be staggered not to exceed twelve feet apart on a line. Where beams are supported on top of girders and sprinklers are spaced 1⅓, 1½, 2½ or 3 beam spaces apart, a progressive stagger shall be used.

3. With extra hazard occupancy, the protection area allotted per sprinkler shall not exceed 80 square feet with the distance between lines and between sprinklers on lines not in excess of ten feet.

b. Approved type one-inch sprinklers shall be spaced as may be required by the superintendent.

c. Approved type one and one-quarter inch sprinkler shall be spaced as may be required by the superintendent.

d. For spray sprinklers see section C26-1352.2.

(15.18.3). D. Sprinkler spacing in open joisted construction:

Wood joist or wood plank and beam construction with bays less than three feet wide, center to center, and construction consisting of combustible flooring on steel joists not conforming to definition of bar joists in section C26-1352.0 sub-division E shall be treated as joist construction. Under open-finish joisted construction, ceilings, floors, decks, and roofs, the lines shall be run at right angles to the joists and the sprinklers shall be "staggered" so that they will be opposite a point one-half the distance between sprinklers on the adjacent lines.

a. For standard one-half inch heads:

1. With light and with ordinary hazard occupancy, the protection area allotted per sprinkler shall not exceed eighty square feet and the distance between sprinklers shall not exceed eight feet at right angles to joists or ten feet parallel with the joists with the end sprinklers on alternate lines not more than two feet from walls or partitions and the end sprinklers on other lines not more than four feet from walls or partitions. Open joisted bays, with joists on top of girders, ten feet one inch to twelve feet six inches, in width, require two lines of sprinklers except where numerous bays of this width prevail, in which case two and one lines may be installed in adjoining bays, with two lines in the bays next to side or end walls.

In small rooms the exact number of sprinklers shall be determined by the superintendent in accordance with the width of bay, hazards of occupancy, water pressure, etc. The maximum allowable distance between sprinklers on lines shall be eight feet and the maximum allowable distance between lines shall be limited to ten feet. In bays eleven feet or twenty-two feet in width one and two lines respectively may be placed in each bay with the sprinklers not over seven feet apart. Where there are two sets of joists under a roof or floor and there is no flooring over the lower set, sprinklers shall be installed above and below the lower set of joists where there is a clearance of from six inches to twelve inches between the top of the lower joist and bottom of the upper joist.

2. With extra hazard occupancy, the protection area allotted per sprinkler shall not exceed 70 square feet and the distance between sprinklers shall not exceed seven feet at right angels to the joists or ten feet parallel with the joists.

b. For one inch approved type heads for light and ordinary hazards—Only one line of sprinklers shall be required in each bay where girders project below the under side of the joists and divide the ceiling into bays not exceeding twenty feet in width, measured from center to center of girders. In bays exceeding twenty feet in width at least two lines shall be installed in each such bay, and in no case shall the distance between adjacent lines exceed twenty feet. The distance between heads on each line shall be sixteen feet or less, and the end heads on alternate lines shall be spaced four feet or less from a wall or partition.

c. For one and one-quarter inch approved type heads for light and ordinary hazards—Only one line of sprinklers shall be required in each bay where girders project below the under side of the joists and divide the ceiling into bays not exceeding twenty-five feet in width measured from center of girders. One line shall be placed in the center of each bay. In bays exceeding twenty-five feet in width at least two lines shall be installed in each bay and in no case shall the distance between adjacent lines exceed twenty-five feet. The distance between the heads on each line shall be twenty feet or less and the end head on alternate lines shall be spaced five feet or less from a wall or partition.

d. For spray type sprinklers see section C26-1352.2.

(15.18.4). E. Sprinkler spacing in bar joist construction:

Bar joists construction.—The term "bar joist construction" refers to construction employing joists consisting of steel truss-shaped members formed of rods or small steel shapes.

a. For standard one-half inch sprinklers:

1. With light hazard occupancy—Incombustible floor or roof deck. The protection area allotted per sprinkler shall not exceed 196 square feet with the distance between lines and between sprinklers on lines not in excess of fourteen feet.

Combustible floor or roof deck. The protection area allotted per sprinkler shall not exceed 144 square feet with the distance between lines and between sprinklers on lines not in excess of fourteen feet.

2. With ordinary hazard occupancy:

Incombustible floor or roof deck. The protection area allotted per sprinkler shall not exceed 100 square feet. Where spacing of joists is three feet or more, the distance between lines and between sprinklers on lines shall not exceed twelve feet. Where spacing of joists is less than three feet the distance between lines shall not exceed twelve feet, with the distance between sprinklers on lines not in excess of eleven feet.

Combustible floor or roof deck. The protection area alloted per sprinkler shall not exceed ninety square feet. Where spacing of joists is three feet or more, the distance between lines and between sprinklers on lines shall not exceed twelve feet. Where spacing of joists is less than three feet, the distance between lines shall not exceed eleven feet, with the distance between sprinklers on lines not in excess of ten feet.

3. With extra hazard occupancy:

Incombustible floor or roof deck. The protection area allotted per sprinkler shall not exceed ninety square feet, with the distance between lines and between sprinklers on lines not in excess of ten feet.

Combustible floor or roof deck. The protection area allotted per sprinkler, shall not exceed eighty square feet with the distance between lines and between sprinklers on lines not in excess of ten feet.

4. The distance between sprinklers and floor or roof deck may be increased where conditions warrant but the distance shall not exceed sixteen inches. Sprinklers on alternate lines shall be staggered.

b. For approved type one-inch heads for light and ordinary hazards.—Area per sprinkler not to exceed 360 square feet and distance betwen lines or sprinklers on lines not to exceed twenty feet.

c. For approved type one and one-quarter-inch heads for light and ordinary hazards. —Area per sprinkler not to exceed 560 square feet and distance between lines or sprinklers on lines not to exceed twenty-five feet.

d. For approved type spray sprinklers see section C26-1352.2.

(15.18.5). F. Sprinkler spacing under sheathed or plastered ceilings.—

a. With standard half-inch heads:

1. With light hazard occupancy, if sheathing is the equivalent of plasterboard not less than half inch in thickness or is of metal, or of wood lath and plaster, the protection area allotted per sprinkler shall not exceed 168 square feet with the distance between lines and betwen sprinklers on lines not in excess of fourteen feet. Sprinklers need not be staggered.

Where sheathing is combustible, such as matched boarding, the protection area allotted per sprinkler shall not exceed 120 square feet with the distance between lines and between sprinklers on lines not in excess of twelve feet. In basements with such combustible sheathing the distance between lines and between sprinklers on lines shall not exceed ten feet. With sheathing of light combustible material, the spacing shall be the same as for open joists.

2. With ordinary hazard occupancy, under smooth sheathed ceilings, provided the sheathing is the equivalent of plasterboard, not less than half inch thick, or is of metal, or of wood lath and plaster, if tight and in good repair, with no openings to joist channels, the protection area allotted per sprinkler shall not exceed eighty square feet with the distance between lines and distance between sprinklers on lines not in excess of ten feet. Sprinklers need not be staggered.

Where wood or other sheathing of similar combustibility is used as a fire stop, the spacing of the sprinklers shall be the same as for open joist construction. A protection area of 100 square feet with a distance between lines and between sprinklers on lines not in excess of twelve feet may be allotted for sprinklers under suspended ceilings of combustible construction provided there is a full complement of sprinklers immediately above such ceilings, also under top floor ceilings of combustible construction provided there is a full complement of sprinklers immediately above such ceilings and the attic space is unfloored and unoccupied. Under smooth sheathed ceilings with cement or gypsum plaster on metal lath or the equivalent, the protection area allotted per sprinkler shall not exceed 100 square feet with the distance between lines and between sprinklers on lines not in excess of twelve feet.

3. With extra hazard occupancy, where sheathing is the equivalent of metal lath and cement plaster, the protection area allotted per sprinkler shall not exceed 80 square feet with the distance between lines and between sprinklers on lines not in excess of ten feet. The sprinklers need not be staggered. For other sheathing of lesser value as a fire stop, the spacing shall be the same as for open joist construction.

b. For approved type one-inch heads for light and ordinary hazards: One line of sprinklers shall be placed in the center of each bay twenty feet or less in width and the distance between the heads on each sprinkler line shall be twenty feet or less. Bays in excess of twenty feet in width shall require at least two lines of sprinklers and in no case shall the distance between adjacent lines exceed twenty feet.

c. For one and one-quarter inch approved type heads for light and ordinary hazards—One line of sprinklers shall be placed in the center of each bay twenty-five feet or less in width and the distance between the heads on each line shall be twenty-five feet or less. At least two lines of sprinklers shall be placed in each bay exceeding twenty-five feet in width and in no case shall the distance between adjacent lines exceed twenty-five feet.

d. For spray type sprinklers see section C26-1352.2.

e. Support of piping—Sprinkler piping shall be supported independently of the sheathing.

(15.18.6). G. Sprinkler spacing in class 1 fireproof construction—The requirement of subdivision B of this section shall apply as far as practicable in class 1 fireproof construction. The rule may be modified to arrange the spacing of heads to protect the contents rather than the ceilings.

The term "fire-resistive" refers to construction such as reinforced concrete on protected steel supports. "Incombustible" refers to construction such as precast concrete, gypsum or steel floor or roof deck on unprotected steel supports.

With these types of construction the location and arrangement of sprinklers shall be such that adequate protection will be given the building contents and keep any unprotected steel cool. Where the type of construction is "incombustible" the arrangement of sprinklers shall be as indicated for mill or semi-mill construction depending upon the spacing and arrangement of beams and girders. For spacing under bar joist construction see subdivision E of this section.

1. With light hazard occupancy, the protection area allotted per sprinkler shall not exceed 196 square feet with the distance between lines and between sprinklers on lines not in excess of fourteen feet.

2. a. With ordinary hazard occupancy, the protection area allotted per sprinkler shall not exceed 100 square feet with the distance between lines and between sprinklers on lines not in excess of twelve feet, except as covered by paragraph d of this subdivision.

b. Under smooth ceilings or under flat-slab concrete construction branch lines may be run in either direction.

c. Under so-called joisted type of concrete construction sprinklers shall be staggered across the joist.

d. In unobstructed bays and under flat slab reinforced concrete construction where lines are six feet to seven and one-half feet apart; sprinklers may be spaced one hundred square feet per sprinkler with sprinklers staggered on alternate lines.

3. With extra hazard occupancy, the protection area allotted per sprinkler shall not exceed ninety square feet with the distance between lines and between sprinklers

a. For standard one-half inch heads:
on lines not in excess of ten feet.

b. For approved one-inch heads for light and ordinary hazards, distance between sprinklers on a line and between lines shall not exceed twenty feet.

c. For approved one and one-quarter inch heads for light and ordinary hazards, distance between sprinklers on a line and between lines shall not exceed twenty-five feet.

d. For spray type sprinklers see section C26-1352.2.

(15.18.7). H. Distance of sprinklers from walls.—The maximum distance from a wall or partition to the first head on a sprinkler line shall be one-half the allowable distance between the heads on such line. Additional heads may be required in the narrow pockets formed by bay timbers or beams and wall if such pockets are more than six inches wide in non-fireproof structures, or more than twelve inches wide in fireproof structures. Where beams, girders, columns, walls, partitions or other obstructions prevent the effective discharge of water, additional heads shall be installed to protect the entire area effectively.

(15.18.8). I. Sprinklers in vertical shafts.

1. In vertical shafts having combustible sides, heads shall be provided within such shafts in addition to the head or heads at the tops of shafts as follows:

a. One standard, spray or sidewall one-half inch head for each two hundred square feet of combustible surface.

b. One approved type one-inch head for each four hundred square feet of combustible surface.

c. One approved type one and one-quarter-inch head for each five hundred square feet of combustible surface.

2. Such sprinklers shall be installed at each floor where practicable, and always when the shaft is trapped.

3. Where practicable, sprinklers shall be staggered at the alternate floor levels, particularly when only one sprinkler is installed at each floor level.

4. In shafts constructed of incombustible material sprinklers shall be located at top of shaft with control valve accessibly located outside of shaft.

5. In incombustible elevator shafts:

a. The sprinkler supply riser and all sprinkler branch lines not directly supplying the shaft sprinklers, shall be located outside the shaft.

b. Sprinkler branch lines in shafts shall supply sprinklers at not more than one floor level.

c. Shut-off valves for sprinklers shall be provided and located outside the shaft so as to be readily accessible.

d. Sprinklers shall be provided at top and bottom of shaft and shall be placed to avoid damage from elevator car.

(15.18.9). J. Sprinkler spacing under pitched or curved roofs or Quonset type buildings.

1. Under non-fireproof construction pitched roofs sloping more steeply than one foot in three, sprinkler heads shall be located in the peak of the roof, and those on either side of the peak shall be spaced according to the foregoing requirements. The distance between heads shall be measured on a line parallel with the roof. Where the roof meets the side wall or the floor line, the heads shall be placed distant from such intersection not more than the distances as follows:

(a) For standard one-half-inch heads, three and one-half feet.
(b) For approved type one-inch heads, seven feet.
(c) For approved type one and one-quarter-inch heads, eight and one-half feet.
(d) For spray type sprinklers, see section C-26-1352.2.

2. In lieu of heads located in the peak of the roof, heads may be spaced at distances from the peak of the roof measured on a line parallel with the roof not exceeding the following:

(a) For standard one-half-inch heads, two and one-half feet.
(b) For approved type one-inch heads, five feet.
(c) For approved type one and one-quarter-inch heads, six and one-quarter feet.
(d) For spray type sprinklers, see section C26-1352.2.

3. In sawtooth roof construction the distance of the end heads on the branch line from the peak of the sawtooth shall not exceed the following:

(a) For standard one-half-inch heads, two and one-half feet.
(b) For approved type one-inch heads, five feet.
(c) For approved type one and one-quarter-inch heads, six and one-quarter feet.
(d) For spray type sprinklers, see section C26-1352.2.

4. Under roofs of fireproof construction the sprinklers shall be spaced in accordance with the rules applying to fireproof construction.

5. a. Under curved roofs, sprinklers shall be spaced in accordance with the foregoing requirements for the closest comparable type of ceiling construction. For other than fire-resistive construction the spacing shall be based on ceiling coverage. Where roofs are curved down to the floor line the horizontal distance measured at the floor level from the side wall or roof construction to the nearest sprinklers shall not be greater than one-half the allowable distance between sprinklers in the same direction.

b. Under curved roofs of steel with ribs six inches deep, four feet apart, the spacing for ordinary hazard occupancy shall not exceed 90 square feet of ceiling area per sprinkler, with the sprinklers preferably staggered.

Where complete wetting of the ceiling surfaces is desired to avoid damage to the light steel members, sprinklers may need to be spaced somewhat more closely.

c. Where extra hazard occupancy spacing of sprinklers is used under pitched or curved ceilings of other than fire-resistive construction, as in aircraft storage or servicing areas, the spacing as projected on the floor shall be not wider than required for extra hazard occupancies, but in no case shall the spacing of the sprinklers at the roof or ceiling be wider than required for ordinary hazard occupancies.

(15.18.10). K. Sprinkler spacing in motion picture film storage vaults:

Vaults used for the storage of inflammable motion picture films shall have one one-half inch head for each sixty-two and one-half cubic feet of available storage space.

(15.18.11). L. Sprinkler spacing in special locations and permissible variations:

1. In high pressure boiler rooms, or over electric generating, power and transforming apparatus, or over their controlling devices and switchboards, and similar special locations where water from the fire extinguishing equipment might be detrimental, the sprinkler lines and heads may be omitted where approved by superintendent.

2. Sprinklers shall be placed throughout premises, including basements and lofts, under stairs, inside elevator wells, in belt, cable, pipe, gear and pulley boxes, inside such small enclosures as drying and heating boxes, tenter and dry-room enclosures, chutes, conveyor trunks, and all cupboards and closets, unless such enclosures have tops entirely open or covered with one-sixteenth inch glass having a numbe· 16 steel wire gauge one-third inch mesh wire screen under the glass or covered with cheesecloth or paper, and are so located that sprinklers can properly spray into them. It shall be unlawful to omit sprinklers in any room merely because it is damp, wet or of fire resistive construction, except by written permission of the superintendent. Where the application of water to the contents of an area would produce or increase a fire hazard, the installation of sprinklers may be omitted with the written permission of the superintendent.

a. Sprinklers shall be installed in all blind spaces enclosed by combustible construction, as in walls, floors and ceilings where it is practicable to install sprinklers, except as modified by paragraph b below. In spaces formed by studs or joists, sprinkler protection shall be provided where there is six inches or more clearance between the inside or near edges of the studs or joists which form the opposite sides of the space. In bar joist construction, sprinklers shall also be installed whenever the total depth of the space exceeds fourteen inches.

b. Permission may be given to omit sprinklers from combustible blind spaces where the following conditions prevail:

1. Where the ceiling is attached directly to the underside of the supporting beams of a combustible roof or floor or otherwise installed to make the installation of sprinklers impracticable.

2. Where a concealed space exceeds six inches between structural members but is very limited in area and does not extend to another fire area provided fire or draft stops are installed to subdivide the areas. Such fire or draft stops shall be provided at each floor level for vertical and at approximately fifty feet intervals for horizontal divisions or at closer intervals if required by the superintendent.

4. Decks. Sprinklers shall be installed under decks and galleries unless they do not exceed four feet in width.

5. Ducts. Sprinklers shall be installed under ducts which are over four feet wide, and under ducts of less width if distribution from ceiling sprinklers is obstructed.

6. Sprinklers may be omitted from portable metal lockers or cabinets unless such lockers or cabinets contain highly inflammable material, and at the discretion of the superintendent sprinklers may be omitted from ornamental entrance lobbies where such omission will introduce no unusual hazard.

(15.18.12). § C26-1352.1 Sidewall Sprinklers.—Sidewall sprinklers are special purpose sprinklers and ordinarily shall not be substituted for regular automatic sprinklers.

a. Sidewall sprinklers shall be located not more than 10 feet apart on walls for ordinary hazard occupancies and not more than 14 feet apart for light hazard occupancies. Deflectors shall be at a distance from walls and ceiling not exceeding six inches and never less than four inches. In no case shall the protected area per sprinkler exceed that for an ordinary sprinkler under the same occupancy classification.

b. Rooms having widths in excess of 15 feet up to 30 feet shall have sprinklers on two opposite walls with spacing as above required and sprinklers regularly staggered. Where rooms are over 20 feet in width special consideration shall be given to additional sprinkler protection required to supplement the protection given by the sprinklers along the sidewalls. The installation of sidewall sprinklers other than beneath smooth ceilings may be done only with the approval of the superintendent.

c. Special consideration shall be given to placing sidewall sprinklers so that they will be favored to the greatest possible extent in receiving the heat from a fire and at the same time most effectively distribute the water discharged by them.

(15.18.13) § C26-1352.2 Automatic Spray Sprinkler Systems.—For ordinary hazard occupancies:

(15.18.13.1) A. 1. Approved makes and types: Spray sprinklers shall be of approved makes and types with nominal ½ inch discharge orifice.

2. Application:

a. The installation of automatic spray sprinklers shall comply with all other rules except as modified by this section.

b. Spray sprinklers may be installed to protect any building construction and ordinary hazard occupancy capable of being protected by regular sprinklers. Automatic spray sprinklers may be substituted for regular automatic sprinklers in existing installations.

c. Where spray sprinklers are used with light hazard occupancies, spacing and area per sprinkler shall not exceed the limits set forth in the following table:

Type of construction	Incombustible: Maximum square feet per sprinkler	Incombustible: Maximum spacing of sprinklers	Combustible: Maximum square feet per sprinkler	Combustible: Maximum spacing of sprinklers
Smooth ceiling, sub-section B	200	15	200	15
Beam and girder, sub-section C	200	15	200	15
Bar joist, sub-section D	168	15	168	15
Joisted, sub-section E			Same as ordinary hazard	
Sheathed ceiling, sub-section F	200	15	168	14

d. Where spray sprinklers are used with extra hazard occupancies, spacing and area per sprinkler shall not exceed the limits set forth in the following table:

Type of construction	Incombustible: Maximum square feet per sprinkler	Incombustible: Maximum spacing of sprinklers	Combustible: Maximum square feet per sprinkler	Combustible: Maximum spacing of sprinklers
Smooth ceiling, sub-section B	90	12	80	12
Beam and girder, sub-section C	90	12	80	12
Bar joist, sub-section D	90	12	80	12
Joist with draft or fire stop, sub-section E			80	10
Joist without draft or fire stop sub-section E			70	10
Sheathed ceilings, sub-section F	90	12	80	12

3. Baffles: Baffles shall be installed wherever spray sprinklers are less than six feet apart. Baffles shall be located midway between sprinklers and arranged to baffle their actuating elements. Baffles may be of sheet metal, about eight inches wide and six inches high. When placed on branch line piping, the top of baffles shall extend two to three inches above the deflectors.

4. Clear space between sprinklers and stored materials: Stored materials shall be kept at least eighteen inches below sprinkler deflectors so as not to interfere with the distribution of water from spray sprinklers.

(15.18.13.2). B. Smooth ceiling construction.

1. The term "smooth ceiling" construction as used in this section includes:

a. Flat slab reinforced concrete construction.

b. Continuous smooth bays formed by wood or steel beams spaced more than 7½ feet on centers with beams supported by columns, girders or trusses.

c. Smooth ceiling supported directly on girders or trusses spaced more than 7½ feet on centers.

d. Smooth monolithic ceilings ¾-inch thick of cement plaster, fibered gypsum plaster or vermiculite plaster on metal lath or equivalent.

In b, c and d the roof and floor decks may be incombustible or combustible. Item b would include standard mill construction.

2. Spacing of spray sprinklers under smooth ceiling construction: Ordinary hazard occupancy.

a. Under smooth ceiling construction as described in 1a, 1b and 1c of this subsection at least one spray sprinkler shall be provided for each 130 square feet of incombustible ceiling and at least one spray sprinkler for each 120 square feet of combustible ceiling. Under metal lath and plastered ceiling item 1d of this subsection at least one spray sprinkler shall be provided for each 130 square feet of ceiling attached to bar joists supporting an incombustible roof or floor deck and at least one spray sprinkler for each 120 square feet of ceiling attached to wood joists or to bar joists supporting a combustible roof or floor deck.

b. Under smooth ceiling construction the maximum allowable distance between lines and between sprinklers on lines is fifteen feet. Sprinklers on alternate lines shall be staggered if the distance between lines or the distance between sprinklers on lines exceeds twelve feet.

c. Under flat slab reinforced concrete construction Item 1a of this subsection branch lines may be run in either direction.

d. In continuous smooth bays formed by wood or steel beams spaced more than 7½ feet apart and supported by columns item 1b of this subsection branch lines shall be placed between the beams in each bay. Branch lines may be placed across the beams and sprinklers may be spaced without regard to the location of

beams provided the maximum allowable distance from the ceiling to the deflector will not be exceeded and provided the location of sprinkler deflectors, if above the bottom of beams, will be at sufficient distance from the beams to avoid obstructions to distribution, as specified in item I 3c of this section.

e. In continuous smooth bays formed by wood or steel beams spaced more than 7½ feet on centers and supported on girders or trusses, 1c of this subsection, branch lines may be placed across the beams and sprinklers may be spaced without regard to the location of beams provided the maximum allowable distance from the ceiling to the deflector will not be exceeded and provided the location of sprinkler deflectors, if above the bottoms of beams, will be at sufficient distance from the beams to avoid obstructions to distribution, as specified in item 3c of this section.

f. The branch line piping may be run in the continuous smooth bays but sprinklers shall be at least three feet, nine inches from girders or trusses.

g. Under smooth ceilings supported directly on girders or trusses, item 1c of this subsection, branch lines shall be placed between the girders or trusses of each bay. The branch line piping may also be run through the trusses.

h. The distance from a wall, or other obstruction to the closest sprinkler shall not exceed one-half the allowable distance betwen sprinklers.

i. Beams or trusses forming narrow pockets of combustible construction along walls when of a depth which will obstruct the spray discharge pattern may require additional spray sprinklers. See table in item I 3c of this section showing maximum allowable distance deflector shall be permitted above bottom of beam.

(15.18.13.3). C. Beam and girder construction.

1. The term "beam and girder construction" as used in this section includes incombustible and combustible roof and floor decks suppported by:

a. Wood beams of four inches or greater nominal thickness or steel beams spaced three to seven and one-half feet on centers and either supported on or framed into girders. When supporting a plank deck this would include semi-mill and panel construction and when supporting, with steel framing, gypsum plank, steel deck, concrete tile or similar material would include much of the so-called "incombustible" construction.

b. Bar joists or light steel trusses spaced three to seven and one-half feet on centers.

2. Spacing of spray sprinklers under beam and girder construction: Ordinary hazard occupancies.

a. Under beam and girder construction at least one spray sprinkler shall be provided for each 130 square feet of incombustible ceiling and at least one spray sprinkler for each 120 square feet of combustible ceiling. The maximum allowable distance between lines, and between sprinklers on lines is fifteen feet. Sprinklers on alternate lines shall be staggered.

b. When beams are spaced less than five feet on centers and either framed into or supported on girders, sprinklers may be spaced without regard to location of beams provided the maximum allowable distance from the ceiling to the deflector will not be exceeded and provided the location of deflectors if above the bottom of beams, will be at sufficient distance from the beams to avoid obstructions to distribution, as specified in item I 3c of this section.

c. When beams are spaced five to seven and one-half feet on centers and supported on girders, sprinklers may be staggered under alternate beams provided the maximum allowable distance from ceiling to deflector will not be exceeded. With this framing, sprinklers may also be spaced without regard to the location of beams provided the maximum allowable distance from the ceiling to the deflector will not be exceeded and provided the location of sprinkler deflectors, if above the bottoms of beams, will be at sufficient distances from the beams to avoid obstruction to distribution, as specified in item I 3c of this section.

d. When beams are spaced five to seven and one half feet on centers and are framed into girders forming panels not over three hundred square feet, sprinklers may be located under the beams provided the maximum allowable distance from the ceiling to the deflector will not be exceeded and in the bays provided the maximum allowable distance from the ceiling to the deflector in the bays will not be exceeded and the location of sprinkler deflectors, if above the bottom of the beams will be at sufficient distance to avoid obstructions as specified in item I 3 (c) of this section. The deflectors of sprinklers in bays shall be located not lower than the bottom of the girders. For the purpose of this paragraph, bays in panel construction may be wider than seven and one half feet, if the panel does not exceed three hundred square feet in area.

e. The distance from a wall or other obstruction to the closest sprinkler shall not exceed one-half the allowable distance between sprinklers.

f. Additional spray sprinklers shall be required when the girders or trusses form narrow pockets of combustible construction along walls if there is a depth which will obstruct the spray discharge pattern.

(15.18.13.4). D. Bar joist construction.

1. This subsection includes incombustible and combustible roof and floor decks supported on bar joists or light steel trusses spaced less than three feet on centers.

2. Spacing of spray sprinklers under bar joist construction: Ordinary hazard occupancies.

a. Under bar joist construction with bar joists spaced less than three feet on centers, at least one spray sprinkler shall be provided for each 120 square feet of incombustible ceiling and at least one spray sprinkler for each 110 square feet of combustible ceiling. The maximum allowable distance between lines and between sprinklers on lines shall be fifteen feet.

b. Spray sprinklers may be located without reference to the bar joists but shall be staggered on alternate lines.

c. The distance from a wall or other obstruction to the closest sprinkler shall not exceed one-half the allowable distance between sprinklers.

(15.18.13.5). E. Joisted construction.

1. Joisted construction consists of boards or planks on wooden beams spaced less than three feet on centers. Wooden beams less than four inches nominal thickness spaced more than three feet on centers are also considered to be joisted construction.

2. Spacing of spray sprinklers under joisted construction: Ordinary hazard occupancies.

a. Under joisted construction without draft or fire stops, at least one spray sprinkler shall be provided for each ninety square feet of ceiling area, and if joist channels are draft or fire stopped at not over forty feet intervals, at least one spray sprinkler shall be provided for each 100 square feet of ceiling area. The maximum allowable distance between lines and between sprinklers on lines shall be twelve feet. Sprinklers shall be staggered across the joist if the distance between sprinklers across the joist exceeds eight feet; otherwise, sprinklers need not be staggered.

b. Bays twelve feet one inch to fourteen feet six inches in width shall have two lines of sprinklers except where numerous bays of this width prevail, in which case two and one lines may be installed in adjoining bays with two lines in bays next to side or end walls. With this arrangement neither the maximum allowable distance between sprinklers on lines nor the maximum allowable protection area per sprinkler, within each bay, shall be exceeded. In the bays containing two branch lines, the sprinklers shall be located not closer than three feet to the girders.

c. Where the joists are framed into supporting girders, the girders may be disregarded in the spacing of the branch lines providing sprinkler deflectors are at such elevation that the girders offer no obstruction to the spray discharge pattern. See table in item I 3c of this section.

d. The distance from a wall or other obstruction to the closest sprinkler shall not exceed one-half the allowable distance between sprinklers.

(15.18.13.6). F. Joist construction with sheathed ceiling:

1. Joist construction with sheathed ceilings as defined in this subsection consists of joist construction sheathed with plasterboard, metal, wood lath and plaster, wood, fiberboard or other combustible sheathing.

2. Spacing of spray sprinklers under joist construction with sheathed ceilings: Ordinary hazard occupancy.

a. Where joisted construction is sheathed:

1. With plaster board, metal, wood lath and plaster—the protected area allotted per sprinkler shall not exceed 100 square feet. The distance between lines and between sprinklers on lines shall not exceed twelve feet.

2. With wood, fiber-board or other combustible sheathing, the protected area allotted per sprinkler shall not exceed 90 square feet. The distance between lines and between sprinklers on lines shall not exceed 12 feet. Sprinklers on alternate lines shall be staggered if the distance between sprinklers on lines exceeds 8 feet.

b. A protection area of 120 square feet per spray sprinkler with a distance between lines and between sprinklers on the lines not in excess of 15 feet may be allotted for sprinklers under suspended ceilings of combustible construction provided there is a full complement of sprinklers immediately above such ceilings, also under top-story ceilings of combustible construction provided there is a full complement of sprinklers immediately above such ceilings and the attic space is unfloored and unoccupied.

(15.18.13.7). G. Pitched roofs.

1. Pitched roofs are those in which the slope exceeds one foot in three feet.

2. Spacing of sprinklers under pitched roofs. Ordinary hazard occupancy:

a. Under pitched roofs where branch lines are run parallel to the peak, one line of spray sprinklers shall be located in the peak of the roof or a line of spray sprinklers shall be located on each side down from the peak a distance not greater than one-half the allowable distance between branch lines. Where branch lines are run up the slopes, the end sprinklers on branch lines on one slope shall be located in the peak or end sprinklers on branch lines on both slopes shall be located down from the peak a distance not greater than one-half the allowable distance between sprinklers on the branch lines. In any case the deflectors of the highest sprinklers shall not be more than two feet vertically below the peak.

b. The spacing of sprinklers shall be in accordance with the type of construction as outlined in subsections B, C, D, E and F of this section. The distances between sprinklers on branch lines shall be measured on a line parallel with the roof.

c. In sawtooth roofs the end spray sprinklers on the branch lines shall be not over two and one-half feet from the peak of the sawtooth.

(15.18.13.8). H. Position of sprinklers: Upright or pendent.

1. Spray sprinklers shall be used only in the position for which they have been approved.
2. Upright spray sprinklers shall be installed except in special cases.

(15.18.13.9). I. Position of deflectors.

1. Deflectors of spray sprinklers shall be parallel to ceilings, roofs, or the incline of stairs, but when installed in the peak of a pitched roof they shall be horizontal.
2. Under smooth ceiling construction: as defined in subsection B of this section.

a. Upright spray sprinklers shall be located with deflectors three to ten inches below smooth combustible ceilings or three to twelve inches below smooth incombustible ceilings. Where branch lines run across the beams, the deflectors of any sprinklers under beams shall be one inch to not more than four inches below the beams and not more than ten inches below the ceiling.

b. When spray sprinklers approved for pendent use are installed in the pendent position under smooth ceilings the deflectors shall be not less than two and one-half inches from ceiling. Special approved type pendent spray sprinkler, flush type, ceiling type, may have deflectors nearer ceiling.

3. Under beam and girder construction: as defined in subsection C of this section.

a. Where sprinklers are placed under beams, the deflectors shall be one inch to not more than four inches below the beams, but not more than sixteen inches below a combustible ceiling and not more than eighteen inches below an incombustible ceiling, except where beams are framed into girders forming panels not over two hundred square feet, the deflectors under beams may be a maximum of twenty-two inches below the ceiling. Where beams are framed into girders forming panels of between two and three hundred square feet, the deflectors under beams may be a maximum of twenty inches below the ceiling.

b. Where sprinklers are placed in the bays the distance between the deflectors and the ceiling shall be not less than three inches nor more than sixteen inches in bays less than five feet wide. When placed in bays five to seven and one half feet wide, the distance between the deflectors and the ceiling shall be not less than three inches nor more than twelve inches under combustible or fourteen inches under incombustible ceilings, except where beams are framed into girders forming panels not over two hundred square feet, deflectors may be a maximum of sixteen inches below combustible or twenty inches below incombustible ceilings.

c. Where deflectors of spray sprinklers in bays are above the bottom of the beams, they shall be located as shown in the following table:

Distance of sprinklers to side of beam	Maximum allowable distance of deflector above bottom of beam
0 to 1 foot	0 inches
1 to 2 feet	1 "
2 feet to 2 feet 6 inches	2 "
2 feet 6 inches to 3 feet	3 "
3 feet to 3 feet 6 inches	4 "
3 feet 6 inches to 4 feet	6 inches
4 feet to 4 feet 6 inches	7 inches
4 feet 6 inches to 5 feet	9 inches
5 feet to 5 feet 6 inches	11 inches
5 feet 6 inches to 6 feet	14 inches

4. a. Under bar joist or light steel trusses, spray sprinklers shall be located with deflectors three to ten inches below a combustible or three to twelve inches below an incombustible roof or floor deck.

5. Under joisted construction: As defined in subsection E of this section.

a. Under open joist construction spray sprinklers shall be located with deflectors one inch to not more than six inches below the bottom of joists.

b. Under joist construction with sheathed ceilings: Subsection F of this section, spray sprinklers shall be located with deflectors three to ten inches below the smooth ceiling.

6. Under bar joist construction as defined in subsections C and D of this section.

a. Under bar joist construction spray sprinklers shall be located with deflectors six to ten inches below the roof or floor deck except where required for drainage of long lines the minimum distance may be reduced to four inches.

(15.18.13.10). J. Schedule of pipe sizes: the standard schedule of pipe sizes for one-half inch heads given in section C26-1355.0 shall be used except as modified below. When the distance between spray sprinklers on branch lines exceeds twelve feet or the distance between branch lines exceeds twelve feet; the number of spray sprinklers on 2½-inch pipe shall be limited to 15, 3-inch pipe to 30, and on 3½-inch pipe to 60.

(15.18.13.11). K. Hangers: location of hangers. All rules in section C26-1355.1 shall apply except where—

1. Lengths of pipe up to and including 1¼ inch are over 12 feet long, hangers along these pipes shall be spaced not over 12 feet apart.
2. On larger size pipe where lengths are over 12 feet, hangers along these pipes may be spaced up to 15 feet apart.

(15.19) § C26-1353.0 Sprinkler Position.—a. Sprinkler heads shall be located wherever possible, in an upright position on top of the pipes, except that when the construction or occupancy of a room or enclosure makes it preferable, on automatic systems sprinkler heads may be pendant on concealed piping. When installing pendant sprinklers on a dry system, approved dry pendant sprinklers shall be installed.

b. Where standard one-half inch heads are installed, sprinkler deflectors shall be parallel to ceilings, roofs or the incline of stairs, but when installed in the peak of a pitched roof, such deflectors shall be horizontal. The distance of deflectors from ceilings of mill or other smooth construction, or the bottom of joists of open joists construction, shall be between three and ten inches. The decking supported by bar joists shall be considered the ceiling.

c. Where approved type one inch or one and one-quarter inch heads are installed, the top of each head shall be located the same distance below joists or ceiling as prescribed for deflectors of one-half inch standard heads; except that when such heads are located under pitched roofs or piers or similar structures, they shall in general be installed in the upright position and three feet vertically below the under side of the roof. When the superintendent deems a variation of this provision advisable in order to obtain a more efficient distribution of water, the heads shall be located with respect to joists or ceiling, as he may direct.

d. In Class 1 Fireproof structures, the maximum permissible distances between deflectors and panel ceilings shall be sixteen inches.

e. Where sprinklers are placed under the beams of semi-mill, panel, fire-resistive or incombustible construction, deflectors of end sprinklers shall be three inches below the beams; and other sprinklers, whether in bays or under beams, shall be only enough lower to provide drainage in the piping. The distance between sprinkler deflectors and floor or roof deck may be increased where conditions warrant, but the distance shall not exceed sixteen inches.

f. Where regular sprinklers are spaced less than five feet apart, baffles, or the equivalent, shall be installed to prevent the first sprinkler opening from wetting adjoining sprinklers. Baffles shall be so designed and located as not to interfere with the distribution of water from sprinklers.

g. When standard sprinklers approved for pendent use are installed in pendent position under smooth ceilings the deflectors shall be not less than 2½ inches from ceiling. Special approved type pendant sprinklers, flush type, ceiling, recessed, may have deflectors nearer ceilings.

h. For position of spray type sprinklers see section C26-1352.2 Sub-section I.

(15.20). § C26-1354.0 Spray Clearance.—a. At least eighteen inches effective clear space shall be left below the sprinkler heads, so that they may discharge an unbroken spray blanket from sprinkler to sprinkler, and to the sides of the room, when in operation. It shall be unlawful to place any stock piles, racks or other obstructions so that they interfere with such action. It shall be unlawful to use sprinkler system piping for the support of stock, clothing, and similar material.

b. In premises wherein the contents are not deemed extra hazardous plastic light diffusers complying with section C26-461.1 and suspended below sprinkler heads shall not be construed as an obstruction or affecting the spray clearance required by subdivision a. of this section, provided, that plastic sheets used in plastic light diffusers

shall be not less than 24 inches and not more than 48 inches in width, and shall be supported by but not fastened to metal "tee" or channel members not exceeding 1 inch in width per edge of plastic, and that the use of such plastic sheets shall be limited in area to the requirements of the board of standards and appeals.

(15.21). § C26-1355.0 Pipe Sizes and Permissible Number of Heads for Sprinkler Systems.—a. The maximum permissible number of heads on a given size pipe in one fire area in any story shall be as follows:

A. For one-half inch heads.—1. Schedule for light hazard occupancies. a. Branch lines shall not exceed eight sprinklers on either side of a cross main except as provided in subdivision E of this section.

Pipe sizes shall be as follows:

1-inch pipe.....2 sprinklers	2½-inch pipe.....30 sprinklers
1¼-inch pipe.....3 sprinklers	3-inch pipe.....60 sprinklers
1½-inch pipe.....5 sprinklers	3½-inch pipe.....100 sprinklers
2-inch pipe.....10 sprinklers	4-inch pipe.....No limit, see note

Each large area requiring more than 100 sprinklers and without subdividing partitions shall be supplied by feed mains or risers sized for ordinary hazard occupancies.

b. Where sprinklers are installed in a space above a ceiling and such sprinklers are supplied from the same piping which supplies sprinklers under the ceiling, pipe sizes up to and including 2½ inches shall be as follows:

1-inch pipe.....2 sprinklers	2-inch pipe.....15 sprinklers
1¼-inch pipe.....4 sprinklers	2½-inch pipe.....50 sprinklers
1½-inch pipe.....7 sprinklers	

Where the total number of sprinklers above and below the ceiling exceeds 50 the pipe supplying more than 50 sprinklers shall be sized by the pipe schedule of subdivision a for the number of sprinklers above or below the ceiling whichever is larger.

c. Connections to such systems from underground mains shall be not less than four inches in size.

2. Schedule for ordinary hazard occupancies. a. Branch lines shall not exceed eight sprinklers on either side of a cross main. Pipe sizes shall be as follows:

1-inch pipe.....2 sprinklers	3½-inch pipe.....65 sprinklers
1¼-inch pipe.....3 sprinklers	4-inch pipe.....100 sprinklers
1½-inch pipe.....5 sprinklers	5-inch pipe.....160 sprinklers
2-inch pipe.....10 sprinklers	6-inch pipe.....275 sprinklers
2½-inch pipe.....20 sprinklers	8-inch pipe.....400 sprinklers
3-inch pipe.....40 sprinklers	

Except in special cases as determined by the superintendent or in areas classified as extra hazard no pipe larger than eight inches will be required. However, except in combined dry pipe and pre-action systems there shall be at least one alarm valve or dry pipe valve with controlling gate valve for each 400 sprinklers in a fire area.

b. Where sprinklers are installed in a space above a ceiling and such sprinklers are supplied from the same piping which supplies sprinklers under the ceiling, pipe sizes up to and including three inches shall be as follows:

1-inch pipe.....2 sprinklers	2-inch pipe.....15 sprinklers
1¼-inch pipe.....4 sprinklers	2½-inch pipe.....30 sprinklers
1½-inch pipe.....7 sprinklers	3-inch pipe.....60 sprinklers

Where the total number of sprinklers above and below the ceiling exceeds 60 the pipe supplying more than 60 sprinklers shall be sized by the pipe schedule of subdivision a for the number of sprinklers above or below the ceiling whichever is larger.

3. Schedule for extra hazard occupancies. a. Branch lines shall not exceed six sprinklers on either side of a cross main. Pipe sizes shall be as follows:

1-inch pipe.....1 sprinkler	3-inch pipe.....27 sprinklers
1¼-inch pipe.....2 sprinklers	3½-inch pipe.....40 sprinklers
1½-inch pipe.....5 sprinklers	4-inch pipe.....55 sprinklers
2-inch pipe.....8 sprinklers	5-inch pipe.....90 sprinklers
2½-inch pipe.....15 sprinklers	6-inch pipe.....150 sprinklers

4. Deluge systems. a. The maximum number of open head sprinklers controlled by any one deluge valve shall be as follows:

1½-inch valve.....5 sprinklers	3-inch valve.....40 sprinklers
2-inch valve.....10 sprinklers	4-inch valve.....75 sprinklers
2½-inch valve.....27 sprinklers	6-inch valve.....150 sprinklers

Where there are over 20 sprinklers or where required by the superintendent, the heat-responsive devices or systems shall be automatically supervised.

b. Pipe schedule for deluge systems. The piping for deluge systems shall conform to the extra hazard schedule, except that where necessary to provide uniform sprinkler discharge, the pipe sizes shall be adjusted according to detailed friction loss calculation. These calculations should show the relation between the water supply and demand. These calculations shall be submitted to the superintendent.

c. In designing the piping system the water supply for deluge systems shall be based on not less than an average discharge of 15 gallons per minute per sprinkler. Adjustment in pipe sizes to provide uniform sprinkler discharge shall be based on a maximum variation of 15 per cent from the assumed average discharge per sprinkler. Where practical to obtain the required degree of uniformity of discharge by sizing of piping this shall be done rather than by using sprinklers having orifices smaller than ½ inch.

d. Friction loss in steel pipe of deluge systems shall be calculated using Hazen & Williams coefficient C equals 120 and obstruction losses due to change of direction of water through fittings shall be figured on terms of equivalent feet of pipe.

e. Where change is made in pipe sizes this shall not be effected by means of reducing flanges.

f. Where 8-inch piping is employed to reduce friction losses in a system operated by heat-responsive devices a six-inch pre-action or deluge valve and six-inch gate valve between taper reducers may be used.

B. For approved type one-inch heads:

Size of pipe in inches	Maximum number of heads allowed	Size of pipe in inches	Maximum number of heads allowed
1	1	4	18
1¼	2	5	34
1½	3	6	51
2	4	7	75
2½	6	8	105
3	9		

C. For approved type one and one-quarter-inch heads:

Size of pipe in inches	Maximum number of heads allowed	Size of pipe in inches	Maximum number of heads allowed
1¼	1	4	12
1½	2	5	21
2	3	6	40
2½	4	7	60
3	6	8	84

D. Not more than 14 branch lines shall be allowed on either side of the riser or feed main.

E. Where more than 8 sprinklers on a branch line are necessary, lines may be increased to 9 sprinklers by making the two end lengths 1-inch and 1¼-inch, respectively, and the sizes thereafter standard.

b. When it is desired to use pipe over eight inches in diameter, a special ruling will be required from the superintendent as to such use and the number of heads that may be fed thereby.

c. Where practicable, piping shall be so arranged that the maximum number of heads on a branch line shall be eight.

d. When the piping is arranged on the "gridiron" plan, the permissible number of heads may be doubled, provided the feed main is of the size indicated in the schedule for the total number of heads.

e. The permissible number of heads fed by six and eight inch pipe may be increased ten per cent more than the numbers allowed where strict compliance with the pipe sizes listed in this section would require another source of water supply or a larger feed main or riser.

f. Where feed mains supply branch lines having only two heads each, and the conditions approach those of long single lines, such feed mains shall usually be centrally supplied where there are over ten branch lines. Branch lines up to fourteen in number may be fed from the end, provided a two and on-half inch pipe does not supply more than sixteen standard one-half inch heads.

g. Structures having slatted floors, or large unprotected floor openings without approved stops, shall be treated as one room with reference to the pipe sizes, and the feed main shall be of sufficient size to accommodate the number of heads called for. Larger pipe sizes than are allowed in the schedule for a given number of heads

may be required wherever the construction or conditions introduce unusually long runs of feed mains or many angles. Structures with blind attics, with small, unprotected openings to the floor below, may be piped from the system on the ceiling of the floor below, provided the pipe size schedule is not overloaded on sizes three inches or under.

(15.21.1). § C26-1355.1 Hangers for Sprinkler Systems.—1. a. Sprinkler piping shall be substantially supported from the building structure. In all cases, sprinkler piping shall be supported independently of suspended ceiling construction.

b. Hangers shall be of approved types.

c. Sprinkler piping shall be supported by round wrought-iron U-type or approved adjustable hangers.

d. Approved C-type hangers shall be acceptable for use on steel beams when provided with a safety strap, or when cup-pointed set screws with lock nuts are provided for these hangers by the manufacturer.

e. If hangers or parts of hangers are made of flat iron or steel, the thickness of the metal must be at least 3/16 inch, unless protected by a suitable corrosion-resistant material. Unprotected steel ⅛-inch in thickness is acceptable for retaining straps used with "C" clamps.

f. Pipe rings hung from coach screw hooks shall not be used.

g. Hangers which permit wide lateral motion of the pipe, particularly on branch lines, shall not be acceptable.

h. Toggle hangers shall be used only for the support of branch lines and under ceilings of hollow tile or metal lath and plaster in buildings of fire-resistive or incombustible construction.

2. Hangers in concrete.—a. In concrete construction approved incombustible inserts set in the concrete may be installed for the support of hangers. The use of wood plugs shall not be permitted.

b. Hangers shall be installed without regard to the support of the sleeves where pipes are run through concrete beams. Such sleeves shall not normally be used for the support of pipes.

c. Expansion shields for supporting pipes under concrete construction shall be used in a horizontal position in the sides of beams, except that in good, sound concrete having gravel or crushed stone aggregate, they may be used in the vertical position to support pipes four inches or less in diameter.

d. For the support of pipes four inches and larger, expansion shields if used in the vertical position shall alternate with hangers connected directly to the structural members such as trusses and girders, or to the sides of concrete beams. In the absence of available structural members, in flat slab reinforced concrete construction pipes four inches and larger may be supported entirely by expansion shields in the vertical position, but spaced not over ten feet apart.

e. Expansion shields shall not be used in ceilings of gypsum or similar soft material. In cinder concrete, expansion shields shall likewise not be used except on branch lines and then shall alternate with through bolts or hangers attached to beams.

f. Depth of the hole for expansion shields shall in no case be less than specified for the type of shields used.

g. Holes for shields in the side of concrete beams shall be at least 4 inches above the bottom of the beam.

h. Where pipes are run through concrete beams, sleeves at least two sizes larger than the piping shall be used.

3. Location of hangers.—a. On branch lines there shall be at least one hanger for each length of pipe with one hanger within 30 inches of the end sprinkler and with hangers not over 12 feet apart, except that where one hanger for each length of pipe would require hangers closer than five feet apart, hangers may be spaced not to exceed 10 feet apart. Where starter lengths are less than 6 feet in length hangers may be omitted, except at end branch lines.

b. Provision to take care of the thrust of branch lines in a steeply pitched roof. shall be made.

c. On cross mains there shall be one hanger between each two branch lines. On feed mains there shall be at least one hanger for each 12 feet of pipe. Where cross mains are located between purlins and where construction is such that piping must be supported from roof or floor framing members, those hangers needed for cross main piping between branch lines coming within the truss or girder bays, shall be attached to steel angles bolted between purlins. In lieu thereof additional branch line hangers attached to the purlins and located thereon as close to the cross main as purlin location permits, together with a hanger on the end length of the cross main attached to steel angles, shall be acceptable.

d. Where sprinkler piping must be supported from roof framing members, as in

.ne case of gypsum or steel deck roofing, and the unsupported length between the end sprinkler and beam hanger would be greater than 36 inches, the pipe shall be extended beyond the end sprinkler to the next beam for support. If 1¼-inch pipe is used for the end piece, the unsupported length may be up to 48 inches.

e. Hangers shall not be near enough to sprinklers to obstruct distribution of water. They shall not be nearer than 12 inches, except in the case of round iron hangers, where a space of not less than three inches may be permitted.

f. Under "semi-mill" construction where sprinklers are located under the center line of beams, hangers may be used on the side of these beams provided the beams are of such width that hangers may not be closer than three inches to the sprinkler. Where beams are less than six inches in width, offset hangers may be used or the hangers located twelve to eighteen inches from sprinklers.

4. Support of Risers.—a. Risers shall be adequately supported by attachments direct to the riser or by hangers located on the horizontal connections close to the riser.

b. Risers shall be supported at every second floor.

c. Sprinkler and tank risers in vertical shafts shall be supported at every second floor.

5. Ceiling flanges, rods and "U" hooks.—a. Ceiling flanges.—For pipe sizes up to 2-inch ceiling flanges shall have at least two supporting screw holes; for sizes 2½-inch to 8-inch, not less than three holes, and in wood construction so located that no two holes are in the same line as the grain in the planking.

b. Rods.—The size of rods for hangers shall be not less than that given in the following table:

Pipe size	Diameter of rod
Up to 2-inch	⅜-inch
2½-inch, 3-inch, 3½-inch	½-inch
4-inch, 5-inch	⅝-inch
6-inch	¾-inch
8-inch	⅞-inch

c. "U" hooks.—The size of the rod material of "U" hooks shall be not less than that given in the following table:

Pipe size	Hook material diameter
Up to 2-inch	5/16-inch
2½-inch, 3-inch	⅜-inch
3½-inch, 4-inch	7/16-inch
5-inch	½-inch
6-inch	⅝-inch
8-inch	¾-inch

d. Screws.—For ceiling flanges and "U" hooks screw dimensions shall be not less than those given in the following table:

Pipe size	2 screw flanges
Up to 2 inch	Wood screw no. 18 x 1½ inch
Pipe size	**3 screw flanges**
Up to 2 inch	Wood screw no. 18 x 1½ inch
2½ inch, 3 inch, 3½ inch	Lag screw ⅜ inch x 2 inch
4 inch, 5 inch, 6 inch	Lag screw ½ inch x 2 inch
8 inch	Lag screw ⅝ inch x 2 inch
Up to 2 inch	Wood screw no. 18 x 1½ inch
2½ inch, 3 inch, 3½ inch	Lag screws ⅜ inch x 1½ inch
4 inch, 5 inch, 6 inch	Lag screw ½ inch x 2 inch
Pipe size	**4 screw flanges**
8 inch	Lag screw ⅝ inch x 2 inch
Pipe size	**"U" hooks**
Up to 2 inch	Drive screw no. 16 x 2 inch
2½ inch, 3 inch, 3½ inch	Lag screw ⅜ inch x 2½ inch
4 inch, 5 inch, 6 inch	Lag screw ½ inch x 2 inch
8 inch	Lag screw ⅝ inch x 3 inch

e. Drive screws shall be used only in a horizontal position as in the side of a beam. Wood screws shall not be driven.

f. Nails are not acceptable for fastening hangers.

g. Screws in the side of a timber or joist shall be not less than 2½ inch from the lower edge when supporting main lines. This shall not apply to 2 inch or thicker nailing strips resting on top of steel beams.

h. The minimum thickness of plank and the minimum width of lower face of

beams or joists in which lag screw rods are used shall be as given in the following table.

Diameter of rod	Nominal plank thickness	Nominal width of beam face
Up to ⅜ inch	3 inch	2 inch
½ inch	4 inch	2 inch
⅝ inch	4 inch	3 inch
¾ inch	4 inch	4 inch

Lag screw rods shall not be used for support of pipes larger than 6 inches. All holes for lag screw rods shall be pre-drilled ⅛ inch less in diameter than the root diameter of the lag screw thread.

i. When the thickness of planking and thickness of flanges does not permit the use of screws 2 inches long, screws 1¾ inches long may be permitted.

(15.22). § C26-1356.0 Supply Mains for Sprinkler Systems.—a. The supply mains for sprinkler systems shall be at least the size of the riser and shall be arranged to run as directly as possible from the source of water supply to the riser.

b. Supply mains for stair or other towers without approved stops between floors when piped on independent risers, shall be of sufficient size to accommodate the total number of sprinklers in such towers but shall not be required to exceed two and one-half inches.

(15.23). § C26-1357.0 Risers for Sprinkler Systems.—a. There shall be one or more separate risers in each structure and in each section of the structure divided by fire walls continuous for the height of the structure. Risers shall be arranged to provide "Center Central" or "Side Central" supply to feed mains. Each riser shall be of sufficient size to supply all the heads on that riser in one story, according to section C26-1355.0.

b. If the conditions warrant, special permission will be granted to allow the heads in a fire section to be fed from the risers in another section.

c. It shall be unlawful to locate risers close to windows. Risers shall be properly protected from mechanical injury and freezing and shall be properly supported by wrought iron clamps, couplings or approved hangers.

d. Wet pipe sprinklers for stairs or other towers without approved stops between floors shall be supplied by independent risers, if more than two stories in height, with control valves at lower level and be large enough to supply the total number of heads in such tower, but shall not be required to exceed two and one-half inches. Soffits of stairs shall be protected except when stair and enclosure are fireproof, in such case only the floor landings shall be protected.

(15.24). § C26-1358.0 Prohibited Connections to Sprinkler Systems.—It shall be unlawful to make connections, such as for sill cocks, house service or hose outlets, to any part of a sprinkler system riser, except as provided in section C26-1346.0.

(15.25). § C26-1359.0 Air Lock Adjustment.—Where gravity and pressure tanks for sprinkler systems feed through a common discharge pipe or "dead riser" to the foot of a riser and an air lock is likely to develop, the discharge pipe of the gravity tank shall connect with the common discharge pipe forty-five feet below the bottom of the gravity tank and the gravity tank check valve shall be placed at the level of this connection.

(15.26). § C26-1360.0 Pipes and Fittings for Sprinkler Systems.—a. Pipe for sprinkler systems shall be full-weight wrought iron or steel threaded pipe, well reamed and screwed up tight into fittings without reducing the waterway.

b. Wrought iron pipe shall comply with the standard specifications for welded wrought iron pipe of the A. S. T. M., D., A. 72-33.

c. Steel pipe shall comply with the standard specifications for welded and seamless steel pipe of the A. S. T. M., D., A. 120-34 T.

d. Fittings shall be standard cast iron fittings or malleable fittings of a type specifically approved for use in sprinkler systems.

e. Cast iron fittings shall be designed and guaranteed for a working pressure of one hundred seventy-five pounds per square inch and malleable fittings shall be designed and guaranteed for a working pressure of three hundred pounds per square inch.

f. Pipes shall be secured to the ceiling, walls and other parts of the building with standard steel, wrought or malleable iron hangers.

g. Extra heavy fittings shall be employed where the normal pressure in the pipe system exceeds the allowable working pressure limits as specified in "a." and shall be designed for a working pressure of two hundred fifty pounds per square inch.

h. Underground pipes shall comply with the regulations of the Department of Water Supply, Gas and Electricity for the working pressure required.

i. Welding of joints may be allowed in special cases but permission must be secured in writing from superintendent. When welding is permitted it shall be in accordance with the American Standard Code for Pressure Piping B31.1—1951 and shall conform to the requirements of title C26-211.0.

(15.27). § C26-1361.0 Protection of Pipes and Sprinklers.—a. When exposed to moisture, sprinkler pipes and hangers, shall be protected against corrosion whenever necessary by thoroughly cleaning the pipe of all scale and grease and painting with a coat of red lead and linseed oil paint or other acceptable moisture resistive paint. When exposed to chemical fumes, the pipe and fittings shall be coated with approved chemical resistive paint. It shall be unlawful to paint sprinkler heads.

b. Supply pipes of risers in low basements, or low spaces under ground floors, exposed to frost, shall be properly protected by concrete, brick or wood enclosures, properly heated, or by two-inch creosoted plank boxing, extending twenty-four inches on all sides of the pipe and filled with mineral wool, sawdust or tar mixed with granulated cork, extending below the bottom of the pipe and through the top flooring of the ground floor, or by other approved methods.

c. Where risers, drains, heating pipes, and similar installations, pass through cinder concrete floors or partitions, they shall be protected with a substantial metal sleeve, and the space between the floor and sleeve shall be grouted with cement mortar.

d. Wherever sprinklers are exposed to corrosion, the heads shall be protected with an approved coating.

(15.28). § C26-1362.0 Drainage of Sprinkler Pipes and Fittings.—a. Sprinkler pipes and fittings shall be so installed that they can be thoroughly drained, and where practicable, piping shall be arranged to drain at the main drain valves.

b. Drains shall be so arranged as not to expose any part of the sprinkler system to frost and shall be connected to a roof or house drain or through the wall of the structure. Systems not supplied from public water mains may have drain connections to sewer lines provided with brass swing check valves and standard traps. Drains for systems supplied from public water mains must be arranged with air break to prevent contamination of water supplies. Discharge from such drains may be made to open trapped receptacles, or on floor where no damage can result, to open connections into roof leaders on house side of leader trap, to open trapped connection to sanitary sewer, or discharge to outside of building. Connections into house drain must be trapped and vented.

c. Drains, pitched at least one-quarter of an inch in ten feet, shall be installed at: the base of the main riser, each alarm valve, each dry-pipe valve, each gravity tank, each pressure tank, each fire department connection, on each floor if independent floor control valves are used, and at each supply main when the water in such a main cannot be removed through any of the above drains. Such drains shall be installed with controlling valves so that flowing tests may be made to determine if the water supplies or connections from yard mains to the inside of the structure are in order without causing water damage or overflowing service connections to the same house drain. Any such drain shall be at least two inches in size, except that drains at independent floor valves shall be at least one inch in size where floor valves are two and one-half inches or less in size and one and one-quarter inches where floor valves are larger and connected to a main drain riser at least one and one-half inches in size. The drain at the main riser shall discharge into a cone or sight drain, or if carried through the wall and exposed to the weather, it shall be fitted with an elbow turned down.

d. A drain may be omitted at an alarm valve at the top of a riser in a down-fed system.

e. On automatic wet-pipe systems, the horizontal branch pipes shall be pitched at least one-quarter of an inch in ten feet to drain towards the sources of supply with drain valves at the low points.

f. On automatic dry-pipe systems, branch pipes shall be pitched at least one-half of an inch in ten feet.

(15.29). § C26-1363.0 Test Pipes for Sprinkler Systems.—a. In wet-pipe automatic sprinkler systems a test pipe at least one inch in diameter shall be connected directly with each system, and shall be connected to a pipe at least one and one-quarter inches in diameter in the upper story and arranged to discharge through a one-half inch brass outlet, preferably to a point where it can readily be seen. Controlling valves shall be located at a sufficient distance from the point where the test pipe passes through the wall of the structure, so as to avoid freezing.

b. In dry-pipe automatic sprinkler systems a one-inch inspector's test pipe shall be installed at the end of the most distant branch line and fitted with a one-inch shut-off valve, plugged with a brass plug.

(15.30). § C26-1364.0 Pressure Gauge for Sprinkler Systems.—a. A double spring Bourdon pressure gauge, three and one-half inches or larger, shall be provided in

automatic sprinkler systems: above dry pipe valves, below dry pipe valves, at the pressure tank, at the air compressor, above the alarm valve, below the alarm valve,

b. Provision may be made for taking the pressure both above and below the alarm and at the suction and discharge of fire pump or pumps.
valve and the dry pipe valve with only one gage at each valve.

c. A gage may be omitted at an alarm valve located at the top of a riser in a down-fed system.

d. Gage connections shall be taken only from the supply main or riser.

e. Gages shall be installed in a suitable place protected from freezing and be controlled by a valve with arrangements for draining. An outlet, at least one-quarter of an inch in size, plugged for the installation of the inspector's gage, shall be located between each valve and gage.

(15.31.1). § C26-1365.0 Valves for Sprinkler Systems.—a. Gate Valves for Sprinkler Systems.—

1. Gate valves two inches and under shall be of cast valve bronze or other approved non-corrosive material. Gate valves two and one-half inches and larger shall have cast iron or cast steel bodies, flanged bronze mounted, bronze stem and ample size hand wheel.

2. Gate valves controlling any number of sprinklers shall be of the outside screw and yoke pattern.

(15.31.2). b. Drain Valves for Sprinkler Systems.—Drain valves for sprinkler systems shall be of valve bronze, angle globe pattern, with renewable discs and ample size hand wheels.

(15.31.3). c. Check Valve for Sprinkler Systems.—

1. Check valves two inches and under shall be of the swing regrinding pattern; bodies and working parts shall be of cast valve bronze, or other approved non-corrosive material.

2. Check valves two and one-half inches and larger shall be of the swing flanged pattern, having cast iron or cast steel bodies, bronze clappers and bronze seat rings.

3. Check valve clappers and their attachments shall be designed so they can be readily removed from the body of the valve for repairs when necessary.

4. Check valves where used to hold a differential in pressure may be provided with rubber or composition discs or washers. Where same require replacement, the new part must be of a type approved for that valve.

5. Where an alarm check valve is installed, on a system only requiring one alarm valve, an additional check valve need not be installed in water supply to system. Alarm check valves may be installed in either vertical or horizontal position.

(15.31.4). d. Water Supply Gate Valves for Sprinkler Systems.—The piping connecting each source of water supply with the sprinkler system shall be provided with a gate valve of the outside screw and yoke type, or an approved post indicator valve, sealed open and tagged to designate its purpose, so located as to control each source of water supply, except the water supply from fire department hose connections. Such gate valves shall be so located as to be easily visible and readily accessible and shall be as close as possible to the supply inlet.

(15.31.5). e. Water Supply Check Valves for Sprinkler Systems.—

1. The piping connecting each source of water supply with the sprinkler system, including fire department connections, shall be provided with a horizontal swing check valve except when written permission is granted by the superintendent to use check valves in other than horizontal position.

2. On two-source systems, check valves on each supply shall have a gate valve on each side to permit repair of the check valve without shutting off both supplies.

(15.31.6). f. System Control Valves for Sprinkler Systems.—

1. Automatic sprinkler risers shall be provided with a main shut-off valve, which will control the water supplies to the sprinklers fed by such riser, except single down feed risers equipped with floor control valves.

2. Valves controlling water supplies to automatic sprinklers shall be readily accessible at all times. Standard signs, indicating the purpose of the valve, shall be attached to the yoke in a substantial manner. Valves shall be lubricated and sealed open.

(15.31.7). g. Precautions Against Freezing of Sprinkler Systems.—

1. When ten or less standard one-half inch sprinkler heads in any automatic wet-pipe system are exposed to cold and subject to freezing, shut-off valves may be provided to discontinue the water supply to such heads between November first and April first.

2. When thirty-six or less one-half inch sprinkler heads are exposed to freezing, the sprinkler piping may be filled with a non-freezing solution. This solution shall be thoroughly mixed and introduced into sprinkler piping through approved filling connection. Such filling connection shall be provided with a metal filling cup, shut-off valve and with an outside screw and yoke gate valve between the solution and the water supply, and with a three-quarter inch plugged drain valve at the bottom. A check valve with 1/32 inch hole drilled in clapper shall be installed when sprinklers on non-freezing system are above water supply.

Note—Where sprinkler systems are supplied by public water connections the use of non-freezing solutions must be in conformity with any state or local health regulations which may apply.

3. A greater number of heads than specified above, located in unheated areas, shall be controlled by an approved automatic dry-pipe valve.

(15.31.8). h. Dry Pipe Valves for Sprinkler Systems.—

1. The term "dry pipe" valve shall mean a valve automatically controlling the water supply of a sprinkler system in such a manner that under normal conditions the piping system beyond the valve is maintained dry, but that in the event of fire, the valve automatically releases the water into the sprinkler system for fire extinguishing purposes.

2. Dry pipe valves shall, for the purpose of this title, be classified as follows:

(a) Type A, in which the valve is actuated by the release of compressed air in the sprinkler piping system, due to the opening of a sprinkler head;

(b) Type B, pre-action in which the valve is actuated automatically in an approved manner by an approved system of control.

3. Dry pipe valves shall be located as near as practicable to the sprinkler system, in an enclosed and accessible place protected from mechanical injury and freezing.

4. When type A dry valves are installed, the air pressure in sprinkler systems under such dry pipe valve control shall be as specified by manufacturer.

5. The compressed air supply shall be from a reliable source available at all times and having a capacity of restoring normal air pressure in the system within a period of thirty minutes. The air supply for the compressor shall be taken, if possible, from a room containing dry air, or it shall be passed through a drying chamber containing calcium chloride, in order to avoid the introduction of moisture into the system. Air compressors shall be provided with an approved bronze relief valve, set to open as specified by dry valve manufacturer.

6. The air pressure on such dry system shall be maintained throughout the year.

7. The maximum number of heads controlled by one type A dry pipe valve shall be as follows:

a. One-half inch heads, 400;

b. Approved type one-inch heads, 100;

c. Approved type one and one-quarter inch heads, 64; except when the system is equipped with an approved type quick opening device, the maximum number of heads controlled by one type A dry pipe valve may be increased fifty per cent above the numbers herein prescribed.

8. When type B dry valves are installed, the actuating system shall be designed to operate at a temperature lower than that required to open the sprinkler heads, and all connections between the system and the dry pipe valve shall be adequately protected against injury. The maximum number of heads controlled by one type B dry pipe valve shall be as follows:

a. One-half inch heads, 1,000;

b. Approved type one-inch heads, 150;

c. Approved type one and one-quarter inch heads, 96.

(15.31.9). i. Alarm Devices for Sprinkler Systems.—

1. Automatic wet-pipe sprinkler systems shall be equipped with an alarm device or devices so constructed that a flow of water through a one-half inch orifice will operate an electric or mechanical gong.

2. Dry pipe valves shall be equipped with an approved water flow alarm device.

3. When an electrical alarm is installed in connection with an alarm valve or dry pipe valve, the installation shall be made in conformity with section C26-1366.0.

(15.31.10) § C26-1365.1 Automatic Dry Pipe Sprinkler Systems Combined with Rate-Of-Rise Actuating Systems.—a. An automatic dry pipe sprinkler system combined with rate-of-rise actuating system is one employing automatic sprinklers attached to a piping system containing air under pressure, with a rate-of-rise heat responsive actuating system of more sensitive characteristics than the automatic sprinklers themselves, installed in the same areas as the sprinklers; actuation of the heat responsive system, as by a fire, opens dry pipe valves which permit water to flow into the sprinkler piping system and to be discharged from any sprinklers which may be open. A rate-of-rise actuating system is one that is operated automatically by a rise in temperature occurring within a fixed period of time.

This combined automatic dry pipe and pre-action system of sprinklers shall be so constructed that failure of the rate-of-rise actuating system shall not prevent the system from properly functioning as a conventional automatic dry pipe system, namely,

fusing of one or more automatic sprinklers reduces air pressure in piping system thereby operating dry pipe valves which permit water to flow into sprinkler piping system and to be discharged from any of the sprinklers which may be open.

Further, this combined automatic dry pipe and preaction system of sprinklers shall be so constructed that failure of the dry pipe system of automatic sprinklers shall not prevent the rate-of-rise actuating system from properly functioning as an automatic fire alarm system.

b. This system shall comply with the following requirements:

1. The sprinklers shall be supplied through two differential type dry pipe valves arranged in parallel with their system sides joined as a unit to a common feed main.

2. Rate-of-rise heat responsive devices shall be properly spaced in the area of each sub-division of the sprinkler system in such a manner as to trip automatically the dry pipe valves described in sub-division b. 1 of this section. Such devices and their locations shall be approved by the board.

3. Common feed mains shall be provided, making connection between two dry pipe valves required under subdivision b. 1 of this section and the several sub-divisions of the sprinkler system.

4. Each branch from the feed mains shall be provided with a check valve to retard back flow of air to the feed main. Total number of sprinklers on the system side of each check valve shall not exceed 600.

5. At least one air exhaust valve directly controlled by the rate-of-rise actuating system shall be placed at the most distant end of each main. At least one air exhaust valve actuated by a rapid drop in air pressure shall be placed at each end of each feed main.

6. The sprinkler system shall be so constructed, and the number of sprinkler heads controlled by the two dry pipe valves shall be so limited, that water shall reach the furthest sprinkler within a period of time not exceeding one minute for each 400 feet of feed main, from the time the rate-of-rise system is actuated. The total number of sprinklers controlled by the two dry pipe valves shall otherwise be unlimited.

7. The sprinkler and actuating systems shall be maintained in operating condition at all times.

8. An approved automatic fire alarm or rate-of-rise actuating system shall be provided, and a watchman shall be employed in the structure for twenty-four hours of each day to send an alarm to the fire department whenever an alarm is sounded by the automatic fire alarm system or the system alarms shall be directly connected to the central station of an operating fire alarm company whose sole business is fire protective service and which is directly connected to fire department headquarters. The fire alarm system shall be operated by both the rate-of-rise actuating system and the operation of the dry pipe valves.

9. When the ceiling height or bottom of beam across the structure exceeds 20 feet, the sprinklered area shall be sub-divided into sections separated from each other by fire curtains or other approved fire stops constructed of incombustible material having a height of at least one-sixth of the distance from the floor to the ceiling or bottom of beams or to the roof if there is no ceiling. Where the ceiling, beam or roof height is twenty-four feet or less, the fire curtain need not extend below an elevation that would allow twenty feet in the clear from the bottom of such curtain to the floor. Not more than 275 heads shall be permitted in any sub-divided area.

10. Provision shall be made for manual operation of the system at locations requiring not more than two hundred feet of travel.

c. In the dry pipe automatic sprinkler system combined with rate-of-rise actuating systems, sizes of pipe supplying the specified number of one-half inch sprinklers in a fire area on a floor shall not be less than those given in the following schedule:

Minimum size of pipe inches	No. of ½-inch sprinklers	Minimum size of pipe inches	No. of ½-inch sprinklers
1	2	3	40
1¼	3	3½	65
1½	5	4	100
2	10	5	160
2½	20	6	275

d. Except as provided otherwise in this section, this system of sprinklers shall in addition comply with all other pertinent provisions of the code.

(15.32). § C26-1366.0 Local Sprinkler Supervisory Alarm Systems.—a. Each gravity tank, pressure tank and Type A dry pipe valve shall be provided with an approved device, connected to an approved closed circuit panel, located in the headquarters of the engineer or person in charge of the sprinkler system, or in the pump room, to indicate

when the water in any tank is too high or too low, when the air pressure in any pressure tank is too high or too low, and when the compressed air in a Type A dry system is too low.

b. The wiring circuits used in connection with this supervisory alarm system shall be at least No. 16, single braid, rubber covered, copper, National Electric Code wire, provided the circuit carries two amperes or less; run in National Electric Code rigid metal conduit, except that approved flexible metal ducts may be used between rigid conduits and devices from which alarms originate, provided three feet or less of flexible duct is used.

c. High and low alarm signals shall be indicated by at least a four inch approved conduit type gong and by visible indication.

d. Waterflow signals from alarm and dry pipe valves shall be indicated by at least a six inch approved conduit type gong and by visible indication.

e. The following sources of energy may be employed:

1. Electricity supplied by a public utility.

2. A private electric generating plant, supplemented by a storage battery floating on the line. Direct current supply lines shall be protected by reverse current circuit breakers.

3. An approved rectifier may be used to transform alternating current to direct current as a source of energy for an alarm system.

f. When the system is connected to a one hundred ten volt lighting service a suitable cut out is to be provided. Such cut-out shall be enclosed in a locked or sealed metal cabinet. The connection to the system shall be the first connection on the house side of, and as near as practicable to, the meter. When batteries are used to operate the system, they shall be placed in an approved cabinet provided with a lock and key.

g. In addition to the above requirements for local supervisory alarm systems, additional approved electrical supervisory devices for either local or central station indication may be installed in any system.

(15.33). § C26-1367.0 Concealed Pipe Systems for Sprinkler Systems.—Pipe in concealed pipe systems shall be of standard full-weight wrought iron or steel and shall be inspected prior to concealment. Pipe installed in ducts or encased in cement mortar shall be inspected prior to concealment. When installed in the concealed space between floor arches and ceiling, such pipe shall be supported by hangers. Where piping is to be concealed before completion of installation the superintendent and the fire commissioner shall be notified so that proper inspection can be made.

(15.34). § C26-1368.0 Preparation of Structure.—a. Floor or wall openings and other structural conditions which prevent the banking up of heated air and retard the automatic action of sprinkler heads shall be provided with the necessary curtain boards and draft stops to permit control of the fire by the sprinklers.

b. Curtain boards shall project at least six inches below the lowest sprinkler and shall be at least twelve inches deep.

c. Where curtain boards are provided to subdivide large areas such curtain boards shall be at least twenty-four inches deep. For peaked roofs curtain boards shall follow slope of roof and be not less than twenty-four inches deep with a minimum of forty-eight inches deep at the peak when the slope is one foot in three feet, or more, except as provided in C26-1365.1. Where required to baffle opening through floors they shall be not less than 12 inches deep.

(15.35). § C26-1369.0 Approval of Sprinkler Systems.—a. Before acceptance automatic sprinkler systems, excluding water supply tanks, shall be subjected after installation to a hydrostatic pressure test, of the whole system, of at least one hour duration at a pressure at least fifty pounds per square inch in excess of that which will be normally carried and observed in the sprinkler system. Such test pressure shall be at least two hundred pounds per square inch in every part of the system. Pressure tanks shall be tested after erection to test pressure of one and one-half times the working pressure. To prevent the possibility of serious water damage in case of a break, the pressure shall be maintained by a small pump, the main controlling gate being meanwhile kept shut. It shall be unlawful to use brine or other corrosive chemicals for testing systems.

b. In automatic dry pipe systems with type A valve control, an air pressure of forty pounds per square inch shall be pumped up, and shall be held for twenty-four hours. All leaks shall be stopped which allow a loss of pressure of over one and one-half pounds per square inch during the twenty-four hours.

c. In the case of automatic dry pipe systems with differential Type A valves, the valve shall be held off its seat during the test to prevent injuring the valve.

d. Non-automatic systems shall be tested after installation at a pressure at least fifty pounds per square inch in excess of the pressure necessary to reach the highest line of sprinklers.

e. Tests of installed systems shall be made by the contractor in the presence of

a representative of the fire department. The fire commissioner shall notify the commissioner of buildings in writing of the results of the test.

f. It shall be unlawful to cover up or permanently conceal piping, devices or any portion of newly constructed sprinkler system until such system, or portion of system, has been tested in the presence of a representative of the fire department and inspected by a representative of the department of housing and buildings and approved in writing, except piping passing through floors, walls, partitions, or beams, for distances equal to the thickness of such floor, wall, partitions or beams.

(15.36). § C26-1370.0 Sprinkler Systems in Non-fireproof Business Structures.—In business structures requiring a sprinkler system to comply with section C26-254.0 the sprinkler system shall have at least one automatic source of water supply and one auxiliary source.

(15.37). § C26-1371.0 Sprinkler Systems in Department Stores.—Wet sprinkler systems shall be required in department stores where the floor area in any story or cellar exceeds ten thousand square feet. When the floor area is less than twenty thousand square feet, at least one of the automatic sources specified in section C26-1341.0, shall be provided and, when the floor area is twenty thousand square feet or more, at least two such automatic sources shall be provided of which one source shall conform to requirements of a one source system and the secondary source may be either a 7,500 gallon pressure tank, a 10,000 gallon gravity tank elevated 20 feet above the highest line of sprinklers under the main roof, a six inch connection to a city main fed two ways and in accordance with section C26-1346.0 or a supervised automatic fire pump of 750 gallons per minute.

(15.38). § C26-1372.0 Sprinkler Systems in Factories and Other Structures.—a. Where the labor law or any other law requires automatic sprinkler systems, or where any of the requirements of the labor law or any other law are waived because of the installation of an automatic sprinkler system, each such sprinkler system, unless specifically otherwise required by law or by the fire commissioner, shall have at least the following sources of supply installed in accordance with this article:

1. A gravity tank and Siamese hose connection, or
2. A pressure tank and Siamese hose connection, or
3. A direct connection to a city water main fed two ways with control valves at intersections capable of maintaining a pressure of at least fifteen pounds per square inch at the top of the highest sprinkler riser, which main shall have five hundred gallons of water flowing per minute at a two and one-half inch hydrant butt at the street level within two hundred fifty feet of the building. The diameter of such connection shall be at least the diameter required in piping supplying the heads as provided in section C26-1355.0. Siamese hose connection shall be installed in conjunction with such system as provided in section C26-1350.0. The pressure test, with hydrant flow as provided in this section, shall be made between the hours of eight ante meridian and five post meridian on a working day.

b. Cellars and sub-cellars requiring sprinkler protection under chapter 19-161 administrative code, because of combustible storage, inadequate ventilation and inaccessibility of fire department hose streams shall be provided with a one source automatic sprinkler system. If cellar or sub-cellar is unheated a non-automatic sprinkler system with thermostatic alarm as defined in section C26-1339.0 may be provided in lieu of an automatic sprinkler system. Where less than ten heads are required the heads may be supplied from the domestic water line if the tap and main are of adequate size and the connection for the sprinkler system is made before the house line at the outlet side of the meter or service pipe and an O.S.&Y. valve and drain is provided in an accessible location. In all cases the water supply line need only be sufficient to supply the number of heads required except where the distance from the water supply to the sprinklered area exceeds 100 feet the main feed pipe to the sprinklered area shall be increased one pipe size above the size otherwise required for the number of sprinklers involved. Where less than ten heads are required a fire department connection need not be provided. If more than ten and not more than thirty-six heads are required a single fire department pumper connection may be installed. When more than thirty-six heads are installed at least one siamese connection and a water flow alarm shall be provided.

c. Sprinklers in multiple dwelling, garages.—Sprinklers in garages where more than thirty-six heads are required shall comply with these rules in all respects, except as herein noted. Where not more than thirty-six heads are required the water main shall be large enough to supply all heads. If in a small garage not more than ten heads are required same may be supplied from the domestic water main if the tap and main size are as large or larger than required for the number of sprinklers involved and the connection is so made that repairs to the domestic lines in the building will not affect the supply to the sprinklers in the garage area except where the distance from the

water supply to the sprinklered area exceeds 100 feet the main feed pipe to the sprinklered area shall be increased one pipe size above the size otherwise required for the number of sprinklers involved. Water flow alarm or siamese connection need not be provided where not more than thirty-six heads are required. Siamese connections shall only be required at the fronts of the building where a garage entrance is located. If the siamese connection cannot be installed at the entrance to the garage a metal sign securely fastened to the wall at the garage entrance indicating the location of the siamese connection shall be provided.

(15.39). § C26-1373.0 Sprinkler Systems in Theatre Structures.—An automatic sprinkler system, where required under the provisions of article thirteen of this title, shall be at least a one-source automatic system.

(15.40). § C26-1374.0 Sprinkler Systems in Fireworks Storage.—Each automatic sprinkler system required in a structure in which fireworks are stored or sold under the provisions of sections C19-41.0 of the code, shall consist of a system supplied from any two of the automatic sources as required in section C26-1351.0 provided that the minimum working pressure is at least twenty-five pounds per square inch at the highest sprinkler line.

(15.41). § C26-1375.0 Sprinkler Systems for Nitro-cellulose Products.—An automatic sprinkler system required in a structure in which nitro-cellulose products are manufactured, stored, or kept, under provisions of section C19-110.0, shall be a two source system having the following water supplies:

a. A primary supply consisting of one of the automatic sources named in section C26-1341.0 b, but this source shall have a static pressure of not less than twenty-five pounds per square inch on the highest line of sprinklers in the area where the nitro-cellulose is located. Tank and pump capacities shall be determined according to sections C26-1342.0, C26-1345.0 and C26-1347.0 but in determining these capacities each sprinkler in the area where the nitro-cellulose is located shall be counted as two sprinklers, except that if there are more than four vaults all sprinklers in the vaults in excess of four shall be omitted from the count.

b. A secondary supply consisting of a gravity tank, or tanks as specified in sections C26-1342.0 through C26-1344.0 inclusive but such tank shall be of at least 10,000 gallons capacity and shall contain an amount of water sufficient to supply fifty per cent of the sprinklers in the area where the nitro-cellulose is located for a period of twenty minutes. Only sprinklers in this area are to be counted and sprinklers in not more than four vaults shall be included in this count.

c. An auxiliary source consisting of a Siamese fire department connection or connections as specified in section C26-1350.0.

(15.42). § C26-1376.0 Sprinkler Systems for Inflammable Motion Picture Films.—An automatic sprinkler system required in a structure in which inflammable motion picture films are stored or kept, under the provision of section C19-115.0 and C19-116.0 of the code shall be a two source system having the following water supplies:

a. A primary supply consisting of one of the automatic sources named in section C26-1341.0 but this source shall have a static pressure of not less than twenty-five pounds per square inch on the highest line of sprinklers in the area where the inflammable motion picture film is located. Tank and pump capacities shall be determined according to sections C26-1342.0, C26-1345.0 and C26-1347.0 but in determining these capacities each sprinkler in the area where inflammable motion picture film is located shall be counted as two sprinklers except that if there are more than four vaults all sprinklers in the vaults in excess of four shall be omitted from the count.

b. A secondary supply consisting of a gravity tank, or tanks, as specified in sections C26-1342.0 through C26-1344.0, inclusive, but such tank shall be of at least 10,000-gallon capacity and shall contain an amount of water sufficient to supply fifty per cent of the sprinklers in the area where the inflammable motion picture film is located for a period of twenty minutes. Only sprinklers in this area are to be counted and sprinklers in not more than four vaults shall be included in this count.

c. An auxiliary source consisting of a Siamese fire department connection or connections as specified in section C26-1350.0.

(15.43). § C26-1377.0 Sprinkler Protection for Special Hazards in Non-sprinklered Structures Unprovided for by Law.—a. Sprinkler heads and piping may be provided on ceilings of enclosed rooms, closets, shafts, or other spaces which are used as carpenter shops, upholstering rooms, paint shops, waste paper rooms, old record storerooms, trunk and general storage rooms in hotels, office buildings or other structures, and in stores and showrooms or where nitro-cellulose products or inflammable photographic or x-ray film is stored or used, or in cold storage plants.

b. In such structures, the number and type of sprinkler heads, spacing and size of pipe, location and number of valves, method of draining lines, water flow or other alarms, shall be as required by the superintendent.

c. The source of water supply where required may be the house supply tank or other sources of water supply, except that connections taken from the standpipe system or from the feed line to boilers shall be unlawful. In all cases there shall be sufficient water to provide ten gallons of water per head for each sprinkler in the largest protected fire area for fifteen minutes, and the pressure on any sprinkler line shall be at least fifteen pounds static pressure.

d. Sprinklers installed under section C26-289.0 may be supplied from the domestic water main if the tap and main size are sufficient and the connection is made at the outlet side of the water meter before the house connection. Independent connection to the street main, water flow alarm and Siamese connection shall be provided if more than thirty-six heads are required.

e. Sprinklers permitted by the superintendent in lieu of other protection may be supplied from the domestic water lines if the tap and main size is adequate and water pressure is at least fifteen pounds per square inch at the highest sprinkler.

f. Sprinklers in spray booths in unsprinklered buildings may be supplied from the domestic water line if the tap and pipe sizes are adequate and water pressure is at least fifteen pounds per square inch at the highest sprinkler.

g. Where the distance from the water supply to the sprinklered area exceeds 100 feet the main feed pipe to the sprinklered area shall be increased one pipe size above the size otherwise required for th number of sprinklers involved. In all cases an O.S.&Y. control valve must be provided in an accessible location and a test connection installed at the end of the line so that system may be properly tested. Where more than five heads are supplied or where damage may be caused by draining, a three-quarter inch drain valve shall be provided.

h. Outside sprinklers.—When used in lieu of iron shutters or fireproof windows a system of approved window type sprinklers shall be installed with a fire department Siamese connection as a water supply. Piping shall be galvanized and fittings shall be of malleable type.

i. Special protection for hazards not covered by this code shall be determined by the fire commissioner. Special protection as covered by this classification may include, but not limited to:

Carbon dioxide, foam, spray or fog nozzles installations for transformers, dip tanks, propane tanks and similar special hazards.

(15.44). § C26-1378.0 Existing Sprinkler System Installations and Approvals.—a. Automatic sprinkler systems and devices installed before January first, nineteen hundred thirty-eight, shall be required to conform to this title only where the fire hazard due to construction and occupancy of the structure is increased. Where substantial additions or extensions in height or area are made to the structure, this title shall apply if deemed advisable or necessary by the superintendent.

b. In cases where sprinkler systems are voluntarily installed by the owner or his representative, and where such sprinkler systems are not required by law, or by any violations standing against the structure, it shall be unnecessary for such sprinkler systems to be designed or installed in conformity with this title, except that where such systems are provided with Siamese hose connections the entire system shall be maintained in a manner satisfactory to the superintendent and to the fire commissioner or the Siamese connection shall be removed. All materials shall be of approved type. Plans and application shall be filed as per section C26-1337.0.

c. When a new system is installed and the water supply is received from an existing system in an adjoining building, the new system must be complete in all respects and arranged so that a shut down in either building will not prevent the effective operation of the fire department Siamese connections. This shall not apply where groups of buildings are used by the same firm or factory and there is no possibility of confusion in operating the system.

(15.45). § C26-1379.0 Communicating Openings.—When a structure fully equipped with sprinklers communicates with another not so equipped, the openings between such structures shall be protected by approved automatic fire doors on both sides of the wall.

(15.46). § C26-1380.0 Maintenance Inspection.—a. Automatic sprinkler systems shall be inspected at least once a month by a competent person holding a certificate of fitness, employed by the owner, to see that all parts of the system are in perfect working order, and that the fire department connection or connections, if any, are ready for immediate use by the fire department. A detailed record of each inspection shall be kept for examination by a representative of the fire department.

b. There shall be kept available at all times in the premises a supply of at least six extra sprinklers, to replace promptly any fused or damaged sprinklers. There shall be one or more employees instructed in the maintenance of sprinkler systems.

ARTICLE 17. STANDPIPE SYSTEMS

Sub-Article 1. General Provisions Governing Standpipe Systems

(16.1.1). § C26-1381.0 Standpipe and Yard Hydrant Systems Required.—a. Standpipe systems, as provided in this article and in accordance with the rules of the board, shall be installed in:

1. Structures erected before January first, nineteen hundred thirty-eight, over eighty-five feet high, previously without a standpipe three inches or more in diameter.

2. Structures constructed after January first, nineteen hundred thirty-eight, that exceed seventy-five feet in height.

3. Structures more than one story high and with more than ten thousand square feet of net floor area.

b. The following structures are exempted from the requirements of this section, provided that such structures, when fifty feet or less in height, used for an occupancy not deemed highly hazardous by the superintendent, shall be equipped with either a standpipe system, a wet or dry sprinkler system in accordance with article sixteen of this title, or with at least one two and one-half gallon hand fire-extinguisher for each twenty-five hundred square feet of floor area and at least one forty-gallon portable chemical fire-extinguisher for each ten thousand square feet of floor area:

1. Structures included within the provisions of section C26-751.0;

2. Structures of a maximum height of two stories or twenty-five feet and twenty thousand square feet or less in area, the occupancy of which structure is not deemed highly hazardous by the superintendent;

3. Structures of a maximum height of six stories or seventy-five feet used for an occupancy not deemed highly hazardous by the superintendent, and provided throughout with an approved, automatic sprinkler system, with two approved sources of supply;

4. Structures used exclusively for school purposes in which pupils are trained in rapid dismissal by means of regular, supervised fire drills, and which are five stories or less in height, provided that where such structures have towers exceeding five stories in height, such tower portion of such structures shall be equipped with a dry-line standpipe system.

c. Nothing contained in the exemptions specified in this section shall nullity any of the standpipe requirements of article thirteen of this title.

d. Yard hydrant systems shall be installed in amusement and exhibition parks, and in enclosures, oil storage plants, lumber yards, ship yards, and in other industrial plants over fifteen thousand square feet in area, when deemed necessary by the superintendent.

(16.1.2). § C26-1382.0 Construction and Maintenance of Standpipe Systems.—Standpipe systems when required shall be constructed and maintained in accordance with the rules of the board, except that standpipe systems in theatres and similar occupancies shall first comply with article thirteen of this title.

(16.1.3). § C26-1383.0 Approval of Devices and Materials for Standpipe Systems.—No device, valve or fitting may be used in a required standpipe system unless such device, valve or fitting is of a type approved by the board for such use. Devices, valves and fittings tested and classified or approved by any nationally recognized testing laboratory which possesses adequate equipment, experience and competency in this field may be approved by the board without additional test, but the board may require tests made under its supervision as a condition of approval. Devices, valves and fittings tested and approved by the board prior to January first, nineteen hundred thirty-eight, shall be approved.

(16.1.4.1). § C26-1384.0 Plans and Diagrams for Standpipe Systems.—a. Application and approval of plans for standpipe systems.—

1. No standpipe system may be installed, extended or altered until an approval of the proposed work has been given by the superintendent.

2. Applications for approval of standpipe work shall be made on forms issued by the superintendent and shall be accompanied by plans indicating the proposed work.

3. The superintendent shall notify the applicant in writing of the approval or disapproval of the application and plans and in the case of disapproval shall list all criticisms and objections or changes which may be required to bring the plans into conformity with the provisions of this title and the rules of the board. When the applicant has fully corrected the plans and satisfactorily answered any objections, three sets of the fully corrected plans shall be filed for final approval. One set of plans, certified by the superintendent, shall be returned to the applicant.

4. A certificate of approval of each standpipe plan approved shall be forwarded to the fire commissioner by the superintendent.

5. If a structure is equipped with an approved automatic sprinkler system, the plans shall include a statement to such effect.

6. The equipment shall be installed in accordance with such approved plans, unless

amended plans are filed at a later date by the owner, or his duly authorized agent. When such amended plans are approved, the installation shall be made in accordance with them.

(16.1.4.2). b. Scope of Plans for Standpipe Systems.—Plans for standpipe systems shall:

1. Be drawn to a scale of at least one-eighth inch to one foot and indicate clearly all information required by the superintendent.

2. Give the correct address of the property, name of the owner of such property, the name and address of the applicant, and the compass bearing.

3. Show the floors and the sub-divisions of such floors, a longitudinal section or cross-section with story heights, and the essential construction features of the structure.

4. Show the location and size of the water supplies, the approximate location and correct size of all feed mains, risers and connections and any valves placed therein; such plans need show only the essential features of the equipment.

5. Bear a notation, signed by the applicant, stating that the equipment will be installed as shown on the plans and in accordance with this article.

(16.1.4.3). Amendment of Plans for Standpipe Systems. Equipment shall be installed in accordance with such approved plans unless amended plans are filed by the owner, or his agent, and approved. When such amended plans are approved, the installation shall be made in accordance with them. (In City Building Code only)

(16.1.4.4). c. Diagram of Standpipe Systems Required.—In every structure equipped with a required standpipe system, a diagram of any system in which there is a fire pump or more than three risers shall be posted in the pump room or some other suitable location within the structure, where such diagram will always be readily available for fire department use. This diagram shall show clearly the location and number of each riser, valve, pump, tank and Siamese hose connection in the system and such other information as may be required at any time by the superintendent.

(16.1.5.1). § C26-1385.0 Tests of Standpipe Systems.—a. Acceptance Tests and Approval of Standpipe Systems.—Every standpipe system shall be subjected to an acceptance test as provided in this section and shall have satisfactorily met the prescribed requirements before acceptance and approval by the superintendent. The test shall demonstrate to the satisfaction of the fire commissioner that such system will sustain a hydrostatic pressure sufficient to produce a pressure of at least one hundred pounds per square inch at the top story hose outlet, and at least three hundred pounds per square inch at the Siamese hose connection, or lowest level pump supply connection to the risers. The test shall be conducted at the owner's risk, by his representative and before a representative of the fire department. The fire commissioner shall notify the superintendent in writing of the results of the test.

(16.1.5.2). b. Periodic Tests of Standpipe Systems.—Upon order of the superintendent, but at least once in five years, every required standpipe system shall be subjected to a hydrostatic pressure test and to a flow test to demonstrate its suitability for fire department use. The test shall be conducted at the owner's risk, by his representative and before a representative of the superintendent who shall be notified at least forty-eight hours before such test is to be made.

Sub-Article 2. Standpipe Risers

(16.2.1). § C26-1386.0 Number and Location of Standpipe Risers.—a. The number and location of standpipe risers shall be such that any point of a structure, except a penthouse or bulkhead less than twenty-five hundred square feet in area, shall be within one hundred twenty feet, measured horizontally, of a riser. In portions of first floors or basements, which are occupied as stores or salesrooms, and which are completely separated from the entrance hall or enclosed stairways leading to the upper floors, standpipe protection may be omitted at the discretion of the superintendent, provided such other fire appliances as he may specify are installed. Standpipe protection may also be omitted at the discretion of the superintendent from transformer vaults, high tension switchboard rooms and other locations where the use of such protection would be dangerous to life.

b. Any space or room which houses equipment of such nature that the use of water would be hazardous to life or ineffective, shall have a conspicuous sign on each door opening on such space or room stating the nature of the use and the warning: "Use no water."

c. Standpipe risers shall be so located that wherever practicable, the hose outlets are within stairway enclosures or fire towers. Where in the opinion of the superintendent such location is impracticable, such outlets shall be located as near such enclosures as possible. It shall be unlawful to place risers in any shaft containing a gas pipeline.

(16.2.2). § C26-1387.0 Size of Standpipe Risers.—Standpipe risers in structures or parts of structures one hundred fifty feet or less in height shall be at least four inch

standard iron pipe size; in structures more than one hundred fifty feet in height, such risers shall be at least six inch standard iron pipe size.

Sub-Article 3. Standpipe System Piping

(16.3.1). § C26-1388.0 Layout of Piping for Standpipe Systems.—a. The arrangement of such standpipe system piping as risers, cross-connections and branches shall be as straight and direct as practicable.

b. It shall be unlawful to cover or conceal any portion of a standpipe system without written approval of the superintendent. The superintendent may require inspections or tests before granting such approval.

(16.3.2). § C26-1389.0 Cross-connections in Standpipe Systems.—a. Standpipe systems installed in structures less than two hundred fifty feet in height, which systems have more than one riser, shall have all risers cross-connected below the street level, except as otherwise provided in this section, so as to permit water to supply every riser under normal conditions.

b. Standpipe systems, in structures having more than one riser, and required under subdivision g. of section C26-1407.0, to have one or more intermediate tanks, shall be so designed and installed that the risers supplied from each tank will be cross-connected below or in the story of the lowest hose outlets supplied from each required tank. Horizontal check valves shall be installed in the run of each riser continuing into a higher required tank section, in such manner as to permit all upper sections of the system to be fed from the section below and to prevent any lower section of the system from being supplied from a section above it.

c. Upper level cross-connections shall be provided with control valves which may be of approved remote control type, so arranged that risers supplied by intermediate tanks may independently be shut off from such supply.

d. Cross-connection shall be at least as large as the largest riser supplied through such cross-connections.

e. Where there is no cellar, cross-connections may be hung from the ceiling of the lowest story.

f. Water delivered into the standpipe system from any tank, fire pump or Siamese hose connection, shall be available at any hose valve in the standpipe system under normal conditions.

Sub-Article 4. Pipes, Fittings and Valves for Standpipe Systems

(16.4.1). § C26-1390.0 Pipes for Standpipe Systems.—a. Pipes for standpipe systems shall, when the maximum working pressure at the pump is six hundred pounds or less, be lap-welded or seamless, standard, full weight, mild steel or genuine wrought iron pipe. When maximum working pressure at the pump exceeds six hundred pounds, such pipe shall be extra strong, mild steel or genuine wrought iron, lap-welded or seamless pipe.

b. Such steel and wrought iron pipe for standpipe systems shall be made in accordance with the specifications of the A. S. T. M., D., A 120-34 T, and A 72 33.

c. Cast iron underground pipe shall be made in accordance with the specifications of the American Water Works Association, nineteen hundred eight, or shall be other pipe approved by a recognized standard testing laboratory, as indicated in section C26-1383.0.

d. The name of the manufacturer and, in the case of cast iron piping, the pressure to which the pipe was tested, shall be permanently and legibly indicated on each length of pipe used in standpipe systems.

e. Only new pipe may be used in standpipe systems.

(16.4.2). § C26-1391.0 Fittings for Standpipe Systems.—Fittings used in standpipe systems shall be malleable cast iron, or cast steel, free from imperfections, and if of cast steel shall comply with the tentative American standard for steel pipe flanges and flanged fittings, approved by the American Standards Association, June nineteen hundred twenty-seven. Cast iron underground fittings shall be made in accordance with the specifications of the American Water Works Association, nineteen hundred eight. Other such fittings shall be made as indicated in section C26-1383.0.

(16.4.3). § C26-1392.0 Supports of Standpipe Risers and Piping.—Piping in standpipe systems shall be securely and rigidly supported. Risers shall be supported at the base on piers or equivalent foundations or supports and at alternate floor levels by approved clamps and supporting members. Horizontal runs of risers, cross-connections branches and similar piping shall be supported by approved hangers at intervals of ten feet or less.

(16.4.4). § C26-1393.0 Protection of Standpipe Systems from Freezing.—All parts of standpipe systems exposed to frost shall be protected from freezing, by methods prescribed by the superintendent.

(16.4.5). § C26-1394.0 Protection of Standpipe Systems from Fire Damage.—Sections of standpipe system piping and hangers subject to damage from fire which might

make the system inoperative shall be protected from such damage, by methods prescribed by the superintendent.

(16.4.6). § C26-1395.0 Identification Markings on Standpipe Systems.—a. Connections from risers or branch lines from risers shall be legibly marked on each story with the identification marking used on the approved plan or diagram.

b. All portions of standpipe system piping shall be painted red.

(16.4.7.1). § C26-1396.0 Valves for Standpipe Systems.—a. Standpipe riser control valves.—

1. Indicating valves shall be provided to permit any riser or other section to be shut off while the remaining risers or sections continue in use. Such indicating valves shall be flanged, if two and one-half inches or larger in size. In single riser systems supplying hose outlets more than one hundred fifty feet above curb level, such valves shall be installed at approximately one hundred fifty feet above curb level and, at points above such level, at vertical intervals of approximately one hundred fifty feet or less.

2. Riser control valves shall, where practical, be located within a required stair enclosure, readily accessible for inspection, repair and fire department use. Where located outside of a required stair enclosure such control valves shall be of such type and so installed as to be operated from either the ground floor or from the fire pump room, and operating devices shall be grouped, suitably housed and kept locked with a fire department lock and key. The door of the housing shall be suitably marked to indicate the purpose of the device. Instructions for operating the valve control devices shall be clear and complete and in letters easily read. The instructions shall be permanently secured to the inner face of the door or painted thereon. Remotely controlled valves shall be hydraulically operated or operated by electrical motors.

3. Each riser control valve shall be so designed and installed as to permit of its operation at the valve location.

4. The position of each remote control valve, whether open or closed, shall be indicated at its remote control point and also at the valve.

5. Valves shall be readily accessible for inspection and repair. If a manually operable shut-off valve is placed so that its operating means is more than seven feet above a floor or stair landing, an approved ladder, securely fastened at the top, bottom and at intervals of ten feet, or less, shall be provided for access to the valve.

(16.4.7.2). b. Check Valves in Standpipe Systems.—

1. Check valves two and one-half inches or larger shall be flanged, cast iron or cast steel body, having non-ferrous metal seat rings and bearings. Swing type valves shall be installed horizontally in pipe from each Siamese hose connection, and in piping from each tank, pump and city water connection.

2. Check valves other than those in Siamese connection lines shall be provided with a flanged, indicating shut-off valve, bolted to the outlet of such check valve. Check valves on discharge lines from tanks shall have an indicating shut-off valve on each side of such check valve. When a shut-off valve is placed on each side of a tank check valve, one of them may be of the remote control type and when used shall be on the downstream side of such check valve.

(16.4.7.3). c. Standpipe Valve Markings.—Each control valve shall be conspicuously marked with the number assigned to it on the diagram required by subdivision c. of section C26-1384.0. This marking shall be in white figures two inches high on a metal disk at least three inches in diameter with a red background, and securely attached to the valve.

(16.4.7.4). d. Sealing of Standpipe Valves.—Each manually operated shut-off valve shall be sealed in its normal position. If the normal position be the closed position, a metal placard stating such fact shall be conspicuously attached to the valve.

(16.4.8.1). § C26-1397.0 Siamese Hose Connections for Standpipe Systems.—a. Siamese Hose Connections Required.—

1. One Siamese hose connection shall be provided for each six inch riser and one such connection for each two four inch risers or fraction thereof; except as otherwise herein provided and except that when more than four such Siamese connections would be provided on this basis, the superintendent shall accept four as a minimum. When a system is required to have more than two Siamese hose connections, such connections shall be distributed along the accessible exterior walls of the premises at such locations as the superintendent may direct.

2. Structures facing on more than one street, equipped with a single riser, shall have at least two Siamese hose connections, one on each street front, unless the superintendent direct otherwise.

3. A building forty-five feet or less in height, other than a theatre with a stage, shall not be required to have a Siamese connection, except when such building is one of a group of buildings and has cross-connection to the standpipe equipment of one or more of the other buildings of such group.

(16.4.8.2). b. Check Valves on Siamese Hose Connections.—It shall be unlawful to use any Siamese hose connections unless such connections have a clapper valve in each inlet branch, or unless such connection is at the shore end of a standpipe system also supplied by a Siamese hose connection of the type specified for fireboat use.

(16.4.8.3). c. Siamese Hose Connection Threads.—Siamese hose connections for fireboat use shall have at least two three and one-half inch branches with fire department female threads. All other Siamese hose connections, except those of the shore end type, shall have at least two three inch branches with fire department female threads.

(16.4.8.4). d. Shore and Siamese Hose Connections.—

1. A shore and Siamese hose connection shall be of a design approved especially for this service. Its hose connections shall have three inch male threads. In lieu of a check valve, each branch shall have an approved long stem valve permitting the valve to be placed within the structure or to be otherwise protected against freezing.

2. It shall be unlawful to use any Siamese hose connections for fireboat use in any standpipe system whose water supply is from the city water mains.

(16.4.8.5). e. Location of Siamese Hose Connections.—Siamese hose connections shall be placed between eighteen and thirty-six inches above the sidewalk level. Such connections shall be of the flush type or shall be installed in a wall recess of ample size to permit the convenient attachment of fire department hose.

(16.4.8.6). f. Marking of Siamese Hose Connections.—

1. Each Siamese hose connection shall be provided with caps painted red, and shall have the word "STANDPIPE" in letters one inch high and one-eighth inch deep cast in the body or on a non-ferrous metal plate secured to the connections.

2. When the Siamese hose connection is to be used for supplying water to the fire pump, such purpose shall be clearly indicated by an appropriate sign.

(16.4.8.7). g. Cross-connection of Siamese Hose Connections.—Each Siamese hose connection shall be connected to a riser or to a cross-connection. Such connection shall be through at least five inch pipe, except that four inch pipe shall be sufficient when such pipe supplies a single four inch riser system. Such pipe shall run as directly as practicable to the riser or cross-connection. It shall be unlawful to extend any Siamese hose connection through a sidewalk unless permission therefor has been obtained from the superintendent. Such Siamese hose connection when extended through a sidewalk shall be of iron pipe size brass pipe equal in strength to standard full weight steel pipe.

(16.4.8.8). h. Drip Valves on Siamese Hose Connections.—A three-quarter inch automatic drip valve shall be placed inside the structure between the Siamese hose connection and the check valve, except that on a fireboat Siamese hose connections a one-half inch open drip without a shutoff may be used.

(16.4.9). § C26-1397.1. a. Hose Outlet Valves on Standpipe Systems.—

On each floor served by a riser, a two and one-half inch hose outlet valve shall be provided for fire department use. Such hose outlet valves shall be readily accessible from a stairway landing on or from a floor, and shall be between five and six feet above the landing or floor, except as provided in section C26-1386.0.

b. At the top of the main riser there shall be provided, thirty-six inches above a flat roof, a three way manifold, equipped with three two and one-half inch hose valves. Such manifolds are exempted from the requirements of section C26-1398.0, but each such hose valve shall be provided with a regulation two and one-half inch fire department cap secured to the manifold by means of chain and swivel.

c. Where the manifold is located elsewhere than within a heated stair enclosure, the control valve shall be located in a horizontal run of piping below the main roof with a long stem extending through the roof and equipped with a wheel handle at its upper end at least twelve inches above the roof. Between the control valve and the manifold there shall be provided within the heated space a one-half inch open drip extending to a sink or a three-quarter inch approved type automatic wall drip.

Sub-Article 5. Hose for Standpipe Systems

(16.5.1). § C26-1398.0 Quality, Material, Size and Length of Hose for Standpipe Systems.—a. Each hose outlet valve shall be equipped except as hereinafter provided, with one or more lengths of two and one-half inch, "flax line," unlined linen fire hose, factory coupled, of sufficient length so that every point of the floor area served by the riser is within twenty feet from the end of the nozzle. The maximum length of hose which shall be permitted at any hose outlet valve is one hundred twenty-five feet.

b. Two and one-half inch cotton, rubber-lined, or rubber hose shall be used in ship-

yards, oil storage plants, lumber yards, amusement or exhibition parks, or other enclosures, when deemed necessary by the superintendent.

c. In Class 1 and 2 office buildings, hotels, multiple dwellings, clubhouses, hospitals, churches, museums, libraries, schools or other structures of non-hazardous occupancy, one and one-half inch "flax line," unlined linen hose, factory coupled, of maximum lengths as prescribed for two and one-half inch hose, may be used. A two and one-half inch by one and one-half inch brass or bronze, non-swivel, reducing coupling shall be attached to the two and one-half inch hose valve.

d. Branch connections of one and one-half inch piping may be made from required standpipe risers to hose stations, in addition to required two and one-half inch valve hose stations, located away from the risers; provided the branch connection is equipped with an approved shut-off valve, sealed open by an easily broken seal, at the point of connection with the riser. A sign indicating the purpose of the branch and of the shut-off valve shall be permanently secured at or to each shut-off valve. Hose stations of such branches shall have one and one-half inch hose valves with not more than one hundred twenty-five feet of hose at any such hose station.

e. Where "flax line" unlined linen fire hose, factory coupled, is specified in this section, other types of fire hose may be used provided such other hose is factory coupled and is approved by the board as adequate to withstand accepted tests for standpipe hose relating to pressure, durability, tensile strength, flexibility, alternating high and low pressure, friction loss, and tests for exposure to water, heat and handling.

(16.5.2). § C26-1399.0 Length of Hose for Standpipe Systems.—Hose lines shall be made up of twenty-five or fifty foot lengths, only one of which lengths may be a twenty-five foot length, except that when more than twenty-five feet and less than fifty feet of hose is required, the hose shall be in one section of the required length.

(16.5.3). § C26-1400.0 Nozzles.—a. Two and one-half inch hose, except hose for yard hydrants, shall be equipped with a smooth bore nozzle having a one inch or one and one-eighth inch discharge orifice. One and one-half inch hose shall be provided with a five-eighth inch smooth bore nozzle. Nozzles shall be at least fifteen inches in length.

b. Hose for use on yard hydrant outlets shall be equipped with a smooth bore one and one-eighth inch Underwriters' play-pipe.

(16.5.4). § C26-1401.0 Threads.—Threads on hose valves, pressure reducers, hose couplings and nozzles shall conform to the fire department standards.

(16.5.5). § C26-1402.0 Pressure Reducers.—a. When the normal hydrostatic pressure at a two and one-half inch hose outlet valve exceeds fifty-five pounds per square inch, each such valve shall be equipped with an adjustable type pressure reducer which as installed shall be so adjusted that the flowing pressure on the downstream side will be approximately fifty pounds per square inch, when the discharge is at the rate of two hundred gallons per minute. The flowing pressure on the downstream side of any hose outlet valve, or, where there is a reducer, on the downstream side of the reducer, shall not exceed fifty pounds per square inch.

b. When one and one-half inch hose is used, an adjustable type of pressure reducer shall be provided on each two and one-half inch hose outlet valve where the hydrostatic pressure exceeds eighty-five pounds per square inch and shall be so adjusted that the flowing pressure on the downstream side will be approximately eighty pounds per square inch.

(16.5.6). § C26-1403.0 Hose Rack.—The hose at each outlet shall be kept upon an approved hose rack, firmly supported and placed between five and six and one-half feet above the landing or floor.

(16.5.7). § C26-1404.0 Hose Cabinet.—a. The hose on its rack may be kept in a cabinet equipped with a single swinging door which shall have a large panel of clear wired glass. Such door shall be unlocked at all times. Each such cabinet shall be readily accessible.

b. At the discretion of the superintendent, such cabinets may have solid metal doors when located in the entrance hall of a structure, where architectural treatment makes such disposition preferable.

c. All hose cabinets shall be permanently marked across the door panel "FIRE HOSE." in red letters at least two and one-half inches in height.

Sub-Article 6. Water Supply for Standpipe Systems

(16.6.1). § C26-1405.0 Primary Water Supply for Standpipe Systems.—Every standpipe system shall have a primary water supply constantly available at every hose outlet or made available automatically when the hose valve at any outlet is opened, or when a control station functions. Such primary water supply may be from one or more gravity tanks, as provided in subdivision d. of section C26-1407.0, or from pressure tank or tanks as provided in subdivision e. of section C26-1407.0, or from a direct connection to a city water main or a private yard underground water main or, in buildings not exceeding seventy-five feet in height, an automatic pump, as provided in sections C26-1420.0 through C26-1427.0.

(16.6.2). § C26-1406.0 High and Low Risers and Cross-Connections in Standpipe Systems.—When gravity or air pressure tanks are used for the primary water supply, the standpipe system may use separate riser systems serving, respectively, low and high parts of the structure. Separate gravity tanks or pressure tanks may supply such separate risers, but in every case the standpipe system shall be designed so that any hose outlet of the entire system is supplied through the required cross-connection from every Siamese hose connection and from every fire pump located at or below the street level.

(16.6.3). § C26-1407.0 Recognized Methods of Providing Water Supply for Standpipe Systems.—The following provisions shall be met in the use of the respective recognized methods of providing required primary water supply for standpipe systems; permitted combinations of two or more of these recognized methods shall be made and in making such combinations the Siamese hose connection shall be considered as a source of supply:

(16.6.3.1). a. Direct Connections of Standpipes to the city water system.—

1. A direct connection to a city water main shall be acceptable as the primary supply to a standpipe system provided the department of water supply, gas and electricity certifies that such main is capable, between five a. m. and eight p. m. on a normal working day, of maintaining a flowing pressure of at least fifteen pounds per square inch at the highest hose outlet when a street level hydrant supplied by the main and located within two hundred fifty feet of the structure is discharging through a two and one-half inch open hydrant butt at the rate of at least five hundred gallons per minute; except that in any building forty feet or less in height and twenty thousand square feet in area a four inch direct connection to a street main fed two ways or one four inch direct connection to each of two street mains on two street fronts, each main so fed that the shutting off of one will not interfere with the supply of the other, shall be acceptable as a primary supply to a standpipe system provided there is sufficient pressure in the street main or mains to maintain a minimum of twenty-five pounds per square inch static pressure at the highest hose outlet and provided further that evidence establishing the fact that such water main conditions and pressures are available, is certified to by the department of water supply, gas and electricity and submitted to the superintendent.

2. Each service, supplying directly a standpipe system or a fire pump, shall be equipped, under the sidewalk, with a control valve in a flush sidewalk box of approved type located within two feet of the front wall of the building or as otherwise provided in the rules of the board. The purpose of each such control valve shall be clearly indicated by the words "Standpipe Supply Control" cast in the cover of such flush sidewalk box.

(16.6.3.2). b. Private Yard Main.—A private yard main may be used as the primary water supply for a standpipe system when approved by the superintendent as meeting the conditions of subdivision a. of this section.

(16.6.3.3). c. Supplementary Water Supply Required for Standpipe Systems.—Where a gravity or pressure tank furnishes the primary supply to a standpipe system comprising more than two six-inch required risers or more than four four-inch required risers, either a fire pump of at least seven hundred fifty gallons per minute capacity, or additional tank capacity at the rate of thirty-five hundred gallons for each two or less six-inch risers above two and for each four or less four-inch risers above four, shall be provided as a supplementary supply. Where a fire pump is provided, such pump may be manually operated.

(16.6.3.4). d. Gravity Tanks in Standpipe Systems.—Gravity tanks may be used subject to the following conditions:

1. The minimum quantity of water reserved for standpipe service shall be thirty-five hundred gallons.

2. The bottom of a tank shall be at least twenty-five feet above the highest hose outlet, other than a roof hose outlet, which such tank supplies, except as otherwise provided in this section.

3. Each standpipe system having more than two risers shall be supplied from either one tank of a standpipe reserve capacity of five thousand gallons or from two tanks each of a standpipe reserve capacity of at least thirty-five hundred gallons.

4. Where a group of two or more separate and distinct structures is operated under a single control, a single gravity tank may be accepted as the primary water supply for the several standpipe systems of such group, provided the tank has a capacity of at least five thousand gallons, and that the capacity is at least that required for the largest structure of the group, and is provided with a dead riser carried from the bottom of the tank to an underground header or cross connecting system and has in each building unit a post indicator type control valve at such place as the superintendent may direct.

5. Where the roof of a structure is designed in a pyramid or tower form, the tank shall be elevated as high as practicable within the pyramid or tower, provided that in no case shall the bottom of such tank be less than twenty-five feet above the highest hose outlet in any room or space, except a room or space occupied solely by water tanks, elevator machinery, an elevator machine repair shop or ventilating fan equipment. In all such cases such auxiliary fire-extinguishing appliances as may be required by the superintendent shall be provided in each such room or space.

(16.6.3.5). e. Pressure Tanks in Standpipe Systems.—In the discretion of the superintendent one or more pressure tanks located at or above the level of the highest hose outlet, other than roof outlets of any risers directly supplied from such pressure tanks, may be used instead of gravity tanks as the primary water supply, provided the conditions of paragraphs one, three and four of subdivision (d) of this section, as to quantity of water are met and provided there is provided an air compressor with suitable automatic control and of sufficient capacity to build up air pressure of at least seventy-five pounds per square inch in the tank within three hours and to maintain thereafter air pressure between seventy and eighty pounds per square inch.

(16.6.3.6). f. Fire Pumps as a Primary Source of Supply for Standpipe Systems.—One or more fire pumps may be accepted as the primary water supply of a standpipe system, provided at least one pump rated at least two hundred fifty gallons per minute, serving the entire system, has automatic control, and provided the installed fire pump capacity is at least seven hundred fifty gallons per minute.

(16.6.3.7). g. Maximum Permissible Pressure at Standpipe Hose Valves.—The maximum pressure at the lowest hose valve supplied with water by a gravity or pressure tank or automatic pump shall be one hundred fifty pounds.

(16.6.3.8). h. Additional Water Supply for Standpipes in Structures Over Two Hundred Fifty Feet High.—The primary water supply to the standpipe system shall be supplemented, in structures which exceed two hundred fifty feet in height, by one or more fire pumps according to the following schedule:

(16.6.3.8.1). 1. Standpipe Systems in Structures Two Hundred Fifty to Four Hundred Fifty Feet High.—For structures between two hundred fifty and four hundred fifty feet in height and equipped with not more than three risers, at least one seven hundred fifty gallon pump or two five hundred gallon pumps; for such structures equipped with more than three risers, pumps with a total capacity of at least one thousand gallons per minute.

(16.6.3.8.2). 2. Standpipe Systems in Structures Over Four Hundred Fifty Feet High.—For structures over four hundred fifty feet in height, at least two fire pumps each of seven hundred fifty gallon capacity shall be provided.

Sub-Article 7. Tanks in Standpipe Systems

(16.7.1). § C26-1408.0 **Construction and Support of Tanks.**—Tanks for standpipe system supply shall be constructed and supported in accordance with the provisions of this title.

(16.7.2). § C26-1409.0 **Combination Sprinkler and Standpipe Tanks.**—Tanks used to provide the required primary water supply to a standpipe system may also be used as a supply for an automatic sprinkler system in a structure, provided the capacity of the tank is at least five thousand gallons greater than the required supply for the sprinkler system. When such combined service is used, the connection which supplies the standpipe system shall be to the uppermost portion of such tank and shall be run on the outside of such tank unless such connection is made of standard full weight iron pipe size brass pipe, without couplings or other connections inside the tank.

(16.7.3). § C26-1410.0 **Means of Filling Tanks.**—a. Tanks shall be filled at the rate of at least sixty-five gallons per minute independently of any standpipe riser which may be supplied. Pipes used to fill tanks shall be of sufficient size to deliver at least sixty-five gallons per minute into such tank. It shall be unlawful to use required fire pumps for filling purposes, except in case of emergency.

b. Where there is sufficient pressure in the city water main to fill tanks at the required rate during all hours of each day, and a filling pump is not provided, the connection to the city water supply shall be made near the point where the city water service connection enters the building.

(16.7.4). § C26-1411.0 **Combination Domestic and Standpipe Tanks.**—a. One automatic tank filling pump may be used for filling both sprinkler, standpipe and domestic service tanks, provided such pump will deliver the required volume and pressure of water into each tank.

b. A gravity tank may be used both for the domestic supply and the standpipe system, in which case an automatic pump of the capacity specified in section C26-1410.0, shall be accepted as the means of filling. When such combined service is used, the connection to the domestic supply shall be run on the outside of the tank, or, if run inside, shall

be of iron pipe size brass pipe, without couplings and such connection shall be made at a sufficient height above the bottom of the tank so that the required capacity is reserved for standpipe use.

(16.7.5). § C26-1412.0 **Emergency Drains on Standpipe Tanks.**—a. Each standpipe tank shall be provided with a drain of at least:

1. Two-inch diameter for a tank of not more than five thousands gallons capacity;
2. Three-inch diameter for a tank of more than five thousand gallons and not more than ten thousand gallons capacity;
3. Four-inch diameter for a tank of more than ten thousand gallons capacity.

b. Each such drain pipe shall be controlled by a manually operated outside screw and yoke type valve located so as to be readily accessible from the roof. The drain shall be so arranged that no damage will result from the discharge of water through it.

(16.7.6). § C26-1413.0 **Heating of Standpipe Tanks.**—a. Tanks located where water is subject to freezing shall be equipped with a tank heater of sufficient capacity that the temperature of the water will remain forty degrees Fahrenheit or more.

b. Where both the standpipe supply and domestic water supply are combined in a single tank, heating of such tank will not be required in structures, including hotels, multiple dwellings and hospitals, where the domestic supply is to be drawn upon during all hours of each and every day of the week.

(16.7.7). § C26-1414.0 **Strainer.**—a. Every standpipe supply tank shall be provided with a brass or bronze strainer at the discharge to risers or to pump supply lines.

b. Each strainer shall have clear openings with an aggregate area equal to or more than the required area of the pipe into which the tank discharges.

(16.7.8). § C26-1415.0 **Filling Pipes for Standpipe Tanks.**—The filling pipe to a standpipe supply tank shall discharge above the overflow level of the tank and shall be of at least two-inch standard pipe size. Any portion of a filling pipe normally below the water level and without the tank shall be of brass or bronze, without couplings.

(16.7.9). § C26-1416.0 **Overflow Pipes for Standpipe Tanks.**—Each gravity standpipe supply tank shall be provided with an overflow at least one pipe size larger than its fill pipe. The top of the inlet to the overflow pipe shall be at least one inch below the bottom of the spider rod holes in a steel tank and at least one inch below the bottom of the flat cover joists of a wood tank; but in no case shall be less than three inches below the top of the tank. Such pipe shall discharge at the nearest convenient point where water damage will not result. Portions of an overflow pipe run within the tank shall be of iron pipe size brass or bronze pipe, without couplings.

(16.7.10). § C26-1417.0 **Access to Standpipe Tanks.**—Easy access to the top of each tank shall be provided by means of a steel or wrought iron gooseneck ladder, substantially constructed of flat iron side bars at least two inches by one-half inch, or channel iron stringers at least two inches by one-quarter inch, spaced at least fourteen inches apart, with rungs round or square at least five-eights of an inch thick, spaced at most twelve inches on centers; the ladder shall be rigidly braced, and shall not tip outward from the vertical at any point. When ladders exceed forty-five feet in height, a body iron and an iron platform at least fourteen inches square, rigidly secured to the stringers of the ladder, shall be provided near the top of the tank.

(16.7.11). § C26-1418.0 **Tanks on Theatre Structures.**—Tanks on theatre structures shall also comply with the requirements of article thirteen of this title.

(16.7.12). § C26-1419.0 **Tank Alarms for Standpipe Systems.**—Gravity tanks not filled by an automatic pump shall be equipped with a closed circuit, local, high and low water level electrical alarm system. All pressure tanks used to provide the required primary water supply of a standpipe system shall be equipped with a closed circuit, high and low air pressure and high and low water level electrical alarm systems.

Sub-Article 8. Fire Pumps for Standpipe Systems

(16.8.1. § C26-1420.0 **Capacity of Standpipe Fire Pumps.**—A standpipe fire pump shall be capable of delivering its rated capacity in gallons per minute through the highest hose outlets to be supplied with a minimum pressure of one hundred pounds per square inch at the pump and at least fifty pounds per square inch at the highest outlet below the roof; except that where a fire pump is provided to supply only a portion of the total height of the structure, the required fifty pounds per square inch shall apply at the highest outlet which such pump supplies.

(16.8.2). § C26-1421.0 **Classification of Standpipe Fire Pumps.**—Fire pumps and accessories, including control devices, pipe, fittings, valves, Siamese hose connections and tanks shall be classified as to their required working pressures and capacities according to the conditions in the standpipe systems in which they are used.

(16.8.3). § C26-1422.0 **Approval of Power Supply for Standpipe Fire Pumps.**—The type of fire pump and prime mover used in a standpipe system shall be suitable for the

required service in a standpipe system provided for fire department use. If the prime mover employs steam or is an internal combustion engine or employs some other form of power other than an electric current supplied by a public utility, the consent in writing of the superintendent shall be secured before its installation is authorized.

(16.8.4). § C26-1423.0 Water Supply to Standpipe Fire Pumps.—a. Any required fire pump shall draught from two independent city water mains in different streets, fed two ways, with control valves at intersections with other mains. The connection from city water mains to pumps shall be at least six-inch pipe size, arranged as required by the department of water supply, gas and electricity.

b. In the event that two separate and distinct city water mains are not available as a supply to fire pumps, there shall be provided either of the following sources of supply:

1. A suction tank or tanks suitably located and of sufficient capacity to furnish each pump with at least one-half hour's supply at the rated capacity of such pump, or

2. One or more Siamese connections reserved exclusively for fire pump supply. Where a building faces on but one street, one such Siamese connection shall be provided. If a building faces on two or more streets, the number and locations of the fire pump Siamese connections shall be as required by the superintendent but in no case shall he require more than one Siamese connection on each street front. The purpose of the fire pump supply Siamese connection shall be indicated by a conspicuous sign permanently secured to each such Siamese connection.

c. Either a single independent connection to a city water main of adequate capacity, or a suction tank adequate to supply each pump for at least fifteen minutes at the rated capacity of such pump, shall be provided in conjunction with fire pump Siamese connections.

d. Suction tanks shall be filled by a six-inch connection to the city water main, controlled by an automatic, ball float valve in the suction tank.

e. A six-inch by-pass shall be provided so that pumps may be fed directly from the city main.

f. When a city water main supplies both the domestic service and the fire pump, a remote control valve shall be placed on the domestic service connection at the point where such connection is taken from the city service main. Such remote control valve shall be controlled from a point near the pump control panel.

(16.8.5). § C26-1424.0 Standpipe Pump Rooms and Location.—a. Fire pumps shall be installed at ground level or below, in rooms of ample size and of three-hour fire resistive construction throughout; such rooms shall be properly heated, ventilated, lighted and drained. The pump room shall have access to the street level by a direct opening to a street or a court or by a cut-off passageway or stairway having a fire resistive rating of at least three hours. Fire pumps shall be placed on concrete foundations at least twelve inches above the pump room floor level and a clearance of at least three feet shall be maintained on all sides of the foundation from walls or from other equipment in the pump room. It shall be unlawful to install other machinery or mechanical equipment in a fire pump room, unless the structure is of Class 1 construction.

b. It shall be unlawful to place in a fire pump room, or in any space housing a fire pump, any refrigerating equipment using noxious, irritating or inflammable refrigerant, gas piping or gas consuming devices or any other equipment which, in the opinion of the superintendent, may make difficult or impossible the operation of a fire pump.

(16.8.6). § C26-1425.0 Installation of Standpipe Fire Pumps.—a. The installation of a fire pump, its controls and accessories, shall conform to the regulations of the National Board of Fire Underwriters, issued in nineteen hundred thirty-three. The controls of such pumps shall also include a variable speed control, starting at one hundred pounds and stepping up in fifty pound steps.

b. Each automatic fire pump shall be provided with a closed cylindrical cushion tank with a capacity of two hundred fifty gallons. There shall be a four-inch nozzle at the bottom of such tank connected to the standpipe supply line between such pump and its discharge check valve.

(16.8.7). § C26-1426.0 Test Equipment for Standpipe Fire Pumps.—With every required fire pump sufficient two and one-half inch rubber lined fire hose shall be provided to permit the required test of the fire pump to be made. Such hose and play pipes, play pipe holders, spanners and washers shall be kept properly in a suitable place satisfactory to the superintendent.

(16.8.8). § C26-1427.0 Combined Use of Fire Pumps for Standpipe and Automatic Sprinkler Systems.—A fire pump which furnishes the primary or the supplementary required water supply either to a standpipe system or to an automatic sprinkler system shall be accepted as furnishing the corresponding required primary or supplementary water supply to the other system, if such pump is in the same premises; provided that in every such case of combined use, suitable relief valves shall be installed so as to prevent such water pressure on the automatic sprinkler system, as may result from any required operation of the pump for the standpipe system, from becoming greater than one hundred seventy-five pounds per square inch.

Sub-Article 9. Yard Hydrant Systems

(16.9). § C26-1428.0 Yard Hydrant Systems.—a. Shipyards, oil storage plants, lumber yards, amusement or exhibition parks or other enclosures, when deemed necessary by the superintendent, shall have one yard hydrant and hose for each twenty thousand square feet of area; such hydrant shall be connected directly with a city water main that complies with the requirements of subdivision (a) of section C26-1407.0. The maximum distance between hydrants shall be two hundred fifty feet. Hydrants and sufficient rubber lined hose with a smooth bore one and one-eighth inch Underwriters' nozzle shall be placed in a hose house painted red, with the words "FIRE HOSE" in six-inch white letters on the door. Where the area of such enclosure is more than forty thousand square feet or where the city water service fails to comply with subdivision (a) of section C26-1407.0, a gravity tank of at least fifty thousand gallons capacity, elevated so that the bottom of the tank is at least seventy-five feet above the yard or twenty-five feet above the highest structure in the yard, shall be provided; or there shall be provided a fire pump with a capacity of at least one thousand gallons a minute, and a suction tank of at least sixty thousand gallons capacity. When a gravity tank supplies both sprinklers and yard hydrants, such tank shall comply with the provisions of subdivision (a) of section C26-1342.0. When approved in writing by the superintendent, suction supply may be from a city water main, provided such main is capable of supplying adequate volume and pressure.

b. The superintendent may permit suction from a river or well if the required quantity of reasonably clean fresh water may be obtained thereby, except that where river suction is proposed and the standpipe primary water supply is taken from a city water main, approval shall also be obtained from the department of water supply, gas and electricity. The superintendent may require, in addition to yard hydrants, one monitor nozzle with remote control for each forty thousand square feet of area or fraction thereof, when, in his opinion, an unusual hazard may exist. Monitor nozzles shall be located as required by the superintendent.

c. Standpipe risers may be connected to yard hydrant systems when such systems are provided with gravity tanks in accordance with this section or when they are supplied in accordance with subdivision (a) of section C26-1407.0.

d. Yard hydrant systems connected to city water mains shall be provided with post indicator valves located in an accessible position. Post indicator valves shall be sealed or locked open and be painted red.

e. Special fire-extinguishing equipment, in addition to that prescribed by this section, shall be prescribed by the superintendent for all oil storage plants, oil refineries, fireworks plants and other plants deemed by the superintendent to present unusual fire hazards and also in rooms or spaces housing electrical equipment when such fire-extinguishing equipment is deemed necessary by the superintendent.

Sub-Article 10. Standpipe Signal Systems

(16.10.1). § C26-1429.0 Standpipe Telephone Systems.—a. In every structure two hundred fifty feet or more in height a telephone system shall be provided for fire department use in operating the standpipe system.

b. Such telephone system shall permit communication by permanent telephones in the pump rooms, on the ground floor, and in gravity tank rooms, with all other floors by means of permanent or portable telephones on each of such other floors.

c. Permanent wall telephones provided with six inch gongs at each instrument shall be placed in the pump room, first floor and each gravity tank room. All other floors shall be provided with jacks, protected by break-glass boxes, or with permanent telephones.

d. Details of the equipment required by this section shall be as required by the rules of the board.

e. At least three portable telephones with jack connections shall be provided for each installation, unless permanent telephones are installed at every required location. The portable telephones shall be kept in a cabinet located in the main hall of the ground floor and shall be provided with a lock capable of being opened with a fire department standard key. Such cabinet shall be kept locked at all times. The panel of the cabinet door shall be conspicuously marked "Portable Telephones for Fire Department Use".

Sub-Article 11. Approval of Special Types of Standpipe Systems

(16.11). § C26-1430.0 Approval of Special Types of Standpipe Systems.—Structures or portions of structures may, in the discretion of the superintendent, be equipped with special standpipe systems approved by any nationally recognized standard testing laboratory and complying with the requirements of section C26-1383.0, and approved by the board, in lieu of the types of systems otherwise prescribed in this article,

provided such systems are installed and operated in accordance with the approved designs and specifications for such systems and the rules of the board.

Sub-Article 12. Elevators for Fire Department Use

(16.14.1). § C26-1431.0 Elevators for Fire Department Use in Completed Structures.—In every completed structure over one hundred fifty feet in height a competent elevator operator shall be available at all times to assist the fire department in obtaining access to any floor of the structure served by elevators.

(16.14.2). § C26-1431.1 Elevators for Fire Department Use in Incompleted Structures.—In structures in course of erection where the work has progressed to a height of more than one hundred fifty feet, at least one elevator used for carrying passengers or employees shall be kept in readiness at all times for fire department use, and a competent elevator operator shall be available at all times unless the elevator is equipped with such devices that it can be safely operated by the fire department.

(16.15). § C26-1431.2 Standpipe Systems in Structures in Course of Erection.—a. In structure under erection for which a standpipe system will be required, provision shall be made for the use of standpipes by the fire department whenever the construction has progressed so that floors are in place above the seventh story or more than seventy-five feet above the curb level. The standpipe equipment thus provided may be a temporary installation.

b. A temporary standpipe system shall be one which may be used for water supply during the construction operations. Temporary risers shall be at least four inches in diameter for structures of less than four hundred fifty feet in height and at least six inches in diameter for structures four hundred fifty feet or more in height. There shall be as many risers as will be required for the permanent system. Each such riser shall have a Siamese hose connection at the street level and be equipped on each floor enclosed in exterior walls with hose outlets equipped with two and one-half inch hose valves. The installations shall be made so that each riser, cross-connection and branch line shall be watertight when work is not being done on the system. The location of the Siamese hose connection shall be placarded, kept free from obstruction, and indicated by a red light.

Sub-Article 13. Existing Standpipe Systems

(16.16). § C26-1432.0 Existing Standpipe Systems.—a. Standpipe systems approved by the superintendent or by the fire commissioner as conforming to the rules and regulations in force at the time of such approval, may remain unaltered despite this title, except that where substantial additions in height or area are made to the structure, this title shall apply if deemed advisable by the superintendent.

b. And except that all such systems shall be provided with:

1. a gravity tank reserve water supply of at least twenty-five hundred gallons for standpipe use, sufficiently elevated to give a hydrostatic pressure of at least five pounds at the highest hose valve under the main roof, unless a city water service connection has been accepted in lieu of a tank;
2. at least one gate valve on the downstream side of the tank check, unless a gate valve has been installed on either side of the check;
3. hose and hose valves in good servicable condition;
4. hose valve wheels within six and one-half feet of the floors or stair landings or of steps within two feet on a horizontal plane;
5. a three inch by three inch Siamese hose connection with approved caps, painted red with the word "STANDPIPE" cast in the body or on metal plates secured to the riser or secured to the face of the structure behind the connection:
6. five-eighth inch smooth bore nozzles where the hydrostatic pressure at the hose valve is less than ten pounds;

c. And except that the caps of all Siamese hose connections and the interiors of all check valves which have been in the standpipe system ten years or more shall be cleaned of all rust or other accumulations and the insides and outsides of the bodies of such valves shall be thoroughly painted with rust-resisting paint;

d. And except that in all such systems it shall be unlawful to use automatic hose valves, and that such systems shall also comply with the following:

1. section C26-1393.0,
2. section C26-1394.0, except in sprinklered structures,
3. subdivision h of section C26-1397.0,
4. section C26-1402.0,
5. section C26-1410.0, except that tank filling pumps and pipes sufficient to deliver at least forty-five gallons per minute into the tank shall be approved,
6. section C26-1411.0,
7. section C26-1412.0,
8. section C26-1413.0,

9. section C26-1415.0, except that existing one and one-quarter inch or larger pipes shall be approved if at least forty-five gallons per minute is supplied through it to the tank,
10. section C26-1416.0, except that existing overflow pipe in good condition and at least as large as fill pipe shall be approved,
11. section C26-1417.0,
12. section C26-1419.0, except that existing high and low water level alarms in good and operative condition need not be replaced,
13. section C26-1431.0.

ARTICLE 18. PLACES OF ASSEMBLY

Sub-Article 1

General provisions governing places of assembly

§ C26-1437.O Application.—Except as otherwise provided in the administrative code of the city of New York, the provisions of this article shall apply to any new room, space or portion of a premises, or to any room, space or portion of a premises existing as or hereafter altered or converted to use or occupancy as a "place of assembly."

§ C26-1438.0 Egress.—a. The means of egress in such places of assembly shall be in conformity with the provisions of this chapter relating to buildings of like classification, area, height, use and occupancy, except, however, that in all cabarets and coffee houses as defined in paragraph three of section B32-296.0 and in paragraph one of section B32-301.0 of this code the greatest distance of travel from any portion of such cabaret or coffee house to a required means of egress shall not exceed seventy-five feet.

b. In all places of assembly there shall be aisles providing proper access to all required means of egress. Such required aisles shall not be obstructed in any manner whatsoever and shall be not less than three feet in width.

c. No required means of egress in a place of assembly hereafter created shall be permitted through any room or space used as a kitchen or service pantry or for the preparation of food. In an existing "place of assembly" an existing means of egress through a room or space used as a kitchen or service pantry or for the preparation of food may be accepted by the department under such conditions as may be prescribed and approved by the department.

d. The provisions of subdivision a of this section limiting to seventy-five feet the greatest distance of travel from any portion of any room or premises used as a cabaret or coffee house to a required means of egress shall not apply to existing legal cabarets and coffee houses as defined in paragraph three of section B32-296.0 and in paragraph one of section B32-310.0 of this code, provided, however, that the means of egress from such cabaret or coffee house is in conformity with the provisions of this chapter relating to buildings of like classification, area, height, use and occupancy.

e. The owner of each place of assembly shall submit to the department a diagram indicating the arrangement of tables, chairs, seats, dancing space, platforms, aisles and means of egress. Diagrams which have been approved by the department shall be kept on the premises for which the approval has been granted and shall be readily available for inspection. Such diagrams shall be filed with the department within sixty days after the date when this article becomes effective.

No place of assembly shall be occupied until a diagram indicating the basic arrangement of aisles has been approved by the department, and the use of any arrangement not approved by the department is prohibited.

f. The provisions of paragraph e of this section relating to the submission and approval of diagrams shall not apply to assembly rooms or auditoriums in elementary or high schools as defined in section C26-132.0 of this code or in colleges which are licensed to operate by the state board of regents; provided, however, that seats in such assembly rooms or auditoriums are stationary.

§ C26-1439.0 Number of Persons, Limited.—The number of persons permitted to occupy a place of assembly shall be as approved by the Department of Housing and Buildings and shall be in conformity with the provisions of this chapter relating to buildings of like classification, area, height, use and occupancy.

§ C26-1440.0 Capacity of Premises To Be Posted Conspicuously.—a. In every room or in any portion of a premises or building which is used as a place of assembly there shall be, conspicuously posted, signs indicating the number of persons who may legally occupy said room or space. Such signs shall read as follows:

OCCUPANCY
BY MORE THAN
..... PERSONS IS
DANGEROUS
& UNLAWFUL

..... Commissioner,
Department of Buildings, City of New York.

b. Such signs shall be twenty inches in width by twenty-four inches in length. The lettering thereon indicating the lawful occupancy shall be of bold gothic type in red on a background of white, shall be not less than two inches in height and the numerals shall be two and three-eighths inches in height, and such lettering and numerals shall be properly spaced to provide good visibility.

c. Such signs shall be illuminated, shall be durable, and shall be substantially secured to wall or partition.

d. Such sign shall be located at the main entrance to such space or room so as to be conspicuously visible to a person entering such space or room.

§ C26-1441.0 Lighting Systems.—During all periods when a place of assembly is occupied such place shall be illuminated by sufficient natural or artificial light to permit a person to read in every portion thereof nine-point print of the kind generally used in the average daily newspaper. Dance halls when in use, shall be so illuminated that every person present may be plainly seen from any point in the hall. When required, artificial light shall be provided through electrical circuits and shall be maintained in continuous operation.

§ C26-1442.0 Exit Signs.—a. In every such place of assembly the required means of egress shall be indicated by signs reading "EXIT". Letters on such signs shall be eight inches in height and such letters shall be properly spaced so as to be easily read at a distance of seventy-five feet.

b. Each such exit sign shall be illuminated by a red light of not less than twenty-five watts or equivalent photometric rating.

c. In any such place of assembly where doors, openings or passageways providing access to required means of egress are not visible from all portions of such room or premises, illuminated directional signs shall be installed in conspicuous locations in such room or premises, indicating the direction of travel to the required means of egress.

d. Such directional signs shall be of the same dimensions as specified in this section for exit signs.

e. It shall be unlawful to obscure in any manner any required means of egress, passageway, exit sign, exit light or directional exit sign.

§ C26-1443.0 Independent Circuit for Illuminated Exit Lights and Directional Signs in "Licensed Places of Public Assembly".—Notwithstanding any other provision contained in this chapter, the illumination of all exit lights and directional signs required under the provisions of this article in all "licensed places of public assembly" which have been approved by the department charged with the enforcement of this chapter for occupancy by more than two hundred and fifty persons shall be provided through circuits separated from the general lighting and power circuits. Such installations shall be in conformity with the provisions of title B of chapter thirty of this code.

§ C26-1444.0 Safety.—a. The superintendent, in his discretion, may require that any opening from a space used as a kitchen or service pantry or for the preparation of food in a place of assembly be protected with a self-closing door or other device when in his opinion such protection is necessary for the safety of the occupants and to prevent the spread of fire. Any door installed for such purpose may be provided with a vision panel of clear wire glass or of plate glass not less than one-quarter of an inch in thickness.

b. In all places of assembly in which food is cooked or prepared for service in such place, the hoods over ranges and the flues shall be thoroughly cleaned at least every three months or more frequently if necessary. A record indicating the person or firm which completed such cleaning process and the date when such flues were cleaned, shall be kept on the premises and shall be available for examination.

§ C26-1445.0 Dressing Rooms.—a. In places of assembly in which dressing rooms are provided for performers, such dressing rooms shall be equipped with sprinklers as prescribed by the superintendent. Water supply for such sprinklers may be taken from the domestic water service of the building.

The provisions of this subdivision shall not apply to guest rooms in hotels when such guest rooms used for the accommodation of performers are separate and remote from that part of the premises used as a place of assembly.

b. All dressing rooms used by performers shall be provided with adequate means of egress as prescribed by the superintendent.

§ C26-1446.0 Revolving Doors Prohibited.—a. No class B revolving door shall be permitted in any place of assembly.

b. It shall be unlawful to install a revolving door or continue the use of an existing revolving door in any exit opening from a place of assembly, except that:

1. A supplemental revolving door may be installed or maintained immediately adjacent to a required exit.

2. Where the occupancy is less than one hundred and fifty persons one of the required exits may be through a revolving door provided there is immediately adjacent thereto an outwardly swinging door of at least twenty-eight inches in width and provided further that there is another required exit from such place of assembly.

c. The provisions of this section shall not apply to street exit doors in class 1, class 2 or class 3 structures where there intervenes, between the place of assembly and said exit doors, areas of safety into which exits of the place of assembly discharge. Said areas shall be public stairhalls, exit corridors or similar protected areas adequate, under the provisions of article seven of this code, for the accommodation of all the occupants of the building including those of such place of assembly.

d. All type A revolving doors shall be cleaned, lubricated, and maintained in proper working order. Tests shall be made each month so that in the event of an emergency such doors may fold back in conformity with the provisions of section C26-287.0 of this code.

A record, indicating the name of the person or firm which made such tests and the date on which such tests were conducted, shall be kept on the premises and shall be available for inspection.

During the period of World War No. 2 and one year thereafter, nothing contained in this section shall be construed to preclude the use of revolving doors in places of assembly other than cabarets or dance halls if such revolving doors legally existed therein on January first, nineteen hundred forty-three, provided, however, that adjacent to such revolving doors there are required means of egress equipped with outwardly swinging doors and further provided that in the opinion of the superintendent no undue hazard will result therefrom.

§ C26-1447.0 Approval Required, Permits, Fees.—a. It shall be unlawful to use or occupy any building or portion of a building or premises as a place of assembly unless an application for such use or occupancy has been filed with and approved by the department.

b. Application forms and permits required under this section shall be provided by the department.

c. The permit issued by the department for such place of assembly shall be kept readily accessible in all such places of assembly.

d. An annual fee of ten dollars shall be paid to the department upon the issuance of the required permit for a place of assembly.

e. The provisions of this section relating to the payment of a fee shall not apply to any place of assembly occupied exclusively by a religious, charitable or educational organization no part of the net earnings of which inures to the benefit of any private shareholder or individual, or to any place of assembly for which a fee is collected by any other department of the city, for similar use and occupancy.

f. Except as provided in subdivision h of this section, the issuance of a permit by the department under this article shall be contingent on the approval of the fire commissioner, and of the department of water supply, gas and electricity and, if a license is required under the provisions of articles 38 and 39 of chapter B32 of this code, the applicant shall also obtain the approval of the license commissioner.

g. A permit issued under the provisions of this article shall not affect application of the provisions of paragraph b of subdivision one of section 487a-1.0 of this code.

h. The department may issue conditional renewals of permits without the renewals approval of the fire commissioner and of the department of water supply, gas and electricity when such renewal approvals are delayed beyond the date of expiration of a permit for a previous period.

§ C26-1448.0 Date Effective.—a. The provisions of section C26-1437.0 of this article shall become effective immediately.

b. Except as otherwise specifically provided in this article, such changes as may be required under the provisions of sections C26-1438.0, C26-1439.0, C26-1440.0, C26-1441.0, C26-1442.0, C26-1444.0, C26-1446.0 and C26-1447.0 of this article shall be completed within sixty days from the date on which this article becomes effective.

c. Such changes as may be required under the provisions of sections C26-1443.0

and C26-1445.0 of this article shall be completed within six months from the effective date of this article.

§ C26-1449.0 Violations, Penalties.—In addition to any other penalty prescribed by this code, any person who shall violate any provision of this article, upon conviction thereof, shall be punished by a fine of not less than ten nor more than fifty dollars, or by imprisonment not exceeding ten days, or by both. Upon a second conviction of such violation the commissioner shall have discretionary power to revoke or suspend any permit issued by the department under the provisions of this article.

If any place of assembly is used or occupied in violation of any provision of this article, whether or not there has been a conviction of any person for such violation, the commissioner may serve notice upon the person charged with having violated such provision, requiring such person to comply with the provisions of this article within ten days after the service of such notice, and if such person fails to comply within said period, the commissioner may serve notice upon such person that a hearing will be held by the said commissioner at a time and place to be fixed in said notice to determine whether or not such violation existed or still exists, and if, after such hearing, at which the person charged with such violation shall be given an opportunity to be heard and present proof, the commissioner determines that such violation continues to exist, he may suspend any permit issued by the department of housing and buildings under the provisions of this article for a period of time not exceeding three months, and during such suspension it shall be unlawful to use or occupy such portion of the premises as a place of assembly.

ARTICLE 19

REINFORCED CONCRETE AND PLAIN CONCRETE CONSTRUCTION

Sub-Article 1

GENERAL PROVISIONS

§C26-1455.0 Reinforced concrete and plain concrete—general provisions. The provisions of this title apply to the use of reinforced concrete and plain concrete. The provisions of sections C26-1455.0 through C26-1564.0 shall supplement the general provisions of this title in order to provide for the proper design and construction of structures of these materials. In all matters pertaining to design and construction where the provisions of this article are in conflict with other provisions of this title, the provisions of this article shall govern.

§C26-1456.0. Definitions.—a. For the purposes of this title, the words and terms listed in this section shall have the meanings herein given, except as they are defined in any other law, section or regulation which may in particular cases apply.

b. The provisions of Article 2 of this code where not inconsistent with the definitions given in this article shall also apply to reinforced concrete and plain concrete construction.

§C26-1456.1. Aggregate.—a. The term "aggregate" shall mean inert material which is mixed with cement and water to produce concrete, consisting in general of sand, pebbles, gravel, cinders, crushed stones, blast furnace slag, burnt shale or clay, or similar materials.

b. The term "coarse aggregate" shall mean aggregate consisting of particles more than one-quarter of an inch in size.

c. The term "fine aggregate" shall mean aggregate consisting of particles one-quarter of an inch or less in size, but not less than the minimum size as specified under C26-1467.0.

§C26-1456.2. Blast furnace slag.—The term "blast furnace slag" shall mean the non-metallic-product, consisting essentially of silicates and alumino-silicates of lime, which is developed simultaneously with iron in a blast furnace.

§C26-1456.3. Column.—The term "column" shall mean an upright compression member the length of which exceeds three times its least lateral dimension.

§C26-1456.4. Combination column.—The term "combination column" shall mean a column in which a structural steel section, designed to carry the principal part of the load, is wrapped with wire and encased in concrete of such quality that some additional load may be allowed.

§C26-1456.5. Composite column.—The term "composite column" shall mean a column in which a steel or cast-iron structural member is completely encased in concrete containing spiral and longitudinal reinforcement.

§C26-1456.6. Concrete.—a. The term "concrete" shall mean a mixture of portland cement, fine aggregate, coarse aggregate and water. Admixtures may be used as approved by the board.

b. Average concrete.—The term "average concrete" shall mean concrete the working stresses of which are established in accordance with the provisions of Section C26-1477.0 and any other applicable sections of this article.

c. Controlled concrete.—The term "controlled concrete" shall mean concrete the working stresses of which are established in accordance with the provisions of Section C26-1478.0, and any other applicable sections of this article.

d. Grade I cement concrete.—The term "Grade I cement concrete" shall mean concrete in which the coarse aggregate consists of limestone, trap rock, blast furnace slag, cinders or calcareous gravel.

e. Grade II cement concrete.—The term "Grade II cement concrete" shall mean concrete in which the coarse aggregate consists of granite or silicious gravel.

§C26-1456.7. Concrete products.—The term "concrete products" shall mean bricks, blocks or other units made of cement, aggregates and water.

§C26-1456.8. Consistency.—The term "consistency" shall mean the relative plasticity of freshly mixed concrete or mortar.

§C26-1456.9. Core area.—The term "core area" shall mean the area within the outer circumference of the hooping in columns with spiral reinforcement.

§C26-1456.10. Crushed stone.—The term "crushed stone" shall mean bedded rocks or boulders, broken into fragments of varying shapes and sizes.

§C26-1456.11. Cyclopean or rubble concrete.—The term "cyclopean concrete" or "rubble concrete" shall mean concrete masonry in which the finer materials form a matrix for large stone and boulders.

§C26-1456.12. Deformed bar.—The term "deformed bar" shall mean a reinforcing bar conforming to "Specifications for Minimum Requirements for the Deformations of Deformed Steel Bars for Concrete Reinforcement" (A.S.T.M. A305-56T) and for No. 14S and No. 18S bars A.S.T.M. A408-62T. Wire mesh with welded intersections not farther apart than six inches in the direction of the principal reinforcement and with cross wires not smaller than 0.135 inch in diameter (No. 10 American Steel and Wire gage) may be rated as deformed bar.

§C26-1456.13. Effective area of concrete.—The term "effective area of concrete" shall mean the area of a section which lies between the centroid of the tensile reinforcement and the compression face of the flexural member.

§C26-1456.14. Effective area of reinforcement.—The term "effective area of reinforcement" shall mean the area obtained by multiplying the right cross-sectional area of the reinforcement by the cosine of the angle between its direction and the direction for which the effectiveness is to be determined.

§C26-1456.15. Gravel.—The term "gravel" shall mean rounded particles larger than sand grains, resulting from the natural disintegration or weathering or rocks.

§C26-1456-16. Panel length.—The term "panel length" shall mean the distance along a panel side from center to center of columns of a flat slab.

§C26-1456.17. Pedestal.—The term "pedestal" shall mean an upright compression member, the height of which does not exceed three times its least lateral dimensions.

§C26-1456.18. Plain bar.—Reinforcement which does not conform to the definition of deformed bar shall be classed as a plain bar.

§C26-1456.19. Plain concrete.—The term "plain concrete" shall mean concrete without reinforcement or reinforced only for shrinkage or temperature changes.

§C26-1456.20. Precast concrete.—The term "precast concrete" shall mean a plain or reinforced concrete building element cast in other than its final position in the structure.

§C26-1456.21. Prestressed concrete.—The term "prestressed concrete" is concrete in which there have been introduced internal stresses of such magnitude and distribution that the stresses resulting from loads are counteracted to a desired degree. In reinforced concrete the prestress is commonly introduced by tensioning the reinforcement.

§C26-1456.22. Reinforced concrete.—The term "reinforced concrete" shall mean concrete in which reinforcement other than that provided for shrinkage or temperature changes is embedded in such a manner that the two materials act together in resisting forces.

§C26-1456.23. Sand.—The term "sand" shall mean small grains one-quarter of an inch or less in size resulting from the natural disintegration of rocks.

§C26-1456.24. Surface water.—The term "surface water" shall mean the water carried by the aggregate except that held by absorption within aggregate particles themselves.

§C26-1456.25. Wall beam.—The term "wall beam" shall mean a reinforced concrete beam which extends from column to column along the outer edge of a wall panel.

§C26-1456.26. Water-cement ratio.—The term "water-cement ratio" shall mean the total quantity of water entering the mixture, including the surface water carried by the aggregate, expressed in terms of the quantity of cement. The water-cement ratio shall be expressed in United States gallons per ninety-four pound sack of cement.

§C26-1457.0. American Society for Testing and Materials (A.S.T.M.)

The following specifications of the American Society for Testing and Materials (A.S.T.M.) shall be considered as part of this article as if fully set forth elsewhere herein:

A7-61T	Tentative specifications for steel for bridges and buildings
A15-62T	Tentative specifications for billet-steel bars for concrete reinforcement
A16-62T	Tentative specifications for rail-steel bars for concrete reinforcement
A82-62T	Tentative specifications for cold-drawn steel wire for concrete reinforcement
A160-62T	Tentative specifications for axle-steel bars for concrete reinforcement
A184-37	Standard specifications for fabricated steel bar or rod mats for concrete reinforcement
A185-61T	Tentative specifications for welded steel wire fabric for concrete reinforcement
A305-56T	Tentative specifications for minimum requirements for the deformations of deformed steel bars for concrete reinforcement
A377-57	Specifications for cast iron pressure pipe
A408-62T	Tentative specifications for special large size deformed billet-steel bars for concrete reinforcement
A431-62T	Tentative specifications for high strength billet-steel bars for concrete reinforcement
A432-62T	Tentative specifications for reformed billet-steel bars for concrete reinforcement with 60,000 pounds per square inch minimum yield strength
C31-62T	Standard method of making and curing concrete compression and flexure test specimens in field
C33-61T	Specifications for concrete aggregates
C39-61	Standard method of test for compressive strength of molded concrete cylinders
C42-62	Standard methods of securing, preparing and testing specimens from hardened concrete for compressive and flexural strengths
C94-62	Specifications for ready-mixed concrete
C150-62	Standard specifications for Portland cement
C172-54	Standard method of sampling fresh concrete
C175-61	Standard specifications for air-entraining Portland cement
C192-62T	Standard method of making and curing concrete compression and flexure test specimens in the laboratory
C260-60T	Tentative specifications for air-entraining admixtures for concrete
C330-60T	Tentative specifications for lightweight aggregates for structural concrete
C138-44	Standard method of test for weight per cubic foot, yield and air content (gravimetric) of concrete
C173-58	Standard method of test for air content of freshly mixed concrete by the volumetric method
C231-60	Standard method of test for air content of freshly mixed concrete by the pressure method

Sub-Article 2

TESTS, INSPECTIONS AND MATERIALS

§C26-1458.0. Notation relating to load test.

D = deflection, produced by a test load, of a member relative to the ends of the span

L = span of member under load test (the shorter span of flat slabs and of floors supported on four sides)

t = total thickness or depth of a member under load test

§C26-1459.0. Tests.—a. The superintendent shall have the authority to order

the test of any material entering concrete or reinforced concrete to determine its suitability for the purpose; to order reasonable tests of the concrete from time to time to determine whether the materials and methods in use are such as to produce concrete of the necessary quality; and to order the test under load of any portion of a completed structure, when conditions have been such as to leave doubt as to the adequacy of the structure to serve the purpose for which it is intended.

b. Tests of materials shall be made in accordance with the requirements of the American Society for Testing and Materials as noted elsewhere in this article. The complete records of such tests shall be available for inspection during the progress of the work and for two years thereafter, and shall be preserved for that purpose by the engineer or architect.

c. Before any cement shall be used for concrete work, test reports shall be available to show that it meets the physical requirements of this title, and is approved by the board.

§C26-1460.0. Tests of controlled and/or average concrete.

a. Sampling. During the progress of the work, samples of concrete shall be taken directly from the mixer in accordance with "Method of Sampling Fresh Concrete A.S.T.M. C172-54." Each sample shall be tested for slump, air content, temperature and weight per cubic foot in accordance with A.S.T.M. C138-44. If the measured slump or air content falls outside the limits specified in C26-1477.0 and C26-1478.0, a check sampling shall be made immediately on another portion of the same sample. In the event of a second failure, the concrete shall be considered to have failed to meet the requirements.

If the time required to discharge the load being sampled is greater than 15 minutes, a separate set of test cylinders shall be made from each one-third portion of the load taken at a greater interval than 15 minutes.

b. Molding standard test acceptance cylinders. For each class of concrete placed on any one day, three standard acceptance cylinders shall be made from the sampling described in a above for each fifty cubic yards or fraction thereof placed. These specimens shall be molded, stored for 24 hours, carefully transported to an approved testing laboratory and cured for 27 days in accordance with A.S.T.M. C31-61T. When requested by the borough superintendent or the licensed professional engineer responsible for the job per C26-1463.0, a fourth specimen shall simultaneously be molded to be tested at 3, 7 or 14 days as may be requested.

Additional specimens for determining when forms may be stripped or a structure may be put to use may also be required. These field cylinders shall be removed from their molds after 24 hours, stored and cured on the work site as near to the sampled concrete in the structure as possible, and subject to the same exposure as the job concrete of which it is representative. These field cylinders shall be kept unmolested on the structure for at least three-fourths of the test period before being taken to the laboratory for testing.

The specimens shall be marked and identified with tags on which shall be noted the class of concrete, date and time of day when molded, the delivery receipt and truck number if ready-mixed, the results of the tests of slump, air content and temperature, and a clear description of where the concrete was placed in the structure. The date of arrival at the testing laboratory also shall be noted thereon.

c. Compression tests. Twenty-eight days after the specimens were molded the three acceptance cylinders shall be tested in compression in accordance with A.S.T.M. C39-61 by an approved testing laboratory. The test strength shall be the average of the breaking strengths of the three acceptance cylinders. If one of the molded specimens shall show manifest evidence of improper sampling, molding, handling or testing, it shall be discarded and the remaining two averaged. If more than one cylinder must be discarded, the entire test shall be discarded. In no case shall a given class of concrete be represented by less than three separate samplings and three compression test strengths.

d. When the average strength of the test cylinders falls consistently below the minimum ultimate strength required by the design, a change in the proportions or water content of the concrete shall be made, to secure the required strength for the remaining portion of the structure.

e. When the average strength of the test cylinders for any portion of the structure is less than that required by the design, the concrete represented by such cylinders may be considered to be of adequate strength if: (1) The designer of the structure submits a correct analysis of stresses to show that the stresses in the portion of the structure affected will not exceed the allowable stresses as specified in C26-1480.0, with the value of f'_c equal to the compressive strength of the concrete as determined by the tests; or (2) if the tests are performed in accordance with the specifications for the standard method of securing, preparing and testing specimens from hardened

concrete for compressive and flexural strengths, A.S.T.M., C42, and the tests show that the strength of the concrete equals or exceeds the design strength, and provided test specimens are obtained from the structure in such manner that the strength of the structure is not impaired; or (3) the structure may be considered to meet the designated requirement if load tests are performed as specified in Section C26-1461.0 for that portion of the structure where the concrete of questionable strength has been placed and the results and interpretation of such tests and the resulting safe capacity of the structure are approved by the superintendent.

§C26-1461.0. Loading—

a. Notation

D = dead load

L = Live load

Δ = maximum deflection, produced by a test load, of a member relative to the ends of the span, or of the free end of a cantilever relative to its support.

l = span of member under load test (the shorter span of flat slabs and of ffoors supported on four sides). The span is the distance between the centers of the supports or the clear distance between supports plus the depth of the member, whichever is smaller.

t = total thickness or depth of member under load test.

b. Static load tests of structures

(a) The superintendent shall have the right to order the test under load of any portion of a structure when conditions are such as to cause doubt about the safety of the structure.

(b) When such load tests of a structure are required a qualified professional engineer acceptable to the superintendent shall conduct the tests.

(c) Load tests of structures shall not be made until the portion subjected to load is at least 56 days old, unless the owner of the structure agrees to the test being made at an earlier age.

(d) When the whole structure is not to be tested, the portion of the structure thought to provide the least margin of safety shall be selected for loading. Prior to the application of the test load, a load which simulates the effect of that portion of the dead load which is not already present shall be applied and shall remain in place until after a decision has been made regarding the acceptability of the structure. The test load shall not be applied until the structural members to be tested have borne the full service dead load for at least 48 hours.

(e) Immediately prior to the application of the test load to flexural members (including beams, slabs, and floor and roof construction), the necessary initial reading shall be made for the measurements of deflections (and strains, if these are considered necessary), caused by the application of the test load.

(f) The members selected for loading shall be subjected to a superimposed test load equivalent to 0.3 times the dead load plus 1.7 times the service live load (test load = 0.3D + 1.7L). The test load shall be applied without shock to the structure and in a manner to avoid arching of the loading materials.

(g) The test load shall be left in position for 24 hours whereupon readings of the deflections shall be taken. The test load shall be removed and additional readings of deflections shall be taken 24 hours after the removal of the test load.

§C26-1462.0. Criteria for evaluation of load tests of existing structures.

a. If the structure shows evident failure or fails to meet the following criteria, the changes needed to make the structure adequate for the rated capacity shall be made; or a lower rating may be established.

(a) If the maximum deflection, Δ, of a reinforced concrete beam, floor or roof exceeds $l^2/20{,}000t$, the recovery of deflection within 24 hours after the removal of the test load shall be at least 75 percent of the maximum deflection.

(b) If the maximum deflection, Δ, is less than $l^2/20{,}000t$, the requirement on recovery of deflection in (a) above, may be waived.

(c) In determining the limiting deflection for a cantilever, l shall be taken as twice the distance from the support to the end, and the deflection shall be adjusted for movement of the support.

(d) Construction failing to show 75 percent recovery of the deflection may be re-tested. The second test loading shall not be made until at least 72 hours after removal of the test load for the first test. The structure shall show no evidence of failure in the re-test, and the recovery of deflection caused by the second test load shall be at least 75 percent.

§C26-1463.0. Supervision of the testing of the materials and the inspection of construction of concrete structures.

a. The owner of a proposed concrete structure, where controlled and/or average concrete is being used, shall engage a licensed professional engineer or registered architect approved by the engineer or architect of record responsible for the design to supervise the testing of the materials and the inspection of concrete construction, to check that all required tests are made and laboratory tests are submitted, to order such changes of the mix of concrete as required to produce concrete of the necessary strength, to report to the superintendent any deviation from the requirements of this article as indicated by records of inspection and reports of tests. The applicant for the building permit shall submit to the department a signed statement by the above mentioned licensed professional engineer or registered architect stating that he has assumed the responsibility for testing of the materials and inspection of the concrete work and will file all reports as required by the department.

b. Arrangements for tests of concrete, concrete materials and reinforced concrete structures where required by the provisions of this article or ordered by the superintendent shall be made by the owner or his representative. All such tests shall be made without expense to the department.

c. All such tests shall be made by competent persons, and when required by the superintendent, shall be made in the presence of his representative. The superintendent may reject any test upon the ground of technical insufficiency and may require further tests under the supervision of an approved testing laboratory.

d. The requirement set forth in subdivision "a" of this section; that the owner engage a licensed professional engineer or registered architect to supervise the testing and inspection of concrete construction may be waived by the superintendent when less than 50 cubic yards of average concrete is placed in any one structure and the stresses do not exceed the following:

Desig-nation	Description	Allowable working stresses in lbs. per sq. inch 2000	2500
Flexure: f_c			
	Extreme fibre stress in compression	650	800
Shear: v			
	Members with no web reinforcement	40	50
	Members with longitudinal bars and with either stirrups or properly located bent bars	100	125
	Members with longitudinal bars and a combination of stirrups and bent bars	150	190
Footings		40	50
Bond: u			
	Deformed bars as defined in section C26-1456.12	100	125
	Top bars (so placed that more than 12" of concrete is placed below the bar)		
	In two-way footings (except top bars)	75	95
	All others	112	142
Bearing: f_c			
	On full area	500	625

Tests of the average concrete shall be made and filed as required by section C26-1460.0 of the administrative code.

§C26-1464.0. Inspection of controlled concrete construction.—a. All controlled concrete work, including concrete forms and reinforcement, shall be continuously inspected at the mixing plant and at the work site by qualified inspectors, under the supervision of the licensed professional engineer, employed for this purpose by the owner. A record shall be kept of such inspection which shall cover the type, quality and quantity of concrete materials, including water, the mixing and placing of the concrete, the slump, unit weight and air content of the concrete, the placing of the reinforcing steel, the size and dimensions of the concrete members, for compliance with the specifications and approved plans, and a complete record of all test samples and tests. The inspection record shall also include a complete record of the progress of the work and of the temperatures, including those of the concrete when placed, and of the protection given to the concrete while curing. Records of inspection required above and tests required by Section C26-1460.0 shall be filed with the department.

§C26-1465.0. Inspection of average concrete construction.—a. All average concrete

work, including concrete, forms and reinforcement, shall be continuously inspected at the work site by qualified inspectors, under the supervision of the licensed professional engineer, or registered architect, employed for this purpose by the owner. A record shall be kept of such inspection which shall cover the certification of the concrete required by section C26-1477.0. the placing of the concrete, the slump, unit weight and air content of the concrete, placing of the reinforcing steel, the size and dimension of the concrete members, and a complete record of all test samples and tests. The inspection record shall also include a complete record of the progress of the work and of the temperatures, including those of concrete when placed, and of the protection given to the concrete when placed, and of the protection given to the concrete while curing. Such records shall be kept on file by the architect or engineer of record during the progress of the work and for two years after completion of the structure and shall be available for inspection by the superintendent at all times during this period. Records of tests required by section C26-1460.0 shall be filed with the department

b. The requirement that the inspection be under the supervision of a licensed professional engineer or registered architect may be waived by the superintendent if the conditions outlined in section C26-1463.0, subdivision "d" are complied with.

§C26-1466.0. Portland cement.—a. Portland cement shall conform to "specifications for Portland cement" (ASTM C150-62) or "specifications for air-entraining Portland cement" (ASTM C175-61).

§C26-1467.0. Concrete aggregates.—a. Concrete aggregates shall conform to "specifications for concrete aggregates" (A.S.T.M. C33-61T), or to "specifications for lightweight aggregates for structural concrete" (ASTM C330-60T). Lightweight aggregates shall be approved by the board.

b. The size of the aggregate shall be at most one-fifth of the narrowest dimension between forms of the member for which the concrete is to be used, or three-fourths of the minimum clear spacing between reinforcing bars.

§C26-1468.0. Water.—a. Water used in fixing concrete shall be clean and free from injurious amounts of oils, acids, alkalis, organic materials, or other deleterious substances.

§C26-1469.0. Metal reinforcement.—a. Reinforcing bars shall conform to the requirements of "specifications for billet-steel bars for concrete reinforcement" (ASTM A15-62T and A408-62T), "specifications for rail-steel bars for concrete reinforcement" (ASTM A16-62T), "specifications for axle-steel bars for concrete reinforcement" (ASTM A160-62T) or "specifications for fabricated steel bar or rod mats for concrete reinforcement" (ASTM A184-37), "tentative specifications for high strength billet steel bars for concrete reinforcement" (ASTM A431-62T), "tentative specifications for deformed billet steel bars for concrete reinforcement with 60,000 pounds per square inch minimum yield point" (ASTM A432-62T). Deformations on deformed bars shall conform to "specifications for minimum requirements for the deformations of deformed bars for concrete reinforcement" (ASTM A305-56T and A408-62T).

b. Cold-drawn wire or welded wire fabric for concrete reinforcement shall conform to the requirements of "specifications for cold-drawn steel wire for concrete reinforcement" (ASTM A82-62T), or "specifications for welded steel wire fabric for concrete reinforcement" (ASTM A185-61T).

c. Structural steel shall conform to the requirements of "specifications for steel for bridges and buildings" (ASTM A7-61T) and tentative specification for structural steel (ASTM A36-62T).

d. Cast-iron sections for composite columns shall conform to "specifications for cast iron pressure pipe" (ASTM A377-57).

§C26-1470.0. Identification of metal reinforcement.—a. All reinforcing bars shall be identifiable as to point of origin, grade of steel and the size.

b. All bundles or rolls of cold-drawn steel wire reinforcement shall be securely tagged, so as to identify the manufacturer, the grade of steel and the size.

§C26-1471.0. Storage of materials.—a. Cement and aggregates shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter. Any material which has deteriorated or which has been damaged shall not be used for concrete.

Sub-Article 3

CONCRETE QUALITY AND ALLOWABLE STRESSES

§C26-1472.0. Notation relating to stresses.

f_c = compressive unit stress in extreme fiber of concrete in flexure.

f'_c = compressive strength of concrete at age of twenty-eight days unless otherwise specified.

f_c = compressive unit stress in the metal core of a composite column.
f_s = tensile unit stress in longitudinal reinforcement; nominal allowable stress in vertical column reinforcement.
f_v = tensile unit stress in web reinforcement.
n = ratio of modulus of elasticity of steel to that of concrete.
u = bond stress per unit of surface area of bar.
v = shearing unit stress.
v_c = shearing unit stress permitted on the concrete.
psi = pounds per square inch.

§C26-1473.0. Concrete quality.—a. For the design of reinforced concrete structures, the value of f'_c used for determining the allowable stresses as stipulated in section C26-1480.0 shall be based on the specified minimum twenty-eight day compressive strength of the concrete, or on the specified minimum compressive strength at the earlier age at which the concrete may be expected to receive its full load. All plans, submitted for approval or used on the job, shall clearly show the assumed strength of concrete at a specified age for which all parts of the structure were designed.

b. Concrete which in its final state will be exposed to the action of freezing weather and all concrete garage floors shall have a mix designed with entrained air to provide a concrete with maximum resistance to freezing, thawing and wear, for the aggregates and cement used.

§C26-1474.0. Concrete proportions and consistency.—a. The proportions of aggregate to cement for any concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms and around reinforcement with the method of placing employed on the work, but without permitting the materials to segregate or excess free water to collect on the surface. The combined aggregates shall be of such composition of sizes that when separated on the No. 4 standard sieve, the weight passing the sieve (fine aggregate) shall not be less than thirty percent nor greater than fifty percent of the total, unless otherwise approved by the superintendent.

b. The methods of measuring concrete materials shall be such that the proportions can be accurately controlled and easily checked at any time during the work.

c. Plain concrete shall have a minimum cement factor of five bags per cubic yard of concrete, and a maximum of eight and one-half U. S. gallons of water per bag of cement including water contained in the aggregate. Such concrete shall develop a strength of at least two thousand pounds per square inch when tested in accordance with the standard methods of test (ASTM C39-61).

Reports of such tests shall be filed with the department. At least two test specimens shall be tested for each day's placing.

§C26-1475.0. Allowable working stresses for plain concrete.—a. For plain concrete the allowable working stresses used for design shall not exceed the following values:

1. The compressive stress, due to combined live and dead loads, shall not exceed four hundred pounds per square inch.
2. In footings, the tension stress due to bending away from the face of the supported wall or pier, at any section, on a depth four inches less than the footing thickness, shall not exceed fifty pounds per square inch.

§C26-1476.0. Method of establishing working stresses in reinforced concrete.—a. The allowable working stresses used in the design of reinforced concrete structures shall be established by the methods described by sections C26-1477.0 or C26-1478.0 and by section C26-1479.0.

b. When concrete structures are designed to receive their full design loads at a period of less than twenty-eight days after being installed, all the requirements of section C26-1478.0 and section C26-1479.0b shall be complied with in establishing the allowable working stresses used is the design as well as in the conduct of the work.

c. When air-entraining cement, or any admixture or additive is to be used in the concrete, all of the requirement of section C26-1478.0 and section C26-1479.0b shall be complied with in establishing the allowable working stresses used in the design as well as in the conduct of the work.

§C26-1477.0. Average concrete; proportions and twenty-eight day strengths.—a. The producer of average concrete shall use mix proportions and water cement ratios which have been shown by previous use to produce satisfactory concrete of the required strength at a slump of five inches with a tolerance of plus or minus one inch. Average concrete shall be limited to the concrete strengths shown in table "A" below, and the cement factor used shall not be less than the value given in the table for the corresponding concrete strengths.

TABLE A

Minimum compressive strength in twenty-eight days (f'_c) pounds per square inch	Minimum bags of cement per cubic yard of concrete	Maximum permissible water cement ratio, U.S. gallons per 94-pound sack of cement	
		Non air-entrained concrete	Air-entrained concrete
2000	5.5	8	7¼
2500	6.0	7¼	6¼

b. Each load of concrete shall be certified by the producer to the owner, whether produced at ready mix plant or site mixed, as to the concrete strength and actual quantities per cubic yard of each material; including water, contained therein. A copy of such certificate shall be available to the department during the progress of the work and for two years thereafter.

§C26-1478.0. Controlled concrete, proportions and twenty-eight day strengths.—The strength of all controlled concrete shall be established in accordance with the following provisions:

Preliminary tests of controlled concrete.—a. Job site, weighed, batched and mixed concrete.—Preliminary tests of controlled concrete shall be made by an approved testing laboratory in advance of the beginning of operations, using the materials proposed and consistencies as hereinafter specified, and tested wet in accordance with the standard method of test for compressive strength of molded concrete cylinders, A.S.T.M. C39-61, including tests of fine and coarse aggregate and the provisions therein for curing in a moist room of seventy degrees Fahrenheit. A curve representing the relation between the average strength of the concrete at twenty-eight days, or at earlier periods, and the water cement ratio shall be established for a range of values including all of the strengths and ages called for in the plans. The tests shall include at least four different water cement ratios, and at least four specimens for each water cement ratio. The mixes used in the tests shall have a slump of five inches, with a tolerance of plus or minus one inch. The water cement ratio to be used in the structure shall be that corresponding to a point on the curve established by these tests, representing a strength of concrete fifteen per cent higher than the minimum ultimate strength called for on the plans. The cement factor used in the work shall have at least the value established by the tests, but shall not be less than the factor given in Table "B" below for the corresponding concrete strength.

TABLE B

Minimum compressive strength in twenty-eight days (f'_c) pounds per square inch	Minimum bags of cement per cubic yard of concrete
2000	5.00
2500	5.25
3000	5.75
3500	6.50
3750	6.75
4000	7.00
5000	7.50

Note: 1. If 4000 pound concrete is used in columns, the floor construction concrete shall be not less than 3000 pounds f'_c controlled concrete.
2. If 5000 pound concrete is used in columns, the floor construction concrete shall be not less than 3500 pounds f'_c controlled concrete.

b. Ready-mixed concrete.—Every owner or his representative shall have an approved testing laboratory submit a mid design based upon tests similar to a hereof.

c. The minimum bags of cement per cubic yard of concrete noted in the preceding Tables A and B may be reduced under the following conditions:

(a) The preliminary tests of the concrete shall be made under the supervision of a licensed professional engineer for the specific project.

(b) The cement, aggregate, admixtures, and other ingredients of the concrete shall be those used for the specific project.

(c) The licensed professional engineer who supervises the preliminary tests shall also inspect the concrete construction as required in C26-1463.0.

(d) The designing Architect and Engineer of record shall certify that the tests meet their requirements for the strength and durability of the structure.

Reports of tests required in C26-1478.0 shall be filed with the department prior to placement of any concrete covered by tests.

§C26-1479.0. Allowable working stresses for reinforced concrete.—a. For average concrete the maximum allowable working stresses in pounds per square inch used for design shall be based on the values of f'_c as determined and limited by section C26-1477.0 and shall be as given in section C26-1480.0.

b. For controlled concrete the maximum allowable working stresses in pounds per square inch on which the design is based shall be as given in section C26-1480.0 where f'_c equals the values determined in accordance with section C26-1478.0 of this section, but not to exceed 5000 pounds per square inch.

§C26-1480.0. Allowable working stresses in concrete.—The allowable working stresses in concrete shall not be greater than the percentage of the strength nor greater than the values given in the following table; psi = pounds per square inch.

(For table see pages 496 and 497.)

§C26-1481.0. Allowable unit stresses in reinforcement.—Unless otherwise provided in this article, steel for concrete reinforcement shall not be stressed in excess of the following limits:

a. Tension

(f_s = tensile unit stress in longitudinal reinforcement) and (f_v = tensile unit stress in web reinforcement) 20,000 psi for rail-steel concrete reinforcing bars, billet-steel concrete reinforcing bars of intermediate and hard grades, axle-steel concrete reinforcing bars of intermediate and hard grades, and cold-drawn steel wire for concrete reinforcement; 18,000 psi for billet-steel concrete reinforcing bars of structural grade, and axle-steel concrete reinforcing bars of structural grade.

b. Tension in one-way slabs of not more than 12-ft span (f_s = tensile unit stress in main reinforcement). For the main reinforcement, in one-way slabs, fifty per cent of the minimum yield point specified in the specifications of the American Society for Testing and Materials for the particular kind and grade of reinforcement used, but in no case to exceed 30,000 psi.

c. Compression, vertical column reinforcement (f_s = nominal allowable stress in vertical column reinforcement) forty per cent of the minimum yield point specified in the specifications of the American Society for Testing and Materials for the particular kind and grade of reinforcement used, but in no case to exceed 30,000 psi.

(f_r = allowable unit stress in the metal core of composite and combination columns)

Structural steel sections	16,000 psi
Cast iron sections	10,000 psi
Steel pipe	See limitations of section C26-1538.0

d. Compression, flexural members

For compression reinforcement in flexural members see section C26-1506.0.

Sub-Article 4

MIXING AND PLACING CONCRETE

§C26-1482.0. Preparation of equipment and place of deposit.—a. Before concrete is placed, all equipment for mixing and transporting the concrete shall be cleaned, all debris and ice shall be removed from the spaces to be occupied by the concrete, forms shall be thoroughly wetted or oiled, masonry filler units that will be in contact with concrete shall be well drenched, and the reinforcement shall be thoroughly cleaned of ice or other coatings.

b. Water shall be removed from place of deposit before concrete is placed unless otherwise permitted by the superintendent.

§C26-1483.0. Mixing of concrete.—a. All concrete shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged.

b. For job-mixed concrete, mixing shall be done in a batch mixer of approved type. The mixer shall be rotated at a speed recommended by the manufacturer and mixing shall be continued for at least one and one-half minutes after all materials are in the drum. For batches larger than one cubic yard, mixing time shall be increased fifteen seconds for each additional cubic yard or fraction thereof.

c. Ready-mixed concrete shall be mixed and delivered in accordance with the requirements set forth in "specifications for ready-mixed concrete" (ASTM C94-62).

§C26-1484.0. Conveying.—a. Concrete shall be conveyed from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials.

b. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to insure a practically continuous flow of concrete at the delivery end without separation of materials.

§C26-1485.0. Depositing.—a. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. The concreting shall be carried on at such a rate that the concrete is at all times plastic and flows readily into the spaces between the bars. No concrete that has partially hardened or been contaminated by foreign particles shall be deposited on the work, nor shall retempered concrete be used.

b. When concreting is once started, it shall be carried on as a continuous operation until the placing of the panel or section is completed. The top surface shall be generally level. When construction joints are necessary, they shall be made in accordance with section C26-1496.0.

c. All concrete shall be thoroughly compacted by suitable means during the operation of placing, and shall be thoroughly worked around the reinforcement and embedded fixtures and into the corners of the forms.

d. Where conditions make compacting difficult, or where the reinforcement is congested, batches of mortar containing the same proportions of cement to sand as used in the concrete, shall first be deposited in the forms to a depth of at least one inch.

§C26-1486.0. Curing.—a. In all concrete structures, a concrete made with normal portland cement shall be maintained above 50° F., in a moist condition for at least the first seven days after placing and high-early-strength concrete shall be so maintained for at least the first three days. Other approved curing methods may be used if the specified strengths are obtained.

§C26-1487.0. Cold weather requirements.—a. Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing or near freezing weather. All concrete materials and all reinforcements, forms, fillers, and ground with which the concrete is to come in contact shall be free from frost. No frozen materials or materials containing ice shall be used.

§C26-1488.0. Protection of heating equipment.—a. where salamanders or other heating equipment are used, escape hatches and protection against fire, complying with the requirements of section C26-555.2, shall be provided.

Sub-Article 5

FORMS AND DETAILS OF CONSTRUCTION

§C26-1489.0. Design and construction of forms.—a. The design and construction of forms shall conform to the following requirements:

1. Forms shall conform to the shapes, lines and dimensions of the member as called for on the plans. Forms shall be substantial and sufficiently tight to prevent leakage of mortar; and shall be properly placed or tied together so as to maintain position and shape and insure safety to workmen and passersby. Temporary openings shall be provided where necessary, to facilitate cleaning and inspection immediately before depositing concrete.

2. Where the height of the shores exceeds ten feet, adequate diagonal bracing shall be provided in both longitudinal and transverse directions. In addition, adequate diagonal braces shall be provided at the ends of the framework. Diagonal bracing shall extend from the top to bottom of shores.

3. The unbraced length of wood shores supporting forms shall not exceed fifty times the least dimension. Metal shores or frames shall be types approved by the board of standards and appeals and shall be installed in accordance with the approval of the board. Shores shall be adequately secured at the top and shall be properly wedged at top or bottom, if required.

4. Where shores rest upon the ground, adequate mud sill, or other bases, shall be provided to support the shores adequately.

5. Qualified workmen shall be detailed constantly during the placing of concrete to insure that there is no movement of shores, braces or other supports. The name of the foreman in charge of the formwork shall be posted in the field office of the contractor.

6. The individual, firm or corporation who does the concrete work shall be responsible for the adequate design and construction of all forms used in the construction of the building. Wherever the shore height exceeds fourteen feet, or the load on the forms exceeds one hundred fifty pounds per square foot, or power buggies are used, or two stage shores are used, the individual firm or corporation who does the concrete work shall certify to the department that the form design has been checked and approved as adequate by a licensed professional engineer who has had at least five years of experience as a structural engineer, and that the forms

DESCRIPTION	Symbol	*Percentage of compressive strength	Maximum Value psi	ALLOWABLE WORKING STRESSES For strength of concrete shown below: $f'_c = 2000$ psi $n = 15$*	$f'_c = 2500$ psi $n = 12$*	$f'_c = 3000$ psi $n = 10$*	$f'_c = 3500$ psi $n = 8.6$*	$f'_c = 4000$ psi $n = 7.5$*	$f'_c = 5000$ psi $n = 6$*
Flexture: f_c									
Extreme fiber stress in compression	f_c	$.45f'_c$		900	1125	1350	1575	1800	2250
Extreme fiber stress in tension in plain concrete footings	f_c	$.03f'_c$		60	75	90	105	120	150
Shear: v (as a measure of diagonal tension)									
Members with no web reinforcement	v_c	$.03f'_c$	90	60	75	90	90	90	90
Members with longitudinal bars and with either stirrups or properly located bent bars	v	$.08f'_c$	240	160	200	240	240	240	240
Members with longitudinal bars and a combination of stirrups and bent bars (The latter bent up suitably to carry at least $0.04f'_c$)		$.12f'_c$	360	240	300	360	360	360	360
For flat slabs see sub-article 10. Footings	v_c	$.03f'_c$	75	60	75	75	75	75	75
Bond: u									
Deformed bars as defined in Section C26-1456.12									
Top bars (so placed that more than 12" of concrete is placed below the bar)	u	$.07f'_c$	245	140	175	210	245	245	245
In two-way footings (except top bars)	u	$.08f'_c$	280	160	200	240	280	280	280
All others	u	$.10f'_c$	350	200	250	300	350	350	350

DESCRIPTION	Symbol	*Percentage of compressive strength	Maximum Value psi	ALLOWABLE WORKING STRESSES For strength of concrete shown below: $f'_c = 2000$ psi $n = 15$*	$f'_c = 2500$ psi $n = 12$*	$f'_c = 3000$ psi $n = 10$*	$f'_c = 3500$ psi $n = 8.6$*	$f'_c = 4000$ psi $n = 7.5$*	$f'_c = 5000$ psi $n = 6$*
Plain bars not conforming to ASTM A-305-56T as defined in Section C26-1456.18 (Must be hooked)									
Top bars	u	$.03f'_c$	105	60	75	90	105	105	105
In two-way footings (except top bars)	u	$.036f'_c$	126	72	90	108	126	126	126
All others	u	$.045f'_c$	158	90	113	135	158	158	158
Bearing: f_c									
On full area	f_c	$.25f'_c$		500	625	750	875	1000	1250
Concentric on one-third area or less#	f_c	$.375f'_c$		750	938	1125	1312	1500	1875

[c]When shear value exceeds .75 of .03 f'c provide #3 stirrups on 12 inch centers

*For any strength of concrete in accordance with Section C26-1476.0 $n = \frac{30000}{f'_c}$

This increase shall be permitted only when the least distance between the edges of the loaded and unloaded areas is a minimum of one-fourth of the parallel side dimension of the loaded area. The allowable bearing stress on a reasonably concentric area greater than one-third but less than the full area shall be interpolated between the values given.

ADMINISTRATIVE BUILDING CODE

have been constructed in conformance with the design which was checked and approved by the said engineer.

§C26-1490.0. Removal of forms.—a. Forms shall be removed in such a manner as to insure the complete safety of the structure. Where the structure as a whole is supported on shores, beam and girder sides, column and similar vertical forms may be removed after twenty-four hours or when the concrete is sufficiently hard not to be injured thereby. In no case shall the supporting forms or shoring be removed until the members have acquired sufficient strength to support safely their weight and the load thereon. The results of suitable control tests may be used as evidence that the concrete has attained such sufficient strength, as specified by the engineer, and filed with the department.

§C26-1491.0. Conduits, pipes, etc., embedded in concrete.—a. Electric conduits, junction boxes and other pipes whose embedment is allowed shall not, with their fittings, displace that concrete of a column on which stress is calculated, or which is required for fire protection, to greater extent than four percent of the area of the cross section. Sleeves or other pipes passing through floors, walls, or beams shall not be of such size or in such location as to impair unduly the strength of the construction; such sleeves or pipes may be considered as replacing structurally the displaced concrete, provided they are not exposed to rusting or other deterioration, are of iron or steel not thinner than standard steel pipe, have a nominal inside diameter not over two inches, and are spaced not less than three diameters on centers. Except when plans of conduits and pipes are approved by the structural engineer and so certified to the department, embedded pipes or conduits, other than those merely passing through, shall not be larger in outside diameter than one-third the thickness of the slab, wall, or beam in which they are embedded, nor shall they be spaced closer than three diameters on center, nor so located as to impair unduly the strength of the construction.

One and three eighths outside diameter conduit in a four inch slab is permitted under the one-third of the slab thickness rule. The design of all slabs and beams shall be such that they shall have the required strength in shear when the area of the conduits, junction or outlet boxes are deducted from the section in shear. The depth of junction or outlet boxes shall not exceed three inches for a four inch slab, or three and one half inches for a five inch slab.

Junction or outlet boxes placed in the middle of the span of either a one-way or two-way slab shall be spaced not less than twenty inches on centers. Junction or outlet boxes located other than in the middle half of the spans shall be not less than eight feet on centers.

b. Pipes which will contain liquid, gas or vapor may be embedded in structural concrete under the following conditions:

1. The temperature of the liquid, gas, or vapor shall not exceed one hundred and fifty degrees Fahrenheit.

2. The maximum pressure to which any piping or fittings shall be subjected shall be two hundred pounds per square inch above atmospheric pressure.

3. All pipings and fittings shall be tested as a unit for leaks immediaterly prior to concreting. The testing pressure per square inch above atmospheric pressure shall be fifty per cent in excess of the pressure to which the piping and fittings may be subjected but the minimum testing pressure shall be not less than one hundred and fifty pounds per square inch above atmospheric pressure. The pressure test shall be held for four hours with no drop in pressure except that which may be caused by air temperature.

4. Pipes carrying liquid, gas or vapor which is explosive or injurious to health shall again be tested as specified in paragraph 3 after the concrete has hardened.

5. No liquid, gas or vapor, except water not exceeding ninety degrees Fahrenheit nor twenty pounds per square inch pressure, is to be placed in the pipes until the concrete has thoroughly set.

6. In solid slabs the piping shall be placed between the top and bottom reinforcement.

7. The concrete covering of the pipes shall be not less than one inch.

8. Reinforcement with an area equal to at least two tenths per cent of the area of the concrete section shall be provided normal to the piping.

9. The pipings and fittings shall be assembled by welding, brazing, soldersweating, or other equally satisfactory method. Screw connections are prohibited. The piping shall be so fabricated and installed that it will not require any cutting, bending, or displacement of the reinforcement from its proper location.

10. No liquid, gas, or vapor which may be injurious or detrimental to the pipes shall be placed in them.

11. Drain pipes and other piping designed for pressures of not more than one pound per square inch above atmospheric pressure need not be tested as required in paragraph (3) above.

§C26-1492.0. Cleaning and bending reinforcement.—a. Metal reinforcement, at the time concrete is placed, shall be free from loose rust scale or other coatings that will destroy or reduce the bond. Bends for stirrups and ties shall be made around a pin having a diameter not less than two times the minimum thickness of the bar. Hooks shall conform to the requirements of section C26-1526.0. Bends for other bars shall be made around a pin having a diameter not less than six times the minimum thickness of the bar, except that for bars larger than one inch, the pin shall not be less than eight times the minimum thickness of the bar. All bars shall be bent cold. Reinforcement shall be formed to the dimensions indicated on the plans before it is embedded in the concrete.

§C26-1493.0. Placing reinforcement.—a. Metal reinforcement shall be accurately placed and adequately secured in position by concrete or metal chairs or spacers. The clear distance between parallel bars, except in columns, shall be not less than the nominal diameter of the bars, one and one-third times the maximum size of the coarse aggregate, nor one inch. Where reinforcement in beams or girders is placed in two or more layers, the clear distance between layers shall not be less than one inch, and the bars in the upper layers shall be placed directly above those in the bottom layer.

§C26-1494.0. Splices in reinforcement of slabs, beams and girders.—a. In slabs, beams and girders, splices of reinforcement at points of maximum stress shall be avoided wherever possible. Such splices where used shall be welded, lapped, or otherwise fully developed, but, in any case, shall transfer the entire stress from bar to bar without exceeding the allowable bond and shear stresses listed in section C26-1480.0. The minimum overlap for a lapped splice shall be twenty-four bar diameters, but not less than twelve inches for bars. The clear distance between bars shall also apply to the clear distance between a contact splice and adjacent splices or bars.

§C26-1495.0. Concrete protection for reinforcement.—a. The reinforcement of footings and other principal structural members in which the concrete is deposited against the ground shall have not less than three inches of concrete between it and the ground contact surface. If concrete surfaces after removal of the forms are to be exposed to the weather or be in contact with the ground, the reinforcement shall be protected with not less than two inches of concrete for bars larger than No. 5 and one and one-half inches for No. 5 bars or smaller.

b. The concrete protective covering for reinforcement at surfaces not exposed directly to the ground or weather shall be not less than three-quarters of an inch for slabs and walls; and not less than one and one-half inches for beams and girders, and two inches for columns. In concrete joist floors in which the clear distance between joists is not more than thirty inches, the protection of reinforcement shall be at least three-quarters of an inch.

c. Concrete protection for reinforcement shall in all cases be at least equal to the diameter of the bars.

d. Exposed reinforcing bars intended for bonding with future extensions shall be protected from corrosion by concrete or other adequate covering.

§C26-1496.0. Construction joints.—a. Joints not indicated on the plans shall be so made and located as to least impair the strength of the structure. Where a joint is to be made, the surface of the concrete shall be thoroughly cleaned and all laitance removed. In addition to the foregoing, all joints shall be thoroughly wetted, and slushed with a coat of neat cement grout immediately before placing of new concrete.

b. At least two hours must elapse after depositing concrete in the columns or walls before depositing in beams, girders, or slabs supported thereon. Beams, girders, brackets, column capitals, and haunches shall be considered as part of the floor system and shall be placed monolithically therewith.

c. Construction joints in floors shall be located near the middle of the spans of slabs, beams, or girders, unless a beam intersects a girder at such point, in which case the joints in the girders shall be offset a distance equal to twice the width of the beam. In this last case provision shall be made for shear by use of inclined reinforcement.

Sub-Article 6

DESIGN—GENERAL CONSIDERATIONS

§C26-1497.0. Design methods.—a. The design of reinforced concrete members shall be made with reference to allowable stresses, working loads, and the accepted straightline theory of flexure. In determining the ratio n for design purposes, the

modulus of elasticity for the concrete shall be assumed at $1000f'_c$ and that the steel as 30,000,000 pounds per square inch. For concrete weighing less than 145 pounds per cubic foot, the value for "n" shall be determined by the board. It is assumed that the steel takes all the tension stresses in flexural computations.

§C26-1498.0. Design loads.—a. The provisions for design herein specified are based on the assumption that all structures shall be designed for all dead and live loads coming upon them, the live loads to be in accordance with the general requirements of the building code of which this forms a part, with such reductions for girders and lower story columns as are permitted therein.

§C26-1499.0. Resistance to wind forces.—a. The resisting elements in structures required to resist wind shall be limited to the integral structural parts.

b. The moments, shears, and direct stresses resulting from wind forces determined in accordance with recognized methods shall be added to the maximum stresses which exist at any section for dead and live loads.

c. Members subject to stresses produced by wind combined with other loads may be proportioned for unit stresses thirty-three and one-third per cent greater than those specified in sections C26-1480.0 and C26-1481.0, provided that the section thus required is not less than that required for the combination of dead and live loads.

Sub-Article 7
FLEXURAL COMPUTATIONS

§C26-1500.0. Notation relating to flexural computations.

b = width of rectangular flexural member or width of flanges for T and I sections

b' = width of web in T and I flexural members

d = depth from compression face of beam or slab to centroid of longitudinal tensile reinforcement; the diameter of a round bar

E = modulus of elasticity

I = moment of inertia of a section about the neutral axis for bending

h = story height

l = span length of slab or beam

l' = clear span for positive moment and shear and the average of the two adjacent clear spans for negative moment (see section C26-1501.0)

t = minimum total thickness of slab.

w = uniformly distributed load per unit of length of beam or per unit area of slab

§C26-1501.0. General requirements.—(a) All members of frames or continuous construction shall be designed to resist at all sections the maximum moments and shears produced by dead load, live load, and wind load, as determined by the theory of elastic frames in which the simplified assumptions of section C26-1502.0 may be used.

(b) Approximate methods of frame analysis are satisfactory for buildings of usual types of construction, spans, and story heights.

(c) In the case of two or more approximately equal spans (the larger of two adjacent spans not exceeding the shorter by more than twenty per cent) with loads uniformly distributed, where the unit live load does not exceed three times the unit dead load, design for the following moments and shears is satisfactory:

Positive moment

End spans

If discontinuous end is unrestrained	$\frac{1}{11}wl'^2$
If discontinuous end is integral with the support	$\frac{1}{14}wl'^2$
Interior Spans	$\frac{1}{16}wl'^2$
Negative moment at exterior face of first interior support two-spans	$\frac{1}{9}wl'^2$
More than two spans	$\frac{1}{10}wl'^2$
Negative moment at other faces of interior supports	$\frac{1}{11}wl'^2$
Negative moment at face of all supports for, (a) slabs with spans not exceeding ten feet and (b) beams and girders where ratio of sum of column stiffnesses to beam stiffnesses exceeds eight at each end of the span	$\frac{1}{12}wl'^2$
Negative moment at interior faces of exterior supports for members built integrally with their supports	
Where the support is a spandrel beam or girder	$\frac{1}{24}wl'^2$
Where the support is a column	$\frac{1}{16}wl'^2$
Shear in end members at first interior support	$1.15\frac{wl'}{2}$
Shear at all other supports	$\frac{wl'}{2}$

(d) Reinforced concrete floors and roofs for loads and spans specified in section C26-620.0 may be designed as prescribed by said section.

(e) A cellar floor or any floor resting directly on the ground shall be built in accordance with section C26-620.1.

(f) Beams supporting reinforced slabs shall be provided with tie rods where required by section C26-629.0.

§C26-1502.0. Conditions of design.—(a) Arrangement of live load

1. The live load may be considered to be applied only to the floor under consideration, and the far ends of the columns may be assumed as fixed.

2. Consideration may be limited to combinations of dead load on all spans with full live load on two adjacent spans and with full live load on alternate spans.

(b) Span length

1. The span length, l, of members that are not built integrally with their supports shall be the clear span plus the depth of the slab or beam but shall not exceed the distance between centers of supports.

2. In analysis of continuous frames, center to center distances, l and h, may be used in the determination of moments. Moments at faces of supports may be used for design of beams and girders.

3. Solid or ribbed slabs with clear spans of not more than ten feet that are built integrally with their supports may be designed as continuous slabs on knife edge supports with spans equal to the clear spans of the slab and the width of beams otherwise neglected.

(c) Stiffness

1. Any reasonable assumption may be adopted for computing the relative stiffness of columns and of floor systems. The assumption made shall be consistent throughout the analysis.

2. In computing the value of I for relative stiffness of slabs, beams, girders, and columns, the reinforcement may be neglected. In T-shaped sections allowance shall be made for the effect of flange.

(d) Haunched floor members

1. The effect of haunches shall be considered both in determining bending moments and in computing unit stresses.

(e) Limitations

1. Wherever at any section positive reinforcement is indicated by analysis, the amount provided shall be not less than 0.005 b'd except in slabs of uniform thickness. (Use b instead of b' for rectangular flexural members.)

2. In structural slabs of uniform thickness the minimum amount of reinforcement in the direction of the span shall be:

For structural, intermediate, and hard grades and rail steel .....0.0025 bd

For steel having a minimum yield point of 56,000 pounds per square inch .....0.0020 bd

3. In slabs other than concrete joist construction or flat slabs, the principal reinforcement shall be centered not farther apart than three times the slab thickness nor more than eighteen inches.

§C26-1503.0. Depth of beam or slab.—(a) The depth of the beam or slab shall be taken as the distance from the centroid of the tensile reinforcement to the compression face of the structural members. Any floor finish not placed monolithically with the floor slab shall not be included as a part of the structural member. When the finish is placed monolithically with the structural slab in buildings of the warehouse or industrial class, there shall be placed an additional depth of one-half inch over-that required by the design of the member.

(b) The following minimum thickness of Flexural Members shall be used:

	Minimum Thickness, t			
Member	Simply Supported	One End Continuous	Both Ends Continuous	Cantilever
One way slab	*l*/25	*l*/30	*l*/35	*l*/12
Beams	*l*/20	*l*/23	*l*/26	*l*/10

§C26-1504.0. Distance between lateral supports.—(a) The clear distance between lateral supports of a beam shall not exceed thirty-two times the least width of compression flange.

§C26-1505.0. Requirements for T-beams.—(a) In T-beam construction the slab and beam shall be built integrally or otherwise effectively bonded together. The effective flange width to be used in the design of symmetrical T-beams shall not exceed one-fourth of the span length of the beam, and its overhanging width on either side of the web shall not exceed eight times the thickness of the slab nor one-half the clear distance to the next beam.

(b) For beams having a flange on one side only, the effective overhanging flange width shall not exceed one-twelfth of the span length of the beam, nor six times the thickness of the slab, nor one-half the clear distance to the next beam.

(c) Where the principal reinforcement in a slab which is considered as the flange of a T-beam (not a joist in concrete joist floors) is parallel to the beam, transverse reinforcement shall be provided in the top of the slab. This reinforcement shall be designed to carry the load on the portion of the slab required for the flange of the T-beam. The flange shall be assumed to act as a cantilever. The spacing of the bars shall not exceed five times the thickness of the flange, nor in any case eighteen inches.

(d) Provision shall be made for the compressive stress at the support in continuous T-beam construction, care being taken that the provisions of section C26-1493.0 relating to the spacing of bars, and section C26-1485.0 (d) relating to the placing of concrete shall be fully met.

(e) The overhanging portion of the flange of the beam shall not be considered as effective in computing the shear and diagonal tension resistance of T-beams.

(f) Isolated beams in which the T-form is used only for the purpose of providing additional compression area, shall have a flange thickness not less than one-half the width of the web and a total flange with not more than four times the web thickness.

§C26-1506.0. Compression steel in flexural members.—(a) Compression steel in beams or girders shall be anchored by ties or stirrups not less than one-quarter inch in diameter spaced not farther apart than sixteen bar diameters, or forty-eight tie diameters. Such stirrups or ties shall be used throughout the distance where the compression steel is required.

(b) To approximate the effect of creep, the stress in compression reinforcement resisting bending may be taken at twice the value indicated by using the straight-line relation between stress and strain and the modular ratio given in section C26-1497.0 (a), but not of greater value than the allowable stress in tension.

§C26-1507.0. Shrinkage and temperature reinforcement.—(a) Reinforcement for shrinkage and temperature stresses normal to the principal reinforcement shall be provided in structural floor and roof slabs where the principal reinforcement extends in one direction only. Such reinforcement shall provide for the following minimum ratios of reinforcement area to concrete area bt, but in no case shall such reinforcing bars be placed farther apart than five times the slab thickness or more than eighteen inches.

Slabs where plain bars are used	0.0025
Slabs where deformed bars with specified yield points less than 60,000 pounds per square inch are used	0.0020
Slabs where deformed bars with 60,000 pounds per square inch specified yield point or wire fabric having welded intersections not farther apart in the direction of stress than twelve inches are used	0.0018

§C26-1508.0. Concrete joist floor construction.—(a) In concrete joist floor construction consisting of concrete joists and slabs placed monolithically with or without burned clay or concrete tile fillers, the joists shall not be farther apart than thirty inches face to face. The ribs shall be straight, not less than four inches wide, and of a depth not more than three times the width.

(b) When burned clay or concrete tile fillers of material having a unit compressive strength at least equal to that of the designed srength of the concrete in the joists are used, the vertical shells of the fillers in contact with the joists may be included in the calculations involving shear or negative bending moment. No other portion of the fillers may be included in the design calculations.

(c) The concrete slab over the fillers shall not be less than one and one-half inches in thickness, nor less in thickness than one-twelfth of the clear distance between joists. Shrinkage reinforcement shall be provided in the slab at right angles to the joists as required in section C26-1507.0.

(d) Where removable forms or fillers not complying with section C26-1508.0(b) are used, the thickness of the concrete slab shall not be less than one-twelfth of the clear distance between joists and in no case less than two inches. Such slab shall be reinforced at right angles to the joists with at least the amount of reinforcement required for flexure, giving due consideration to concentrations, if any, but in no case shall the reinforcement be less than that required by section C26-1507.0.

(e) When the finish used as a wearing surface is placed monolithically with the structural slab in buildings of the warehouse or industrial class, the thickness of the concrete over the fillers shall be one-half inch greater than the thickness used for design purposes.

(f) Where the slab contains conduits or pipes as allowed in section C-26-1491.0, the thickness shall not be less than one inch plus the total over-all depth of such conduits or pipes at any point. Such conduits or pipes shall be so located as not to impair the strength of the construction.

(g) Shrinkage reinforcement shall not be required in the slab parallel to the joists.

§C26-1509.0. Two-way systems with supports on four sides.—(a) This construction, reinforced in two directions, includes solid reinforced concrete slabs; concrete joists with fillers of hollow concrete units or clay tile, with or without concrete top slabs; and concrete joists with top slabs placed monolithically with the joists. The slab shall be supported by walls or beams on all sides and if not securely attached to supports, shall be reinforced as specified C26-1509.0(b).

(b) Where the slab is not securely attached to the supporting beams or walls, special reinforcement shall be provided at exterior corners in both the bottom and top of the slab. This reinforcement shall be provided for a distance in each direction from the corner equal to one-fifth the longest span. The reinforcement in the top of the slab shall be parallel to the diagonal from the corner. The reinforcement in the bottom of the slab shall be at right angles to the diagonal or may be of bars in two directions parallel to the sides of the slab. The reinforcement in each band shall be of equivalent size and spacing to that required for the maximum positive moment in the slab.

(c) The slab and its supports shall be designed by approved methods which shall take into account the effect of continuity at supports, the ratio of length to width of slab and the effect of two-way action.

(d) In no case shall the slab thickness be less than four inches nor less than the perimeter of the slab divided by one hundred and eighty. The spacing of reinforcement shall not be more than three times the slab thickness and the ratio of reinforcement shall be at least 0.0025.

(e) The requirements of this section are satisfied by either of the methods of design covered in ACI 318-56.

Sub-Article 8

SHEAR AND DIAGONAL TENSION

§C26-1510.0. Notation relating to shear and diagonal tension.

Av = total area of web reinforcement in tension within a distance of s (measured in a direction parallel to that of the main reinforcement) or the total area of all bars bent up in any one plane

α = angle between inclined web bars and axis of beam

b = width of rectangular flexural member of width of flange for T- and I- sections

b′ = width of web in T and I flexural members

d = depth from compression face of beam or slab to centroid of longitudinal tensile reinforcement

f'_c = compressive strength of concrete at age of twenty-eight days unless otherwise specified

f_v = tensile unit stress in web reinforcement

j = ratio of distance between centroid of compression and centroid of tension to the depth of d

s = spacing of stirrups or of bent bars in a direction parallel to that of the main reinforcement

v = shearing unit stress

V = total shear

V′ = total shear carried by the web reinforcement

§C26-1511.0. Shearing unit stress.—a. The shearing unit stress v, as a measure of diagonal tension, in reinforced concrete flexural members shall be computed by formula (2):

$$v = \frac{V}{bjd} \quad \ldots\ldots (2)$$

b. For beams of I-or T- section, b′ shall be substituted for b in formula (2)

c. In concrete joist floor construction, where burned clay or concrete tile are used, b′ may be taken as a width equal to thickness of the concrete web plus the thickness of the vertical shells of the concrete or burned clay tile in contact with the joist as in section C26-1508.0(b).

d. Wherever the value of the shearing unit stress computed by formula (2) exceeds the shearing unit stress v_c permitted on the concrete of an unreinforced web (see section C26-1480.0), web reinforcement shall be provided to carry the excess. Such reinforcement shall also be provided for a distance equal to the depth, d, of the member beyond the point theoretically required.

e. Where continuous or restrained beams or frames do not have a slab so cast as to provide T-beam action, the following provisions shall apply. Web reinforcement shall be provided from the support to a point beyond the extreme position of the point of inflection a distance equal to either one-sixteenth of the clear span or depth of the member, whichever is greater even though the shearing unit stress does not exceed v_c. Such reinforcement shall be designed to carry at least two-thirds of the total shear at the section. Web reinforcement shall be provided sufficient to carry at least two-thirds of the total shear at a section in which there is negative reinforcement.

§C26-1512.0, Types of web reinforcement.—a. Web reinforcement may consist of:

1. Stirrups or web reinforcing bars perpendicular to the longitudinal steel.
2. Stirrups or web reinforcing bars welded or otherwise rigidly attached to the longitudinal steel and making an angle of thirty degress or more thereto.
3. Longitudinal bars bent so that the axis of the inclined portion of the bar makes an angle of fifteen degrees or more with the axis of the longitudinal portion of the bar.
4. Special arrangements of bars with adequate provisions to prevent slip of bars or splitting of the concrete by the reinforcement (see section C26-1514.0-f).

b. Stirrups or other bars to be considered effective as web reinforcement shall be anchored at both ends, according to the provisions of section C26-1524.0.

§C26-1513.0. Stirrups.—a. The area of steel required in stirrups placed perpendicular to the longitudinal reinforcement shall be computed by formula (3).

$$Av = \frac{V's}{f_v jd} \quad \ldots\ldots (3)$$

b. Inclined stirrups shall be proportioned by formula (5) (section C26-1514.0d).

c. Stirrups placed perpendicular to the longitudinal reinforcement shall not be used alone as web reinforcement when the shearing unit stress, v, exceeds $0.08f'_c$ or two-hundred-forty pounds per square inch.

§C26-1514.0. Bent bars.—a. Only the center three-fourths of the inclined portion of any longitudinal bar that is bent up for web reinforcement shall be considered effective for that purpose, and such bars shall be bent around a pin having a diameter not less than six times the bar size.

b. When the web reinforcement consists of a single bent bar or of a single group of parallel bars all bent up at the same distance from the support, the required area of such bars shall be computed by formula (4).

$$Av = \frac{V'}{f_v \sin \alpha} \quad \ldots\ldots (4)$$

c. In formula (4), V′ shall not exceed $0.04\ f'_c\ bjd$, or 120 bjd.

d. Where there is a series of parallel bars or groups of bars bent up at different distances from the support, the required area shall be determined by formula (5).

$$Av = \frac{V's}{f_v jd\ (\sin \alpha + \cos \alpha)} \quad \ldots\ldots (5)$$

e. When bent bars, having a radius of bend of at least six bar diameters are used alone as web reinforcement, they shall be so spaced that the effective inclined portion described in section C26-1514.0a meets the requirements of section C26-1516.0, and the allowable shearing unit stress shall not exceed $0.08f'_c$ nor two-hundred-forty pounds per square inch.

f. The shearing unit stress permitted when special arrangements of bars are employed shall be that determined by making comparative tests, to destruction, of specimens of the proposed system and of similar specimens reinforced in conformity with the provisions of this code, the same factor of safety being applied in both cases.

§C26-1515.0. Combined web reinforcement.—a. Where more than one type of reinforcement is used to reinforce the same portion of the web, the total shearing resistance of this portion of the web shall be assumed as the sum of the shearing resistances computed for the various types separately. In such computations the shearing resistance of the concrete shall be included only once, and no one type of reinforcement shall be assumed to resist more than $2V^1/3$.

§C26-1516.0. Maximum spacing of web reinforcement.—a. Where web reinforcement is required it shall be so spaced that every forty-five degree line (representing a potential crack) extending from the middepth of the beam to the longitudinal tension bars shall be crossed by at least one line of web reinforcement. If a shearing unit stress in excess of $0.06\ f'_c$ is used, every such line shall be crossed by at least two such lines of web reinforcement.

§C26-1517.0. Minimum web reinforcement.—Where web reinforcement is required, the amount used shall be not less than 0.15 per cent of the area computed as the product of the width of the member at middepth and the horizontal spacing of the web reinforcement.

§C26-1518.0. Shearing stresses in flat slabs. (see Section C26-1529.0).

§C26-1519.0. Shear and diagonal tension in footings.—a. In isolated footings the shearing unit stress computed by formula (2) on the critical section (see section C26-1551.0a) shall not exceed $0.03\ f'_c$ nor in any case shall it exceed seventy-five pounds per square inch.

Sub-Article 9

BOND AND ANCHORAGE

§C26-1520.0. Notation relating to bond and anchorage.

d = depth from compression face of beam or slab to centroid of longitudinal tensile reinforcement.

f'_c = compressive strength of concrete at age of twenty-eight days unless otherwise specified.

j = ratio of distance between centroid of compression and centroid of tension to the depth d.

Σo = sum of perimeters of bars in one set.

u = bond stress per unit of surface area of bar.

V = total shear.

§C26-1521.0. Computation of bond stress in beams.—a. In flexural members in which the tensile reinforcement is parallel to the compression face, the bond stress at any cross section shall be computed by formula (6).

$$u = \frac{V}{\Sigma o jd} \quad \ldots\ldots (6)$$

in which V is the shear at that section and Σo is taken as the perimeter of all effective bars crossing the section on the tension side. Bent-up bars that are not more than d/3

from the level of the main longitudinal reinforcement may be included. Critical sections occur at the face of the support, at each point where tension bars terminate within a span, and at the point of inflection.

b. Bond shall be similarly computed on compressive reinforcement, but the shear used in computing the bond shall be reduced in the ratio of the compressive force assumed in the bars to the total compressive force at the section. Anchorage shall be provided by embedment past the section to develop the assumed compressive force in the bars at the bond stress in section C26-1480.0.

c. Adequate end anchorage shall be provided for the tensile reinforcement in all flexural members to which formula (6) does not apply, such as sloped, stepped or tapered footings, brackets or beams in which the tensile reinforcement is not parallel to the compression face.

§C26-1522.0. Anchorage requirements.—a. Tensile negative reinforcement in any span of a continuous, restrained or cantilever beam, or in any member of a rigid frame shall be adequately anchored by bond, hooks, or mechanical anchors in or through the supporting member. Within any such span every reinforcing bar, except in a lapped splice, whether required for positive or negative reinforcement, shall be extended at least twelve diameters beyond the point at which it is no longer needed to resist stress. At least one-third of the total reinforcements provided for negative moment at the support shall be extended beyond the extreme position of the point of inflection a distance sufficient to develop by bond one-half the allowable stress in such bars, not less than one-sixteenth of the clear span length, or not less than the depth of the member, whichever is greater. The tension in any bar at any section must be properly developed on each side of the section by hook, lap, or embedment (see section C26-1526.0). If preferred, the bar may be bent across the web at any angle of not less than fifteen degrees with the longitudinal portion of the bar and be made continuous with the reinforcement which resists moment of opposite sign.

b. Of the positive reinforcement in continuous beams not less than one-fourth the area shall extend along the same face of the beam into the support a distance of six inches.

c. In simple beams, or at the freely supported end of continuous beams, at least one-third the required positive reinforcement shall extend along the same face of the beam into the support a distance of six inches.

§C26-1523.0. Plain bars in tension.—Plain bars in tension shall terminate in standard hooks except that hooks shall not be required on the positive reinforcement at interior supports of continuous members.

§C26-1524.0. Anchorage of web reinforcement.—a. The ends of bars forming simple U- or multiple stirrups shall be anchored by one of the following methods:

1. By a standard hook, considered as developing ten thousand pounds per square inch, plus embedment sufficient to develop by bond the remaining stress in the bar at the unit stress specified in section C26-1480.0. The effective embedded length of a stirrup leg shall be taken as the distance between the middepth of the beam and the tangent of the hook.

2. Welding to longitudinal reinforcement.

3. Bending tightly around the longitudinal reinforcement through at least one hundred and eighty degrees.

4. Embedment above or below the middepth of the beam on the compression side, a distance sufficient to develop the stress to which the bar will be subjected at a bond stress of not to exceed 0.045 f'_c on plain bars nor 0.10 f'_c on deformed bars, but, in any case, a minimum of twenty-four bar diameters.

b. Between the anchored ends, each bend in the continuous portion of a U- or multiple U-stirrup shall be made around a longitudinal bar.

c. Hooking or bending stirrups around the longitudinal reinforcement shall be considered effective only when these bars are perpendicular to the longitudinal reinforcement.

d. Longitudinal bars bent to act as web reinforcement shall, in a region of tension, be continuous with the longitudinal reinforcement. The tensile stress in each bar shall be fully developed in both the upper and the lower half of the beam as specified in section C26-1524.0a1 and C26-1524.0a4.

e. In all cases web reinforcement shall be carried as close to the compression surface of the beam as fireproofing regulations and the proximity of other steel will permit.

§C26-1525.0. Anchorage of bars in footing slabs.—a. Plain bars in footing slabs

shall be anchored by means of standard hooks. The outer faces of these hooks and the ends of deformed bars shall be not less than three inches nor more than six inches from the face of the footing.

§C26-1526.0. Hooks.—a. The term "hook" or "standard hook" as used herein shall mean either

1. A complete semicircular turn with a radius of bend on the axis of the bar of not less than three and not more than six bar diameters, plus an extension of at least four bar diameters at the free end of the bar, or

2. A ninety-degree bend having a radius of not less than four bar diameters plus an extension of twelve bar diameters, or

3. For stirrup anchorage only, a one hundred and thirty-five degree turn with a radius on the axis of the bar of three diameters plus an extension of at lease six bar diameters at the free end of the bar.

Hooks having a radius of bend of more than six bar diameters shall be considered merely as extensions to the bars.

b. No hook shall be assumed to carry a load which would produce a tensile stress in the bar greater than ten thousand pounds per square inch.

c. Hooks shall not be considered effective in adding to the compressive resistance of bars.

d. Any mechanical device capable of developing the strength of the bar without damage to the concrete may be used in lieu of a hook. Tests must be presented to the board to show the adequacy of such devices.

Sub-Article 10

FLAT SLABS WITH SQUARE OR RECTANGULAR PANELS

§C26-1527.0. Notation relating to flat slabs.

A = distance in the direction of span from center of support to the intersection of the centerline of the slab thickness with the extreme forty-five degree diagonal line lying wholly within the concrete section of the slab and column or other support, including drop panel, capital and bracket.

b = width of section.

c = effective support size (see section C26-1531.0c).

d = depth from compression face of beam or slab to centroid of tensile reinforcement.

f'_c = compressive strength of concrete at age of twenty-eight days unless otherwise specified.

H = story height in feet of the column or support of a flat slab center to center of slabs.

j = ratio of distance between centroids of compression and tension to depth d.

L = span length of a flat slab panel center to center of supports.

M_e = numerical sum of assumed positive and average negative moments at the critical design sections of a flat slab panel (see section C26-1531.0f1).

t = thickness of slab in inches at center of panel.

t_1 = thickness in inches of slabs without drop panels, or through drop panel, if any

t_2 = thickness in inches of slabs with drop panels at points beyond the drop panel.

v = shearing unit stress.

V = total shear.

w′ = uniformly distributed unit dead and live load.

W = total dead and live load on panel,

W_D = total dead load on panel.

W_L = total live load on panel, uniformly distributed.

§C26-1528.0. Definitions and scope.—a. Flat slab—A concrete slab reinforced in two or more directions, generally without beams or girders to transfer the loads to supporting members. Slabs with recesses or pockets made by permanent or removable fillers between reinforcing bars may be considered flat slabs. Slabs with panel ceilings may be considered as flat slabs provided the panel of reduced thickness lies entirely within the area of intersecting middle strips, and is at least two-thirds the thickness of the remainder of the slab, exclusive of the drop panel, and is not less than four inches thick.

b. Column capital—An enlargement of the end of a column designed and built to act as an integral unit with the column and flat slab. No portion of the column capital shall be considered for structural purposes which lies outside of the largest right circular cone with ninety-degrees vertex angle than can be included within the outlines of the column capital. Where no capital is used, the face of the column shall be considered as the edge of the capital.

c. Drop panel—The structural portion of a flat slab which is thickened throughout an area surrounding the column, column capital, or bracket.

d. Panel strips—A flat slab shall be considered as consisting of strips in each direction, as follows:

A middle strip one-half panel in width, symmetrical about panel centerline.

A column strip consisting of the two adjacent quarter-panels either side of the column centerline.

§C26-1529.0. Design procedures.—a. Methods of analysis—All flat slab structures shall be designed in accordance with a recognized elastic analysis subject to the limitations of sections C26-1529.0 and C26-1530.0, except that the empirical method of design given in section C26-1531.0 may be used for the design of flat slabs conforming with the limitations given therein. Flat slabs within the limitations of section C26-1531.0 when designed by elastic analysis, may have resulting analytical moments reduced in such proportion that the numerical sum of the positive and average negative bending moments used in design procedure need not exceed M_o as specified under section C26-1531.0(f).

b. Critical sections—The slab shall be proportioned for the bending moments prevailing at every section except that the slab need not be proportioned for a greater negative moment than that prevailing at a distance A from the support centerline.

c. Size and thickness of slabs and drop panels.

1. Subject to limitations of section C26-1529.0(c)3, the thickness of a flat slab and the size and thickness of the drop panel, where used, shall be such that the compressive stress due to bending at any section, and the shear about the column, column capital, and drop panel shall not exceed the unit stresses allowed in concrete of the quality used. When designed under section C26-1531.0, three-fourths of the width of the strip shall be used as the width of the section in computing compression due to bending, except that on a section through a drop panel, three-fourths of the width of the drop panel shall be used. Account shall be taken of any recesses which reduce the compressive area.

2. The shearing unit stress on vertical sections which follow a periphery, b, at distance, d, beyond the edges of the column or column capital and parallel or concentric with it, shall not exceed the following values for the concrete when computed by the formula.

$$v = \frac{V}{bjd}$$

(a) $0.03f'_c$ but not more than one hundred pounds per square inch when at least fifty percent of the total negative reinforcement required for bending in the column strip passes through the periphery.

(b) $0.025\ f'_c$ but not more than eighty-five pounds per square inch when twenty-five percent, which is the least value permitted, of the total negative reinforcement required or bending in the column strip passes through the periphery.

(c) Proportionate values of the shearing unit stress for intermediate percentages of reinforcement.

3 Where drop panels are used, the shearing unit stress on vertical sections which lie at a distance, d, beyond the edges of the drop panel, and parallel with them, shall not exceed $0.03\ f'_c$ nor one hundred pounds per square inch. At least fifty percent of the total negative reinforcement required for bending in the column strip shall be within the width of strip directly above the drop panel.

4. Slabs with drop panels whose length is at least one-third the parallel span length and whose projection below the slab is at least one-fourth the slab thickness shall be not less than L/40 nor four inches in thickness.

Slabs without drop panels as described above shall be not less than L/36 nor five inches in thickness.

5. For determining reinforcement, the thickness of the drop panel below the slab shall not be assumed to be more than one-fourth of the distance from the edge of the drop panel to the edge of the column capital.

d. Arrangement of slab reinforcement.

1. The spacing of the bars at critical sections shall not exceed two times the slab thickness, except for those portions of the slab area which may be of cellular or ribbed construction. In the slab over the cellular spaces, reinforcement shall be provided as required by section C26-1507.0.

2. In exterior panels, except for bottom bars adequately anchored in the drop panel, all positive reinforcement perpendicular to the discontinuous edge shall extend to the edge of the slab and have embedment, straight or hooked, of at least six inches in spandrel beams, walls, or columns where provided. All negative reinforcement perpendicular to the discontinuous edge shall be bent, hooked, or otherwise anchored in spandrel beams, walls, or columns.

3. The area of reinforcement shall be determined from the bending moments at the critical sections but shall not be less than 0.0025 bd at any section.

4. Required splices in bars may be made wherever convenient, but preferably away from points of maximum stress. The length of any such splice shall be at least thirty-six bar diameters.

e. Openings in flat slabs—Openings of any size may be provided in flat slabs if provision is made for the total positive and negative moments and for shear without exceeding the allowable stresses except that when design is based on section C26-1531.0, the limitations given therein shall not be exceeded.

f. Design of columns.

1. All columns supporting flat slabs shall be designed as provided in sub-article eleven with the additional requirements of this sub-article.

§C26-1530.0 Design by elastic analysis.—a. Assumptions—In design by elastic analysis the following assumptions may be used and all sections shall be proportioned for the moments and shears thus obtained.

1. The structure may be considered divided into a number of bents, each consisting of a row of columns or supports and strips of supported slabs, each strip bounded laterally by the centerline of the panel on either side of the centerline of columns or supports. The bents shall be taken longitudinally and transversely of the building.

2. Each such bent may be analyzed in its entirety; or each floor thereof and the roof may be analyzed separately with its adjacent columns as they occur above and below, the columns being assumed fixed at their remote ends. Where slabs are thus analyzed separately, it may be assumed in determining the bending at a given support that the slab is fixed at any support two panels distant therefrom beyond which the slab continues.

3. The joints between columns and slabs may be considered rigid, and this rigidity (infinite moment of inertia) may be assumed to extend in the slabs from the center of the column to the edge of the capital, and in the column from the top of slab to the bottom of the capital. The change in length of columns and slabs due to direct stress, and deflections due to shear, may be neglected.

4. Where metal column capitals are used, account may be taken of their contributions to stiffness and resistance to bending and shear.

5. The moment of inertia of the slab or column at any cross section may be assumed to be that of the cross section of the concrete. Variation in the moments of inertia of the slabs and columns along their axis shall be taken into account.

6. Where the load to be supported is definitely known, the structure shall be analyzed for that load. Where the live load is variable but does not exceed three-quarters of the dead load, or the nature of the live load is such that all panels will be loaded simultaneously, the maximum bending may be assumed to occur at all sections under full live load. For other conditions, maximum positive bending near midspan of a panel may be assumed to occur under full live load in the panel and in alternate panels; and maximum negative bending in the slab at a support may be assumed to occur under full live load in the adjacent panels only.

b. Critical sections—The critical section for negative bending, in both the column strip and middle strip, may be assumed as not more than the distance A from the center of the column or support and the critical negative moment shall be considered as extending over this distance.

c. Distribution of panel moments—Bending at critical sections across the slabs of each bent may be apportioned between the column strip and middle strip, as given in the table 4. For design purposes, any of these percentages may be varied not more than ten per cent of its value, but their sum for the full panel width shall not be reduced.

TABLE 4: DISTRIBUTION BETWEEN COLUMN STRIPS AND MIDDLE STRIPS IN PERCENT OF TOTAL MOMENTS AT CRITICAL SECTIONS OF A PANEL.

Strip		Moment section			
		Negative moment at interior support	Positive moment	Negative moment at exterior support	
				Slab supported on columns and on beams of total depth equal to the slab thickness*	Slab supported on reinforced concrete bearing wall or columns with beams of total depth equal or greater than 3 times the slab thickness*
Column strip		76	60	80	60
Middle strip		24	40	20	40
Half column strip adjacent and parallel to marginal beam or wall	Total depth of beam equal to slab thickness*	38	30	40	30
	Total depth of beam or wall equal to greater than 3 times slab thickness*	19	15	20	15

* Interpolate for intermediate ratios of beam depth to slab thickness.

Note: The total dead and live load reaction of a panel adjacent to a marginal beam or wall may be divided between the beam or wall and the parallel half column strip in proportion to their stiffnesses, but the moment provided in the slab shall not be less than given in Table 4.

§C26-1531.0. Design by empirical method.—a. General limitations—Flat slab construction may be designed by the empirical provisions of this section when they conform to all of the limitations on continuity and dimensions given herein.

1. The construction shall consist of at least three continuous panels in each direction.

2. The ratio of length to width of panels shall not exceed 1.33.

3. The grid pattern shall consist of approximately rectangular panels. The successive span lengths in each direction shall differ by not more than twenty percent of the longer span. Within these limitations, columns may be offset a maximum of ten percent of the span, in direction of the offset, from either axis between centerlines of successive columns.

4. The calculated lateral force moments from wind may be combined with the critical moments as determined by the empirical method, and the lateral force moments shall be distributed between the column and middle strips in the same proportions as specified for the negative moments.

b. Columns.

1. The minimum dimensions of any column shall be ten inches. For columns or other supports of a flat slab, the required minimum average moment of inertia, I_c, of the gross concrete section of the columns above and below the slab shall be determined from the following formula, and shall be not less than one thousand inches.[4] If there is no column above the slab, the I_c of the column below shall be twice that given by the formula with a minimum of one thousand inches[4].

$$I_c = \frac{t^3 H}{0.5 + \frac{W_D}{W_L}} \quad \ldots\ldots (7)$$

where t need not be taken greater than t_1 or t_2 as determined in section C-26-1531.0 d, H is the average story height of the columns above and below the slab, and W_L is the greater value of any two adjacent spans under consideration.

2. Columns supporting flat slabs designed by the empirical method shall be proportioned for the bending moments developed by unequally loaded panels, or uneven spacing of columns. Such bending moment shall be the maximum value derived from

$$(WL_1 - W_D L_2)\frac{l}{f}$$

L_1 and L_2 being lengths of the adjacent spans ($L_2 = 0$ when considering an exterior column) and f is 30 for exterior and 40 for interior columns.

This moment shall be divided between the columns immediately above and below the floor or roof line under consideration in direct proportion to their stiffness and shall be applied without further reduction to the critical sections of the columns.

c. Determination of "c" (effective support size).

1. Where column capitals are used, the value of c shall be taken as the diameter of the cone described in section C26-1528.0b measured at the bottom of the slab or drop panel.

2. Where a column is without a concrete capital, the dimension c shall be taken as that of the column in the direction considered.

3. Brackets capable of transmitting the negative bending and the shear in the column strips to the columns without excessive unit stress may be substituted for column capitals at exterior columns. The value of c for the span where a bracket is used shall be taken as twice the distance from the center of the column to a point where the bracket is one and one-half inches thick, but not more than the thickness of the column plus twice the depth of the bracket.

4. Where a reinforced concrete beam frames into a column without capital or bracket on the same side with the beam, for computing bending for strips parallel to the beam, the value of c for the span considered may be taken as the width of the column plus twice the projection of the beam above or below the slab or drop panel.

5. The average of the values of c at the two supports at the ends of a column strip shall be used to evaluate the slab thickness t_1 or t_2 as prescribed in section C26-1531.0d.

d. Slab thickness.

1. The slab thickness, span L being the longest side of the panel, shall be at least:

L/36 for slab without drop panels conforming with section C26-1531.0e, or when a drop panel is omitted at any corner of the panel, but not less than five inches nor t_1 as given below.

L/40 for slabs with drop panels conforming to section C26-1531.0 (e) at all supports, but not less than four inches nor t_2 as given below.

2. The total thickness, t_1, in inches, of slabs without drop panels, or through the drop panel if any, shall be at least.

$$t_1 = 0.028L \left(1 - \frac{2c}{3L}\right) \sqrt{\frac{w'}{f'_c/2000}} + 1\tfrac{1}{2}^* \quad \ldots\ldots (8)$$

3. The total thickness, t_2, in inches, of slabs with drop panels, at points beyond the drop panel if any, shall be at least

$$t_2 = 0.024L \left(1 - \frac{2c}{3L}\right) \sqrt{\frac{w'}{f'_c/2000}} + 1^* \quad \ldots\ldots (9)$$

4. Where the exterior supports provide only negligible restraint to the slab, the value of t_1 and t_2 for the exterior panel shall be increased by at least fifteen

percent. Note: *In the above formulae, t_1 and t_2 are in inches and L and c are in feet.

e. Drop panels.

1. The maximum total thickness at the drop panel used in computing the negative steel area for the column strip shall be $1.5t_2$.

2. The side or diameter of the drop panel shall be at least 0.33 times the span in the parallel direction.

3. The minimum thickness of slabs where drop panels at wall columns are omitted shall equal $(t_1 + t_2)/2$ provided the value of c used in the computations complies with section C26-1531.0 (c).

f. Bending moment coefficients.

1. The numerical sum of the positive and negative bending moments in the direction of either side of a rectangular panel shall be assumed as not less than

$$M_o = 0.09\ WLF\left(1 - \frac{2c}{3L}\right)^2 \quad \ldots\ldots(10)$$

in which $F = 1.15 - c/L$ but not less than 1.

2. Unless otherwise provided, the bending moments at the critical sections of the columns and middle strips shall be at least those given in table 1004 (f)ACI 318.56.

3. The average of the values of c at the two supports at the ends of a column strip shall be used to evaluate M_o, as determining bending in the strip. The average of the values of M_o, as determined for the two parallel half column strips in a panel, shall be used in determining bending in the middle strip.

4. Bending in the middle strips parallel to a discontinuous edge shall be assumed the same as in an interior panel.

5. For design purposes, any of the moments determined from table 1004(f)-ACI 318-56 may be varied by not more than 10 percent, but the numerical sum of the positive and negative moments in a panel shall be not less than the amount specified.

g. Length of reinforcement—In addition to the requirements of section C26-1529.0(d), reinforcement shall have the minimum lengths given in tables 1004 (g)1ACI 318-56 and 1004(g)2-ACI 318-56. Where adjacent spans are unequal, the extension of negative reinforcement on each side of the column centerline, as prescribed in table 1004(g) 1-ACI-318-56, shall be based on the requirements of the longer span.

h. Openings in flat slabs.

1. Openings of any size may be provided in a flat slab in the area common to two intersecting middle strips provided the total positive and negative steel areas required in section C26-1531.0 (f) are maintained.

2. In the area common to two column strips, but not more than one-eighth of the width of strip in any span shall be interrupted by openings. The equivalent of all bars interrupted shall be provided by extra steel on all sides of the openings. The shearing unit stresses given in section C26-1529.0 (c)2 shall not be exceeded.

3. In any area common to one column strip, and one middle strip, openings may interrupt one-quarter of the bars in either strip. The equivalent of the bars so interrupted shall be provided by extra steel on all sides of the opening.

4. Any opening larger than described above shall be analyzed by accepted engineering principles and shall be completely framed as required to carry the loads to the columns.

Sub-Article 11

REINFORCED CONCRETE COLUMNS AND WALLS

§C26-1532.0. Notation relating to reinforced concrete columns and walls.

A_c = area of core of a spirally reinforced column measured to the outside diameter of the spiral; net area of concrete section of a composite column.

A_g = over-all or gross area of spirally reinforced or tied columns; the total area of the concrete encasement of combination columns.

A_r = area of the steel or cast-iron core of a composite column; the area of the steel core in a combination column.

A_s = effective cross-sectional area of reinforcement in compression in columns.

B = trial factor (see section C26-1541.0-c).

e = eccentricity of the resultant load on a column measured from the gravity axis.

F_a = nominal allowable axial unit stress ($0.225\ f'_c + f_s p_g$) for spiral columns and 0.8 of this value for tied columns.

F_b = allowable bending unit stress that would be permitted if bending stress only existed.

f_a = nominal axial unit stress = axial load divided by area of member, A_g.

f_b = bending unit stress (actual = bending moment divided by section modulus of member.

f_c = computed concrete fiber stress in an eccentrically loaded column where the ratio of e/t is greater than 2/3.

f'_c = compressive strength of concrete at age of twenty-eight days, unless otherwise specified.

f_r = allowable unit stress in the metal core of a composite column.

f'_r = allowable unit stress on unencased steel columns and pipe columns .

f_s = nominal allowable stress in vertical column reinforcement.

f'_s = useful limit stress of spiral reinforcement.

h = unsupported length of column.

K_c = radius of gyration of concrete in pipe columns.

K_s = radius of gyration of a metal pipe section (in pipe columns.)

N = axial load applied to reinforced concrete column.

p' = ratio of volume of spiral reinforcement of the volume of the concrete core (out to out of spirals) of a spirally reinforced concrete column.

p_g = ratio of the effective cross-sectional area of vertical reinforcement to the gross area A_g.

P = total allowable axial load on a column whose length does not exceed ten times its least cross-sectional dimension.

P' = total allowable axial load on a long column.

t = over-all depth of rectangular column section, or the diameter of a round column.

§C26-1533.0. Limiting dimensions.—a. The following sections on reinforced concrete and composite columns, except section C26-1539.0a apply to a short column for which the unspported length is not greater than ten times the least dimension. When the unsupported length exceeds this value, the design shall be modified as shown in section C26-1539.0(a). Principal columns in buildings shall have a minimum diameter of twelve inches, or in the case of rectangular columns, a minimum thickness of eight inches, and a minimum gross area of one hundred and twenty square inches. Posts that are not continuous from story to story shall have a minimum diameter or thickness of six inches.

§C26-1534.0. Unsupported length of columns.—a. For purposes of determining the limiting dimensions of columns, the unsupported length of reinforced concrete columns, shall be taken as the clear distance between floor slabs, except that

1. In flat slab construction, it shall be the clear distance between the floor and the lower extremity of the capital, the drop panel or the slab, whichever is least.

2. In beam and slab construction, it shall be the clear distance between the floor and the under side of the deeper beam framing into the column in each direction at the next higher floor level.

3. In columns restrained laterally by struts, it shall be the clear distance between consecutive struts in each vertical plane; provided that to be an adequate support, two such struts shall meet the column at approximately the same level, and the angle between vertical planes through the struts shall not vary more than fifteen degrees from a right angle. Such struts shall be of adequate dimensions and anchorage to restrain the column against lateral deflection.

4. In columns restrained laterally by struts or beams, with brackets used at the junction, it shall be the clear distance between the floor and the lower edge of the bracket, provided that the bracket width equals that of the beam or strut and is at least half that of the column.

b. For rectangular columns, that length shall be considered which produces the greatest ratio of length to depth of section.

§C26-1535.0. Spirally reinforced columns. a. Allowable load—The maximum allowable axial load, P, on columns, with closely spaced spirals enclosing a circular concrete core reinforced with vertical bars shall be given by formula (11).

$$P = A_g\ (0.225f'_c) + f_s p_g \quad \text{.....(11)}$$

Wherein f_s = nominal allowable stress in vertical column reinforcement, to be taken at forty percent of the minimum specification value of the yield point; viz., sixteen thousand pounds per square inch for intermediate grade steel and twenty thousand pounds per square inch for rail or hard grade steel. Nominal allowable stresses for reinforcement of higher yield point may be established at forty percent of the yield point stress, but not more than thirty thousand pounds per square inch when the properties of such reinforcing steels have been definitely specified by standards of ASTM designation. If this is done, the length of splice required by section C26-1535.0c shall be increased accordingly.

b. Vertical reinforcement—The ratio p_g shall not be less than 0.01 nor more than 0.08. The minimum number of bars shall be six, and the minimum bar size shall be Number 5. The center to center spacing of bars within the periphery of the column core shall not be less than two and one-half times the diameter for round bars or three times the side dimension for square bars. The clear spacing between individual bars or between pairs of bars at lapped splices shall not be less than one and one-half inches or one and one-half times the maximum size of the coarse aggregate used. These spacing rules also apply to adjacent pairs of bars at a lapped splice; each pair of lapped bars forming a splice may be in contact, but the minimum clear spacing between one splice and the adjacent splice should be that specified for adjacent single bars.

c. Splices in vertical reinforcement—Where lapped splices in the column verticals are used, the minimum amount of the lap shall be as follows:

1. For deformed bars with concrete having a strength of three thousand pounds per square inch or more, twenty diameters of bar of intermediate or hard grade steel. For bars of higher yield point, the amount of lap shall be increased one diameter for each one thousand pounds per square inch by which the allowable stress exceeds twenty thousand pounds per square inch. When the concrete strengths are less than three thousand pounds per square inch, the amount of lap shall be one third greater than the values given above.

2. For plain bars, the minimum amount of lap shall be twice that specified for deformed bars.

3. Welded splices or other positive connections may be used instead of lapped splices. Welded splices shall preferably be used in cases where the bar size exceeds No. 11. An approved welded splice shall be defined as one in which the bars are butted and welded and that will develop in tension at least the yield point stress of the reinforcing steel used. Welded splices may be either thermite or arc-welded, if the steel analyses indicates its suitability for welding. All welding shall be in accord with the Board rules and conform to AWS Bulletin D12.1-61.

4. Where longitudinal bars are offset at a splice, the slope of the inclined portion of the bar with the axis of the column shall not exceed one in six, and the portions of the bar above and below the offset shall be parallel to the axis of the column. Adequate horizontal support at the offset bends shall be treated as a matter of design ,and may be provided by metal ties, spirals or parts of the floor construction. Metal ties or spirals so designed shall be placed near (never more than eight bar diameters from) the point of bend. The horizontal thrust to be resisted may be assumed as one and one-half times the horizontal component of the nominal stress in the inclined portion of the bar.

Offset bars shall be bent before they are placed in the forms. No field bending of bars partially embedded in concrete shall be permitted.

d. Spiral reinforcement—The ratio of spiral reinforcement, p′ shall not be less than the value given by formula (12).

$$p' = 0.45\left(\frac{A_g}{A_c} - 1\right)\frac{f'_c}{f'_s} \quad \text{.....(12)}$$

Wherein f'_s = useful limit stress of spiral reinforcement, to be taken as forty-thousand pounds per square inch for hot rolled rods of intermediate grade, fifty-thousand pounds per square inch for rods of hard grade, and sixty-thousand pounds per square inch for cold drawn wire.

The spiral reinforcement shall consist of evenly spaced continuous spirals held firmly in place and true to line by vertical spacers, using at least two for spirals twenty inches or less in diameter, three for spirals twenty to thirty inches in diameter, and four for spirals more than thirty inches in diameter or composed of spiral rods five-eighths of an inch or larger in size. The spirals shall be of such size and so assembled as to permit handling and placing without being distorted from the designed dimensions. The material used in spirals shall have a minimum diameter of one-quarter of an inch for rolled bars or No. 4 AS&W gage for drawn wire. Anchorage for spiral

reinforcement shall be provided by one and one-half extra turns for spiral rod or wire at each end of the spiral unit. Splices when necessary shall be made in spiral rod or wire by welding or by a lap of one and one-half turns. The center to center placing of the spirals shall not exceed one-sixth of the core diameter. The clear spacing between spirals shall not exceed three inches nor less than one and three-eighths inches or one and one-half times the maximum size of coarse aggregate used. The reinforcing spiral shall extend from the floor level in any story or from the top of the footing in the basement, to the level of the lowest horizontal reinforcement in the slab, drop panel or beam above. In a column with a capital, it shall extend to a plane at which the diameter or width of the capital is twice that of the column.

e. Protection of reinforcement—The column spiral reinforcement shall be protected everywhere by a covering of concrete cast monolithically with the core, for which the thickness shall not be less than two inches nor less than one and one-half times the maximum size of the coarse aggregate, nor shall it be less than required by the fire protection and weathering provisions of C26-1495.0.

f. Isolated column with multiple spirals—In case two or more interlocking spirals are used in a column, the outer boundary of the column shall be taken as a rectangle the sides of which are outside the extreme limits of the spiral at a distance equal to the requirements of section C26-1535.0e.

g. Limits of section of column built monolithically with wall—For a spiral column built monolithically with a concrete wall or pier, the outer boundary of the column section shall be taken either as a circle at least one and one-half inches outside the column spiral or a square or rectangle of which the sides are at least one and one-half inches outside the spiral or spirals.

h. Equivalent circular columns—As an exception to the general procedure of utilizing the full gross area of the column section, it shall be permissible to design a circular column and to build it with a square, octagonal, or other shaped section of the same least lateral dimension. In such case, the allowable load, the gross area considered, and the required percentages of reinforcement shall be taken as those of the circular column.

§C26-1536.0. Tied columns.—a. Allowable load—The maximum allowable axial load on columns reinforced with longitudinal bars and separate lateral ties shall be eighty per cent of that given by formula (11), The ratio, p_g, to be considered in tied columns, shall not be less than 0.01 nor more than 0.04. The longitudinal reinforcement shall consist of at least four bars, of minimum bar size of No. 5. Splices in reinforcing bars shall be made as described in section C26-1535.0c. The spacing requirements for vertical reinforcement in section C26-1535.0b shall also apply for all tied columns.

b. Combined axial and bending load—For tied columns which are designed to withstand combined axial and bending stresses, the limiting steel ratio of 0.04 may be increased to 0.08. The amount of steel spliced by lapping shall not exceed a steel ratio of 0.04 in any three-foot length of column. The size of the column designed under this provision shall in no case be less than that required to withstand the axial load alone with a steel ratio of 0.04.

c. Lateral ties—Lateral ties shall be at least one-quarter inch in diameter and shall be spaced apart not over sixteen bar diameters, forty-eight tie diameters, or the least dimension of the column. When there are more than four vertical bars, additional ties shall be provided so that every longitudinal bar is held firmly in its designed position and has lateral support equivalent to that provided by a ninety-degree corner of a tie.

d. Limits of column section—In a tied column which for architectural reasons has a larger cross section than required by considerations of loading, a reduced effective area, A_g, not less than one-half of the total area, may be used in applying the provisions of section C26-1536.0a.

§C26-1537.0. Composite columns.—a. Allowable load—The allowable load on a composite column, consisting of a structural steel or cast iron column thoroughly encased in concrete reinforced with both longitudinal and spiral reinforcement, shall not exceed that given by formula (13).

$$P = 0.225\ A_c f'_c + f_s A_s + f_r A_r \quad \text{.....(13)}$$

Wherein f_r = allowable unit stress in metal core, not to exceed sixteen thousand pounds per square inch for a steel core; or ten thousand pounds per square inch for a cast-iron core.

b. Details of metal core and reinforcement—The cross-sectional area of the metal core shall not exceed twenty per cent of the gross area of the column. If a hollow metal core is used it shall be filled with concrete. The amounts of longitudinal and spiral reinforcement and the requirements as to spacing of bars, details of splices and thickness of protective shell outside the spiral shall conform to the limiting values

specified in section C26-1535.0b, c, d, and e. A clearance of at least three inches shall be maintained between the spiral and the metal core at all points except that when the core consists of a structural H-column, the minimum clearance may be reduced to two inches.

c. Splices and connections of metal cores—Metal cores in composite columns shall be accurately milled at splices and positive provision shall be made for alignment of one core above another. At the column base, provision shall not be made to transfer the load to the footing at safe unit stresses in accordance with section C26-1480.0a. The base of the metal section shall be designed to transfer the load from the entire metal section only, provided it is so placed in the pier or pedestal as to leave ample section of concrete above the base for the transfer of load from reinforced concrete section of the column by means of bond on the vertical reinforcement and by direct compression on the concrete. Transfer of loads to the metal core shall be provided for by the use of bearing members such as billets, brackets or other positive connections. These shall be provided at the top of the metal core and at intermediate floor levels where required. The column as a whole shall satisfy the requirements of formula (13) at any point; in addition to this, the reinforced concrete portion shall be designed to carry, in accordance with formula (11), all floor loads brought onto the column at levels between the metal brackets or connections. In applying formula (11), the value of A_g, shall be interpreted as the area of the concrete section outsides the metal core, and the allowable load on the reinforced concrete section shall be further limited to $0.35\ f'_c A_g$. Ample section of concrete and continuity of reinforcement shall be provided at the junction with beams or girders.

d. Allowable load on metal core only—The metal core of composite columns shall be designed to carry safely any construction or other loads to be placed upon them prior to their encasement in concrete.

§C26-1538.0. Combination columns.—a. Steel columns encased in concrete—The allowable load on a structural steel column which is encased in concrete at least two and one-half inches thick over all metal (except rivet heads) reinforced as hereinafter specified, shall be computed by formula (14).

$$P = A_r f'_r \left[+ \frac{A_g}{100\ A_r} \right] \quad \text{.....(14)}$$

The concrete used shall develop a compressive strength, f'_c, of at least 2,000 pounds per square inch at twenty-eight days. The concrete shall be reinforced by the equivalent of welded wire mesh having wires of Number ten AS&W gage, the wires encircling the column being spaced not more than four inches apart and those parallel to the column axis not more than eight inches apart. This mesh shall extend entirely around the column at a distance of one inch inside the outer concrete surface and shall be lap-spliced at least forty wire diameters and wired at the splice. Special brackets shall be used to receive the entire floor load at each floor level. The steel column shall be designed to carry safely any construction or other loads to be placed upon it prior to its encasement in concrete.

b. Pipe columns—The allowable load on columns consisting of steel pipe filled with concrete shall be determined by formula (15).

$$P = 0.25 f'_c \left(1 - 0.000025 \frac{h^2}{K_s^2} \right) A_c + f'_r A_s \quad \text{.....(15)}$$

The value of f'_r shall be given by formula (16) when the pipe has a yield strength of at least thirty-three thousand pounds per square inch, and an h/K_s ratio equal to or less than one hundred and twenty.

$$f'_r = 17{,}000 - 0.485 \frac{h^2}{K_s^2} \quad \text{.....(16)}$$

§C26-1539.0. Long columns.—a. The maximum allowable load, P′, on axially loaded reinforced concrete or composite columns having an unsupported length, h, greater than ten times the least lateral dimension, t, shall be goven by formula (17).

$$P' = P\ (1.3 - 0.03\ h/t) \quad \text{.....(17)}$$

where P is the allowable axial load on a short column as given by sections C26-1535-0, C26-1536.0 and C26-1537.0.

The maximum allowable load, P′, on eccentrically loaded columns in which h/t exceeds ten shall also be given by formula (17), in which P is the allowable eccentrically applied load on a short column as determined by the provisions of section C26-1451.0. In long columns subjected to definite bending stresses, as determined in section C26-1540.0, the ratio h/t shall not exceed twenty.

§C26-1540.0. Bending moment in columns.—a. The bending moments in the columns of all reinforced concrete structures shall be determined on the basis of loading conditions and restraint and shall be provided for in the design. When the stiffness and strength of the columns are utilized to reduce moments in beams, girders, or slabs, as in the case of rigid frames, or in other forms of continuous construction wherein column moments are unavoidable, they shall be provided for in the design. In building frames, particular attention shall be given to the effect of unbalanced floor loads on both exterior and interior columns and of eccentric loading due to other causes. In computing moments in columns, the far ends may be considered fixed. Columns shall be designed to resist the axial forces from loads on all floors, plus the maximum bending due to loads on a single adjacent span of the floor under consideration.

Resistance to bending moments at any floor level shall be provided by distributing the moment between the columns immediately above and below the given floor in proportion to their relative stiffness and conditions of restraint.

§C26-1541.0. Columns subjected to axial load and bending.—a. Members subject to an axial load and bending in one principal plane, but with the ratio of eccentricity to depth e/t no greater than 2/3, shall be so proportioned that

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} \text{ does not exceed unity} \quad \text{.....(18)}$$

b. When bending exists on both of the principal axes, formula (18) becomes

$$\frac{f_a}{F_a} + \frac{f_{bx}}{F_b} + \frac{f_{by}}{F_b} \text{ does not exceed unity} \quad \text{.....(19)}$$

where f_{bx} and f_{by} are the bending moment components that the x and y principal axes divided by the section modulus of the transformed section relative to the respective axes, provided that the ratio e/t is no greater than 2/3 in either direction.

c. In designing a column subject to both axial load and bending, the preliminary selection of the column may be made by use of an equivalent axial load given by formula (20).

$$P = N \left(1 + \frac{Be}{t} \right) \quad \text{.....(20)}$$

When bending exists on both of the principal axes, the quantity Be/t is the numerical sum of the Be/t quantities in the two directions.

For trial computations B and may be taken from three to three and one-half for rectangular tied columns, the lower value being used for columns with the minimum amount of reinforcement. Similarly for circular spiral columns, the value of B from five to six may be used.

d. For columns in which the load N, has an eccentricity, e, greater than 2/3 the column depth, t, the determination of the fiber stress f_c shall be made by use of recognized theory for cracked sections, based on the assumption that the concrete does not resist tension. In such cases the modular ratio for the compressive reinforcement shall be assumed as double the value given in section C26-1497.0; however the stress in the compressive reinforcement when calculated on this basis, shall not be greater than the allowable stress in tension. The maximum combined compressive stress in the concrete shall not exceed $0.45 f'_c$. For such cases the tensile steel stress shall also be investigated.

§C26-1542.0. Wind stress.—a. When the allowable stress in columns is modified to provide for combined axial load and bending, and the stress due to wind loads is also added, the total shall still come within the allowable values specified for wind loads in section C26-1499.0 (c).

§C26-1543.0. Reinforced concrete walls.—a. The allowable stresses in reinforced concrete bearing walls with a minimum reinforcement as required by section C26-1543.0h shall be $0.25 f'_c$ for walls having a ratio of height to thickness of ten or less, and shall be reduced proportionately to $0.15 f'_c$ for wall having a ratio of height to thickness of twenty-five. When the reinforcement in bearing walls is designed, placed, and anchored in position as for tied columns, the allowable stresses shall be on the basis of section C26-1536.0, as for columns. In the case of concentrated loads, the length of the wall to be considered as effective for each shall not exceed the center to center distance between loads, nor shall it exceed the width of the bearing plus four times the wall thickness. The ratio p_g shall not exceed 0.04.

b. Walls shall be designed for any lateral or other pressure to which they are

subjected. Proper provision shall be made for eccentric loads and wind stresses. In such designs the allowable stresses shall be given in section C26-1480.0 and section C26-1499.0c.

c. Panel and enclosure walls of reinforced concrete shall have thickness of not less than four inches and not less than one-thirtieth the distance between the supporting or enclosing members.

d. Reinforced concrete bearing walls of buildings shall not be less than six inches thick for the upper most fifteen feet of their height; and for each successive twenty-five feet downward, or fraction thereof, the minimum thickness shall be increased one inch. Reinforced concrete bearing walls of two-story dwellings may be six inches thick throughout their height.

e. Exterior basement walls, foundation walls, and party walls shall not be less than eight inches thick whether reinforced or not.

f. Reinforced concrete bearing walls shall have a thickness of at least one-twenty-fifth of the unsupported height or width, whichever is the shorter.

g. Reinforced concrete walls shall be anchored to the floors, or to the columns, pilasters, buttresses, and intersecting walls with reinforcement at least equivalent to No. 3 bars twelve inches on center, for each layer of wall reinforcement.

h. The area of the horizontal reinforcement of reinforced concrete walls shall be not less than 0.0025 and that of the vertical reinforcement not less than 0.0015 times the area of the reinforced section of the wall if of bars, and not less than three-fourths as much if welded wire fabric or A.S.T.M. A432-62T and A16 62T special grade bars. The wire of the welded fabric shall be of not less than No. 10 AS&W gage. Walls more than ten inches thick, except for basement walls, shall have the reinforcement for each direction placed in two layers parallel with the faces of the wall. One layer consisting of not less than one-half and not more than two-thirds the total required shall be placed not less than two inches nor more than one-third the thickness of the wall from the exterior surface. The other layer, comprising the balance of the required reinforcement, shall be placed not less than three-quarters of an inch and not more than one-third the thickness of the wall from the interior surface. Bars, if used, shall not be less than No. 3 bars, nor shall they be spaced more than eighteen inches on centers. Welded wire reinforcement for walls shall be in flat sheet form.

i. In addition to the minimum as prescribed in section C26-1543.0h there shall be not less than two No. 5 bars around all window or door openings. Such bars shall extend at least 24 inches beyond the corner of the opening.

j. Where reinforced concrete bearing walls consist of studs or ribs tied together by reinforced concrete members at each floor level, the studs may be considered as columns, but the restrictions as to minimum diameter or thickness of columns shall not apply.

k. The limits of thickness and quantity of reinforcement may be waived where structural analysis shows adequate strength and stability.

§C26-1544.0. Fire resistance of concrete walls and partitions.—a. Reinforced concrete walls built in conformity with section C26-1543.0 may be used for the purposes described in the following sections of this code.

1. Six inch thick wall as a fire wall under section C26-631.0.
2. Five inch thick wall as a fire partition under section C26-633.0.
3. Four inch thick wall as a fire resistive stairway enclosure where a two-hour fire-resistive rating is acceptable under Section C26-635.0.

b. A solid three inch thick cinder concrete partition (poured or block) may be used as a fireproof partition under section C26-636.0 of this code.

c. Poured in place concrete used for fireproofing of steel shall be tied with wire mesh weighing at least one and one-half pounds per square yard which shall be of a type approved by the board.

§C26-1545.0. Plain concrete.—The general requirements governing plain concrete masonry poured in place, as to workmanship, bond, anchors, forms, tests, construction details and miscellaneous provisions shall be the same as the requirements prescribed in sections C26-1455.0 through C26-1556.0 except that the thickness shall comply with section C26-432.0 of this code.

§C26-1546.0. Concrete chimneys.—Concrete chimneys shall comply with the requirements of subdivisions (a) and (e) of section C26-710.0 of this code.

Sub-Article 12
FOOTINGS

§C26-1547.0. Scope.—a. The requirements prescribed in section C26-1548.0 to C26-1555 apply only to isolated footings.

§26-1548.0. Loads and reactions.—a. Footings shall be proportioned to sustain the applied loads and induced reactions without exceeding the allowable stresses as prescribed in sections C26-1480.0 and C26-1481.0, and as further provided in sections C26-1551.0, C26-1552.0 and C26-1553.0.

b. In cases where the footing is concentrically loaded and the member being supported does not transmit any moment to the footing, computations for moments and shears shall be based on an upward reaction assumed to be uniformly distributed per unit area or per pile and a downward applied load assumed to be uniformly distributed over the area of the footing covered by the column, pedestal, wall, or metallic column base.

c. In cases where the footing is eccentrically loaded and/or the member being supported transmits a moment to the footing, proper allowance shall be made for any variation that may exist in the intensities of reaction and applied load consistent with the magnitude of the applied load and the amount of its actual or virtual eccentricity.

d. In the case of footings on piles, computations for moments and shears may be based on the assumption that the reaction from any pile is concentrated at the center of the pile.

§C26-1549.0. Sloped or stepped footings.—a. In sloped or stepped footings, the angle of slope or depth and location of steps shall be such that the allowable stresses are not exceeded at any section.

b. In sloped or stepped footings, the effective cross section in compression shall be limited by the area above the neutral plane.

c. Sloped or stepped footings shall be cast as a unit.

§C26-1550.0. Bending moment.—a. The external moment on any section shall be determined by passing through the section a vertical plane which extends completely across the footing, and computing the moment of the forces acting over the entire area of the footing on one side of said plane.

b. The greatest bending moment to be used in the design of an isolated footing shall be the moment computed in the manner prescribed in section C26-1550.0a at sections located as follow:

1. At the face of the column, pedestal or wall, for footings supporting a concrete column, pedestal or wall.
2. Halfway between the middle and the edge of the wall, for footings under masonry walls.
3. Halfway between the face of the column or pedestal and the edge of the metallic base, for footings under metallic bases.

c. The width resisting compression at any section shall be assumed as the entire width of the top of the footing at the section under consideration.

d. In one-way reinforced footings, the total tensile reinforcement at any section shall provide a moment of resistance at least equal to the moment computed in the manner prescribed in section C26-1550.0a; and in reinforcement thus determined shall be distributed uniformly across the full width of the section.

e. In two-way reinforced footings, the total tensile reinforcement at any section shall provide a moment of resistance at least equal to eighty-five percent of the moment computed in the manner prescribed in section C26-1550.0a; and the total reinforcement thus determined shall be distributed across the corresponding resisting section in the manner prescribed for the square footings in section C26-1550.0f, and for rectangular footings in section C26-1550.0g.

f. In two-way square footings, the reinforcement extending in each direction shall be distributed uniformly across the full width of the footing.

g. In two-way rectangular footings, the reinforcement in the long direction shall be distributed uniformly across the full width of the footing. In the case of the reinforcement in the short direction, that portion determined by formula (21) shall be uniformly distributed across a band-width (B) centered with respect to the centerline of the column or pedestal and having a width equal to the length of the short side of the footing. The remainder of the reinforcement shall be uniformly distributed in the outer portion of the footing.

$$\frac{\text{Reinforcement in band-width (B)}}{\text{Total reinforcement in short direction}} = \frac{2}{(S+1)} \qquad \text{.....(21)}$$

In formula (21), S is the ratio of the long side to the short side of the footing.

§C26-1551.0. Shear and bond.—a. The critical section for shear to be used as a measure of diagonal tension shall be assumed as a vertical section obtained by passing a series of vertical planes through the footing, each of which is parallel to a corresponding face of the column, pedestal, or wall and located a distance therefrom equal to the depth d for footings on soil, and one-half the depth d for footings on piles.

b. Each face of the critical section as defined in Section C26-1551.0(a) shall be considered as resisting an external shear equal to the load on an area bounded by said face of the critical section for shear, two diagonal lines drawn from the column or pedestal corners and making forty-five degrees angles with the principal axes of the footing, and that portion of the corresponding edge or edges of the footing intercepted between the two diagonals.

c. Critical sections for bond shall be assumed at the same planes as those prescribed for bending moment in section C26-1550.0(b); also at all other vertical planes where changes of section or of reinforcement occur.

d. Computation for shear to be used as a measure of bond shall be based on the same section and loading as prescribed for bending moment in section C26-1550.0(a).

e. The total tensile reinforcement at any section shall provide a bond resistance at least equal to the bond requirement as computed from the following percentages of the external shear at the section:

1. in one-way reinforced footings one-hundred percent.
2. in two-way reinforced footings, eighty-five percent.

f. In computing the external shear on any section through a footing supported on piles, the entire reaction from any pile whose center is located six inches or more outside the section shall be assumed as producing shear on the section; the reaction from any pile whose center is located six inches or more inside the section shall be assumed as producing no shear on the section. For intermediate positions of the pile center, the portion of the pile reaction to be assumed as producing shear on the section shall be based on straight-line interpolation between full value at six inches outside the section and zero value at six inches inside the section.

g. For allowable shearing stress, see sections C26-1480.0 and C26-1519.0.

h. For allowable bond stresses, see sections C26-1480.0 and C26-1521.0 through C26-1552.0.

§C26-1552.0. Transfer of stress at base of column.—a. The stress in the longitudinal reinforcement of a column or pedestal shall be transferred to its supporting pedestal or footing either by extending the longitudinal bars into the supporting member, or by dowels.

b. In case the transfer of stress in the reinforcement is accomplished by extension of the longitudinal bars, they shall extend into the supporting member the distance required to tranfer to the concrete, by allowable bond stress, their full working value.

c. In cases where dowels are used, their total sectional area shall be not less than the sectional area of the longitudinal reinforcement in the member from which the stress is being transferred. In no case shall the number of dowels per member be less than four and the diameter of the dowels shall not exceed the diameter of the column bars by more than one-eighth inch.

d. Dowels shall extend up to the column or pedestal a distance at least equal to that required for lap of longitudinal column bars (see section C26-1535.0) and down into the supporting pedestal or footing the distance required to transfer to the concrete, by allowable bond stress, the full working value of the dowel (see section C26-1526.60c).

e. The compressive stress in the concrete at the base of the column or pedestal shall be considered as being transferred by bearing to the top of the supporting pedestal or footing. The unit compressive stress on the loaded area shall not exceed the bearing stress allowable for the quality of concrete in the supporting member as limited by the ratio of the loaded area to the supporting area.

f. For allowable bearing stresses (see section C26-1480.0).

g. In sloped or stepped footings, the supporting area for bearing may be taken as the top horizontal surface of the footing, or assumed as the area on the lower base of the largest frustum of a pyramid or cone contained wholly within the footing and having for its upper base the area actually loaded, and having side slopes of one vertical to two horizontal.

§C26-1553.0. Pedestals and footings (plain concrete).—a. The allowable compressive unit stress on the gross area of a concentrically loaded pedestal shall not exceed $0.25f'_c$. Where this stress is exceeded, reinforcement shall be provided and the member designed as a reinforced concrete column.

b. The depth and width of a pedestal or footing of plain concrete shall be such that the tension in the concrete shall not exceed $0.03f'_c$ or shall not exceed fifty

pounds per square inch, and the average shearing stresses shall not exceed $0.02f'_c$ taken on sections as prescribed in section C26-1550.0 and C26-1551.0 for reinforced concrete footings.

§C26-1554.0. Footings supporting round columns.—a. In computing the stresses in footings which support a round or octagonal concrete column or pedestal, the area of the column or pedestal shall be taken as the side of a square having an area equivalent to the area enclosed within the perimeter of the column or pedestal.

§C26-1555.0. Minimum edge-thickness.—a. In reinforced concrete footings, the thickness above the reinforcement at the edge shall be not less than six inches for footings on soil, nor less than twelve inches for footings on piles.

b. In plain concrete footings, the thickness at the edge shall be not less than eight inches for footings on soil, nor less than fourteen inches above the tops of the piles for footings on piles.

§C26-1556.0. Foundation piers.—a. The minimum diameter of foundation piers shall be two feet and the method of their installation and construction shall be such as to provide for accurate preparation and inspection of their bottoms, and to insure sound concrete.

b. The design of foundation piers built of concrete shall be governed by the requirements of Sections C26-1455.0 through C26-1554.0, provided that for a foundation pier, constructed of plain concrete, the height of which pier exceeds six times its least horizontal dimension, except where the least horizontal dimension is six feet or greater, the maximum allowable working stress shall be determined by the following formula:

$$f' \text{ equals } f_c \left(1.3 \text{ minus } \frac{H}{20D}.\right)$$

in which f' is the reduced allowable working stress in pounds per square inch.

f_c is the allowable bearing working stress in pounds per square inch given in section C26-1480.0.

H is the height of the pier in feet.

D is the least rorizontal dimension in feet.

c. The height shall in all cases be at most twelve times the least horizontal dimension, and the compressive stress shall be at most eight hundred fifty pounds per square inch.

d. If piers are constructed of reinforced concrete, such piers may be constructed with spiral or vertical reinforcement as prescribed in section C26-1455.0 through C26-1554.0 except that when all other conditions of such sections are fulfilled the provisions of section C26-1539.0 shall be applicable. Such construction shall be subject to the following modifications:

1. The maximum allowance for spiral reinforcement shall be limited to one per cent and the maximum stress permitted on the gross section, including vertical reinforcement, shall be limited to one thousand pounds per square inch.

2. When such piers are spirally reinforced, and are six feet or greater in diameter, or where the ratio of height to diameter of such piers is twelve to one or less, vertical reinforcement may be omitted, the factor "p_g," in the formula for columns with spiral reinforcement, prescribed in subdivision a of Section C26-1535.0 becoming zero. $P = A_c f_c (1 + 15p_g + 50 P')$

3. A minimum of three-quarters of one per cent of vertical reinforcement uniformly spaced around the perimeter shall be used in all other cases.

e. Where a pier is circular and entirely encased by a steel shell having a minimum thickness of three-eighths of an inch, such percentage of the shell thickness as corresponds with the efficiency of the vertical joint may be considered as the equivalent of an equal volume of the spiral reinforcement required by subdivision d of section C26-1535.0. If horizontal joints are spliced, the shell may be considered as the vertical as well as the spiral reinforcement up to the efficiency of the horizontal joints in tension.

f. It shall be unlawful to design the bases of foundation piers so that the presumptive capacity of the hearing material is exceeded. The presumptive capacity of hard rock may, however, be increased above that stated in section C26-377.0 to equal the unit compression in the pier itself, provided all of the following conditions are satisfied:

1. Such pier bears on hard sound bed rock which is substantially level and the bearing surface of which is prepared by hand in level or benched areas.

2. Such loaded areas are ten feet or more from the lot line or forty feet or more from the curb level.

3. Forty-five degree slopes extending downward from the periphery of the bearing areas fall outside of and below any adjoining excavation.

Sub-Article 13

PRECAST CONCRETE

§C26-1557.0. Scope.—a. All provisions of this code shall apply to precast concrete except for the specific variations given in this sub article.

§C26-1558.0. Aggregates.—a. The maximum size of aggregate shall not be larger than one-third of the least dimension of the member.

§C26-1559.0. Concrete protection for reinforcement.—a. At surfaces not exposed to weather, all reinforcement shall be protected by concrete equal to the nominal diameter of bars but not less than five-eighths inch.

§C26-1560.0. Details.—a. All details of jointing, inserts, and anchors shall be shown on the drawings.

§C26-1561.0. Curing.—a. Curing by high-pressure steam, steam vapor, or other accepted processes may be employed to accelerate the hardening of the concrete and to reduce the time of curing required by section C26-1486.0 provided that the compressive strength of the concrete at the time of use be at least equal to the specified design strength.

§C26-1562.0. Indentification and marking.—a. All precast concrete members shall be plainly marked to indicate the top of the member and its location and orientation in the structure. Identification marks shall be duplicated on the placing plans.

§C26-1563.0. Transportation, storage, and erection.—a. Units shall be so stored, transported, and placed that they will not be over-stressed or damaged.

b. Precast concrete units shall be adequately braced and supported during erection to insure proper alignment and safety and such bracing or support shall be maintained until there are adequate permanent connections.

§C26-1564.0. Inspections and reports.—The inspection of precast concrete shall also include the inspection of the manufacture of the precast members and of the methods of placing and securing same in the structure. The records of inspection shall include reports of every step taken in the manufacture of the members and the erection of the structure.