

BUILDING CODE
of the
CITY OF SEATTLE

(Revised and Amended Edition, December 15, 1968)

J. D. BRAMAN

Mayor

C. S. McCormick, Superintendent of Buildings

Kaun Onodera, Code Research Director



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1968

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BUILDINGS

Title 3

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Chapter 3.01 TITLE AND SCOPE

Sections:

- 3.01.010 Title.
- 3.01.020 Purpose.
- 3.01.030 Scope.
- 3.01.040 Application to existing buildings.
- 3.01.050 Alternative materials and methods of construction.
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3.01.010 Title. This ordinance (Chapters 3.01 through 3.57) shall be known as the "Building Code," may be cited as such, and will be referred to herein as "this Code." (Ord. 85500 § 101; Sept. 10, 1956).

3.01.020 Purpose. The purpose of this Code is to provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, occupancy, location and maintenance of all buildings and structures within the city and certain equipment specifically regulated herein. (Ord. 85500 § 102; Sept. 10, 1956).

3.01.030 Scope. New buildings and structures hereafter erected in the city, and buildings and structures moved into or within the city shall conform to the requirements of this Code.

Additions, alterations, repairs and changes of occupancy in all buildings and structures shall comply with the provisions for new buildings and structures except as otherwise provided in Sections 3.01.040, 3.03.060, and 3.05.020 of this Code.

Exception: For a period not to exceed one year following the effective date of adoption of this Code, permits for new buildings, additions, alterations and repair may be issued for construction conforming to the requirements of Ordinance No. 72200, as amended, provided that the applicant for such permit submits satisfactory evidence that the proposed project was initiated prior to the adoption of this Code.

No requirement of this Code shall be retroactive unless it is specifically stated "The following requirement shall be retroactive" as a preface to such requirement.

Where, in any specific case, different sections of this Code specify conflicting materials, methods of construction or other requirements, the most restrictive shall govern. (Ord. 85500 § 103; Sept. 10, 1956).

3.01.040 Application to existing buildings. Buildings or structures to which additions, alterations or repairs are made shall comply with all the requirements for new buildings or structures except as specifically provided in this section and as provided in the Housing Code (Ordinance 99112) or other applicable ordinances of the city.

For construction in fire zones, see Chapter 3.16.

(a) **ADDITIONS, ALTERATIONS, AND REPAIRS. FIFTY PERCENT OR LESS.** Additions, alterations and repairs of an estimated cost not exceeding fifty percent of the true and fair market value of an existing building or structure as computed from the assessed value and complying with the requirements for new buildings or structures may be made to such building or structure without making an entire building or structure comply. The new construction shall conform to the requirements of this Code for a new building of like area, height and occupancy.

For purposes of this section, in determining the ratio of the estimated cost of additions, alterations and repairs to the true and fair market value of an existing building, such estimated costs shall include all construction costs of the following:

- (1) All new work added to a building which did not previously exist in or on a building;
- (2) All portions of the building which are removed and replaced with new construction;
- (3) All portions of the building which are repaired.

Such estimated costs shall not include the following:

- (1) The addition, replacement, alteration or repair of mechanical and electrical equipment not affecting structural safety; safety of exit, or required fire resistance of the building.
- (2) Minor nonstructural architectural treatment not affecting the required fire resistance of the building.

(b) **NONSTRUCTURAL ALTERATIONS AND REPAIRS: TWENTY-FIVE PERCENT OR LESS:** Alterations or repairs of an estimated cost not exceeding twenty-five percent of the true and fair market value of an existing building or structure as computed from the assessed value which are nonstructural and do not affect any member or part of the building or structure having required fire resistance, may be made with the same materials of which the building or structure is constructed, provided that no change in occupancy shall be permitted which increases its life hazard rating as set forth in Table No. 5-E.

(c) **MINOR STRUCTURAL ADDITIONS, ALTERATIONS AND REPAIRS:** Minor structural additions, alterations, or repairs necessary to maintain the structural stability of the building may be made with the same material of which the building or structure is constructed when approved by the superintendent of buildings.

(d) **EARTHQUAKE RESISTIVE REQUIREMENTS.** The provisions of Section 3.23.120 shall apply to the entire building or structure to which additions, alterations or repairs are made, regardless of the ratio of the estimated cost of such additions, alterations of repairs to the true and fair market value of the building or structure, except as provided in (c) of this section and as follows:

Where additions, alterations or repairs are made to buildings constructed prior to July 26, 1967, such buildings need comply only with earthquake-resistive requirements as specified in Section 3.23.120(d) (2), except that in lieu of the requirements set forth in footnote 2 of Table 23-D, an opinion may be submitted to the superintendent of buildings by a licensed structural engineer that the existing floors, walls, roof and other resisting elements, when interconnected to provide sufficient transfer of stresses, are able to withstand lateral seismic forces at least equal to those experienced in the seismic disturbance in Seattle on April 13, 1949.

The superintendent of buildings may waive requirements of Section 3.23.120(d) (2) when it can be demonstrated to his satisfaction that there is sufficient strength and safety in the existing construction to resist the lateral forces at least equal to those experienced in the seismic disturbance in Seattle on April 13, 1949, provided the requirements of Sections 3.23.120 (1) and (m) are met.

The superintendent of buildings may further require, as he deems necessary, a comprehensive report by a licensed structural engineer of an investigation and structural analysis of the building for the purpose of determining conformance of the building to the structural requirements of this Code. This requirement shall also apply to Section 3.02.030 as conditions may require.

(e) **NONCONFORMING BUILDINGS.** A building or portion thereof which because of its height, occupancy or area could not be lawfully reconstructed in its present location, shall have no additions added thereto, nor shall its occupancy be changed to one which will result in increased danger to life or property; provided this shall not be construed to prohibit such minor additions as the superintendent of buildings shall find necessary for improving the safety of exit, or to prohibit change of occupancy as set forth in Section 3.05.010.

(f) **REPAIRS, ROOF COVERING.** Not more than twenty-five percent of roof covering of any building or structure shall be replaced in any twelve-month period unless the new roof covering is made to conform to the requirements of this Code for new buildings or structures.

(g) **EXISTING OCCUPANCY.** Buildings in existence at the time of the passage of this Code may have their existing occupancy continued if such occupancy was legal at the time of the passage of this Code, provided such continued occupancy is not dangerous to life or limb.

Any change in the occupancy of any existing building or structure shall comply with the provisions of Sections 3.03.060 and 3.05.010.

(h) **MOVED BUILDINGS.** No building shall be moved into or within the City of Seattle unless, prior to moving, said building has been inspected for compliance with this Code by the superintendent of buildings and a building permit issued in accordance therewith.

(i) **MAINTENANCE.** All buildings or structures both existing and

new and all parts thereof shall be maintained in a safe condition. All devices or safeguards which are required by this Code in a building or structure when erected, altered, or repaired, shall be maintained in good working order. The owner or his designated agent shall be responsible for such maintenance of buildings and structures.

It shall be the duty of the chief of the fire department and the superintendent of buildings to see that the means of exit, fire escapes, sprinkler systems, standpipes, occupancy or area separations, fire doors, construction for segregating dangerous uses and all other parts of buildings or equipment thereof which are intended to assist in the extinguishing of fire, or to prevent the origin or spread of fire, or to safeguard life or property from fire, shall be maintained in a usable and safe condition, and it is unlawful to fail to so maintain them or to fail to immediately comply with any lawful notice or order of the chief of the fire department or the superintendent of buildings. (Ord. 85500 § 104 as amended by Ord. 86257 and Ord. 102219 § 1; June 4, 1973).

3.01.050 Alternative materials and methods of construction. This Code is not intended to prevent the use of any alternate material or method of construction not specifically prescribed by this Code, provided any such alternate has been approved, as follows:

The superintendent of buildings may approve any such alternate provided he finds that the proposed design is satisfactory and complies with the provisions of Chapter 3.23 (where they apply), and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this Code in quality, strength, effectiveness, fire resistance, durability, and safety.

The superintendent of buildings shall require that evidence be submitted to substantiate any claims that may be made regarding the use of alternates. (Ord. 85500 § 105; September 10, 1956).

3.01.060 Tests. Whenever the superintendent of buildings deems evidence of compliance with the provisions of this Code or evidence that any material or any construction does not conform to the requirements of this Code is insufficient or in order to substantiate claims for alternate materials or methods of construction, he may require tests as proof of compliance to be made at the expense of the owner or his agent by an approved agency.

Test methods shall be as specified by this Code for the material in question. If there are no appropriate test methods specified in this Code, the superintendent of buildings shall determine the test procedure.

Copies of the results of all such tests shall be retained by the superintendent of buildings for a period of not less than two years after the acceptance of the structure. (Ord. 85500 § 106; September 10, 1956).

Chapter 3.02

ORGANIZATION AND ENFORCEMENT

Sections:

- 3.02.010 Building department—Jurisdiction.
- 3.02.020 Powers and duties of superintendent of buildings.
- 3.02.030 Unsafe buildings—Emergency orders.
- 3.02.035 Abatement committee.
- 3.02.040 Board of appeals.
- 3.02.050 Violations and penalties.
- 3.02.055 Violations and penalties.
- 3.02.060 Building Code Advisory Board.
- 3.02.070 Building Code Advisory Board—Additional member.
- 3.02.075 Building Code Advisory Board—Additional member.
- 3.02.080 U. B. C. Standards.
- 3.02.090 Temporary buildings.

3.02.010 Building department — Jurisdiction. The “building department” shall be under the jurisdiction of the superintendent of buildings as contemplated by the City Charter. (Ord. 85500 § 201; September 10, 1956).

3.02.020 Powers and duties of superintendent of buildings. (a) **GENERAL.** The superintendent of buildings is authorized and directed to enforce this Code, except where authority as elsewhere provided in this Code, is specifically vested in the director of public health, the chief of the fire department, or the city engineer.

(b) **DEPUTIES.** In accordance with the City Charter, the superintendent of buildings may appoint such officers, inspectors and assistants and other employees as shall be authorized from time to time.

(c) **REPORTS AND RECORDS.** The superintendent of buildings shall report to the mayor and city council not less than once a year, covering the work of the department during the preceding period. He shall incorporate in said report his recommendations as to desirable amendments to the law.

The superintendent of buildings shall keep an account of all fees and other moneys collected and received by him under this Code, the names of the persons upon whose account the same were paid, the date and amount thereof, together with the location of the building or premises to which they relate.

(d) **RIGHT OF ENTRY.** The superintendent of buildings or his authorized representative may enter at reasonable times any building, structure, or premises in the city to perform any duty imposed upon him by this Code.

(e) **STOP ORDERS.** Whenever any building work is done contrary to this Code, the superintendent of buildings may order the work stopped

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by notice in writing to persons engaged in the doing or causing such work to be done, posted on the premises and all shall forthwith stop such work until authorized by the superintendent of buildings to proceed.

(f) **NOTICES.** It shall be unlawful for any person to remove, mutilate, destroy or conceal any notice issued or posted by the superintendent of buildings pursuant to the provisions of this Code.

(g) **ADMINISTRATIVE RULINGS.** When the superintendent of buildings deems it necessary to issue an administrative ruling to: (1) Effect clarification or interpretation of this Code; or (2) Permit the use of alternate materials or methods of construction as provided in Section 3.01.050, he shall submit such proposed ruling to the building code advisory board which shall make recommendations regarding the necessity for, and substance of, such proposed ruling. All such administrative rulings shall be filed in the office of the superintendent of buildings and available for public inspection. (Ord. 85500 § 202; September 10, 1956).

3.02.030 Unsafe buildings—Emergency orders. The following provisions shall be retroactive. All buildings or structures which are structurally unsafe or not provided with adequate exit, or which constitute a fire hazard or are otherwise dangerous to human life, or which in relation to existing use constitute a hazard to safety, health, or public welfare by reason of inadequate maintenance, dilapidation, obsolescence, damage by fire or other causes, or abandonment as specified in this Code or any other effective ordinance are, for the purpose of this section unsafe buildings. Any such unsafe building may be declared to be a public nuisance and may be abated.

Whenever the superintendent of buildings finds that any unsafe building or portion thereof is in such a dangerous and unsafe condition as to constitute an imminent hazard to the extent that persons in or around such building are in serious jeopardy of life or limb, he may issue an emergency order directing that said building be restored to a condition of stability and safety, stating in the order the time for compliance. Said order may also require that such building be vacated within a reasonable time, to be specified in the order, and in the case of extreme danger said order may specify immediate vacation of the building; and no person shall use or occupy such building from and after the date on which the same is required to be vacated until said building is restored to a condition of stability and safety as required by said order and this Code. (Ord. 85500 § 203 as amended by Ord. 102219 § 2; June 4, 1973).

3.02.035 Abatement committee. The superintendent of buildings and a representative of the fire department and of the public health department, respectively, designated by the heads of such departments, shall constitute an abatement committee to act in an advisory capacity to the city government concerning buildings and structures on public and private property which are found by such committee to be public nuisances and

to make recommendations concerning the summary abatement thereof by ordinance. (Ord. 87132 § 1; April 28, 1958).

3.02.040 Board of appeals. The board of appeals, created by the City Charter, shall be governed in its operation by the following regulations.

1. The board shall elect a chairman and secretary from its membership.

2. When the superintendent of buildings and an applicant for permits, or other interested party, cannot agree as to the correct interpretation of any part of the building code, said applicant or other party may appeal from the interpretation of the superintendent of buildings, or from any requirements of his not specifically covered by ordinance, to the board of appeals by paying twenty-five dollars to the city treasurer and giving written notice of appeal to the secretary of the board of appeals. Should the board of appeals decide that the interpretation of the superintendent of buildings is not the true and correct interpretation and should therefore sustain the appeal the deposit of twenty-five dollars shall be returned to the applicant by the city treasurer.

3. The superintendent of buildings and the appellant shall be represented at all meetings of the board.

4. The board shall meet and act on any appeal within thirty days after such appeal is filed.

5. The board shall review all appeals from interpretation by the superintendent of buildings of building code provisions and render a decision that shall be binding both on the superintendent of buildings and the appellant.

6. The board shall review all appeals from restrictions of building code provisions applying to any specific situation in which situation it is claimed the intent of the Code is not applicable and render a decision that shall be binding on the superintendent of buildings and the appellant.

7. The board shall review, upon written request from any applicant for building permit, any administrative ruling by the superintendent of buildings and render a decision that shall be binding on the superintendent of buildings, the applicant for permit, and all future applicants for permit.

8. All decisions and findings shall appear in the minutes of the board, shall be submitted in writing to the superintendent of buildings with a duplicate copy to the appellant, and shall be available for inspection in the office of the superintendent of buildings.

9. The board shall submit to the mayor, on or before the first day



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of April of each year, a report of its activities for the preceding year. (Ord. 85500 § 204; September 10, 1956.)

3.02.050 Violations and penalties. It is unlawful to construct, erect, shore, underpin, enlarge, alter, repair, move, remove or demolish any building or other structure or part thereof, or equipment regulated therein, except in conformity with this Code, or to use or occupy the same except in a manner and under such conditions as to conform with this Code.

Any one violating or failing to comply with any of the provisions of this Code shall be deemed guilty of a misdemeanor, and each such person shall be deemed guilty of a separate offense for each and every day or portion thereof during which any violation of any of the provisions of this Code is committed, continued or permitted, and upon conviction of any such violation such person shall be punishable by a fine of not more than three hundred dollars, or by imprisonment for not more than ninety days, or both such fine and imprisonment.

(Superseded to the extent inconsistent with Section 3.02.055 by Section 2 of Ordinance 85655). (Ord. 8550 § 205; September 10, 1956).

3.02.055 Violations and penalties. Anyone, violating or failing to comply with the provisions of this code shall, upon conviction thereof, be punishable by a fine of not more than three hundred dollars, or by imprisonment for not more than ninety days, or by both such fine and imprisonment, and each day's violation or failure to comply shall constitute a separate offense. (Ord. 85500 § 6000 added by Ord. 85644; November 14, 1956: Supersedes section 3.02.050 to the extent inconsistent).

3.02.060 Building Code Advisory Board. There is hereby created a "Building Code Advisory Board" to consist of fourteen members to be selected as follows:

One member from nominations made by each of the following groups:
American Institute of Architects, Washington Chapter
Structural Engineers Association of Washington
Seattle Master Builders Association
Seattle Building Trades Council
Puget Sound Engineering Council
Building Owners and Managers Association of Seattle
Seattle Chapter, Associated General Contractors of America
Seattle Construction Council
Seattle Chamber of Commerce
Mortgage Bankers Association
Apartment Operators Association

together with the following who shall serve as ex-officio members:

The Superintendent of Buildings, or a member of his department designated in writing by him

The Chief of the Fire Department or a member of his department to be designated in writing by him

The Chairman of the Public Safety Committee of the City Council.

Each of said groups may submit to the mayor a list of not more than three names, and the Mayor shall from each list appoint one person to be a member of the Building Code Advisory Board, subject to confirmation by the City Council. The Mayor may remove any member so appointed and confirmed and any vacancy shall be filled in the same manner.

Such Board shall examine proposed administrative rulings of the Superintendent of Buildings relating to this Code and make recommendations thereon and may make recommendations to the City Council in writing for changes in the Building Code in connection therewith or independently thereof; but it shall act in an advisory capacity only and its powers, duties and functions shall not conflict with those of the Board of Appeals created by Charter Article VII, Section 12.

No member of such Board shall receive any compensation for services thereon.

The Board shall organize and elect a chairman and a secretary and may adopt rules and regulations. The chairman may call special meetings when deemed necessary, provided three days written notice is given each member of the time and place of such meetings. The Board shall meet at least once a month in regular meeting at a time and place fixed by the rules. If the time and place of the regular meeting is not fixed by rule the chairman shall cause timely written notice thereof to be given as in the case of special meetings. (Ord. 85500 § 206; September 10, 1956.)

3.02.070 Building Code Advisory Board—Additional member. The Building Code Advisory Board created by Section 3.02.060 is hereby expanded to include one additional member, to be appointed in accordance with the provisions of said section from nominations made by the Seattle Area Industrial Council of the Seattle Chamber of Commerce, as recommended in C. P. 233340. (Ord. 85500 § 206A added by Ord. 86624; November 13, 1957.)

3.02.075 Building Code Advisory Board—Additional member. The Building Code Advisory Board created by Section 3.02.060 of the Building Code is hereby expanded to include as one additional member the Chief Plumbing Inspector of the Department of Health, as recommended by letter of the Superintendent of Buildings dated September 23, 1958. (Ord. 85500 § 206B, added by Ord. 87581; October 9, 1958).

3.02.080 U.B.C. Standards. The U.B.C. Standards referred to in various parts of this Code shall be the applicable standards as set forth in the Uniform Building Code Standards, (1967 edition, published by International Conference of Building Officials) which are, by reference, made a part of this Code, and a copy of which is filed with the City Comptroller (C.F. 261483). (Ord. 97033 § 1; September 5, 1968; prior Ord. 94563 § 1; February 23, 1966; Ord. 85500 § 207 as amended by Ord. 91130; May 1, 1962).

3.02.090 Temporary buildings. The board of public works in its judgment may authorize the superintendent of buildings to issue a permit to erect and maintain in any fire zone, for a period of not to exceed six months after the issuance thereof, a tent or other temporary structure, to be used solely for religious services, conventions, circuses, carnivals, fairs or for use in connection with constructing streets, bridges or other public works.

Such structures shall be removed within six months after the issuance of the permit, and such removal shall be guaranteed by cash deposited with the city treasurer or by a surety bond in a sum which in either case shall be fixed by the superintendent of buildings. Said bond shall be filed with the city comptroller, after approval by the corporation counsel and the mayor.

The conditions relative to the cash deposit or the bond shall be such that in case of failure of the occupant or owner to conform to any of the lawful requirements of the city of Seattle relative to erection, maintenance or removal of said tent or other structure, the properly authorized officers of said city may enter the premises and take such steps as are necessary to conform to such lawful requirements, and shall recover the cost thereof from the cash deposit or bond.

The construction of such structure shall be subject to such reasonable safeguards for persons and property as the superintendent of buildings shall prescribe; the nature and extent of fire extinguishing equipment and decorations shall be subject to the requirements of the chief of the fire department, and the sanitary facilities shall meet the requirements of the director of public health. (Ord. 85500 § 208; September 10, 1956).

Chapter 3.03

PERMITS AND INSPECTIONS*

Sections:

- 3.03.010 Permits—Requirement.
- 3.03.020 Building permit requirements.
- 3.03.030 Fees for building permit.
- 3.03.040 Inspections.
- 3.03.050 Special inspections.
- 3.03.051 Registration of special inspectors.
- 3.03.052 Approved testing laboratories.
- 3.03.053 Certified plants.
- 3.03.054 Other plants.
- 3.03.060 Certificate of occupancy.
- 3.03.071 Home fall-out shelters.
- 3.03.075 Special building permits—Cenutry 21.

3.03.010 Permits—Requirement. It is unlawful to begin any work involving construction or installation of equipment on any building or struc-

*Permit fees—See Chapter 3.60 of this code.

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ture under any category below listed without first obtaining a permit therefor:

- (1) Building permit. See Section 3.03.020.
- (2) Heating installation permit. See Section 3.50.020.
- (3) Gas piping permit. See Section 3.54.220.
- (4) Plumbing permit. See Plumbing Code (Title 5).
- (5) Electrical permit. See Electrical Code. (Title 4).
- (6) Sign permit. See Section 3.46.030
- (7) Oil burner permit. See Section 3.53.030.
- (8) Boiler permit. See Section 3.52.120.
- (9) Permits for cutting of curbs, use of public property, encroachments over and under public property. See city engineer.
- (10) Permits to maintain, store or handle hazardous materials, conduct hazardous processes, or install equipment used in connection with such activities. See Fire Code. (Ord. 97033 § 2; September 5, 1968; prior Ord. 85500 § 301; September 10, 1956).

3.03.020 Building permit requirements. (a) PERMITS REQUIRED.

It is unlawful to erect, construct, enlarge, alter, repair, move, improve, remove, change the occupancy of or demolish any building or structure in the city, or cause the same to be done, without first obtaining a separate building permit for each such building or structure from the superintendent of buildings.

Exception: Minor repairs or alterations, cost to owner not to exceed five hundred dollars in any six month period as determined by the superintendent of buildings, may be made without permit, excluding the first fire zone; providing the repairs are not in violation of any of the provisions of this code, no structural changes are made, and egress, light, air or ventilation are not affected.

(b) APPLICATION. To obtain a permit, the applicant shall first file with the superintendent of buildings an application therefor in writing on a form furnished for that purpose. Every such application shall:

(1) Describe the land on which the proposed work is to be done, by lot, block, or metes and bounds, and house and street address, or similar description that will readily identify and definitely locate the proposed building or work;

(2) Show the occupancy of all parts of the building.

(3) Be accompanied by plans and specifications as required in subsection (c) of this section;

(4) State the valuation of the proposed work;

(5) Be signed by the permittee, or his authorized agent, who may be required to submit evidence to indicate such authority;

(6) Give such other information as reasonably may be required by the superintendent of buildings.

(c) PLANS AND SPECIFICATIONS. With each application for a

and improvements thereon, and shall further indicate the proposed location of such building or structure on such property, which location shall be such that vehicular access to such property will be provided by a driveway having in relation to such established or proposed grade a slope of not more than twenty percent. In the event that special or unusual circumstances make it impractical to construct such vehicular access so as to conform to established or proposed grades, the superintendent of buildings may approve vehicular access conforming to existing grades upon the execution and delivery to the city of Seattle of an agreement in writing, signed and acknowledged by the owner of said property and any contract purchaser, lessee, sublessee, tenant or subtenant, containing an accurate legal description of said premises and covenanting on the part of such owner, contract purchaser, lessee, sublessee, tenant and subtenant, for themselves and their heirs, executors, administrators, successors, and assigns, forever to hold and save the city of Seattle harmless from any and all claims, actions or damages of every kind and description which may accrue to, or be suffered by, any person or persons or property by reason of the construction, existence, maintenance or use of such structure or the vehicular access thereto, or by reason of any future street improvement in accordance with the established or proposed grade. Such agreement shall be filed and recorded in the office of the King County director of records and elections at the expense of the applicant for the permit.

Plans submitted for other than one- and two-story residences shall contain the following information:

- (1) Approved variances, if any, from the governing building code;
- (2) Type of occupancy;
- (3) Type of zoning;
- (4) Fire zone;
- (5) Floor areas;
- (6) Type of construction;
- (7) Type of soil foundation;
- (8) Types of heating and air conditioning systems.

In addition, plans submitted for buildings with an occupant load of fifty or more, buildings of more than two stories, buildings of more than four thousand five hundred square feet total floor area, or buildings or other structures that are determined by the superintendent of buildings to embody hazards or complex structural concepts, shall include applicable information as to the following:

- (9) Design loads:
 - Live loads and live load reductions,
 - Lateral loads;
- (10) Foundations:
 - Foundation investigations,
 - Allowed bearing pressure for spread footings,

building permit two sets of printed plans and specifications shall be submitted. Where existing or proposed driveways are involved, a third copy of the plot plan showing all driveways, drains for parking lots and other pertinent information shall be required for submission to the city engineer.

Exception: Plans and specifications need not be submitted for small and unimportant work when authorized by the superintendent of buildings.

The superintendent of buildings shall require plans and specifications for all work involving structural design to be prepared and designed by or under the direct supervision of an architect or structural engineer licensed to practice his profession under the laws of the state of Washington. Plans and specifications for work not involving structural design shall be prepared by a professional engineer qualified in the proposed work. Each sheet of plans shall bear the seal, the signature of the licensee and the date of expiration of his license.

Exceptions: When authorized by the superintendent of buildings, plans and specifications need not be prepared by an engineer or architect licensed by the state for the following:

- (1) One and two family dwellings.
- (2) Nonresidential buildings or structures of wood frame bearing wall construction with spans not exceeding twenty-five feet and having a total valuation of less than twenty-five thousand dollars.
- (3) Additions, alterations and repairs having a total valuation of less than twenty-five thousand dollars.

The superintendent of buildings may reject and refuse to examine any incomplete, unintelligible or indefinite plans even though a plan examination fee has been paid.

(d) **INFORMATION ON PLANS AND SPECIFICATIONS.** Plans shall be drawn to a clearly indicated and commonly accepted scale upon substantial paper and shall be of sufficient clarity to indicate the nature and extent of the work proposed and show in detail that it will conform to the provisions of this Code and all relevant laws, ordinances, rules and regulations. The first sheet of each set of plans shall give the house and street address of the work and the name and address of the owner and person who prepared them. Plans comprising more than five sheets shall have an index on the first sheet thereof. Plans shall include a plot plan showing the net width of streets, alleys, yards and courts, legal description and size of lot, the location, area, story height, and type of construction and use of the proposed building and of every existing building on the property. Where any building or structure is to be erected or constructed on property abutting an unimproved or partially improved street or alley, such plans shall also include a profile showing the established or proposed grade of such street or alley, based upon information obtained from the city engineer in relation to the proposed finished elevations of the property

- Allowed bearing capacity of piles,
Pile driving formula;
- (11) Soil fill and back fill:
Type, compaction and drainage;
- (12) Masonry:
Type, quality and strength of units,
Strength of mortar and grout,
Type and strength of reinforcement;
- (13) Wood:
Species or species groups, and grades of sawn lumber, glue-laminated lumber, plywood, and assemblies,
Fasteners;
- (14) Concrete:
Design strengths,
Reinforcing steel, types and strengths,
Welding of reinforcing steel, restrictions, if any;
- (15) Steel and Iron:
Types and strengths;
- (16) Assignment of responsibilities for inspection and testing during construction, and the degree of inspection and testing.

In lieu of detailed specifications, the superintendent of buildings may approve minor references on the plans to a specific section or part of this Code or other ordinances or laws.

Computations, stress diagrams, and other data sufficient to show the correctness of the plans shall be submitted when required by the superintendent of buildings.

When substitutions and changes are made during construction, amendments to building permit shall be secured prior to execution. All substitutions, changes, and clarifications shall be shown on as-built plans and two sets shall be submitted to and approved by the superintendent of buildings prior to occupancy.

(e) **ISSUANCE.** The application, plans and specifications filed by an applicant for a permit shall be checked by the superintendent of buildings. Such plans may be reviewed by other departments of the City to check compliance with the laws and ordinances under their jurisdiction. If the superintendent of buildings is satisfied that the work described in an application for permit and the plans filed therewith conform to the requirements of this Code and other pertinent laws and ordinances, and that the fee specified in Section 3.03.030 has been paid, he shall issue a permit therefor to the applicant; provided that as to structures extending over navigable water and requiring approval by the U.S. Army Corps of Engineers, the superintendent of buildings, if satisfied that the work described in an application for permit and the plans filed therewith conform to the requirements of this Code and other pertinent laws and ordinances and that

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the fee specified in Section 3.03.030 has been paid, shall first issue a certificate evidencing compliance with said requirements and deliver the same to the applicant for presentation to the U.S. Army Corps of Engineers, and upon presentation of a permit evidencing approval by the U.S. Army Corps of Engineers shall issue a building permit therefor to the applicant. The superintendent of buildings may refuse to issue a building permit to any person who refuses or fails to prosecute or complete the work permitted by and existing building permit on the same building or premises.

When the superintendent of buildings issues a permit, he shall endorse in writing or stamp the plans "APPROVED." Such approved plans shall not be changed, modified or altered without authorization from the superintendent of buildings, and all work shall be done in accordance with the approved plans.

(f) **RETENTION OF PLANS.** One (1) set of approved plans shall be retained by the superintendent of buildings except that plans for buildings of I and J occupancies shall be retained for a period of not less than ninety days from date of completion of the work covered therein, and one set of approved plans shall be returned to the applicant, which set shall be kept on such building or work at all times during which the work authorized thereby is in progress.

Plans submitted for checking, for which no permit is issued, and on which no action is taken by the applicant for six months, shall be destroyed one month after written notice is sent to the last known address of the applicant; to renew action on said plans new plans and a payment of a new plan examination fee shall be required.

(g) **VALIDITY.** The issuance or granting of a permit or approval of plans and specifications shall not be construed to be a permit for or an approval of, any violation of any of the provisions of this Code. No permit presuming to give authority to violate or cancel the provisions of this Code shall be valid, except insofar as the work or use which it authorizes is lawful.

The issuance of a permit based upon plans and specifications shall not prevent the superintendent of buildings from thereafter requiring the correction of errors in said plans and specifications or from preventing building operations being carried on thereunder when in violation of this Code or of any other ordinance of the city.

The issuance of a building permit shall not prevent the superintendent of buildings from requiring correction of conditions found to be in violation of this Code or any other ordinance of the city, nor shall the period of time for which any such permit is issued be construed to extend or otherwise affect any period of time for compliance specified in any notice or order issued by the superintendent of buildings or other administrative authority requiring the correction of any such conditions.

(h) **EXPIRATION.** Permits and renewed permits shall expire one

year from date of issue, except as otherwise specified. Original permits shall be renewed by the superintendent of buildings for one year upon application within the thirty day period immediately preceding the date of expiration. Renewed permits may be further renewed upon application within the thirty day period immediately preceding the date of expiration thereof, provided that the work permitted has been started and is progressing at a rate approved by the superintendent of buildings. Where conditions require, the superintendent of buildings may, as he deems necessary, issue non-renewable permits which shall expire within a period less than one year from date of issue. (Ord. 85500 § 302 as amended by Ord. 94086, Ord. 95265, Ord. 97532, Ord. 100341 and Ord. 101417 § 1; September 22, 1972).

3.03.030 Fees for building permit. A fee for each building permit shall be paid to the city treasurer as set forth in the permit fee ordinance. (See Chapter 3.60). (Ord. 85500 § 303; September 10, 1956).

3.03.040 Inspections. (a) **GENERAL.** All construction or work for which a permit is required shall be subject to inspection by the superintendent of buildings, and certain types of construction shall have continuous inspection by special inspectors, as specified in Section 3.03.050.

(b) **INSPECTION OF RECORD CARD.** Work requiring a building



permit shall not be commenced until the permit holder or his agent shall have posted an inspection record card in a conspicuous place on the front of the premises and in such position as to allow the superintendent of buildings conveniently to make the required entries thereon regarding inspection of the work. This card shall be maintained in such position by the permit holder until the certificate of occupancy has been issued and posted.

(c) **APPROVALS REQUIRED.** No work shall be done on any part of the building or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the superintendent of buildings. Such written approval shall be given only after an inspection shall have been made of each successive step in the construction as indicated by each of the inspections required in Subsection (d).

(d) **CALLED INSPECTIONS.** No required reinforcing steel or structural framework of any part of any building or structure shall be covered or concealed in any manner whatever without first obtaining the approval of the superintendent of buildings.

The superintendent of buildings upon notification from the permit holder or his agent shall make the following inspections of all buildings and shall either approve that portion of the construction as completed or shall notify the permit holder or his agent wherein the same fails to comply with the law.

1. **FOUNDATION INSPECTION.** To be made after trenches are excavated and forms erected to point where location and wall thickness may be determined and when all materials for the foundation are delivered on the job. Where concrete from a central mixing plant (commonly termed "transit mixed") is to be used, materials need not be on the job.

2. **FRAME INSPECTION.** To be made after the roof, all framing, fire-blocking and bracing are in place and all pipes, chimneys and vents are complete.

3. **LATH INSPECTION.** To be made after all lathing, interior and exterior, is in place, in all cases where plaster is used for fire-resistive requirements of two hours or more.

4. **FINAL INSPECTION.** To be made after building is completed and ready for occupancy.

(e) **OTHER INSPECTIONS.** In addition to the called inspections specified above, the superintendent of buildings may make any other inspections of any construction work to ascertain compliance with the provision of this code and other laws which are enforced by the building department. (Ord. 85500 § 304; September 10, 1956).

3.03.050 Special inspections. (a) **WHERE REQUIRED.** In addition to the inspections to be made by the superintendent of buildings as speci-

fied in Section 3.03.040, a registered special inspector or an approved testing laboratory shall provide inspection as required on the following types of work:

- (1) Masonry: See Chapter 3.24 for detailed requirements;
- (2) Wood: See Chapter 3.25 for detailed requirements;
- (3) Concrete: See Chapter 3.26 for detailed requirements;
- (4) Structural Steel: See Chapter 3.27 for detailed requirements;
- (5) Piling: See Chapter 3.28 for detailed requirements;
- (6) Special Cases: On special construction or work designated by the superintendent of buildings and involving unusual hazards or requiring constant inspection;

provided that upon approval by the superintendent of buildings, a person other than a registered special inspector may provide the required inspection as specified above, in the following cases:

- (1) Where the required inspection is to be performed by the architect or engineer responsible for the design of the work.
- (2) Where, in the opinion of the superintendent of buildings, the nature of the work requires inspection by a person having certain technical knowledge and skill in a specialized type of work for which a registered special inspector may not be qualified or authorized to inspect. In such cases, the superintendent of buildings may designate the person to perform the special inspection required.

Where the magnitude or complexity of a specific job is sufficient to warrant, additional registered special inspectors may be required by the superintendent of buildings.

If any registered special inspector is negligent in the performance of his duties, the work may be stopped.

(b) STATUS. No registered special inspector shall be an employee of the city of Seattle nor shall any such inspector inspect work performed, or materials supplied, by any contractor, subcontractor, or material vendor, with whom such inspector is employed; provided that such restrictions shall not apply to a registered special inspector employed by and performing such inspections for the owner of the project for which the work is performed or materials supplied.

(c) DUTIES OF SPECIAL INSPECTORS. The registered special inspector employed on any work shall be present during the prosecution of all work he has undertaken to inspect. He shall notify the superintendent of buildings and the architect, engineer or owner of his commencement of inspection of a job and shall specify the type of inspection for which he has been engaged. This notification shall be made no later than the last working day preceding such commencement of inspection. He shall report to the job sufficiently in advance of construction to familiarize himself with the plans and to inspect all materials to be used or concealed within such work; he shall inspect the construction, erection, placing, or other use of such materials; and he shall observe whether there is compliance with the approved design as to all of the foregoing. During the prosecution of the work, he shall not undertake or engage in any other task or occupation which will interfere with the proper performance of his duties of inspection. He shall immediately report all irregularities, substitution of materials or violations to the architect or engineer and to the superintendent of buildings. He shall also provide, as directed by the superintendent of buildings or by the architect, engineer or owner, such other information as may be required during his assigned employment. At the conclusion of his duties on any project which has been completed in accordance with the approved design, he shall submit a report to the architect, engineer or owner relative to the portion of the work he has inspected. A copy of the report shall be submitted to the superintendent of buildings and shall be filed in the records of his office.

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The registered special inspector shall not approve the placing of concrete or the placement of masonry or structural steel prior to the approval of the soil condition by the architect or engineer responsible for the design of the structure.

(d) **RESPONSIBILITY FOR PERFORMANCE.** Registered special inspectors and approved testing laboratories shall be chosen by and be responsible to the licensed architect or engineer whose signature and seal appear on the design drawings.

Upon completion of construction, the architect or engineer shall notify the superintendent of buildings in writing that the construction requiring special inspection as indicated on the design drawings has been so inspected; that he has read and approves the registered special inspectors' reports; and that, to the best of his knowledge, such construction conforms to the approved design.

(e) **ADVISORY BOARD FOR REVIEW.** The building code advisory board, as constituted under Section 3.02.060, 3.02.070 and 3.02.075 of this Code, and hereinafter referred to as "the board," shall serve in an advisory capacity to assist the superintendent of buildings in the enforcement of applicable provisions of this code relating to special inspections and supervision of construction, materials and products. The board shall make recommendations to the superintendent of buildings as to:

- (1) Registration of registered special inspectors.
- (2) Approval of testing laboratories to provide special inspection.
- (3) Certification of manufacturing plants.

(Ord. 85500 § 305 as amended by Ord. 91130 and Ord. 96942; August 1, 1968).

3.03.051 Registration of special inspectors. (a) **APPLICATION FOR REGISTRATION.** Any person desiring registration as a registered special inspector for registration for one or more types of special inspection shall make application to the superintendent of buildings on a form provided by him. Before accepting an application for registration as a registered special inspector, the superintendent of buildings shall collect a registration fee of five dollars.

(b) **ISSUANCE OF CERTIFICATE OF REGISTRATION.** The superintendent of buildings shall cause each applicant to be examined as to his knowledge, experience and training for performing the special inspection of the type or types for which he has applied. When satisfied as to the fitness of the applicant, the superintendent of buildings shall issue to him a certificate of registration, specifying thereon the type or types of inspection for which the applicant is qualified. The superintendent of buildings shall keep on file in his office a current classified list, open to public inspection, of the names of all registered special inspectors, showing the type or types of work each has been authorized to inspect.

(c) **RENEWAL OF CERTIFICATE.** A certificate of registration shall be valid for one year from the date of its issuance and shall be subject to renewal annually. Upon application for renewal of a certificate of registration, the applicant may be re-examined to ascertain his fitness to perform the inspection of the type or types for which he has applied. Before renewing a certificate of registration as registered special inspector, the superintendent of buildings shall collect a renewal fee in the amount of five dollars.

(d) **REVOCAION OF CERTIFICATE.** The superintendent of buildings may revoke, suspend, or refuse to renew any certificate of registration, upon evidence submitted to him, of incompetence, of willful or negligent failure to observe or report violations of this code, or of any other failure to perform properly and effectively the duties assumed by a registered special inspector, but prior to such action, the holder shall be given an opportunity to appear before the board and be heard. (Ord. 85500 § 305A added by Ord. 96942; August 1, 1968).

3.03.052 Approved testing laboratories. (a) **APPROVAL BY SUPERINTENDENT OF BUILDINGS.** Whenever tests or certification of any material or fabricated assembly thereof are required by this code, such tests or certification shall be made by a testing laboratory approved by the superintendent of buildings to conduct such tests or provide such certification.

The superintendent of buildings shall establish rules and regulations setting forth conditions and provisions for approval and for the conduct of any testing agency so approved.

The superintendent of buildings may suspend or revoke his approval of a testing laboratory, subject to review by the board, upon evidence of failure of the agency so approved to properly conduct any test or certify any material in a manner required by this code.

(b) **EMPLOYMENT OF SPECIAL INSPECTORS.** It shall be the responsibility of an approved testing laboratory to employ only registered special inspectors on work required to be so inspected by this code and such testing laboratory shall report, as directed by the superintendent of buildings, all special inspections performed by the laboratory. Any testing laboratory employing registered special inspectors shall certify to the superintendent of buildings a roster of such registered special inspectors monthly. The roster shall be made on forms supplied by the superintendent of buildings and shall be filed in the records of his office. (Ord. 85500 § 305B added by Ord. 96942; August 1, 1968).

3.03.053 Certified plants. (a) **APPLICATION FOR CERTIFICATION.** Application for certification as a certified plant may be made to the superintendent of buildings by plants engaged in the manufacture of:

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- (1) Prestressed or precast concrete structural products, and premixed concrete.
- (2) Unit masonry products.
- (3) Engineered wood products.
- (4) Prefabricated or assembly line produced metal products.
- (5) Such other prefabricated products as the superintendent of buildings may, from time to time, designate.

(b) **REQUIREMENTS FOR CERTIFICATION.** The superintendent of buildings shall examine manufacturing plants which submit application for certification and he shall issue certification when such plants have complied with the following requirements:

- (1) Have demonstrated capacity to produce materials and products conforming to the requirements of this code, and have agreed to furnish affidavits certifying that each item to be used in the city complies with all applicable requirements of this code and to clearly mark and identify each item as emanating from such approved plant, or where marking is not practicable, identified by other approved means.
- (2) Have certified that all such materials produced for use in the city will be manufactured in accordance with approved drawings and specifications.
- (3) Have agreed to reimburse the city for all expense incurred in making required inspections of such plants, or have agreed to pay the cost of inspection by an approved inspection or testing agency.
- (4) Have paid a certification fee of twenty-five dollars.

The superintendent of buildings may accept inspection by an approved testing or inspection agency when personal inspection of a plant by him is impractical. The superintendent of buildings shall set up standards to be used by such testing or inspection agency to determine the acceptability for certification when such plant has been certified by another jurisdiction having standards equal to those established in accordance with this code.

Registered special inspectors shall not be required where the work is done on the premises of a certified manufacturing plant approved by the superintendent of buildings to perform such work without special inspections.

(c) **RENEWAL OF CERTIFICATION.** Certificates of manufacturing plants shall be valid for one year from date of issuance and shall be subject to renewal annually. A certificate may be renewed upon application therefor and payment of a fee of twenty-five dollars in the manner prescribed

for the original application. The superintendent of buildings may revoke such certificates for cause, subject to review by the board. (Ord. 85500 § 305C added by Ord. 96942; August 1, 1968).

3.03.054 Other plants. Plants engaged in the manufacture of prestressed or precast concrete structural products, premixed concrete, unit masonry products, prefabricated or assembly line produced standard steel products, or engineered wood products, which have not been certified shall not furnish such products for use in the city unless each such product is manufactured under approved inspection by a registered special inspector. (Ord. 85500 § 305D added by Ord. 96942; August 1, 1968).



3.03.060 Certificate of occupancy. (a) OCCUPANCY. No new building or structure in Groups A to H, inclusive, shall be used or occupied, and no change in the existing use of a building or structure or portion thereof shall be made until the superintendent of buildings has issued a certificate of occupancy therefor as provided herein.

(b) CHANGE IN OCCUPANCY. Changes in the occupancy of a building shall not be made except as specified in Section 3.05.020 of this code.

(c) CERTIFICATE ISSUED. After final inspection when it is found that the building or structure complies with the provisions of this code, and a request has been made by the permittees or owner, the superintendent of buildings shall issue a certificate of occupancy which shall contain the following:

1. The occupancy for which the certificate is issued.
2. A statement that the floor load signs, as required by Section 3.23.080, have been installed.
3. A statement that the room capacity signs, as required by Section 3.33.010 (i), have been installed.
4. A certification that the building or structure complies with the provision of this code.

(d) TEMPORARY CERTIFICATE. A temporary certificate of occupancy may be issued by the superintendent of buildings for the use of a portion or portions of a building or structure prior to the completion of the entire building or structure.

(e) POSTING. The certificate of occupancy shall be posted in a conspicuous place on the premises and shall not be removed except by the superintendent of buildings. (Ord. 85500 § 306 as amended by Ord. 88324; June 24, 1959).

3.03.071 Home fall-out shelters. Any structure found by the superintendent of buildings to be designed for use only as a home fall-out shelter shall be exempt from the payment of city building and other permits and inspection fees and charges incident to the construction thereof; and all ordinances insofar as in conflict herewith are hereby superseded. (Ord. 90708 § 1; November 14, 1961).

3.03.075 Special building permits—Century 21. The superintendent of buildings is authorized to issue special building and use permits for the construction and occupancy of temporary buildings in the following described area:

Beginning at the intersection of the center line of 2nd Avenue North and Denny Way, thence east along the center line of Denny Way to the center line of Broad Street, thence northeast along the center line

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of Broad Street to the center line of 5th Avenue North, thence north along the center line of 5th Avenue North to the center line of Mercer Street, thence west along the center line of Mercer Street to the center line of Warren Avenue, thence south along the center line of Warren Avenue to the center line of Republican Street, thence west along the center line of Republican Street to the center line of 1st Avenue North, thence south along the center line of 1st Avenue North to the center line of Thomas Street, thence east along the center line of Thomas Street to the center line of 2nd Avenue North, and thence south along the center line of 2nd Avenue North to the point of beginning at the center line of Denny Way

for use in connection with and until the termination of Century 21 Exposition as recommended in C. F. 241577. Such temporary structures shall be constructed in accordance with the requirements of the building code for F-2 occupancies in Fire Zone 3, except as follows:

(a) Where noncombustible exterior walls are required, they may be of noncombustible covered, wood frame construction.

(b) Walls dividing tenancies shall be of not less than thirty minute fire resistive rating.

(c) In an open front building, two hour fire resistive separations, where required by the building code because of building area, need not extend upward beyond the roof, and, provided that there is a promenade not more than fourteen feet in width at the front of such building, such fire resistive separations need not extend into such promenade.

(d) Plastics will not support combustion at temperatures below five hundred degrees Fahrenheit may be used for nonstructural purposes.

Such special building and use permits may authorize construction of temporary structures on areas otherwise required by Chapter 26.46 of the Zoning Code for off-street parking and loading. (Ord. 89967 § 1, 2; January 25, 1961).

DEFINITIONS

Chapter 3.04

Sections:

- 3.04.010 Definitions and abbreviations—Introductory.
- 3.04.020 "Access road" to "Awning"—Words defined.
- 3.04.030 "Basement" to "Building, superintendent of"—Words defined.
- 3.04.040 "Canopy" to "Court"—Words defined.
- 3.04.050 "Day care center" to "Dwelling unit"—Words defined.
- 3.04.060 "Exit" to "Exit court"—Words defined.
- 3.04.070 "Factory" to "Front of lot"—Words defined.
- 3.04.080 "Garage, private" to "Guest room"—Words defined.
- 3.04.090 "Habitable room" to "Hotel"—Words defined.
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- 3.04.120 Reserved.
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- 3.04.170 "Painting shop" to "Public hall"—Words defined.
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- 3.04.190 "Repair" to "Room"—Words defined.
- 3.04.200 "Sanitarium" to "Sufficient"—Words defined.
- 3.04.210 "Theater" to "Tread, width of"—Words defined.
- 3.04.220 "U. B. C. standards" to "Use"—Words defined.
- 3.04.230 "Value, true and fair market" to "Vertical openings"—Words defined.
- 3.04.240 "Wall, bearing" to "Workshop"—Words defined.
- 3.04.250 "Yard"—defined.

3.04.010 Definitions and abbreviations—Introductory. For the purpose of this Code, certain abbreviations, terms, phrases, words and their derivatives which are used generally through the Code shall be construed as specified in this Chapter. Many other terms and abbreviations with only specialized application are defined in the chapter in which they are used. Words used in the singular include the plural and the plural, the singular. Words used in the masculine gender include the feminine, and the feminine, the masculine. (Ord. 85500 § 401; Sept. 10, 1956).

3.04.020 "Access road" to "Awning"—Words defined.

ACCESS ROAD: A private right of way not less than forty feet wide sufficiently improved to permit passage of Fire Department vehicles.

ACCESSORY BUILDING: A building smaller than, and used in connection with, the principal building on the same lot.

ACCESSORY OCCUPANCY, USE: A secondary occupancy or use comprising not more than ten percent of the floor area of any floor of a building and closely associated with the principle use.

ADEQUATE: Found to be acceptable by the Superintendent of Buildings.

ALLEY: A public thoroughfare which is less than twenty feet in width or one which is twenty feet or more in width but unnamed.

AMERICAN STANDARDS: Standards approved by the American Standards Association (A.S.A.) reconstituted in 1966 as the United States of America Standards Institute; such standards redesignated as U.S.A. Standards.

AMUSEMENT PARK STRUCTURE: A structure used to house or support rides, games and amusement devices common to carnivals, amusement parks, and side shows. Examples: Roller Coaster, Shooting Gallery, Bath Houses, Drive-in Movies, etc.

ANIMAL HABITATION: A building or portion thereof used to house animals, fowls or fish, such as a barn, hutch, apiary, aviary, cock loft, kennel, aquarium, zoo structures, etc.

APARTMENT: A suite of rooms for occupancy by one family containing not less than two hundred square feet in area, a toilet, bathing facilities and kitchen equipment.

APARTMENT HOUSE: Any building, or portion thereof, containing three or more apartments.

APPROVED: Approval by the Superintendent of Buildings, as the result of investigation and tests conducted by him, or approval by the Superintendent of Buildings by reason of accepted principles or tests by national authorities, technical or scientific organizations.

ARCADE: A covered structure used exclusively as a pedestrian walkway.

AREA OF BUILDING: The area in square feet of the largest floor of a building bounded by the exterior wall, pilaster or column faces and including covered loading platforms and covered exterior stairs and including uncovered platforms and exterior stairs which exceed ten percent of the covered area of the building. Where no roof is provided the building area is the area of the largest floor or deck. Where walls are omitted, the area is measured two feet in from the extremities of the roof projection. Uncovered paved walks, driveways, yards, patios and similar site improvements are not included in building areas.

ASSEMBLY BUILDING: A building or part thereof the occupant load of which is one hundred or more and which is used as a dance hall, place of worship, skating rink, sports arena, theater, club room, ex-

hibition hall, lodge hall, specialty school, social hall, waiting room for passengers awaiting transportation, or a drinking and/or dining establishment.

ASSEMBLY ROOM: See ASSEMBLY BUILDING.

ATTIC: (a) The space between a ceiling and a roof other than joist spaces.

(b) The space between the bottom chord line of trusses and the roof with or without a ceiling.

(c) Any space between a ceiling and the floor above which exceeds twenty-four inches in depth.

AUDITORIUM: A public place for assemblage of people such as theaters, concert halls, nave of a church, meeting rooms of lodges, clubs, societies and other organized groups.

AWNING: A protective covering attached to a building, the upper surface of which has a pitch of at least thirty degrees from the horizontal. (Ord. 85500 § 402 as amended by Ord. 91546, Ord. 97033 and Ord. 97889 § 1; June 26, 1969).

3.04.030 "Basement" to "Building, superintendent of"—Words defined.

BASEMENT: That portion of a building between floor and ceiling which is partly below and partly above grade, but so located that the average vertical distance from grade at exterior walls to the floor is less than the average vertical distance from grade to ceiling.

BLEACHER SEAT: A fixed bench without a back used in sports arenas and stadiums.

BOARDING HOMES FOR THE AGED: Any home or other institution however named, which is advertised, announced or maintained for the express or implied purpose of providing board and domiciliary care to three or more aged persons not related by blood or marriage to the operator. It shall not include any home, institution or section thereof which is otherwise licensed and regulated under the provisions of state law providing specifically for the licensing and regulation of such home, institution or section thereof. "Aged person" means a person of the age sixty-five years or more, or a person of less than sixty-five years who by reason of infirmity requires domiciliary care.

BOAT YARD STRUCTURES: Structures with areas in excess of three thousand square feet used for building or repairing of vessels of combustible construction to one hundred ten feet in length.

BREEZEWAY: A covered passageway between an I and a J occupancy which are not contiguous.

BUILDING: Any structure built for the support, shelter or enclosure of persons, animals, chattels, or property of any kind, including tanks, piling, towers, radio and TV masts, signs; and fences over six feet high.

BUILDING, AREA OF: See "Area of Building."

BUILDING, EXISTING: Any building actually constructed or started under properly issued building permit previous to the adoption of this Code, or located on land annexed to the city.

BUILDING, HEIGHT OF: The vertical distance in feet from the average grade to the highest roof of a flat or mansard roofed building, or to the average height of the highest gable of a pitch or hip roofed building. In stories it is the number of stories inclusive, from the first, as herein defined, to the highest story. See "first story" and "basement." In waterfront buildings, height is measured from city datum over salt water and from "low water" over fresh water.

BUILDING, MULTISTORY: A building having any floor area above the first floor except as provided in this Code for mezzanines, stages, platforms, balconies and penthouses.

BUILDING, PORTION OF: Any part of a building separated from other portions by an occupancy separation as provided in 3.05.030(d).

BUILDING, SUPERINTENDENT OF: The legally appointed head of the building department. As used in this Code the term includes authorized representatives of the superintendent of buildings. (Ord. 85500 § 403 as amended by Ord. 87090, Ord. 94563 and Ord. 101283 § 1; August 10, 1972).

3.04.040 "Canopy" to "Court"—Words defined.

CANOPY: A nonrigid, collapsible, nonretractable, protective covering, located at an entrance to a building.

CARPORT: An automobile shelter which is open to the weather on at least forty percent of the total area of its sides.

CEILING HEIGHT: The shortest vertical distance between a floor, platform, balcony, mezzanine, stair tread or landing or any similar space and a ceiling.

CELLAR: That portion of a building between floor and ceiling which is wholly or partly below grade and so located that the average vertical distance from grade at exterior walls to the floor below is equal to or greater than the vertical distance from grade to ceiling. Any requirement of this Code for basements also applies to cellars.

CENTRAL HEATING PLANT: (a) A heating plant designed for floor mounting that supplies heat by means of ducts or pipes to any area other than the room in which the plant is located.

(b) A heating plant that supplies heat by any means to a story other than the one in which the plant is located.

CHIEF OF THE FIRE DEPARTMENT: The head of the fire department. As used in this Code the term includes authorized representatives of the chief of the fire department.

CHURCH: A place of worship and its accessory spaces including Sunday school class rooms.

CLINIC: A building containing offices for provision of medical, dental, or psychiatric services to outpatients.

CLUB: A building, or portion thereof, used for entertainment, recreation or lodging by an organized group or society. Fraternities and sororities are clubs for the purpose of this Code.

COMBUSTIBLE: Any material not meeting the requirements of this Code for noncombustible.

COMBUSTIBLE, HIGHLY: Any material capable of burning with extreme rapidity or which is easily ignited or one having a rate of flame spread above two hundred fifty (250) as determined by the Tunnel Test.

CONVENT: A building housing a group of religious recluses.

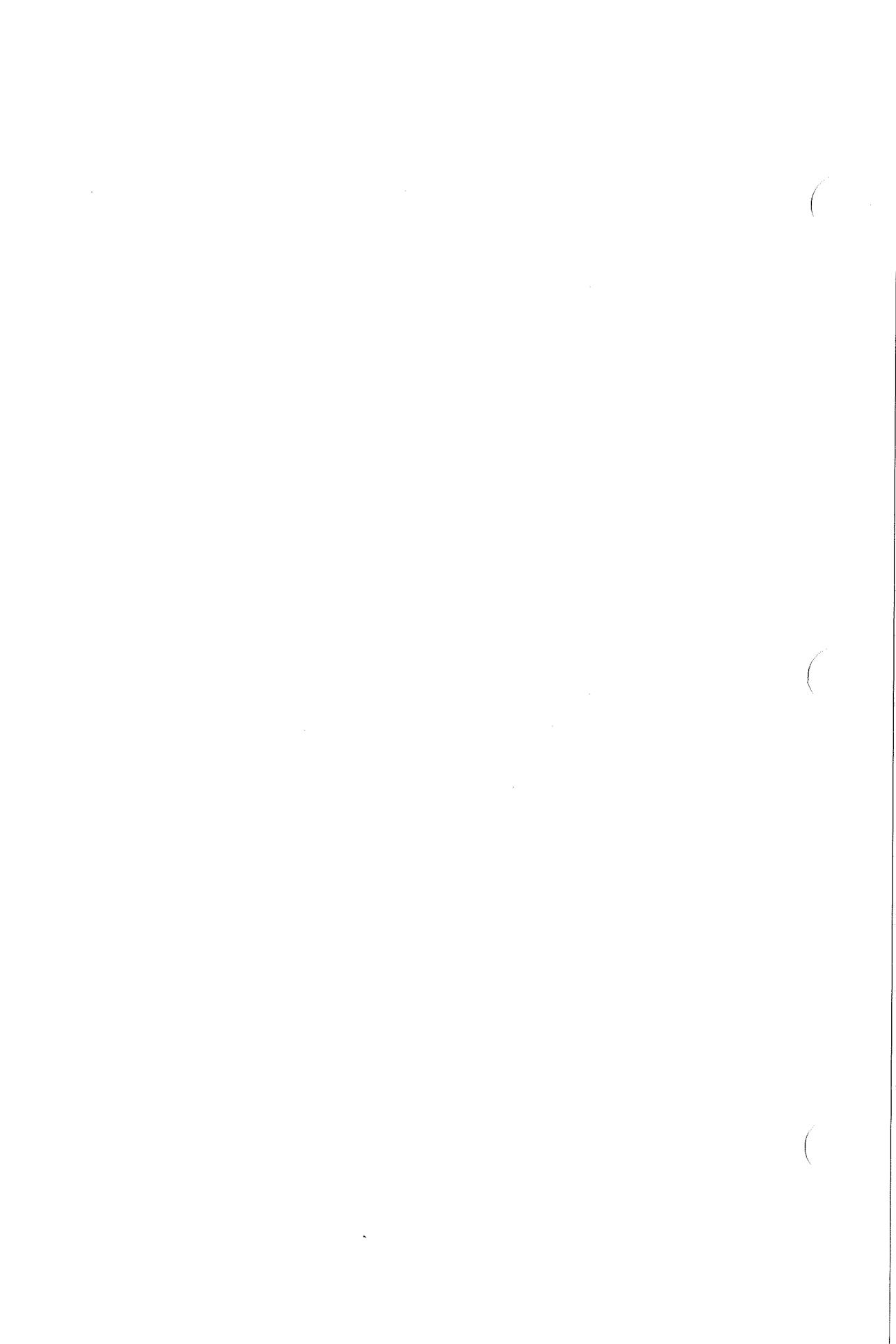
CORRIDOR: An enclosed passageway for use as access to an exit.

CORRIDOR, PUBLIC: An exit space or passage open or accessible to the general public or to persons who do not live or work in the area served by the corridor.

COURT: The open area used as a source of light or ventilation for a required window which area is outside the exterior wall of a building and on the same lot therewith. (Ord. 85500 § 404, as amended by Ord. 91546; October 30, 1962).

3.04.050 "Day care center" to "Dwelling unit"—Words defined.

DAY CARE CENTER: A facility operated by any person, firm, association, partnership or corporation which regularly provides care in other than a family setting to a group of children for less than twenty-four hours a day, whether for compensation or not.



DEAD LOAD: The weight of the walls, permanent partitions, framing, floors, roofs and all other permanent stationary construction entering into and becoming a part of the building.

DISTANCE OF TRAVEL: The distance from any point in any room or building to an enclosed stair, horizontal exit or exterior exit, measured along an unobstructed path of travel. The exit doorway may be used as the starting point in apartments and hotel rooms and in other rooms which are not larger than thirty feet in greatest dimension.

DOOR, SELF-CLOSING: A door which closes automatically after use.

DOOR LEAF: A single door section. When a doorway is to be closed by two or more doors then each individual door which may be used independent of another is considered as a leaf.

DWELLING: Any building or any portion thereof which is not an "Apartment House," "Lodging House" or a "Hotel" as defined in this code, which contains one or two "Dwelling Units" or "Guest Rooms," used, intended, or designed to be built, used, rented, leased or let, to be occupied, or which are occupied for living purposes.

DWELLING UNIT: One or more habitable rooms occupied, or intended, or designed to be occupied by one family and containing space for living, sleeping, preparation of food, and eating, and containing toilet and bathing facilities. (Ord. 85500 § 405 as amended by Ord. 101283 § 2; August 10, 1972).

3.04.060 "Exit" to "Exit court"—Words defined. **EXIT:** A continuous and unobstructed means of making departure from any place in a building to a public street or alley including intervening doorways, corridors, ramps, stairways, smoke-proof enclosures, horizontal exits, or any other permitted means.

EXIT, HORIZONTAL: A horizontal passage, ramp, or bridge into another building or into another portion of the same building through an area or occupancy separation of not less than one-hour fire-resistive value.

EXIT, MAIN OR PRINCIPLE: (a) The primary exit capable of providing the required exit width in assembly rooms or buildings. (b) that exit on a street (or leading directly to a street) which provides exits for the largest occupant load. (Ord. 85500 § 406 as amended by Ord. 88324; June 24, 1959).

3.04.070 "Factory" to "Front of lot"—Words defined.

FACTORY: A building or portion thereof used for manufacturing articles principally by machinery (see "WORKSHOP").

FAMILY: One or more individuals living, cooking and eating together in a single apartment but not including a group of more than eight persons unrelated by blood or marriage. In the case of a rectory, parsonage or convent, twelve persons are considered as a family.

FAMILY DAY CARE HOME: A family dwelling in which a child or children are received for care and supervision for periods of less than twenty-four hours per day in lieu of care in their own homes, whether or not compensation is given or received for such care and supervision.

FIRE DOOR ASSEMBLY: All doors, frames, jambs, sills, astragals, coordinators, hardware, etc. required to make a doorway fire-resistive as required by this Code.

FIRE DOOR, AUTOMATIC CLOSING: A fire door normally kept open which closes automatically when the temperature of a heat-actuated device reaches one hundred sixty-five degrees Fahrenheit or fifty degrees above maximum room temperature under normal conditions, whichever is greater.

FIRE-RESISTIVE: Able to resist fire. Generally used to describe construction, not fire proof, but not easily destroyed by fire. See Chapters 3.42 and 3.43.

FIRE RETARDANT: Able to retard fire. Impregnated with chemicals or otherwise treated in such manner that when fire tested in accordance with American Society for Testing Materials Standard E-84-50T it shall, in a test of thirty minutes duration, have a flame spread of not over the equivalent of twenty-five and show no evidence of significant progressive combustion.

FIRE WINDOW ASSEMBLY: The metal frame, jambs, mullions, muntins, glazing clips or angles, wired glass, required hardware, etc. necessary to make a window opening fire resistive as required by this Code.

FIRST STORY: (a) The story with its mean floor level nearest but not over four feet above grade.

(b) The story above the basement.

FLAMMABLE: See "LIQUIDS, FLAMMABLE."

FLOOR AREA: The area in square feet of all usable spaces combined, within inside face of enclosing walls, including platforms, stages, balconies, mezzanines, galleries, public corridors, stairways, vestibules between a foyer and the street, closets, toilet rooms, minor service rooms, and vaults.

FOYER: A space between an assembly area and the exterior exit in an assembly building designed to allow adjustment of exit columns at the point of convergence or change of direction.

FRATERNITY: See "CLUB."

FRONTING ON STREETS: (a) In buildings within sixteen feet of property lines: Facing directly on a street and not more than ten feet from the street margin.

(b) In buildings sixteen feet or more from property lines: Facing directly on a street and separated therefrom by an outer and unobstructed court.

FRONT OF LOT: The front boundary line of a lot bordering on the street. When an alley abuts a corner lot, the front is opposite the alley. A corner lot without abutting alley fronts on the shorter street front.

(Ord. 85500 § 407, as amended by Ord. 90485 and Ord. 101283 § 3; August 10, 1972).

3.04.080 "Garage, private" to "Guest room"—Words defined.

GARAGE, PRIVATE: A building, or a portion of a building in which only motor vehicles used by the tenants of the building or buildings on the premises are stored or kept.

GARAGE, OPEN DECK PARKING: A structure which is at least 50 per cent open on two sides and is used exclusively for parking passenger motor vehicles with a capacity of not more than nine persons per vehicle and commercial motor vehicles with a maximum weight of not more than 6,000 lbs. gross.

GARAGE, REPAIR: Any building or portion thereof used for repair of internal combustion motors, repair of motor vehicle transmission, differentials, frames or bodies, or where any part is removed for repair which would render the vehicle inoperative, repairs requiring welding or brazing, removal or replacing of upholstery other than seat covers, wrecking or stripping of inoperative motor vehicles, motor vehicle painting or any other work not permitted in a storage garage.

GARAGE, STORAGE: Any building or portion thereof used for storage of motor vehicles without service other than that customary in a service station.

GRADE (GROUND LEVEL): The average of the finished ground level at the center of all walls of a building. In case walls are parallel to and within five feet (5') of a public sidewalk, the above ground level shall be measured at the sidewalk. Where a wall is less than five feet (5') from a property line other than a street or alley line, the ground level for that wall or portion thereof is disregarded.

GRADE ELEVATION: To regulate height of exits above ground, the mean elevation of the finished grade within ten feet horizontal distance of an exit door.

GROUND STORY: The first story as defined herein.

GUEST: Any person occupying a room which is let or rented for living or sleeping purposes.

GUEST ROOM: Any room or rooms used, or intended to be used by a guest for sleeping purposes. Every one hundred square feet of superficial floor area in a dormitory shall be considered to be a guest room. (Ord. 85500 § 408 as amended by Ord. 101283 § 4; August 10, 1972).

3.04.090 "Habitable room" to "Hotel"—Words defined.

HABITABLE ROOM: Any room meeting the requirements of this code for sleeping, living, cooking or dining purposes excluding such enclosed spaces as closets, pantries, bath or toilet rooms, service rooms, connecting corridors, laundries, unfinished attics, foyers, storage spaces, cellars, utility rooms and similar spaces.

HEIGHT OF BUILDING: (See "Building, Height Of").

HOME FOR CHILDREN: A building used for full time care of chil-

dren of kindergarten age or older which provides no hospital or detention service.

HORIZONTAL EXIT: See "Exit, Horizontal."

HOTEL: Any building containing six or more guest rooms intended or designed to be used, or which are used or rented to be occupied, or which are occupied for sleeping purposes by guests. (Ord. 85500 § 409 as amended by Ord. 94563 and Ord. 101283 § 5; August 10, 1972).

3.04.100 "Ice plant"—Defined.

ICE PLANT: A building or portion thereof where ice is manufactured or stored. (Ord. 85500 § 410; September 10, 1956).

3.04.110 Reserved.

3.04.120 Reserved.

3.04.130 "Landing" to "Lot line"—Words defined. **LANDING.** A continuation of the floor of a building that gives access to the top or bottom of a flight of stairs, ramps or escalators, or any level space larger than a tread between two flights of stairs.

LIQUID, COMBUSTIBLE: Any liquid having a flash point above two hundred degrees Fahrenheit and below six hundred degrees Fahrenheit.

LIQUID, FLAMMABLE: Any liquid having a flash point below two hundred degrees Fahrenheit and having a vapor pressure not exceeding forty pounds per square inch (absolute) at one hundred degrees Fahrenheit.

Flammable liquids shall be divided into three classes as follows:

Class I shall include those having flash points at or below twenty degrees Fahrenheit.

Class II shall include those having flash points above twenty degrees Fahrenheit but at or below seventy degrees Fahrenheit.

Class III shall include those having flash points above seventy degrees Fahrenheit but at or below two hundred degrees Fahrenheit.

When artificially heated to temperatures equal to or higher than their flash point, Class II and III liquids shall be subject to the applicable requirements for Class I or II liquids. This Code may also be applied to high flash point liquids when so heated even though these same liquids when not heated are outside of its scope.

LIVE LOADS: All loads except dead and lateral loads.

LODGING HOUSE: A hotel where both meals and rooms are furnished for a stipulated price per day or week.

LOT: A subdivision of a block, as shown by a recorded plat of an addition to, or a subdivision of, the city of Seattle, or any portion of land whether platted or unplatted, considered as a unit of property and

described by metes and bounds. If two or more contiguous lots are described and built upon as one unit of property, they are considered as a single lot.

LOT FRONT: See "FRONT OF LOT".

LOT LINE: The boundary line of a lot which may include street or alley lines. See "PROPERTY LINE". (Ord. 85500 § 413 as amended by Ord. 88910; January 5, 1960).

3.04.140 "Marquee" to "Motor vehicle"—Words defined.

MARQUEE: An approximately horizontal, rigid, non-retractable, non-collapsible structure, projecting from and supported by a building.

MEZZANINE FLOOR: A partial, intermediate floor in any story or basement of a building having an area not more than one-half of the area of the room or space in which it is constructed with a net ceiling height of not less than seven feet above and below.

MONASTERY: See "CONVENT."

MORTUARY ESTABLISHMENTS: Undertaking parlors, crematoriums, mausoleums.

MOTOR VEHICLE: Any self-propelled vehicle powered by an internal combustion engine, except airplanes. A vehicle in transit containing no petroleum product is not a "Motor Vehicle", for the purpose of this code. (Ord. 85500 § 414 as amended by Ord. 91546 and Ord. 101283 § 6; August 10, 1972).

3.04.150 "Noncombustible" to "Nursing home"—Words defined.

NONCOMBUSTIBLE: A material which, in the form in which it is used, falls in one of the following groups (a) through (c). No material is classed as noncombustible which is subject to increase in combustibility or flame spread rating beyond the limits herein established, through the effects of age, moisture or other atmospheric condition as, for example, various types of treated wood. Flame spread rating as used herein refers to ratings obtained according to the Standard Test Method for Fire Hazard Classification of Building Materials of Underwriters' Laboratories, Inc., ASTM E84.

(a) Materials no part of which will ignite and burn when subjected to fire. Examples: Asbestos fiber, brick, clay tile, concrete, glass, gypsum, iron, portland cement, slate, steel, stone.

(b) Materials having a structural base of noncombustible material as defined in (a), with a surfacing not over one-eighth inch thick which has a flame spread rating not higher than twenty-five. Examples: Certain type of protected steel sheets, gypsum wallboard.

(c) Materials, other than as described in (a) or (b), having a surface flame spread rating not higher than twenty-five without evidence

of continued progressive combustion and of such composition that cross-sections in any plane would not have a flame spread rating higher than twenty-five without evidence of continued progressive combustion. Examples: Certain insulation materials as, blocks of cellular glass, boards of glass fiber, slabs made of excelsior impregnated with portland cement; certain sandwich type of materials; certain plastic sheets.

NURSERY: A place other than a single family dwelling which provides either full or part time supplemental parental care and supervision or educational experience for children under kindergarten age.

NURSING HOME: Any home, place or institution which operates or maintains facilities providing convalescent or chronic care, or both, for a period in excess of twenty-four consecutive hours for three or more patients not related by blood or marriage to the operator and who, by reason of illness or infirmity, are unable to properly care for themselves. No care for the acutely ill, or surgical or obstetrical services, shall be provided in such a home; a boarding home for the aged shall not be construed to be included in this definition. (See Sanitarium). (Ord. 85500 § 415 as amended by Ord. 94563 and Ord. 101283 § 7; August 10,1972).

3.04.160 "Occupancy" to "Owner"—Words defined.

OCCUPANCY: One of the 75 plus, purposes listed in this code, under occupancy groups for which a building or portion thereof may be used, or designed or intended to be used. The term shall also include the building or room housing such use. Change of occupancy is not intended to include change of tenants or proprietors.

OCCUPANCY, DIVISION OF: A subdivision of an occupancy group. Where alphabetic designation is used to indicate occupancy groups the numeral sub-group designations are Divisions of occupancy.

OCCUPANCY GROUP: One of ten designated groups of occupancies. The term occupancy group includes each Division of occupancy listed alphabetically or numerically together.

OCCUPANCY, MIXED: A building used for more than one of the twenty-two occupancy groups and Divisions.

OCCUPANT LOAD: Occupant load is the total number of persons actually occupying a building or portion thereof at any one time, but never less than the result obtained by dividing the floor area by the square foot per occupant set forth in Table No. 33-A for the occupancy housed therein.

OFFICE BUILDING: A building or portion thereof used for administration of business and professional work including accounts, records, etc. Bank, clinics and similar approved uses are included in the term.

OWNER: Any person having title to, or control, as guardian or trustee, of a building or property. (Ord. 85500 § 416 as amended by Ord. 101283 § 8; August 10, 1972).

3.04.170 "Painting shop" to "Public hall"—Words defined.

PAINTING SHOP: A building or portion thereof where articles are painted by brush or spray or where painted articles are placed for paint drying. "Paint" includes flammable thinners, varnish, lacquer, etc.

PAINT, STORE, BULK HANDLING: A store for handling of any flammable paint, thinner, paint product or ingredient except in factory sealed containers. The term includes spaces for mixing of flammable paint, varnish, etc.

PARTITION: Any vertical construction used to divide a building or part thereof into rooms or spaces and which extends over six feet above the floor on which it rests or which extends more than one-half the distance from floor to ceiling, whichever is less.

PENTHOUSE: A room constructed above the roof of a building and used for the housing of a stairway or of equipment used in the operation of the building, such as tanks, fans or elevator machinery.

PERSON: A natural person, his heirs, executors, administrators, or assigns, or a firm, partnership, or corporation and its or their successors or assigns, or the agent of any of the aforesaid.

PLATFORM, ENCLOSED: A partially enclosed portion of an assembly room the ceiling of which is not more than five feet above the proscenium opening and which is designed for the presentation of plays or other entertainment wherein scenery, drops, decorations, or other effects are to be installed or used.

PLATFORM LOADING: An exterior loading floor, usually raised, used for storage or handling of materials.

PROPERTY LINE: A line defining the limit of one side of a piece of property. For the purposes of this code, there are two types of property line, as follows:

1. **Legal property line:** The boundaries within which a piece of property is legally defined and which are shown on any survey of the property. These consist of the lines separating the property from any other property and, where the property abuts on public streets or alleys, the lines separating the property from such public streets or alleys.

2. **Property lines assumed for the purpose of regulating area and height of buildings and fire protection of walls and openings.** These consist of the lines separating the property from any other property and, where the property abuts on public streets or alleys, the opposite lines of such streets or alleys.

PUBLIC HALL: See "Corridor." (Ord. 85500 § 417 as amended by Ord. 90485 and Ord. 101283 § 9; August 10, 1972).

3.04.180 Reserved.

3.04.190 "Repair" to "Room"—Words defined.

REPAIR: The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

RESTAURANT: A place where food and drink are regularly served to the public and where capacity is less than three hundred persons. Where the capacity is three hundred or more, such a place is classed as an Assembly Building.

RISE: The vertical distance between the tops of two successive treads of a stair, or between the top of a tread and a landing.

ROOF, OPEN SKELETON FRAME: A roof, all supporting members of which are exposed on the underside, without ceiling or other obstruction between the roof and floor.

ROOF STRUCTURE: A penthouse, dormer, monitor, tank house, enclosed tower, spire or similar structure, erected above the roof of a building.

ROOM: That part of a building enclosed on the sides with permanent partitions or a combination of exterior walls or columns and permanent partitions as distinguished from parts of a room created by temporary partitions. (Ord. 85500 § 419; September 10, 1956).

3.04.200 "Sanitarium" to "Sufficient"—Words defined.

SANITARIUM: A hospital without surgery or a hospital used principally to treat patients with chronic ailments. For the purposes of this code the term shall include nursing homes.

SCHOOL: (a) A public place of instruction operated by public authorities, including elementary, secondary, and higher learning institutions.

(b) A place of instruction operated by private persons or religious organizations in which the course of study is similar to that in a public school, and which has been authorized by the state as an educational institution.

SERVICE STATION: A building or lot, whose primary purpose is the sale of motor vehicle fuels. The term includes replacement of minor parts and minor repairs but does not include parking of motor vehicles within a building or any other garage use.

SHAFT: A vertical enclosure through a building.

SHALL, as used in this Code, is mandatory.

SHIP YARD: A structure used for repair or building of vessels over one hundred ten feet in length.

SKYLIGHT: An opening in the roof of a building which is covered with glass, plastic, or other material to permit the passage of light and in which such glass or other material slopes less than eighty-seven degrees.

SOCIAL HALL: Meeting, card, or game room having a total capacity of one hundred or more persons. When a social hall has a capacity less than one hundred, it is classed in group G.

SORORITY: See "Club."

SPECIALTY SCHOOL: A building or part thereof used as a trade, voice, dance, art, language, music or cultural school or studio. This occupancy, when having a capacity of one hundred or more, is classed in group B and, when having a capacity of less than one hundred, is classed in group G.

SPORTS ARENA: A completely enclosed building or portion thereof, whose primary use is for sporting events such as basketball, ice hockey, boxing, wrestling, etc.

STADIUM: A building or portion thereof having an open sports area adjacent to one side and having no wall between the seating and the open play area.

STADIUM, SKELETON FRAME TYPE: A stadium having no exterior walls, concealed spaces or rooms of any kind.

STAGE: A partially enclosed portion of an assembly building for the presentation of plays or other entertainment wherein scenery, drops, or other effects may be installed or used, and where the distance between the top of the proscenium opening and the ceiling above the stage is more than five feet.

STAIR: See "Stairway."

STAIR, EXTERIOR: Any stair outside or partly outside the building walls rising more than four feet above ground and exposed to rain, snow or ice.

STAIR, MONUMENTAL: An ornamental stair.

STAIRWAY: All the flights and landings between two or more successive floor levels.

STEP: A tread and the riser beneath.

STORAGE, COMBUSTIBLE: Any storage with a hazard rating of C-3 to C-7, inclusive, as established by the Washington Surveying and Rating Bureau.

STORE FRONT: That portion of an exterior wall of a commercial building, including any openings therein, on a street front, which does not extend above the first story above grade.

STORY: That portion of a building included between the surface of any floor and the surface of the floor next above, except that the highest story is that portion of the building included between the highest floor surface and the ceiling or roof above.

STREET: A named public thoroughfare, not less than twenty feet in width.

STREET FRONT: A line, not less than twenty feet long separating private property and a public street.

STRUCTURE: See "Building."

SUFFICIENT, SUFFICIENTLY: Enough, as determined by the Superintendent of Buildings. (Ord. 85500 § 420 as amended by Ord. 86257, Ord. 94563 and Ord. 101283 § 10; August 10, 1972).

3.04.210 "Theater" to "Tread, Width of"—Words defined.

THEATER: A building or portion thereof designed primarily for the purpose of providing entertainment with dramatic, musical, variety, or motion picture performances; and equipped with fixed seats and a stage or enclosed platform.

THOROUGHFARE: Any public road, including streets, alleys, highways, etc.

TOWER: A superstructure above the roof of a building. (See Sections 3.05.070 and 3.36.020).

TREADS: The horizontal part of a step, including nosing.

TREADS, WIDTH OF: The shortest horizontal distance from face to face of adjacent risers, or between the nosings of adjacent treads. (Ord. 85500 § 421, as amended by Ord. 87090; April 22, 1958).

3.04.220 "U.B.C. Standards" to "Use"—Words defined.

U.B.C. STANDARDS: The "Uniform Building Code Standards."

UNOCCUPIED BUILDING AREA: That area of a building not used for any purpose whatsoever and which is separated from usable space by fire resistive construction and/or fire doors not larger than two (2) feet by two (2) feet.

U. S. GAUGE: U. S. revised manufacturer's gauge.

U.S.A. STANDARDS: Standards approved by the United States of America Standards Institute. (See "American Standards").

USE: A component or constituent of an occupancy. (Ord. 97033 § 4; September 5, 1968; prior Ord. 85500 § 422; September 10, 1956).

3.04.230 "Value, True and Fair Market" to "Vertical Openings"—Words defined.

VALUE, TRUE AND FAIR MARKET: The assessed value as determined by the County Assessor, divided by the current ratio established by the State Tax Commission.

VENT SHAFT: Any part of a lot or the space above it which is unoccupied from the ground to the sky or from an intermediate floor to the sky and which is not of large enough dimensions to comply with requirements for courts as set forth in this Code.

VERTICAL OPENINGS: (a) Openings in the enclosure of a shaft, chute, dust, elevator, dumbwaiter or similar story penetration (other than a stairway), above or below the floor forming the story separation.

(b) Openings through floors which carry flues, vents, or ducts. (Ord. 85500 § 423; September 10, 1956).

3.04.240 “Wall, Bearing” to “Workshop”—Words defined.

WALL, BEARING: A wall which supports any load other than its own weight.

WALL, CURTAIN: A non-bearing wall built between columns and extending through one or more stories without intermediate support.

WALL, EXTERIOR: The outside wall of a building. An exterior wall line is also the exterior column line or line extended, to complete the circumference of the building.

WALL, NON-BEARING: A wall which supports no load other than its own weight.

WALL, PARAPET: That part of any wall entirely above the roof line.

WALL, RETAINING: Any wall used to resist the lateral displacement of any material.

WAREHOUSE: A building used primarily for storage of goods or materials.

WINDER: A tread that is wider at one end than at the other.

WINDOW, AUTOMATIC: A fire window designed to close by the action of a heat actuated device when the surrounding temperature reaches 165 degrees Fahrenheit.

WIRED GLASS: Glass not less than one-fourth inch thick and containing wire fabric.

WORKSHOP: A building used primarily for manufacture or repair of articles principally by hand or with hand tools. (Ord. 85500 § 424, as amended by Ord. 87090; April 22, 1958).

3.04.250 “Yard”—Defined.

YARD: An open, unoccupied space, other than a court, unobstructed from the ground to the sky except where specifically provided by this Code, on the lot on which a building is situated. (Ord. 85500 § 425; September 10, 1956).

Chapter 3.05**OCCUPANCIES—CLASSIFICATION AND REQUIREMENTS****Sections:**

- 3.05.010 Occupancy classified.
- 3.05.020 Change in occupancy.
- 3.05.030 Mixed occupancy.
- 3.04.040 Location on property.
- 3.05.050 Allowable floor areas.

- 3.05.060 Allowable area increases.
- 3.05.070 Maximum height of buildings and increases.
- 3.05.080 Fire—Resistive substitution.
- 3.05.090 Arcades.
- 3.05.100 Courts.

3.05.010 Occupancy classified. Every building, whether existing or hereafter erected shall be classified by the Superintendent of Buildings according to its occupancy as a building in a division of Group A, B, C, D, E, F, G, H, I, or J, as defined in Chapters 3.06, 3.07, 3.08, 3.09, 3.10, 3.11, 3.12, 3.13, 3.14 and 3.15 respectively.

Any occupancy not mentioned specifically shall be classified by the Superintendent of Buildings and included in the division which its occupancy most closely resembles, based on the existing or proposed fire and life hazard.

Buildings used or proposed for use, in whole or in part, for the storage and handling of explosives, hazardous chemicals, oxidizing materials, and flammable liquids, shall be governed, in addition, by the provisions of the Fire and Explosion Hazard Ordinance (Title 8), as amended. (Ord. 85500 § 501; Sept. 10, 1956).

3.05.020 Change in occupancy. No change shall be made in the character of occupancy of any building or part thereof which would place the building in a different division of occupancy, unless such building is made to comply with the requirements of this Code for that group. Change of tenants will be permitted so long as the character of the occupancy is not changed.

Exception: The character of occupancy of existing buildings may be changed, subject to approval by the Superintendent of Buildings, and the building may be occupied for other occupancy purposes without conforming to all requirements of this Code for such occupancy, provided that the new or proposed occupancy is less hazardous based on life and fire risk than the existing occupancy as set forth in Table No. 5-E.

It shall be the duty of the Chief of the Fire Department to notify every owner or lessee who is using, or causing to be used, any lot or building or part thereof or other structure for any purpose when the use thereof constitutes a violation of any provision of this Code, provided that any existing building used for a legal purpose at the time this Code is adopted may continue in such use. It shall be unlawful to continue to use said lot or building or other structure after such notification by the Chief of the Fire Department. The Chief of the Fire Department may cause any unlawfully occupied lot or building or other structure to be immediately vacated by notifying the owner thereof, or lessee, in writ-

ing, or by posting a notice on the property. The above shall not relieve the Superintendent of Buildings from enforcing any provision of this Code relating to change of occupancy.

No change in the character of occupancy of a building shall be made without obtaining a certificate of occupancy as required in Sec. 3.03.060 of this Code. (Ord. 85500 § 502; Sept. 10, 1956).

3.05.030 Mixed occupancy. (a) **GENERAL.** When a building is used for more than one occupancy purpose, each part of the building comprising a distinct Occupancy, as described in Chapters 3.05 to 3.15, inclusive, shall be separated from any other occupancy as specified in Section 3.05.030, or, for the special case of Waterfront Structures, in Chapter 3.56.

When a building is used for more than one occupancy purpose, it shall be subject to the most restrictive requirements for the occupancies concerned.

Exceptions: 1. When a one-story building houses more than one occupancy, each separate occupancy in the building shall conform to the requirements for the occupancy as specified in Chapters 6 through 15. The maximum floor area of any separate occupancy shall be the area allowed by Sec. 3.05.050, multiplied by the percentage of the total building area occupied by such occupancy.

2. Where minor accessory uses do not occupy more than ten per cent of the area of any floor of a building, the major use of the building shall determine the occupancy classification, provided that the uses are separated as specified in Section 3.05.030 (d).

An office use not exceeding 1,000 sq. ft. in area nor 10% of the floor area in any story is not required to be separated from other occupancies. Other occupancies comprising not more than 10% of the floor area of any story may be separated from the major occupancy by a one hour occupancy separation provided that Table 5-B does not require a 4-hour separation between such occupancies and provided that the minor occupancies are not more hazardous than the major occupancy as determined by Table No. 5-E.

(b) **FORMS OF OCCUPANCY SEPARATION.** Occupancy separations may be vertical or horizontal or both, or when necessary, of such other form as will create a complete separation between the various occupancy divisions in the building.

Openings in exterior walls adjacent to ends of vertical occupancy separations which are within ten feet of each other, as measured along such wall surface, shall be automatic closing E or F fire doors or windows.

Openings in exterior walls adjacent to ends of horizontal occupancy separations which are within five feet of each other, as measured along

such wall surface, shall be automatic closing E or F fire doors or windows.

Exception: Automatic closing devices shall not be required where required value of separation is only one hour fire resistive.

Vertical occupancy separations shall extend a minimum of thirty inches above the highest adjacent roof where such roof has less fire resistance value than the requirements for such separations.

Exception: Occupancy separations need not extend above roofs, provided that:

1. The roof construction is entirely noncombustible, or
2. The roof within a distance of five feet each side of the occupancy separation has fire resistance as follows:
 - a. In buildings of Type I, II, or III construction—2 hrs.
 - b. In buildings of Type IV or V construction—1 hr.

(c) **TYPES OF OCCUPANCY SEPARATION.** Occupancy separations shall be classed as "Four-Hour Fire-Resistive," "Three-Hour Fire-Resistive," "Two-Hour Fire-Resistive," and "One-Hour Fire-Resistive." Materials and construction for such separations shall be as specified in Chapter 3.43 for the required fire resistance.

1. A Four-Hour Fire-Resistive Occupancy Separation shall have no openings therein.

Exception: In buildings containing Group D-1 or Group D-2 occupancies, openings between such occupancies and adjoining storage garages shall be permitted, provided that each such opening is fully enclosed by a Four-Hour Fire-Resistive vestibule equipped with Class "A" self closing fire doors on all openings.

2. A Three-Hour Fire-Resistive Occupancy Separation may have openings subject to the following provisions:

- a. Every opening in a vertical separation shall be protected on each side thereof by Class "A" fire doors.
- b. The aggregate width of all openings in any story of a vertical separation shall not exceed 25 per cent of the length of the separation in that story.
- c. No opening shall exceed one hundred and sixty-eight square feet in area.
- d. All openings in horizontal separations shall be protected by vertical enclosures, extending above and below such openings. Walls of such enclosures shall be of not less than two-hour fire-resistive construction and all openings in such walls shall be protected on one side by Class "B" fire doors.

3. A Two-Hour Fire-Resistive Occupancy Separation may have openings, provided that they are protected on one side by Class "B" fire doors.

4. A One-Hour Fire-Resistive Occupancy Separation may have openings, provided that they are protected on one side by Class "C" fire doors, and may have openings glazed with $\frac{1}{4}$ " wired glass in metal frames not larger than 7'x12' in dimensions and no glass shall be larger than 720 square inches in area.

(d) FIRE RATINGS FOR OCCUPANCY SEPARATIONS. Occupancy separations shall be provided between the various groups and divisions of occupancy as set forth in Table No. 5-B. Where any occupancy separation is required, the minimum shall be a One-Hour Fire-Resistive Occupancy Separation.

Exception: In buildings which normally contain several occupancies, such as hotels, office buildings, churches, department stores, and clubs, and where close interrelation of the various occupancies is customary, no occupancy separation shall be required, unless the elimination of such separation creates a demonstrable hazard based on life and fire risk. (Ord. 85500 § 503; Sept. 10, 1956).

3.05.040 Location on property. (a) GENERAL. Each portion of a building separated from other portions by area or occupancy separations shall adjoin a public street, alley or exit court. (Note: Location of buildings on property is also subject to regulations under the Zoning Ordinance).

(b) FIRE RESISTANCE OF WALLS. Exterior walls shall have the degree of fire resistance and exterior openings shall have the protection set forth in Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030, or 3.22.030. The above provisions shall not apply to walls at right angles to the property line.

(c) BUILDINGS ON SAME PROPERTY. For the purpose of determining required exterior wall protection, buildings on the same property shall be assumed to have a property line between them.

When a new building is to be erected on the same property with an existing building, the assumed property line shall be drawn at a distance, from the existing building, as required in Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030, or 3.22.030 for each occupancy of said existing building.

Exception: Two or more buildings on the same property may be considered as portions of one building, if the total area within a line circumscribing the building, does not exceed maximum limits specified in Section 3.05.050. In this case, any space between such build-

ings shall be considered as inner court (see Table No. 17-A) for the purpose of determining exterior wall construction.

When such buildings house different occupancies, or are of different Types of Construction, the area permitted under Section 3.05.050 shall be that allowed for the most restricted occupancy or construction. (Ord. 85500 § 504 as amended by Ord. 86257; June 18, 1957).

3.05.050 Allowable floor areas. (a) **ONE-STORY AREAS.** The area of a one-story building shall not exceed the limits set forth in Table No. 5-C, as amended by Ordinance 90196, except as provided in Section 3.05.060, nor the limits specified in Chapter 3.16.

Exception: The allowable area for a building of A-2, B-1 or B-2 occupancy (irrespective of construction type) shall be determined in the following manner:

The plan of the proposed building shall be divided into areas of use as set forth in Table No. 33-A. The area of each separate use shall be divided by the available square feet per occupant. The sum of all occupants thus determined shall not exceed the maximum permitted for the occupancy classification.

No increase in allowable areas, as set forth in Section 3.05.060, shall be permitted in buildings of A-2, B-1, or B-2 occupancy.

(b) **AREAS OF BUILDINGS OVER ONE STORY.** The total area of all floors (except basements and cellars) of buildings over one story in height shall not exceed 200 per cent of the area allowed in Table No. 5-C for one story buildings of the same occupancy and construction type. No single floor area shall exceed that permitted for one story buildings. For buildings located in Fire Zones 1 and 2, basic areas shall be reduced 25 per cent.

Exception: The total area of a building of A-1, B-1, or B-2 occupancy shall not exceed that permitted in Section 3.05.050 (a), regardless of number of stories.

(c) **AREAS OF BASEMENTS AND CELLARS.** 1. A one story basement or cellar shall not exceed, in area, the limits set forth in Table No. 5-C for buildings one story in height.

2. Basements or cellars, over one story in height, shall not exceed, in total area, two hundred per cent of the area allowed in Table No. 5-C for one-story buildings. No single basement or cellar area shall exceed that permitted for a one-story building.

Exception: Where basements or cellars and the first floor construction of a building are of Type I construction, the total allowable area of basements or cellars shall not be limited, regardless of occupancy

or construction type of the building structure above such first floor construction.

(d) **SEPARATIONS OF AREAS.** For the purpose of this section, each portion of a building, separated by one or more continuous fire-resistive walls which extend at all points from the foundation to or through the roof in accordance with Section 3.05.030 (b), may be considered a separate building. Such area separation shall be not less than four-hour fire-resistive construction in buildings of Type I, II and III construction, with openings protected as required for Class "A" openings, and shall not be less than two-hour fire-resistive construction in buildings of Types IV and V construction with openings protected as required for Class "D" openings. The total width of all openings in such fire-resistive wall, in each story, shall not exceed twenty-five per cent of the length of the wall in that story and no single opening shall exceed one hundred and sixty-eight square feet in area.

Exception: One opening not to exceed one hundred and sixty-eight square feet in area is permitted in any area separation, even though its width exceeds twenty-five per cent of the total width of such separation.

See Chapters 3.06 to 3.15 inclusive for special occupancy provisions. (Note: Areas of buildings are also subject to regulation under the Zoning Ordinance.) (Ord. 85500 § 505, as amended by Ord. 90196; April 24, 1961).

3.05.060 Allowable area increases. (a) **GENERAL.** The increases of floor areas permitted in this section may be compounded when applicable, except that increases permitted in Section 3.05.060 (f) shall not apply where sprinklers are required by other provisions of this code. No increase in floor areas of buildings of A-2, B-1, or B-2 occupancy or of basements or cellars is permitted under this section.

(b) **SEPARATION ON TWO SIDES.** Where public streets, alleys, or outer courts more than twenty feet in width extend along two sides of a building, the areas specified in Section 3.05.050 may be increased at a rate of one per cent for each foot by which the full width of the narrower street, alley, or court exceeds twenty feet, but the increase shall not exceed fifty per cent.

(c) **SEPARATION ON THREE SIDES.** Where public streets, alleys, or outer courts more than twenty feet in width extend along three sides of a building, the areas specified in Section 3.05.050 may be increased at a rate of two and one-half per cent for each foot by which the full width of the narrowest street, alley, or court exceeds twenty feet, but the increase shall not exceed one hundred per cent.

(d) **SEPARATION ON ALL SIDES.** Where public streets, alleys, or outer court more than twenty feet in width, extend on all sides of one and two story buildings, the areas specified in Section 3.05.050 may be

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increased at a rate of five per cent for each foot by which the full width of the narrowest street, alley, or court exceeds twenty feet, but the increase shall not exceed one hundred per cent.

Exception: Area increases for buildings of Group G occupancy shall not exceed two hundred per cent, except as permitted in Section 3.05.060 (e).

(e) **UNLIMITED AREAS.** 1. Where public streets, alleys or outer courts not less than sixty feet in width extend on all sides of a building, its area may be unlimited, provided it conforms to the requirements of the following table:

OCCUPANCY	HEIGHT	CONST. TYPE	SPRINKLER SYSTEM
Group E, Div. 5	1 & 2 Story	II, III, IV	Required
Group F, Div. 2	1 & 2 Story	II, III, IV	Required
Group F, Div. 3	1 & 2 Story	II, III, IV	Required
Group G	1 & 2 Story	II, III, IV	Required
Group G	1 Story	I, IV	Not Required

2. A one story, Type IV building of Group G occupancy may be of unlimited area, provided the building is of fire-retardant or noncombustible construction and the contents are noncombustible.

3. A building of Group B-3 occupancy may be unlimited in area, provided:

- (1) If of Type III-N, IV-N or V-N construction, it shall have no roof and any enclosed spaces below the seating deck shall be separated by draft stops into areas of not more than ten thousand square feet.
- (2) If of Type III-N, IV-N or V-N construction, any occupancy space shall have not less than one hour fire-resistive walls and separations as provided by this title for the occupancy for which such space is used.

(f) **SPRINKLERS.** The areas specified in Section 3.05.050 may be tripled in one story buildings and doubled in buildings of more than one story, if the building is provided with an automatic sprinkler system throughout as specified in Chapter 3.38.

Exceptions: 1. Where sprinklers are already required by any provision of Section 3.38.010(a), they may not be used as justification for such area increases.

2. Where sprinkler systems are used to justify height increases under Section 3.05.070, they may not be used as justification for such area increases. (Ord. 85500 § 506, as amended by Ord. 90485; August 21, 1961).

3.05.070 Maximum height of buildings and increases. The maximum height and number of stories of every building shall depend on the character of occupancy and type of construction and shall not exceed the limits set forth in Table No. 5-D, except as provided in this section. (Note: Maximum heights of buildings are also subject to regulation under the Zoning Ordinance.)

Towers, spires and similar architectural features, designed for architectural effect and not used for habitation or storage above the highest floor of the building or for signs as defined in Section 3.46.010 may be built exceeding the height limits of Table No. 5-D. The total horizontal area at the bases of such a tower in Type III construction shall not exceed four hundred square feet and in Type V construction two hundred fifty square feet. Penthouses and roof structures: See Section 3.36.010 for provisions governing their height.

One story aircraft hangars shall not be limited in height if provided with automatic sprinkler systems throughout as provided in Chapter 3.38, and entirely surrounded by public streets, alleys, or outer courts not less in width than one hundred fifty per cent of the height of such buildings.

The limits set forth in Table No. 5-D may be increased by one story or ten feet if the building is provided with an automatic sprinkler system throughout as specified in Chapter 3.38.

Exceptions: 1. Where sprinklers are already required by any provision of Section 3.38.010 (a), no height increase shall be permitted under the above paragraph.

2. Where sprinkler systems are used to justify area increases under Section 3.05.060 (e or f), they shall not be used to justify height increases under this subsection.

3. On hillside sites, the limits set forth in Table No. 5-D may be increased by one story, provided that the first and at least one additional story provide exits, as set forth in Chapter 3.33, directly to a public street, alley or exit court and within four feet of the grade elevation.

Exception: The height of Group E, Division 2, buildings shall not exceed one story under any circumstances. (Ord. 85500 § 507; Sept. 10, 1956).

3.05.080 Fire-resistive substitution. Where one-hour fire-resistive construction throughout is required by this Code, an automatic sprinkler system as specified in Chapter 3.38 may be substituted, unless such system is already required by any provision of Section 3.38.010 (a), or is used to justify area or height increases under Section 3.05.060 or 3.05.070. (Ord. 85500 § 508; Sept. 10, 1956).

3.05.090 Arcades. Arcades shall be as follows:

1. The maximum width of any arcade shall be forty (40) feet.

2. Two (2) or more buildings may be connected by an arcade, provided as follows:

(a) Provided that portions of the building walls within the arcades are finished with the same construction as is required for the exterior walls of the building, with no communicating openings between the arcade and building, except Class "D" fire doors; and, provided that the arcade is constructed of not less than one (1) hour fire-resistive, fire-retardant, or noncombustible materials, or of heavy timber with nominal two (2) inch sheathing and roof.

Exceptions: 1. An arcade not exceeding ten percent (10%) of the area of the building it connects, open on at least one side, not more than twelve (12) feet wide nor less than twenty (20) feet long, may be constructed of noncombustible construction without fire doors.

2. An arcade, forming a breezeway between Group I and Group J buildings, with open sides may be of Type V construction, when such buildings are separated as set forth in Section 3.14.080.

3. An arcade may be erected between facing buildings not less than forty (40) feet apart, provided as follows:

(a) Such arcade shall be of noncombustible construction and, except for supporting members, shall be open on all sides.

(b) All building walls facing such arcade shall be of not less than one (1) hour fire-resistive construction, but may have otherwise permitted unprotected openings.

(c) Any portion of a supporting member of any such arcade, within ten (10) feet of any such building, shall be of not less than one (1) hour fire-resistive construction.

(d) The distance from any part, except supporting members, of any such arcade, to any part of any such building, or any marquee or other projection from any such building, shall be not less than ten (10) feet and, when the roof of such arcade is higher than a building wall which such arcade faces, then the horizontal distance between the roof of such arcade and a vertical plane projected upward from the face of any such building wall shall also be not less than six (6) feet. (Ord. 85500 § 509, as amended by Ord. 91546; October 30, 1962).



3.05.100 Courts. (a) **GENERAL.** Courts used as required sources of light and ventilation shall conform to the minimum requirements specified in this section. See Chapter 3.55 for sizes of required openings and mechanical ventilation.

(b) **INNER COURTS.** An inner court shall be any court entirely enclosed within the exterior walls of a building or within the exterior walls of a building and an adjacent property line.

A required inner court ten feet or less in height shall have a minimum width of seven feet six inches and such width shall be increased one foot six inches for each ten feet or fraction thereof such court exceeds ten feet in height.

(c) **OUTER COURTS.** All other courts shall be deemed to be outer courts. A required outer court ten feet or less in height shall have a minimum width of five feet and such width shall be increased one foot for each ten feet or fraction thereof such court exceeds ten feet in height.

(d) **PROTECTION OF OPENINGS.** (1) Inner Courts. Openings in inner courts shall be protected as provided in Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030 and 3.22.030.

Exception: When an inner court wall faces an adjacent property line, the openings in such walls shall be protected as required for openings in exterior walls of the same type of construction as required by Tables 18-A, 19-A, 20-A, 21-A, or 22-A.

(2) Outer Courts. Openings in outer courts shall be protected as required for exterior walls in Tables 18-A, 19-A, 20-A, 21-A, or 22-A except that where openings in opposing walls of an outer court are less than ten feet apart such openings shall be protected.

(e) **PROJECTIONS IN COURTS.** A projection beyond the face of a court wall shall be limited as follows:

No projection shall be permitted which would reduce required minimum court width or length.

No projection above the sill of a required window shall exceed six feet when said projection is within four feet of the window head or side jamb. Projections may be increased six inches per foot for each foot of clearance beyond the four feet above stated.

(f) **LOCATION OF WINDOWS.** Windows may be permitted on all sides of a court with the following limitations:

In group D-2, D-3 and H occupancies, windows in adjoining walls forming an angle of less than one hundred and fifty degrees shall be separated by five feet.

Exception: Windows which otherwise would require separation as

above specified but are used in one apartment or suite, are exempt from the above limitations.

(g) **DUPLICATE USE OF COURTS.** Courts used as required light and ventilation for one building shall not be used for another building, even though said other building may be under same ownership on same lot.

Exception: Two buildings on one lot under one occupancy group may use one court.

(h) Buildings of Group I occupancy are exempt from requirements of this section. (Ord. 85500 § 510 as amended by Ord. 86257 and Ord. 96247; November 16, 1967).

Note: Table No. 5-A deleted by Section 6 of Ordinance 86257—Approved June 18, 1957—30 day ending.

TABLE No. 5-A*

CLASSIFICATION OF BUILDINGS BY OCCUPANCY

GROUP	DESCRIPTION
A See also Sec. 3.06.020	1—Any assembly building with an occupant load of 1,500 or more.
	2—Any assembly building with an occupant load of 900 to 1,500.
B See also Sec. 3.07.020	1—Any assembly building with an occupant load of 300 to 900.
	2—Any assembly building with an occupant load less than 300.
	3—Stadiums and reviewing stands; amusement park structures not included in Group A or Group B, Divisions 1 or 2.
C See also Sec. 3.08.020	Any building used for school purposes, involving assemblage for instruction, or recreation and not classed in Group A or B occupancies.
D See also Sec. 3.09.020	1—Mental hospitals, places of detention and other buildings where personal liberties of inmates are restrained.
	2—Mental sanitariums; hospitals; sanitariums; nurseries for full time care of children under kindergarten age.
	3—Homes for retired persons; homes for children of kindergarten age or older.
E See also Sec. 3.10.020	1—Storage and handling of hazardous and highly combustible materials; storage and handling of small quantities of containers with flammable liquids, as defined in Section 3.04.130, paint and oil stores with bulk handling; painting shops.
	2—Storage and handling of large quantities of containers with flammable liquids as defined in Section 3.04.130; dry cleaning plants using flammable liquids.
	3—Shops and factories where loose combustible fibers are manufactured; or where dust is generated; woodworking establishments in excess of 3,000 square feet, planing mills, and box factories.
	4—Warehouses for highly combustible material; repair garages; boatyard structures.
	5—Aircraft repair hangars.

*Table 5-A, although not a part of the Building Code, is included here for convenience.

TABLE No. 5-A (Continued)

GROUP	DESCRIPTION
F See also Sec. 3.11.020 and 3.11.090	<p>1—Gasoline filling and service stations, storage garages; boat storage; storage tanks for flammable liquids.</p> <p>2—Wholesale and retail stores; restaurants with less than 300 capacity; factories, workshops using flammable or combustible materials; ice plants; warehouses and storage rooms for combustible goods.</p> <p>3—Aircraft storage hangars; open deck parking garages; boat moorage.</p>
G See also Sec. 3.12.020	Office buildings; lodge halls, exposition halls, club rooms, specialty schools and social halls with less than 100 capacity; clinics; printing plants; shipyard structures; animal habitations; mortuary establishments; power plants; cold storage; creameries; factories, workshops, and dry cleaning plants using nonflammable and noncombustible materials; warehouses and storage rooms for noncombustible goods; commercial greenhouses.
H See also Sec. 3.13.020	Hotels; motels; police and fire stations; apartment houses; dormitories; clubs; lodging houses; maternity homes; day nurseries; convents and monasteries with more than 12 capacity.
I	One and two family dwellings. Convents and monasteries with capacity of 12 or less.
J	<p>1—Private garages, carports, plant nurseries, sheds and minor buildings used as accessories, not exceeding 1,000 sq. ft. in area.</p> <p>2—Fences over 6 feet high; radio and television masts over 25 feet high.</p> <p>3—Towers; tanks for storage of nonflammable and noncombustible liquids; signs (see special provisions, Chapters 16 and 46).</p>

TABLE No. 5-B
SEPARATIONS REQUIRED BETWEEN OCCUPANCIES IN BUILDINGS OF MIXED OCCUPANCY
 (Fire Resistive Values in Hours) †

GROUP	A	B	C	D	E-1	E-2	E-3	E-4-5	F-1	F-2	F-3	G	H	I	J-1-3
A	N	N	N	3	4	4	4	4	4	3	3	3	2	1	2
B	N	N	N	3	4	4	3	3	3	2‡	3***	1	1	1	1
C	N	N	N	2	4	4	4	4	4	2	3	1	1	1	1
D	N	N	N	N	4	4	4	4	4	3	3	3	2	1	2
E-1*	N	N	N	N	2	2	2	2	2	2	2	3	4	4	1
E-2*	N	N	N	N	2	2	2	2	2	2	2	3	4	4	1
E-3*	N	N	N	N	1	2	2	2	2	2	2	2	3	3	1
E-4-5*	N	N	N	N	1	1	1	1	1	1	1	1	3	3	1
F-1*	N	N	N	N	N	N	N	N	N	1	1	1	3**	1	1
F-2*	N	N	N	N	N	N	N	N	N	N	1	1	1	1	1
F-3*	N	N	N	N	N	N	N	N	N	N	N	1	2	1	1
G	N	N	N	N	N	N	N	N	N	N	N	N	1	1	1
H	N	N	N	N	N	N	N	N	N	N	N	N	1	1	1
I	N	N	N	N	N	N	N	N	N	N	N	N	1	1	1
J	N	N	N	N	N	N	N	N	N	N	N	N	1	1	1

†Required hour values for occupancy separations may be reduced by one hour provided the separate occupancies are equipped with approved automatic sprinkler systems and further provided no reduction shall be permitted where a one-hour separation is required.

‡As an exception to the preceding footnote (†), no occupancy separations will be required where the separate occupancies are equipped with approved automatic sprinkler systems.

*In any Group E or Group F occupancy where flammable liquids or highly combustible materials are used, handled or stored, or where flammable vapors or combustible or explosive dust is generated self-closing fire doors shall be required for all openings connecting to other occupancy classifications.

**A one-hour occupancy separation is permitted provided the Group F Division 1 occupancy is a garage used only for the parking of passenger vehicles having a capacity of not more than nine persons per vehicle, no repair work or fueling is done and the area does not exceed three thousand square feet. For an area exceeding three thousand square feet and not exceeding ten thousand square feet, a one-hour occupancy separation is permitted provided such garage is equipped with an approved automatic sprinkler system. For an area exceeding ten thousand square feet a two-hour separation is permitted if equipped with an approved automatic sprinkler system.

***A one-hour occupancy separation is permitted where the Group F, Division 3 occupancy is an open deck parking garage or boat moorage and provided that such occupancy and the Group B occupancy are both equipped with approved automatic sprinkler systems. (Table No. 5-B as amended by Ord. 94563 and Ord. 97889 § 6; June 26, 1969).

TABLE No. 5-C—BASIC ALLOWABLE FLOOR AREAS FOR ONE-STORY BUILDINGS
(Amended)

GENERAL NOTES:

1. Increases may be permitted under certain conditions. See 4. Floor areas are also subject to regulation under the Zoning Ordinance. Where areas permitted under this chapter conflict with those permitted under the Zoning Ordinance, the more restrictive requirements shall apply.
2. For higher buildings, see Sec. 3.05.050 (b).
3. Basic areas for buildings in Fire Zones 1 and 2 shall be 5. Floor areas of waterfront structures are subject to additional special regulations specified in Section 3.56.030.

(Areas In Square Feet)

Occupancy	TYPES OF CONSTRUCTION				
	I	II	III	IV	V
A-1	Unlimited	Unlimited	One Hr. Or Heavy Timber Resistant Require.	1-Hour	No Fire Resistant Require.
A-2	See Sec. 3.05.050 (a)	See Sec. 3.05.050 (a)	See Sec. 3.05.050 (a)	1-Hour	No Fire Resistant Require.
B-1	See Sec. 3.05.050 (a)	See Sec. 3.05.050 (a)	See Sec. 3.05.050 (a)	1-Hour	No Fire Resistant Require.
B-2	Unlimited	Unlimited	See Sec. 3.05.050 (a)	1-Hour	No Fire Resistant Require.
B-3	Unlimited	Unlimited	See Sec. 3.05.050 (a)	1-Hour	No Fire Resistant Require.
C	Unlimited	27,000	20,000	20,000	9,000
D-1	Unlimited	7,000	7,000	7,000	2,000
D-2-3	Unlimited	9,000	7,000	7,000	2,000
E-1-2	15,000	7,500	5,000	5,000	2,000
E-3-4-5	Unlimited	15,000*	11,000*	11,000*	7,500*
F-1-2-3	Unlimited	24,000*	18,000*	18,000*	12,000*
G	Unlimited	36,000*	27,000*	27,000*	18,000*
H	Unlimited	18,000	13,500	13,500	9,000**
I	Unlimited	27,000	20,000	20,000	9,000
J	Unlimited	27,000	20,000	20,000	9,000

* Area limitations removed under certain conditions. See Sec. 3.05.050 (e)
 ** See Section 3.13.020
 (Ord. 85500 § 505, as amended by Ord. 90196; April 24, 1961).

TABLE No. 5-D—BASIC ALLOWABLE HEIGHTS OF BUILDING AND OCCUPANCIES

NOTES: 1. Increases may be permitted under certain conditions. See Section 3.05.070.
 2. Waterfront structures are subject to special regulations. See Section 3.56.030.
 3. Heights are also subject to regulation under the zoning ordinance. Where conflict with this code occurs, the more restrictive requirements shall apply.

Occupancy	TYPES OF CONSTRUCTION				
	I	II	III	IV	V
		One Hour or Heavy Timber	No Fire Resistive Require.	One Hour Resistive Require.	No Fire Resistive Require.
		MAXIMUM HEIGHT IN FEET			
	Unlimited	80'	55'	65'	50'
					40'
			MAXIMUM HEIGHT IN STORIES		
A-1	Unlimited		NOT PERMITTED		
A-2	Unlimited	Four	NOT PERMITTED		
B-1	Unlimited	Four	Two	Not Permitted	Two
B-2	Unlimited	Three	Two	One	Two
B-3	Unlimited	Four	Two	One	Two
		Four			
C	Unlimited	Sec. 3.08.020 (b)	Two	One	Two
D-1	Unlimited	Two	NOT PERMITTED		
D-2	Unlimited	Three	One	Not Permitted	One
D-3	Unlimited	Three	Two	Not Permitted	Two
E-1	Unlimited	Two	One	Not Permitted	One
E-2	One	One	One	Not Permitted	One
E-3-4-5	Unlimited	Two	Two	One	One
F-1-2-3	Unlimited	Six	Four	Two	Two
G	Unlimited	Six	Four	Two	Three
H	Unlimited	Five	Four	Two	Two
I	Unlimited	Three	Three	Three	Three
J			SEE CHAPTER 3.15		

(Table No. 5-D as amended by Ord. 86257; June 18, 1957.)

Table 5-E

BUILDINGS

TABLE No. 5-E—RATING OF OCCUPANCIES BY DEGREES OF HAZARD

CLASSIFICATION OF HAZARDS		OCCUPANCY		Life Hazard Rating	Fire Hazard Rating	Combined Rating
A. LIFE HAZARD BASED ON POSSIBLE MORTALITY DUE TO OCCUPANCY, IF FIRE OCCURS:	B. FIRE HAZARD BASED ON POSSIBLE GENERATING FIRE, DUE TO OCCUPANCY:	Occupancy Classification	Life Hazard Rating	Fire Hazard Rating	Combined Rating	
Minimum Hazard — 1	Noncombustible — 1					
Minor Hazard — 2	Slow Burning — 2	E-2	4	7	28	
Average Hazard — 3	Moderate Burning — 3	E-1	4	5	20	
Serious Hazard — 4	Free Burning — 4	E-3	4	5	20	
Maximum Hazard — 5	Quick Burning — 5	G	3	6	18	
	Intense Burning — 6					
	Flash Burning — 7					
OCCUPANCY						
Dry cleaning plants using flammable liquids.		E-2	4	7	28	
Paint and oil stores with bulk handling; painting shops.		E-1	4	5	20	
Shops and factories where loose combustible fibers are manufactured or processed or where dust is generated.		E-3	4	5	20	
Animal habitations.		G	3	6	18	
Any assembly building with an occupant load of 1,500 or more.		A-1	4	4	16	
Any assembly building with an occupant load of 900 to 1,500.		A-2	4	4	16	
Any assembly building with an occupancy load of 300 to 900.		B-1	4	4	16	
Mental hospitals.		D-1	5	3	15	
Mental sanitariums; hospitals; sanitariums; nurseries for full time care of children under kindergarten age.		D-2	5	3	15	
Homes for retired persons.		D-3	5	3	15	
Woodworking establishments, planing mills, and box factories.		E-4	3	5	15	
Storage and handling of large quantities of containers with flammable liquids as defined in Section 3.04.130.		E-2	2	7	14	
Tanks for storage of flammable liquids.		F-1	2	7	14	

OCCUPANCIES

Table 5-E

Table No. 5-E (Continued)

OCCUPANCY	Occupancy Classification	Life Hazard Rating	Fire Hazard Rating	Combined Rating
Any assembly building with an occupant load of less than 300.	B-2	3	4	12
Homes for children of kindergarten age or older.	D-3	4	3	12
Storage and handling of hazardous and highly combustible materials; storage and handling of small quantities of containers with flammable liquids as defined in Section 3.04.130.	E-1	2	6	12
Wholesale and retail stores.	F-2	3	4	12
Day Nurseries.	H	4	3	12
Aircraft repair hangars.	E-5	2	5	10
Restaurants with capacity of less than 300; factories, workshops and dry cleaning plants using flammable or combustible materials.	F-2	3	3	9
Lodge halls, exposition halls, clubrooms, specialty schools and social halls with capacity less than 100.	G	3	3	9
Hotels; dormitories; lodging houses; clubs; maternity homes.	H	3	3	9
Any building used for school purposes, involving assemblage for instruction, education, or recreation; Sunday school classrooms not exceeding capacity of 50.	C	4	2	8
Repair garages; boatyard structures.	E-4	2	4	8
Gasoline filling and service stations, storage garages.	F-1	2	4	8
Warehouses for highly combustible material.	E-4	1	7	7
Stadiums and reviewing stands; amusement park structures not included in A, B-1 or B-2.	B-3	2	3	6
Places of detention.	D-1	3	2	6
Ice plants.	F-2	1	6	6
Aircraft storage hangars; open deck parking garages.	F-3	2	3	6

Table 5-E

BUILDINGS

Table No. 5-E (Continued)

OCCUPANCY	Occupancy Classification	Life Hazard Rating	Fire Hazard Rating	Combined Rating
Printing plants; mortuary establishments; factories, workshops and dry cleaning plants using nonflammable and noncombustible materials.	G	2	3	6
Apartments; convents and monasteries over 12 capacity.	H	3	2	6
One and two family dwellings; convents and monasteries with capacity of 12 or less.	I	3	2	6
Warehouses, storage and sales rooms for combustible goods.	F-2	1	5	5
Power plants, pumping plants.	G	1	5	5
Fire and police stations; office buildings; clinics.	G	2	2	4
Warehouses for noncombustible materials; shipyard structures.	G	1	4	4
Private garages, sheds and minor buildings used as accessories; carpools; plant nurseries.	J-1	1	4	4
Cold storage, creameries, storage and sales rooms for noncombustible materials; commercial greenhouses.	G	1	3	3
Towers; tanks for storage of nonflammable and non-combustible liquids.	J-3	1	3	3
Fences over six feet high; television and radio receiving masts.	J-2	1	1	1
Signs.	J-3	1	1	1

Chapter 3.06

GROUP A OCCUPANCIES—REQUIREMENTS

Sections:

- 3.06.010 Group A occupancies defined.
- 3.06.020 Construction height and area allowable.
- 3.06.030 Location on property.
- 3.06.040 Exit facilities.
- 3.06.050 Light, ventilation and sanitation.
- 3.06.060 Enclosure of vertical openings.
- 3.06.070 Fire extinguishing systems.
- 3.06.080 Special hazards.

3.06.010 Group A occupancies defined. Group A occupancies shall be:

DIVISION 1. Any assembly building with an occupant load of 1,500 or more.

DIVISION 2. Any assembly building with an occupant load of 900 to 1,500.

For occupancy separation see Table No. 5-B.

For occupant load see Section 3.33.010. (Ord. 85500 § 601; Sept. 10, 1956).

3.06.020 Construction height and area allowable. (a) **GENERAL.** Buildings or parts of buildings classed in Group A because of the character of the occupancy shall not exceed in area or height, the limits specified in Sections 3.05.050, 3.05.060 and 3.05.070. Height and area allowable are also subject to regulation under the Zoning Ordinance. Where height and area allowable under this Code conflict with those permitted under the Zoning Ordinance, the more restrictive requirements shall apply.

(b) **SPECIAL PROVISIONS.** Stages and enclosed platforms as defined in Chapter 3.04 shall be constructed in accordance with the requirements of Chapter 3.39. The slope of the main floor of an assembly room shall not exceed one in eight. Group A occupancies shall not be permitted in cellars. (Ord. 85500 § 602; Sept. 10, 1956).

3.06.030 Location on property. Buildings shall front directly upon at least one public street not less than forty feet wide in which front shall be located the main entrance and exit of such building.

The location of Group A occupancies is also subject to regulation under the Zoning Ordinance.

For fire-resistive protection of exterior walls see Sections 3.18.030 and 3.19.030. (Ord. 85500 § 603; Sept. 10, 1956).

3.06.040 Exit facilities. Stairs, exits, and smokeproof enclosures shall be provided as specified in Chapter 3.33. (Ord. 85500 § 604; Sept. 10, 1956).

3.06.050 Light, ventilation and sanitation. All portions of Group A occupancies customarily used by human beings and all dressing rooms shall be provided with light by means of windows or skylights or by artificial light in accordance with requirements of the Electrical Code. Ventilation of spaces shall be as specified in Chapter 3.55.

Plumbing shall be provided as specified in the Plumbing Code. (Title 5.) (Ord. 85500 § 605; Sept. 10, 1956).

3.06.060 Enclosure of vertical openings. Exits shall be enclosed as specified in Chapter 3.33. Elevator shafts, vent shafts and other vertical openings shall be enclosed and the enclosure shall be as set forth in Table No. 17-A. (See also Chapter 3.30.) (Ord. 85500 § 606; Sept. 10, 1956).

3.06.070 Fire extinguishing systems. Automatic fire extinguishing systems shall be installed as specified in Chapter 3.38.

All Group A theaters shall be provided with an auxiliary electric fire alarm system, which shall be connected with and operate a main fire alarm box located outside of the theater building, but within the width of an abutting street of it, and connecting with the city alarm system, or such auxiliary fire alarm system shall be connected to an approved central station which, in turn, is connected with the city alarm system.

Stages shall be equipped with automatic ventilators as required in Section 3.39.010. (Ord. 85500 § 607; Sept. 10, 1956).

3.06.080 Special hazards. (a) Chimneys shall conform to the requirements of Chapter 3.37. Heating systems shall conform to the applicable requirements of Chapters 3.50 to 3.54, inclusive. Motion picture booths shall conform to the requirements of Chapter 3.40.

(b) Flammable liquids shall not be stored in any Group A occupancy.

(c) Exterior openings in a boiler room or room containing central heating equipment, if located below openings in another story or if less than ten feet from other doors or windows of the same building shall be protected by Class "E" or "F" fire doors or windows.

(d) Every boiler room or room containing a central heating plant in any Group A occupancy shall be separated from the rest of the building by not less than a three-hour fire-resistive occupancy separation. (Ord. 85500 § 608, as amended by Ord. 93964; June 15, 1965).

Chapter 3.07

GROUP B OCCUPANCIES — REQUIREMENTS

Sections:

- 3.07.010 Group B occupancies defined.
- 3.07.020 Construction, height and area allowable.
- 3.07.030 Location on property.
- 3.07.040 Exit facilities.
- 3.07.050 Light, ventilation and sanitation.

- 3.07.060 Enclosure of vertical openings.
- 3.07.070 Fire extinguishing systems.
- 3.07.080 Special hazards.

3.07.010 Group B occupancies defined. Group B occupancies shall be:

DIVISION 1. Any assembly building with an occupant load of 300 to 900.

DIVISION 2. Any assembly building with an occupant load less than 300.

DIVISION 3. Stadiums and reviewing stands; amusement park structures not included in Group A or Group B, Divisions 1 and 2.

For occupancy separations see Table No. 5-B.

For occupant load see Section 3.33.010. (Ord. 85500 § 701; Sept. 10, 1956).

3.07.020 Construction, height and area allowable. (a) **GENERAL.** Buildings or parts of buildings classed in Group B because of the character of the occupancy shall not exceed in area or height, the limits specified in Sections 3.05.050, 3.05.060 and 3.05.070.

(b) **SPECIAL PROVISIONS.** Stages and enclosed platforms as defined in Chapter 3.04 shall be constructed in accordance with requirements of Chapter 3.39.

Divisions 1 and 2 occupancies with an occupant load of fifty or more which are located over usable space shall be separated from such space by a one-hour fire-resistive occupancy separation, unless otherwise regulated by Table No. 5-B. Division 1 occupancies shall not be permitted in cellars.

For attic space partitions and draft stops see Section 3.32.060.

(c) **DIVISION 3 PROVISIONS.** Erection and structural maintenance of structures housing Division 3 occupancies shall conform to the requirements of this Code and where there are no such specific requirements, shall provide adequate safety for the loads to which they may be subjected.

Structures housing Division 3 occupancies other than those of open skeleton frame type, when located in a basement or when more than one story in height or four hundred square feet in area, shall be of not less than one-hour fire-resistive construction. When the space under a Division 3 occupancy is used for any purpose, it shall be separated from all parts of such Division 3 occupancy including exits, by walls, floors, and ceilings as specified in Table No. 5-B. (Ord. 85500 § 702, as amended by Ord. 90196; April 24, 1961).

3.07.030 Location on property. All buildings housing Group B occupancies shall front upon at least one public street or access road open to a public street, not less than forty feet wide in which front shall be located the main entrance of the building.

For fire resistive protection of exterior walls and openings, see Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030. (Ord. 85500 § 703; Sept. 10, 1956).

3.07.040 Exit facilities. (a) GENERAL. Stairs, exist, and smoke-proof enclosures shall be provided as specified in Chapter 3.33. All required exit doors in exterior walls in two-story buildings of Types III, IV, or V construction shall be within four feet of grade elevation.

(b) AMUSEMENT STRUCTURES. Stairs and exits for Division 3 amusement structures shall be provided as specified in Chapter 3.33 subject to the approval of the Superintendent of Buildings. Exit signs shall be installed as specified in Section 3.33.120. (Ord. 85500 § 704; Sept. 10, 1956).

3.07.050 Light, ventilation and sanitation. All portions of Group B occupancies customarily used by human beings and all dressing rooms shall be provided with light by means of windows or skylights or by artificial light in accordance with requirements of the Electrical Code. (Title 4.) Ventilation of spaces shall be as specified in Chapter 3.55.

Plumbing shall be provided as specified in the Plumbing Code. (Title 5.) (Ord. 85500 § 705; Sept. 10, 1956).

3.07.060 Enclosure of vertical openings. Exits shall be enclosed as specified in Chapter 3.33.

Elevator shafts, vent shafts, and other vertical openings shall be enclosed and the enclosure shall be as set forth in Table No. 17-A. (See also Chapter 3.30.) (Ord. 85500 § 706; Sept. 10, 1956).

3.07.070 Fire extinguishing systems. Automatic fire extinguishing systems shall be installed as specified in Chapter 3.38.

Every B-1 theater shall be provided with an auxiliary electric fire alarm system, which shall be connected with and operate a main fire alarm box located outside of the theater building, but within the width of an abutting street of it, and connecting with the city fire alarm system, or such auxiliary fire alarm system shall be connected to an approved central station, which, in turn, is connected with the city fire alarm system. (Ord. 85500 § 707; Sept. 10, 1956).

3.07.080 Special hazards. (a) Chimneys shall conform to the requirements of Chapter 3.37. Heating systems shall conform to the applicable requirements of Chapters 3.50 to 3.54, inclusive. Motion picture projection booths shall conform to the requirements of Chapter 3.40.

- (b) Flammable liquids shall not be stored in a Group B occupancy.
- (c) Exterior openings in a boiler room or room containing central heating equipment, if located below openings in another story or if less than ten feet from other doors or windows of the same building shall be protected by Class "E" or "F" fire doors or windows.
- (d) Every boiler room or room containing a central heating plant in any Group B occupancy shall be separated from the rest of the building by not less than a one-hour fire-resistive occupancy separation.
- (e) In gymnasiums, one inch nominal tight tongue and grooved wall covering may be used on the gymnasium side over fire-resistive plaster. (Ord. 85500 § 708, as amended by Ord. 93964; June 15, 1965).

Chapter 3.08

GROUP C OCCUPANCIES — REQUIREMENTS

Sections:

- 3.08.010 Group C occupancies defined.
- 3.08.020 Construction, height and area allowable.
- 3.08.030 Location on property.
- 3.08.040 Exit facilities.
- 3.08.050 Light, ventilation and sanitation.
- 3.08.060 Enclosure of vertical openings.
- 3.08.070 Fire extinguishing systems.
- 3.08.080 Special hazards.
- 3.08.090 Exceptions and deviations.
- 3.08.100 Open plan educational building.
- 3.08.110 Fire alarms.

3.08.010 Group C occupancies defined. Group C occupancies shall be:

Division 1. Any building used for educational purposes through the twelfth grade by fifty or more persons for more than twelve hours per week or four hours in any one day;

Division 2. Any building used for educational purposes through the twelfth grade by less than fifty persons for more than twelve hours per week or four hours in any one day;

Division 3. Day care centers (each accommodating more than twelve children).

For occupancy separations, see Table No. 5-B.

For occupancy load, see Section 3.33.010. (Ord. 85500 § 801 as amended by Ord. 101283 § 11; August 10, 1972).

3.08.020 Construction, height and area allowable. (a) General. Buildings of parts of buildings classed in Group C because of the use or character of the occupancy shall be limited to the types of construction set

forth in Tables No. 5-C and No. 5-D and shall not exceed, in area or height, the limits specified in Sections 3.05.050, 3.05.060 and 3.05.070, except that the area may be increased by fifty percent when the maximum travel distance specified in Section 3.33.020(d) is reduced by fifty percent.

(b) **Special Provisions.** Rooms in Divisions 1 and 2 occupancies used for day care purposes, kindergarten, first or second grade pupils and Division 3 occupancies shall not be located above the first story above grade.

Laboratories, woodworking and metalworking shops, mechanical equipment rooms, machine shops, paint shops, storage rooms and similar areas shall be separated from each other and from classrooms by not less than a one-hour fire-resistive occupancy separation as defined in Chapter 3.05.

Janitor closets shall be of one-hour fire-resistive construction.

All curtains, drops, and drapes shall be flameproofed as required by the Fire Code.

Stages and enclosed platforms shall be constructed in accordance with Chapter 3.39.

For attic space partitions and draft stops, see Section 3.32.060. (Ord. 85500 § 802 as amended by Ord. 101283 § 12; August 10, 1972).

3.08.030 Location on property. All buildings housing Group C occupancies shall front directly upon or have access to a public street not less than forty feet in width. The access to the public street shall be a minimum forty-foot wide right-of-way, unobstructed and maintained only as access to the public street. At least one required exit shall be located on the public street or on the access way.

For fire resistive protection of exterior walls and openings, as determined by location on property, see Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030 and 3.22.030. (Ord. 85500 § 803 as amended by Ord. 101283 § 13; August 10, 1972).

3.08.040 Exit facilities. Stairs, exits, and smokeproof enclosures shall be provided as specified in Chapter 3.33. (See also Section 3.33.180). All required exit doors in exterior walls of two story buildings of Types III, IV, or V construction shall be within four feet of grade elevation. (Ord. 85500 § 804 as amended by Ord. 101283 § 14; August 10, 1972).

3.08.050 Light, ventilation and sanitation. All portions of group C occupancies shall be provided with light and ventilation, either natural or artificial, as specified in Section 3.06.050. (Ord. 85500 § 805 as amended by Ord. 101283 § 15; August 10, 1972).

3.08.060 Enclosure of vertical openings. Exits shall be enclosed as specified in Chapter 3.33. Elevator shafts, vent shafts and other vertical openings shall be enclosed, and the enclosure shall be as specified in Chapter 3.17. (See also Chapter 3.30). (Ord. 85500 § 806 as amended by Ord. 101283 § 16; August 10, 1972).

3.08.070 Fire-extinguishing systems. Where required, automatic fire-extinguishing systems and standpipes shall be installed as specified in Chapter 3.38, subject to approval by the fire chief. (Ord. 85500 § 807 as amended by Ord. 101283 § 17; August 10, 1972).

3.08.080 Special hazards. Motion picture machine rooms shall conform to the requirements of Chapter 3.40.

Each building served by gas shall be provided with an approved outside gas shutoff valve conspicuously marked.

All exterior openings in a boiler room or rooms containing central heating equipment, if located below openings in another story or if less than ten feet from other doors or windows of the same building, shall be protected by a fire assembly having a three-fourths-hour fire-protection rating. Such fire assemblies shall be fixed, automatic, or self-closing.

Every room containing a boiler or a central heating plant shall be separated from the rest of the building by not less than a one-hour fire-resistive occupancy separation as defined in Chapter 3.05 with openings protected by a one-hour fire-protection assembly.

When the opening for a heater or equipment room is protected by a pair of fire doors, the inactive leaf shall be normally secured in the closed position and shall be openable only by the use of a tool. As astragal shall be provided and the active fire leaf shall be self-closing.

Storage, handling and use of flammable liquids shall be as specified in the Fire Code. (Ord. 85500 § 808 as amended by Ord. 93964 and Ord. 101283 § 18; August 10, 1972).

3.08.090 Exceptions and deviations. In gymnasiums, tight tongue and grooved wood or plywood wall covering may be used on the inner side over fire-resistive plaster when applied without air space.

Roof covering shall be a "fire-retardant" roofing as specified in Section 3.32.040.

A building housing a group C, division 2 or a division 3 occupancy for not more than twenty pupils and which will have only the first floor accessible to children may be used for school day care purposes with the following exceptions to code requirements.

Exceptions: 1. Exterior walls or parts of walls which are less than three feet from adjacent property lines shall have no openings therein and shall be of not less than one-hour fire-resistive construction as specified in Chapter 3.43.

2. Classrooms may have only one exit not less than twenty-eight inches in clear width of opening.

(Ord. 85500 § 809 as amended by Ord. 88324 and Ord. 101283 § 19; August 10, 1972).

3.08.100 Open plan educational building. A group C, division 1 occupancy may be constructed as an open plan educational building under the following conditions:

1. Corridor walls need not comply with the requirements of Sections 3.33.040 and 3.33.180;

2. The maximum distance of travel to the exterior of the building shall not exceed one hundred feet;

3. Partitions and room dividers need not have a fire-resistive rating, but shall meet the requirements of Section 3.17.050 and have a Class I flame-spread rating;

4. Floor plan arrangements which will affect exiting conditions shall be approved by the superintendent of buildings. Copies of such approved floor plan arrangements shall be maintained available on the premises for inspection by regulatory authorities;

5. In buildings protected by an approved automatic fire-extinguishing system, the relocation of partitions and room dividers may require relocation of the fire-extinguishing system devices;

6. Industrial vocational shops shall be of one-hour construction and shall be separated from each other by a one-hour fire-resistive occupancy separation as defined in Chapter 3.05. (Ord. 85500 § 810 added by Ord. 101283 § 20; August 10, 1972).

3.08.110 Fire alarms. Approved fire alarms shall be provided for all group C occupancies with an occupant load of more than fifty persons as specified in the Fire Code. In every group C occupancy provided with an automatic fire-extinguishing system, the operation of such system shall automatically activate the school fire alarm system. (Ord. 85500 § 811 added by Ord. 101283 § 21; August 10, 1972).

Chapter 3.09

GROUP D OCCUPANCIES—REQUIREMENTS

Sections:

- 3.09.010 Group D occupancies defined.
- 3.09.020 Construction, height and area allowable.
- 3.09.030 Location on property.
- 3.09.040 Exit facilities.
- 3.09.050 Light, ventilation and sanitation.
- 3.09.060 Enclosure of vertical openings.
- 3.09.070 Fire extinguishing systems.
- 3.09.080 Special hazards.
- 3.09.090 Fire alarms.

3.09.010 Group D occupancies defined. Group D occupancies shall be:

Division 1. Mental hospitals, mental sanitariums, jails, prisons, reformatories, and buildings where personal liberties of inmates are similarly restrained;

Division 2. Nurseries for the full time care of children under kindergarten age (each accommodating more than six children, including the children of the resident family under kindergarten age).

Hospitals, sanitariums, nursing homes and similar buildings (each accommodating more than two patients);

Division 3. Boarding homes for the aged (each accommodating more than two persons).

Homes for children of kindergarten age or over (each accommodating more than six children, including the children of the resident family).

For occupancy separations see Table No. 5-B.

For occupant load see Section 3.33.010. (Ord. 85500 § 901 as amended by Ord. 94563 and Ord. 101283 § 22; August 10, 1972).

3.09.020 Construction, height and area allowable. (a) **GENERAL.** Buildings or parts of buildings classed in group D because of the use or character of the occupancy shall be limited to the types of construction set forth in Tables No. 5-C and No. 5-D and shall not exceed, in area or height, the limits specified in Sections 3.05.050, 3.05.060 and 3.05.070.

Division 1 occupancies shall be housed in buildings of Type I or II construction.

Exceptions: One-story buildings of Type III-one hour, IV-one hour or V-one hour construction may be permitted provided the floor area does not exceed three thousand nine hundred square feet between separation walls of two-hour fire-resistive construction with openings protected by fire assemblies having one and one-half-hour fire-protection rating. See Section 3.33.190(g) for limitation on locking devices. Occupancies in which the personal liberties of inmates or patients are restrained within the building shall have floors of noncombustible construction.

For attic space partitions and draft stops, see Section 3.32.060.

(b) **SPECIAL PROVISIONS.** 1. Group D occupancies shall be prohibited in cellars. Such occupancies shall be permitted in basements only where the floor level is at or above ground level on at least one whole side of such occupancy;

2. At least one elevator, not less in size than five feet by seven feet, shall be provided in every Division 1 or 2 occupancy over one story in height.

Exception: Ramps as specified in Section 3.33.060 may be substituted for elevators in two story buildings;

3. Every room used for living, eating, or sleeping purposes shall have a minimum ceiling height of seven feet, six inches;

4. Division 1 occupancies shall be of Type I or II construction only and shall have floors of noncombustible construction.

5. Plans accompanying an application for a permit to construct or alter any group D occupancy must be approved by the State Health De-

partment before a building permit will be issued for such work.

Where requirements of this code conflict with state health laws, the more restrictive shall apply. (Ord. 85500 § 902 as amended by Ord. 92504 and Ord. 101283 § 23; August 10, 1972).

3.09.030 Location on property. For fire resistive protection of exterior walls and openings, as determined by location on property, see Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030 and 3.22.030. (Ord. 85500 § 903; September 10, 1956).

3.09.040 Exit facilities. Stairs, exits, and smokeproof enclosures shall be provided as specified in Chapter 3.33. (See also Section 3.33.190). (Ord. 85500 § 904 as amended by Ord. 101283 § 24; August 10, 1972).

3.09.050 Light, ventilation and sanitation. All portions of group D occupancies customarily used by human beings shall be provided with light and ventilation by means of windows or skylights with an area equal to one-eighth of the total floor area, one-half of which shall be openable or shall be provided with artificial light and a mechanically operated ventilating system as specified in Chapter 3.55. (Ord. 85500 § 905 as amended by Ord. 101283 § 25; August 10, 1972).

3.09.060 Enclosure of vertical openings. Exits shall be enclosed as specified in Chapter 3.33. (For specific requirements, see Section 3.33.190).

Elevator shafts, vent shafts, and other vertical openings shall be enclosed, and the enclosure shall be as specified in Chapter 3.17. (See also Chapter 3.30). (Ord. 85500 § 906 as amended by Ord. 101283 § 26; August 10, 1972).

3.09.070 Fire-extinguishing systems. When required by other provisions of this code, automatic fire-extinguishing systems and standpipes shall be installed as specified in Chapter 3.38, subject to approval by the fire chief. (Ord. 85500 § 907 as amended by Ord. 101283 § 27; August 10, 1972).

3.09.080 Special hazards. Motion picture machine rooms shall conform to the requirements of Chapter 3.40.

Storage, handling and use of flammable liquids shall be as specified in the Fire Code.

Each building served by gas shall be provided with an approved outside gas shutoff valve conspicuously marked.

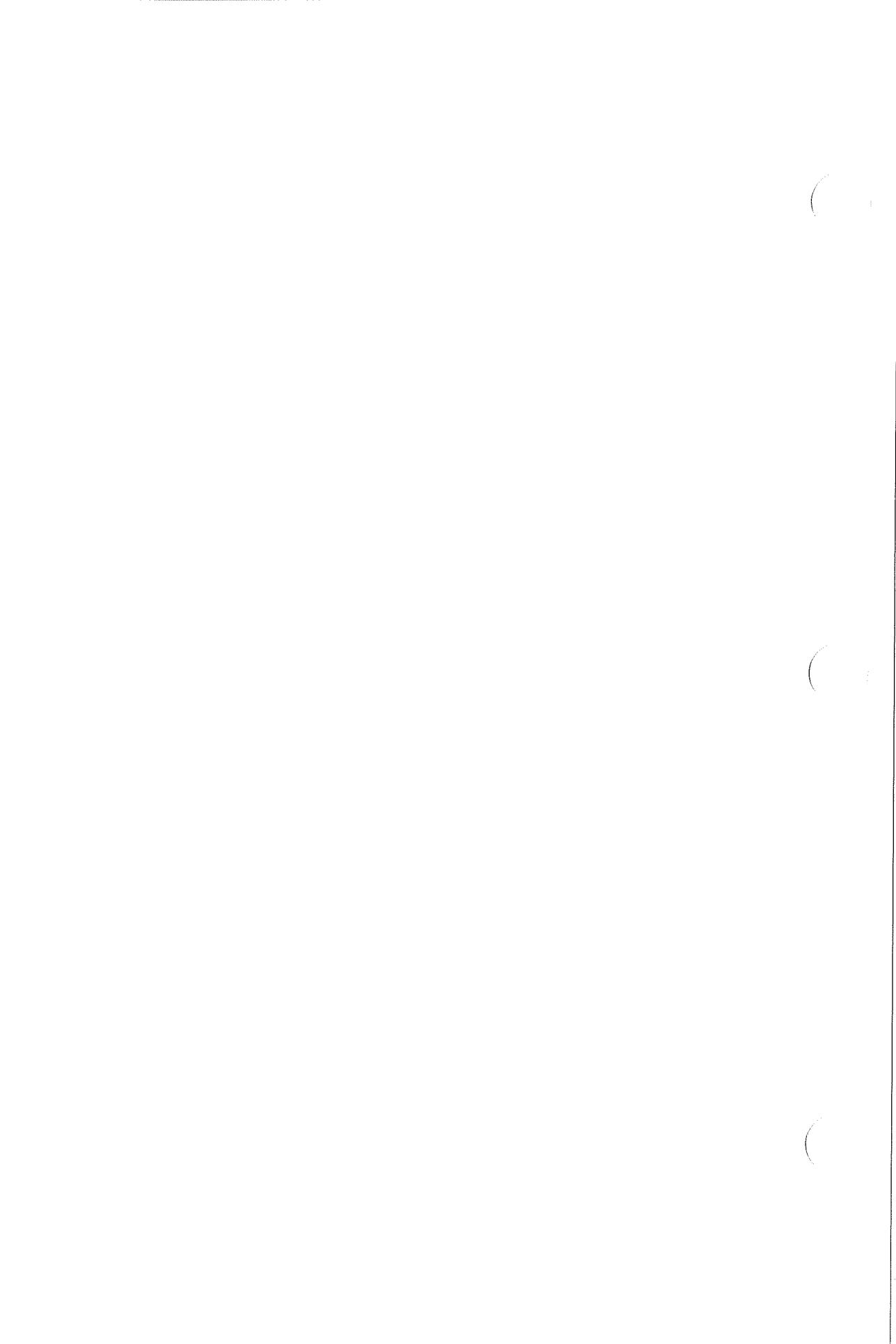
All exterior openings in a boiler room or room containing central heating equipment if located below openings in another story, or if less than ten feet from the other doors or windows of the same building, shall be protected by a fire assembly having a three-fourths-hour fire-protection rating. Such fire assemblies shall be fixed, automatic, or self-closing.

Every room containing a boiler or a central heating plant shall be separated from the rest of the building by not less than a one-hour fire-

resistive occupancy separation as defined in Chapter 3.05, with openings protected as specified in Section 3.33.200.

Exception: When the opening for a heater of equipment room is protected by a pair of fire doors, the inactive leaf shall be normally secured in the closed positions and shall be openable only by the use of a tool. An astragal shall be provided and the active leaf shall be self-closing. (Ord. 85500 § 908 as amended by Ord. 93964 and Ord. 101283 § 28; August 10, 1972).

3.09.090 Fire alarms. An approved fire alarm system shall be provided for all group D occupancies as specified in the Fire Code. (Ord. 85500 § 909 added by Ord. 101283 § 29; August 10, 1972).



Chapter 3.10

GROUP E OCCUPANCIES — REQUIREMENTS

Sections:

- 3.10.010 Group E occupancies defined.
- 3.10.020 Construction, height and area allowable.
- 3.10.030 Location on property.
- 3.10.040 Exit facilities.
- 3.10.050 Light, ventilation and sanitation.
- 3.10.060 Enclosure of vertical openings.
- 3.10.070 Fire extinguishing systems.
- 3.10.080 Special hazards.

3.10.010 Group E occupancies defined. Group E occupancies shall be:

DIVISION 1. Storage and handling of hazardous and highly flammable or explosive materials other than flammable liquids.

DIVISION 2. Storage and handling of flammable liquids except as regulated by Chapter 8.15 of the Fire Code; dry cleaning plants using flammable liquids.

DIVISION 3. Shops and factories where loose, combustible fibers are manufactured; or where dust is generated; woodworking establishments in excess of three thousand (3,000) square feet, planing mills, and box factories.

DIVISION 4. Warehouses for highly combustible material; repair garages; boatyard structures.

DIVISION 5. Aircraft repair hangars, heliports.

For occupancy separations see Table No. 5-B.

For occupancy load see Section 3.33.010. (Ord. 85500 § 1001, as amended by Ord. 89827; December 12, 1960).

3.10.020 Construction, height and area allowable. (a) GENERAL. Buildings or parts of buildings classed in Group E because of the use or character of the occupancy shall not exceed, in area or height, the limits specified in Sections 3.05.050, 3.05.060 and 3.05.070.

(b) SPECIAL PROVISIONS. The area increases allowed by Section 3.05.060 (e) shall not exceed 500 per cent for aircraft repair hangars. Boatyard structures may be two stories high in Types III N, IV N, and V N construction.

In public garages and other buildings where flammable liquids are used or stored, floors shall be entirely protected with noncombustible materials.

In buildings over ninety-five feet (95') in height, the structure frame shall be protected with not less than four-hour fire-resistive protection and the floors shall be of not less than three-hour fire-resistive construction.

Paint spray rooms are regulated by Chapter 8.14 of the Fire Code.

For attic space partitions and draft stops see Section 3.32.060. (Ord. 85500 § 1002 as amended by Ord. 88910; January 5, 1960).

3.10.030 Location on property. (a) In buildings of Division 1, 2, 3, and 4, exterior walls (except on street fronts) within five feet (5') of adjacent property lines shall be of four-hour fire-resistive construction and shall have no openings therein, and when from five to ten feet (5'-10') shall be not less than two-hour fire-resistive with Class "D" fire doors on all exterior openings, and when from ten to twenty feet (10'-20') shall be not less than one-hour fire-resistive. Openings in walls from ten to twenty feet (10'-20') shall be protected with Class "E" fire doors or fire windows.

Exception: Division 2 occupancies shall have exterior walls of four-hour fire-resistive construction and shall have no openings therein within ten feet (10') of a property line. Openings ten to twenty feet (10'-20') shall be protected with Class "D" fire doors.

In buildings of Division 5 occupancy, exterior walls (except on street fronts) shall be not less than one-hour fire-resistive when within sixty feet (60') of adjacent property lines, and shall have no openings within five feet (5'), and any openings from five to sixty feet (5'-60') from adjacent property lines shall be protected with "E" fire doors or windows.

(b) Specialized buildings of Division 1 and 2 occupancy are also regulated by Fire and Explosion Hazard Ordinance. (Title 8).

(Ord. 85500 § 1003 as amended by Ord. 86257; June 18, 1957).

3.10.040 Exit facilities. Stairs, exits, and smokeproof enclosures shall be provided as specified in Chapter 3.33.

No automobile ramp within a building and with exit to a public street shall meet the exit floor level at a point less than sixteen feet from the property line fronting on such street. (Ord. 85500 § 1004; Sept. 10, 1956).

3.10.050 Light, ventilation and sanitation. All portions of Group E occupancies customarily used by human beings shall be provided with light by means of windows or skylights or by artificial light in accordance with requirements of the Electrical Code. (Title 4). Ventilation of spaces shall be as specified in Chapter 3.55.

Plumbing shall be provided as specified in the Plumbing Code (Title 5). (Ord. 85500 § 1005; Sept. 10, 1956).

3.10.060 Enclosure of vertical openings. Exits shall be enclosed as specified in Chapter 3.33.

Elevator shafts, vent shafts, and other vertical openings shall be enclosed, and the enclosure shall be as set forth in Table No. 17-A. (See also Chapter 3.30).

Doors which are part of an automobile ramp enclosure shall be so arranged as to be automatic or self-closing when released. (Ord. 85500 § 1006; Sept. 10, 1956).

3.10.070 Fire extinguishing systems. Automatic fire-extinguishing systems shall be installed as specified in Chapter 3.38. (Ord. 85500 § 1007; Sept. 10, 1956).

3.10.080 Special hazards. (a) GENERAL. Chimneys shall conform to the requirements of Chapter 3.37. Heating systems shall conform to the applicable requirements of Chapters 3.50 to 3.54, inclusive.

Devices generating a glow or flame capable of igniting volatile flammable vapor shall not be installed or used within two feet of the floor in any story in which volatile flammable liquids are used or stored unless such devices are adequately separated from areas where such liquids are used or stored.

Heating shall be by steam or hot water, in Division 2 occupancies.

(b) BOILER ROOMS AND HEATING PLANTS. 1. Every boiler room or room containing a heating plant in Groups E-1 and E-2 occupancies shall be separated from the rest of the building by a four-hour fire-resistive occupancy separation.

2. Every boiler room or room containing a heating plant in Groups E-3 and E-4 occupancies shall be separated from the rest of the building by a two-hour fire-resistive occupancy separation.

3. A boiler room or heating plant in a Group E-5 occupancy shall be separated from the rest of the building by a one-hour fire-resistive occupancy separation.

(c) FLAMMABLE LIQUIDS. The use, handling, storage and sale of gasoline, fuel oil and other flammable liquids shall not be permitted in any Group E occupancy unless such use, handling, storage and sale comply with the requirements of the Fire Code.

(d) DRY CLEANING PLANTS. Dry cleaning plants in which flammable solvents having a flash point below 138.5 degrees Fahrenheit (closed cup tester) or having a flash point above 138.5 degrees Fahrenheit and exceeding sixty gallons in aggregate volume are used or stored shall be of Type I construction and:

1. Shall be not over one story in height above the established grade of the lowest abutting street or alley, without attics, concealed roof spaces, basements, cellars or pits; and, if they use flammable solvents having a flash point below 138.5 degrees Fahrenheit shall not be permitted in Fire Zone 1.
2. Shall have bearing walls of four-hour fire-resistive construction and interior finish shall be noncombustible.
3. Exterior walls between dry cleaning or dry dyeing rooms and other buildings shall have no openings.
4. Each room containing washing, extracting or clarifying machines shall be provided with at least two exits which shall be remote from each other and lead directly to outside of the building.
5. Wired glass for windows where permitted shall be in sash so hung that they will readily swing out in case of an explosion. Such sash shall not be secured. Glass area in walls shall be so located as to vent the force of any explosion in the direction or directions of least exposure.
6. Floors shall not be below grade and shall have no pits, wells or pockets, and the wearing surface shall be of noncombustible material. Floor surface shall be of non-sparking type.
7. Skylights or monitors shall be provided in the roof. They shall be constructed of metal frame and sash and glazed with wired glass. The sash shall be of the pivot type, and so hung as to readily swing out in case of an explosion; or in lieu thereof, the skylights or monitors may be constructed of metal frame and sash and be provided with thin glass with a wire screen above the skylights. The glass area of the skylights shall be equal to one-fifteenth of the room area.
8. Drying equipment shall not be in the same room with washing machines.
9. Drying, dry cleaning and dry dyeing rooms shall be separated from each other and from other parts of the building by partitions of not less than three-hour fire-resistive construction.
10. The entrance to each drying, dry cleaning room or dry dyeing room shall be protected by a sliding type self-closing Class "A" fire door.
11. All exterior nonbearing walls shall be of at least three-hour fire-resistive construction. All permitted openings in exterior walls unless otherwise regulated by this section shall be protected by Class "E" or "F" fire doors or fire windows.
12. Mechanical systems of ventilation shall have sufficient capacity to insure complete and continuous change of air in dry cleaning and dry dyeing rooms once every three minutes.

13. Each dry cleaning room, dry dyeing room, drying room, scrubbing room, and scouring room shall be equipped with an approved fire extinguishing system, of one of the following types:
- i. An approved automatic sprinkler system.
 - ii. An approved carbon dioxide room flooding system.
 - iii. An approved steam smothering system, manually controlled by means of an approved quick opening valve from a conveniently accessible point outside the room protected with continuously available steam supply at a pressure of at least fifteen pounds per square inch and discharge piping outlets sufficient to deliver eight pounds of steam per minute per one hundred cubic feet of volume of the space protected.

(e) DUST. In Group E, Division 3 occupancies, equipment or machinery which generates or emits combustible or explosive dust or fibres shall be provided with an adequate dust collecting and exhaust system installed in accordance with U.B.C. Standard No. 10-2. Fire extinguishing systems may be required for such occupancies as specified in Chapter 3.38. (Ord. 85500 § 1008, as amended by Ord. 93964; June 15, 1965).

Chapter 3.11

GROUP F OCCUPANCIES — REQUIREMENTS

Sections:

- 3.11.010 Group F occupancies defined.
- 3.11.020 Construction, height and area allowable.
- 3.11.030 Location on property.
- 3.11.040 Exit facilities.
- 3.11.050 Light, ventilation and sanitation.
- 3.11.060 Enclosure of vertical openings.
- 3.11.070 Fire extinguishing systems.
- 3.11.080 Special hazards.
- 3.11.090 Open parking garages.
- 3.11.100 Storage tanks for flammable liquids.

3.11.010 Group F occupancies defined. Group F occupancies shall be:

DIVISION 1. Gasoline filling and service stations, storage garages; boat storage; storage tanks for flammable liquids.

DIVISION 2. Wholesale and retail stores; drinking and/or dining establishments with less than one hundred capacity; factories, workshops using flammable and combustible materials; ice plants; warehouses and storage rooms for combustible goods.

Buildings or portions of buildings having rooms used for educational purposes beyond the twelfth grade with less than fifty occupants in any room.

DIVISION 3. Aircraft storage hangars; helistops; open deck parking garages; boat moorage.

For occupancy separations see Table No. 5-B, except as provided in Section 3.11.020(b).

For occupant load see Section 3.33.010.

(Ord. 85500 § 1101 as amended by Ord. 89827, Ord. 97889 and Ord. 101283 § 30; August 10, 1972).

3.11.020 Construction, height and area allowable. (a) **GENERAL.** Buildings or parts of buildings classed in Group F because of the character of the occupancy shall not exceed, in area or height, the limits specified in Sections 3.05.050, 3.05.060 and 3.05.070.

Exceptions: For special provisions governing construction, height and area allowable for Division 3 occupancy, open deck parking garages, see Section 3.11.090.

(b) **SPECIAL PROVISIONS.** Motor vehicle service stations shall be of noncombustible or one-hour fire-resistive construction, including canopies and supports over pumps.

Exterior walls of aircraft hangars within twenty feet of a property line or of buildings on the same property shall be of not less than one-hour fire-resistive construction with all openings protected by Class "E" or "F" fire doors or fire windows.

Storage areas in excess of fifteen hundred square feet, used in connection with retail stores, shall be separated from the public area by a one-hour fire-resistive occupancy separation or such storage areas shall be sprinklered.

Height and area allowable are also subject to regulation under the Zoning Ordinance. Where height and area allowable under this Code conflict with those permitted under the Zoning Ordinance, the more restrictive requirements shall apply.

Parking on roofs shall be permitted as a Group F-3 occupancy when such parking areas are counted as a story and the parking area is protected with a surface of noncombustible material. Where parking occurs on roofs within sixteen feet of adjacent property lines, parapet walls shall be carried to a minimum height of three and one-half feet.

Helistops on roofs shall be permitted as a Group F-3 occupancy if building is of Type I or II construction, provided that the roof area is counted as a story, is protected with a surface of noncombustible material, is surrounded by an approved parapet wall or an approved railing of a minimum height of three and one-half feet, and meets the design requirements of Section 3.23.040.

For attic space partitions and draft stops see Section 3.32.060. (Ord. 85500 § 1102, as amended by Ord. 89827; December 12, 1960 and by Ord. 92060; May 14, 1963).

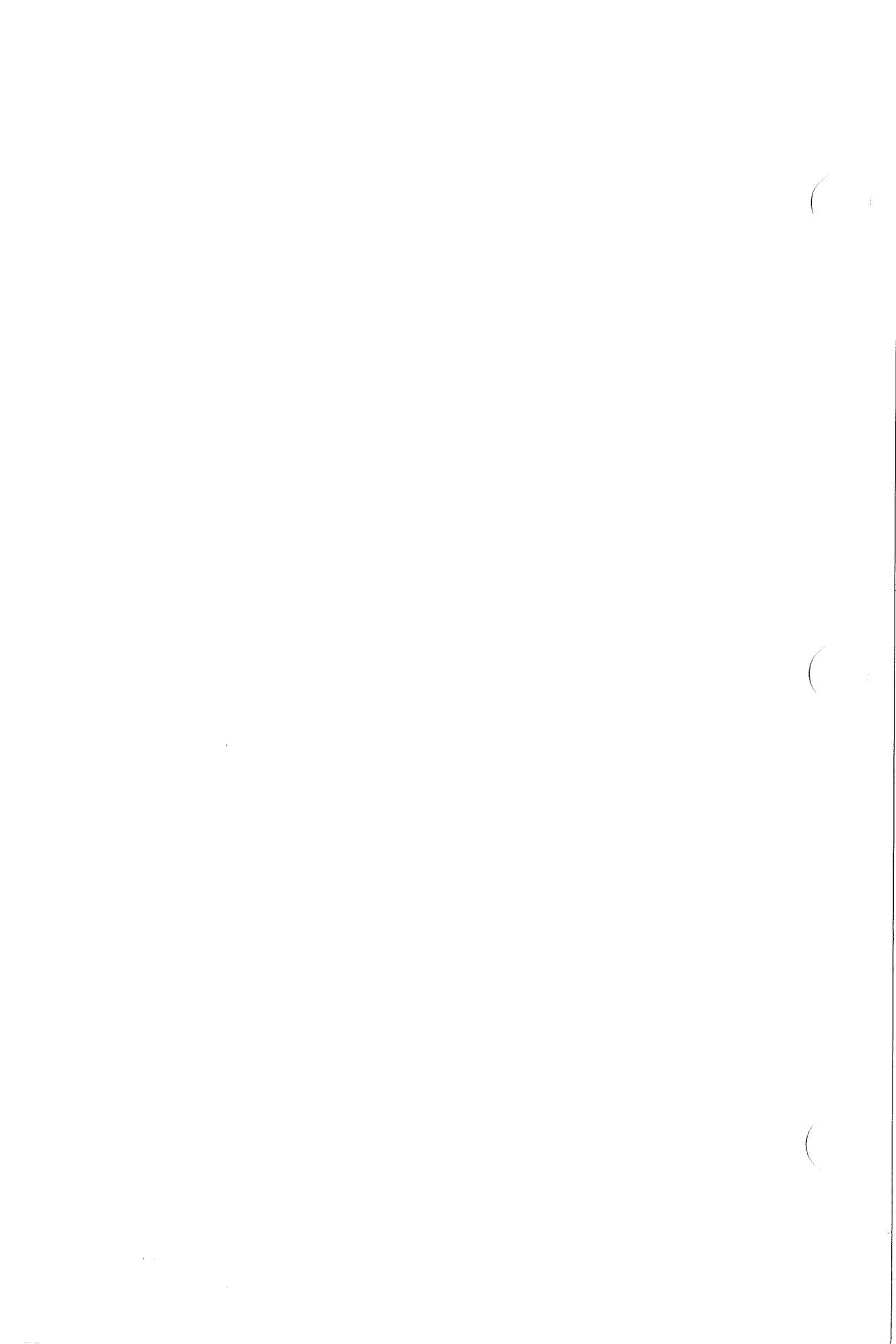
3.11.030 Location on property. For fire resistive protection of exterior walls and openings, as determined by location on property, see Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030, and Section 3.11.090.

The location of Group F occupancies is also subject to regulation under the Zoning Ordinance. (Ord. 85500 § 1103; Sept. 10, 1956).

3.11.040 Exit facilities. Stairs, exits and smokeproof enclosures shall be provided as specified in Chapter 3.33 and Section 3.11.090. An automobile ramp within a building and with exit to a public street shall not meet the exit level at a point less than sixteen feet from the property line fronting on such street unless approved pedestrian safeguards are provided. (Ord. 85500 § 1104 as amended by Ord. 88324; June 24, 1959).

3.11.050 Light, ventilation and sanitation. All portions of Group F occupancies customarily used by human beings shall be provided with light and ventilation as provided by Chapter 3.55. (Ord. 85500 § 1105 as amended by Ord. 88324; June 24, 1959).

3.11.060 Enclosure of vertical openings. Exits shall be enclosed as specified in Chapter 3.33. Elevator shafts, vent shafts, and other vertical openings shall be enclosed, and the enclosure shall be as set forth in Table No. 17-A. (See also Chapter 3.30). Doors which are part of an automobile ramp enclosure shall be so arranged as to be automatic or self-closing when released.



Exceptions: 1. For special provisions governing exits and enclosure of vertical openings in Division 3 occupancy, open deck parking garages, see Section 3.11.090.

2. Vertical openings in elevator type parking garages need not be enclosed if all portions of the structure below the highest street grade are provided with an automatic sprinkler system.

3. Ramps in parking garages of Type I or II construction need not be enclosed provided they are completely sprinklered. (Ord. 85500 as amended by Ord. 88324; June 24, 1959).

3.11.070 Fire extinguishing systems. Automatic fire extinguishing systems shall be installed as specified in Chapter 3.38, except for open deck parking garages whose requirements are specified in Section 3.11.090. (Ord. 85500 § 1107; Sept. 10, 1956).

3.11.080 Special hazards. (a) Chimneys shall conform to the requirements of Chapter 3.37. Heating systems shall conform to the requirements of Chapters 3.50 to 3.54, inclusive.

(b) Storage of flammable liquids shall not be allowed in Group F occupancies except as specified in the Fire Code.

(c) Devices generating a glow or flame capable of igniting volatile flammable vapor shall not be installed or used within two feet of the floor in any story in which volatile flammable liquids are used or stored unless such devices are adequately separated from areas where such liquids are used or stored.

(d) Exterior openings in a boiler room or room containing central heating equipment, if located below openings in another story, or if less than ten feet from other doors or windows of the same building, shall be protected by Class "E" or "F" fire doors or fire windows.

(e) A boiler or heating plant located in warehouses and storage rooms for combustible goods (Group F-2) and aircraft storage hangars (Group F-3) shall be separated from the rest of the building by not less than a one-hour fire-resistive occupancy separation. (Ord. 85500 § 1108 as amended by Ord. 93964; June 15, 1965).

3.11.090 Open parking garages. (a) Scope. Except where specific provisions are made in the following subsections, other requirements of this code shall apply.

(b) Definition. For the purpose of this section, an open parking garage is a structure of Type I, II, or IV construction more than one tier in height which is at least fifty percent open on two or more sides and is used exclusively for the parking or storage of passenger motor vehicles having a capacity of not more than nine persons per vehicle.

Open parking garages are further classified as either ramp-access or mechanical-access. Ramp-access open parking garages are those employing a series of continuously rising floors or a series of interconnecting ramps between floors permitting the movement of vehicles under their own power from and to the street level. Mechanical-access parking garages are those employing parking machines, lifts, elevators, or other mechanical devices for vehicles moving from and to street level and in which public occupancy is prohibited above the street level.

(c) Construction. Construction shall be of noncombustible materials. Open parking garages shall meet the design requirements of Chapter 3.23. Adequate curbs and railings shall be provided at every opening.

(d) Area and Height. Area and height of open parking garages in Fire Zones No. 1, No. 2, and No. 3 shall be limited as set forth in Table No. 11-A except for increases allowed by subsection (e).

In structures having a spiral or sloping floor, the horizontal projection of the structure at any cross section shall not exceed the allowable area per parking tier. In the case of a structure having a continuous spiral floor, each nine feet six inches of height or portion thereof shall be considered as a tier.

The clear height of a parking tier shall be not less than six feet six inches, except that a lesser clear height may be permitted in mechanical-access open parking garages when approved by the superintendent of buildings.

(e) Area and Height Increases. Structures open on three sides may be increased twenty-five percent in area and one tier in height. Structures open on four sides may be increased fifty percent in area and one tier in height.

(f) Location on Property. When located adjacent to interior property lines, exterior walls shall be of the degree of fire resistance set forth in Table No. 11-B and such walls shall be without openings.

(g) Stairs and Exits. Where persons other than parking attendants are permitted, stairs and exits shall meet the requirements of Chapter 3.33, based on an occupant load of two hundred square feet per occupant. Where no persons other than parking attendants are permitted there shall be not less than two stairs three feet wide. Lifts may be installed for use of employees only; provided they are completely enclosed in noncombustible materials.

(h) Standpipes. Standpipes shall be installed when required by the provisions of Chapter 3.38.

(i) Fire-extinguishing Systems. When required by other provisions of this code, automatic fire-extinguishing systems and standpipes shall be installed in accordance with the provisions of Chapter 3.38.

(j) Enclosure of Vertical Openings. Enclosure shall not be required for vertical openings except as specified in subsection (g) for stairs, exits and lifts.

(k) Ventilation. Ventilation, other than the percentage of openings specified in subsection (b), shall not be required.

(l) Prohibitions. The following uses and alterations are not permitted.

1. Automobile repair work;
2. Parking of busses, trucks and similar vehicles;
3. Partial or complete closing of required openings in exterior walls by tarpaulins or any other means.

TABLE NO. 11-A — OPEN PARKING GARAGES
AREA AND HEIGHT

Type of Construction	Area Per Tier (Square Feet)	Height		
		Ramp Access	Mechanical Access Automatic Fire-Extinguishing System	
			No	Yes
I	Unlimited	Unlimited	Unlimited	Unlimited
II	75,000	10 Tiers	12 Tiers	18 Tiers
IV-1-hour	50,000	8 Tiers	10 Tiers	15 Tiers
IV-N	30,000	6 Tiers	8 Tiers	12 Tiers

TABLE NO. 11-B — OPEN PARKING GARAGES
EXTERIOR WALLS

Distance From Property Line To Building	Fire Zone No. 1	Fire Zone No. 2	Fire Zone No. 3
0'—10'	2-hour	2-hour	1-hour
10'—20'	1-hour	1-hour	None

(Ord. 85500 § 109 as amended by Ord. 88324 and Ord. 101092 § 1; June 19, 1972).

3.11.100 Storage tanks for flammable liquids. (a) **SCOPE.** This section provides regulations for a specialized occupancy, tanks for the storage of flammable and combustibile liquids as defined in Section 3.04.130.

Exception: The following tanks are exempt from these requirements and are regulated by the provisions of the Fire Code:

1. All portable containers not used in conjunction with heating equipment.

2. All aboveground tanks storing Class I or II liquids.
3. Aboveground tanks which exceed two hundred seventy-five gallons in capacity.
4. Aboveground tanks not used in conjunction with a heating plant.

(b) **LOCATION OF TANK.** Underground tanks or tanks under buildings shall be so located with respect to existing building foundations and supports that the loads carried by the latter cannot be transmitted to the tank. The distance from any part of a tank storing Class I or II liquids to the nearest wall of any basement, pit or cellar shall be not less than one foot, and from any property line that may be built upon not less than three feet. The distance from any part of a tank storing Class III liquids to the nearest wall of any basement, pit or property line shall be not less than one foot, except that tanks with a capacity of one thousand gallons or less shall not require separation from walls.

(c) **GENERAL CONSTRUCTION REQUIREMENTS.** Every metal tank shall bear a permanent label with the manufacturer's name, gauge, capacity and serial number of the tank, or date of manufacture. Tanks for storage of liquids of thirty-five degrees A.P.I. or heavier may be constructed of concrete when approved by the Superintendent of Buildings.

Metal tanks shall be thoroughly coated on the outside with approved rust-resistive materials and shall be protected against damage to such coat during installation. Concrete tanks shall be waterproofed.

Connections to tanks shall be made through the top of tank above the liquid level, except that tanks of not over two hundred seventy-five gallons capacity may have one bottom connection for gravity feed and one opening for an approved valve or for a scavenging line to be run to the outside and capped oil tight when not in use.

Where tanks are located so that the top of the tank is above the level of the suction inlet of the pump, an approved siphon breaking device shall be installed. Provided, however, that in the case of a single tank not exceeding two hundred seventy-five gallons capacity, or a multiple tank installation so connected by means of an approved three-way valve that only one tank may be drawn from at a time, the installation of the above mentioned siphon breaking devices may be omitted.

(d) **SPECIAL REQUIREMENTS FOR UNDERGROUND TANKS.**
1. Underground tanks and tanks buried in buildings shall be constructed of steel or wrought iron and of sufficient strength to withstand safely the most severe strains to which they may be subjected, but in no case less than specified in the following table:

TABLE NO. 11-C—THICKNESS OF UNDERGROUND TANKS

Capacity of Tank in Gallons		Minimum Thickness Shell	of Materials Heads*
1 through	560	No. 12 gauge (U.S.S.)	No. 12 gauge (U.S.S.)
561 through	1,100	10 gauge	3/16"
1,101 through	4,000	7 gauge	1/4"
4,001 through	12,000	1/4"	5/16"
12,001 through	20,000	5/16"	3/8"
20,001 through	30,000	3/8"	1/2"

*When heads are adequately braced, flanged or dished, minimum thickness may be as specified for shells.

Tanks with diameter of more than eighty-four inches, or length greater than three and one-half times the diameter, or that are to be covered with more than five feet of earth, or that are to be subjected to surface load of more than one hundred pounds per square foot, in addition to the required covering, shall be constructed with additional reinforcing approved by the Superintendent of Buildings.

2. Underground tanks shall not be used for simultaneous storage of two or more classes of liquids.

3. An underground tank shall not be installed at a gasoline service station until there has been filed with the Superintendent of Buildings a plan of the property which shall show the location, size and separating distances of existing and proposed buildings, tanks or equipment.

4. Excavations for underground storage tanks shall be made with due care to avoid undermining of foundations of existing structures. Underground tanks shall be set on firm foundation and surrounded with soft earth or sand well tamped in place. Tanks shall be covered with a minimum of two feet of earth, or shall be covered with not less than one foot of earth on top of which shall be placed a slab of reinforced concrete not less than four inches thick. When underground tanks are or are likely to be subjected to traffic, they shall be protected against damage from vehicles passing over them by at least three feet of earth cover, or eighteen inches of well tamped earth, plus six inches of reinforced concrete or eight inches of asphalt concrete. When asphaltic or reinforced concrete pavings is used as part of the protection, it shall extend at least one foot horizontally beyond the outline of the tank in all directions.

5. An underground tank shall not be covered from sight nor shall flammable liquids be placed in such tank until the tank and appurtenances have been approved by the Superintendent of Buildings.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for ensuring transparency and accountability in financial operations. This section also highlights the role of internal controls in preventing fraud and errors.

2. The second part of the document focuses on the implementation of robust risk management strategies. It outlines various risk assessment techniques and provides guidance on how to identify, evaluate, and mitigate potential risks. The text stresses the need for a proactive approach to risk management to protect the organization's assets and reputation.

3. The third part of the document addresses the importance of effective communication and reporting. It discusses the need for clear and concise communication channels and the role of regular reporting in keeping stakeholders informed. This section also touches upon the importance of maintaining accurate financial statements and providing timely updates to management and investors.

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10. The tenth part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for ensuring transparency and accountability in financial operations. This section also highlights the role of internal controls in preventing fraud and errors.

earth or sand well tamped in place. Tanks shall be covered with a minimum of two feet of earth, or shall be covered with not less than one foot of earth on top of which shall be placed a slab of reinforced concrete not less than four inches thick. When underground tanks are or are likely to be subjected to traffic, they shall be protected against damage from vehicles passing over them by at least three feet of earth cover, or eighteen inches of well tamped earth, plus six inches of reinforced concrete or eight inches of asphalt concrete. When asphaltic or reinforced concrete paving is used as part of the protection, it shall extend at least one foot horizontally beyond the outline of the tank in all directions.

5. An underground tank shall not be covered from sight nor shall flammable liquids be placed in such tank until the tank and appurtenances have been approved by the Superintendent of Buildings.

The first part of the report deals with the general situation in the country. It is noted that the economy is still in a state of depression, and that the government is struggling to meet its obligations. The report also mentions the need for a more active role for the state in the economy, and the importance of maintaining social order.

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(e) **SPECIAL REQUIREMENTS FOR TANKS WITHIN OR UNDER BUILDINGS.** Tanks for the storage of Class I or II liquids may be located under buildings only when specifically designed for such installation and approved by the Superintendent of Buildings.

Tanks for the storage of class III liquid may be located within a building subject to the following requirements:

1. Tanks exceeding ten gallons (10 gal.) capacity shall not be located in a waterfront structure or in other buildings above the lowest story, cellar or basement.

2. Unenclosed tanks shall not be located within ten feet (10'), horizontally, of any oil burner.

Exception: Tanks constructed by the manufacturer as an integral part of the oil burner.

3. The capacity of a tank shall not exceed 275 gallons nor shall there be more than two (2) such tanks unless installed in an enclosure or casing constructed as follows:

The walls of the enclosure shall be constructed of reinforced concrete at least six inches (6") thick, or of brick at least eight inches (8") thick, shall be anchored to the floor, and shall extend not less than one foot (1') above the tank. The enclosure shall be filled with sand or well tamped earth. The top shall be a minimum of four inches (4") of concrete.

Tanks of reinforced concrete construction may be installed without additional concrete enclosure.

Tanks for storage of Class III liquid may be installed underneath a building provided the capacity and distances conform to the requirements for underground tanks in subsection (b). Tanks shall not be installed under a building which affects the structural frame without prior approval by the Superintendent of Buildings.

(f) **SPECIAL REQUIREMENTS FOR ABOVEGROUND TANKS.** Aboveground tanks shall be constructed of steel or wrought iron of minimum U. S. Standard gauge in accordance with the following table:

CAPACITY, GALLONS	MINIMUM THICKNESS
1 through 60	18 gauge
61 through 275	14 gauge

Such tanks shall not be permitted in buildings of Group A or B occupancies nor in C occupancies except those of Types III-N, IV-N, or V-N construction.

(g) **PIPING, GENERAL.** 1. Fill, vent, discharge and return pipes shall be connected to a tank through the top with approved fittings and where possible shall be pitched to drain to the tank.

2. Unions employing gaskets subject to deterioration by oil shall not be permitted.

3. Right and left couplings, running threads, lock nuts or packing shall not be permitted.

4. Piping and fittings shall be put together with approved paste.

5. Piping and fittings for tanks shall be protected in an approved manner.

6. Piping connected with tanks storing Class I and II liquids shall not enter a building.

Exception: Such piping may enter Group E-1 or E-2 occupancies, service stations and garages.

(h) VENT PIPES. 1. Every tank shall have an open or approved automatically operated vent. Such vent pipe shall drain to the tank without trap or sag and shall extend through the top into the tank not more than one inch (1"). Vent pipes from tanks storing Class I or II flammable liquids shall be so located that the discharge point is outside of any buildings, higher than the fill pipe opening, and not less than twelve feet (12') above the adjacent ground level, and shall discharge only upward or horizontally. Vent pipes two inches (2") or less in nominal inside diameter shall not be obstructed by devices that will reduce their capacity and thus cause excessive back pressure. Vent pipe outlets shall be so located that flammable vapors will not enter building openings, or be trapped under eaves or other obstructions. If the vent pipe is less than ten feet (10') in length or greater than two inches (2") in nominal inside diameter, the outlet shall be provided with a vacuum and pressure relief device or there shall be an approved flame arrester located in the vent line at the outlet or within an approved distance from the outlet. In no case shall a flame arrester be located more than fifteen feet (15') from the outlet end of the vent line.

2. Vent openings and vent pipes shall be of ample size to prevent abnormal pressure in the tank during filling but not less than specified in the following table:

TANK CAPACITY	MINIMUM DIAMETER OF VENTS
1- 275 gallons (Underground)	$\frac{3}{4}$ inches
1- 275 gallons (Aboveground)	1- $\frac{1}{4}$ inches
276-1,000 gallons	1- $\frac{1}{4}$ inches
1,001-3,000 gallons	1- $\frac{1}{2}$ inches
Over 3,000 gallons	2 inches

3. Tanks for the storage of Class III flammable or combustible liquids and exceeding sixty (60) gallons individual capacity shall be equipped with vent pipes having approved caps and terminating outside any building

at a point not less than two feet distant from any window or other opening above the fill cap, and not less than three feet above finished grade.

4. Vent pipes shall not be cross-connected with fill pipes or return lines from burners.

5. Vent pipes shall not be run through windows or coal chutes unless such openings are totally enclosed with approved construction.

(i) **FILL AND OVERFLOW PIPES.** 1. Fill pipes of underground tanks and tanks in buildings shall be carried to an approved outside location but in no case closer than two feet (2') from any exterior door or basement or cellar opening.

2. Fill pipes shall not exceed four inches (4") in diameter and their openings shall be closed and liquid tight when not in use.

3. Test wells or gauging devices shall be designed to prevent the escape of oil or vapor when closed.

4. Auxiliary tanks shall be so installed as to be filled by pumping from storage tanks only. Auxiliary tanks other than vacuum tanks shall be equipped with an overflow pipe draining to the storage tank, at least one size larger than the supply pipe.

5. Cross connections permitting flow from one underground tank to another shall be permitted only through the top of the tank.

6. Where fill pipes are located so that excessive head pressure might be created in tanks, approved devices shall be provided to relieve such pressures.

(j) **MANHOLE SHAFTS.** Where manhole shafts are installed, they shall have one boiler plate cover at the top of the tank and one at the ground surface. Manhole covers in public streets, alleys, or places shall be approved by the City Engineer. Manhole shafts when not in use shall be filled with sand and shall not be used for filling or emptying tanks.

(k) **PUMPS.** Every pump for withdrawal of flammable liquids shall be of a type approved by the Superintendent of Buildings. In making his determinations said Superintendent shall be guided by the standards of recognized testing agencies.

(l) **SERVICE STATIONS.** Pumps shall be located not less than twelve feet (12') from public street, alley or adjacent property line.

Fill pipes located within twelve feet (12') of adjacent property line shall not be offset toward such property line. (Ord. 85500 § 1110 as amended by Ord. 90196; April 24, 1961).

Chapter 3.12

GROUP G OCCUPANCIES — REQUIREMENTS

Sections:

- 3.12.010 Group G occupancies defined.
- 3.12.020 Construction, height and area allowable.
- 3.12.030 Location on property.
- 3.12.040 Exit facilities.
- 3.12.050 Light, ventilation and sanitation.
- 3.12.060 Enclosure of vertical openings.
- 3.12.070 Fire extinguishing systems.
- 3.12.080 Special hazards.

3.12.010 Group G occupancies defined. Group G occupancies shall be an office building; lodge hall, exposition hall, club room, specialty school, social hall, dance hall, place of worship, skating rink, sports arena or theater, the occupant load of which is less than one hundred; clinic, printing plant, shipyard structure, animal habitation, mortuary establishment, power plant, cold storage, creamery, factory, workshop or dry cleaning plant using nonflammable and noncombustible materials; warehouse or storage room for noncombustible goods; commercial greenhouse.

For occupancy separations see Table No. 5-B, except as provided in Section 3.11.020 (b).

For occupant load see Section 3.33.010. (Ord. 85500 § 1201, as amended by Ord. 90196; April 24, 1961).

3.12.020 Construction, height and area allowable. (a) **GENERAL.** Buildings or parts of buildings classed in Group G because of the character of the occupancy shall not exceed, in area or height, the limits specified in Sections 3.05.050, 3.05.060 and 3.05.070.

(b) **SPECIAL PROVISIONS.** Fire protection of the underside of roof framing may be omitted in buildings of types III, IV and V construction, except office buildings and those with roofs of concrete.

For attic space partitions and draft stops see Section 3.32.060.

Height and area allowable are also subject to regulation under the Zoning Ordinance. Where height and area allowable under this Code conflict with those permitted under the Zoning Ordinance, the more restrictive requirements shall apply. (Ord. 85500 § 1202; Sept. 10, 1956).

3.12.030 Location on property. For fire resistive protection of exterior walls and openings, as determined by location on property, see Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030 and 3.22.030.

Exception: Section 3.21.030 (Table 21-A) shall not apply to Type IV buildings in Fire Zone Three housing factories, workshops and similar occupancies using nonflammable and noncombustible materials and warehouses or storage rooms for noncombustible goods. Such buildings, when located less than three feet from an adjacent property line, shall have one-hour fire resistive exterior walls with no openings.

The location of Group G occupancies is also subject to regulation under the Zoning Ordinance. (Ord. 94563 § 8; February 23, 1966; prior Ord. 85500 § 1203; September 10, 1956).

3.12.040 Exit facilities. Stairs, exits, and smokeproof enclosures shall be provided as specified in Chapter 3.33.

Exception: In buildings of Type I or II construction, fifty percent of required stairs may exit through a lobby or foyer and need not be enclosed on the first floor provided such lobby or foyer is separated from the second floor stair enclosure.

(Ord. 85500 § 1204 as amended by Ord. 86257; June 18, 1957).

3.12.050 Light, ventilation and sanitation. All portions of Group G occupancies customarily used by human beings shall be provided with light by means of windows or skylights or by artificial light in accordance with requirements of the Electric Code. (Title 4). Ventilation of spaces shall be as specified in Chapter 3.55. Plumbing shall be provided as specified in the Plumbing Code. (Title 5). (Ord. 85500 § 1205; September 10, 1956).

3.12.060 Enclosure of vertical openings. Exits shall be enclosed as specified in Chapter 3.33. Other vertical openings are not required to be enclosed in any building housing animal habitations, mortuary establishments, power plants, creameries, steel mills and cement mills; and in buildings not more than two stories high housing offices, warehouses and storage rooms for noncombustible goods, printing plants, police and fire stations, cold storage, and factories, workshops and dry cleaning plants using non-flammable and non-combustible materials. (Ord. 85500 § 1206, as amended by Ord. 93964; June 15, 1965).

3.12.070 Fire extinguishing systems. Automatic fire extinguishing systems shall be installed as specified in Chapter 3.38. (Ord. 85500 § 1207; September 10, 1956).

3.12.080 Special hazards. (a) Chimneys shall conform to the requirements of Chapter 3.37. Heating systems shall conform to the applicable requirements of Chapters 3.50 to 3.54 inclusive.

(b) In cold storage buildings or rooms, refrigerator doors shall be designed to permit easy opening from the inside. Such buildings or rooms

shall be adequately insulated to prevent freezing of ground and damage to adjacent property.

(c) Exterior openings in a boiler room or room containing central heating equipment, if located below openings in another story, or if less than ten feet from other doors or windows of the same building, shall be protected by Class "E" or "F" fire doors or windows.

(d) A boiler or heating plant located where flammable liquids or gases are stored in any Group G occupancy shall be separated from the rest of the building by not less than a one-hour fire-resistive occupancy separation. (Ord. 85500 § 1208, as amended by Ord. 93964; June 15, 1965).

Chapter 3.13

GROUP H OCCUPANCIES—REQUIREMENTS

Sections:

- 3.13.010 Group H occupancies defined.
- 3.13.020 Construction, height and area allowable.
- 3.13.030 Location on property.
- 3.13.040 Exit facilities.
- 3.13.050 Light, ventilation and sanitation.
- 3.13.060 Yards and courts.
- 3.13.070 Room dimensions.
- 3.13.080 Efficiency dwelling units.
- 3.13.090 Enclosure of vertical openings.
- 3.13.100 Fire extinguishing systems.
- 3.13.110 Heating
- 3.13.120 Special hazards.

3.13.010 Group H occupancies defined. Group H occupancies shall be: Hotels, motels, police and fire stations, lodging houses and apartment houses;

Dormitories, residential clubs, maternity homes, sororities, and fraternities (each accommodating more than six persons);

Nurseries for the full time care of children under kindergarten age (each accommodating three or more but not more than six children, including the children of the resident family under kindergarten age);

Nurseries for the part time care of children under kindergarten age (each accommodating more than six children, including the children of the resident family under kindergarten age);

Convents and monasteries (each accommodating more than twelve persons).

For occupancy separations, see Table No. 5-B.

For occupancy load, see Section 3.33.010.

(Ord. 85500 § 1301 as amended by Ord. 88324 and Ord. 101283 § 31; August 10, 1972).

3.13.020 Construction, height and area allowable. (a) GENERAL. Buildings or parts of buildings classed in group H because of the use or character of the occupancy shall be limited to the types of construction set forth in Tables No. 5-C and No. 5-D and shall not exceed, in area or height, the limits specified in Sections 3.05.050, 3.05.060 and 3.05.070.

(b) SPECIAL PROVISIONS. Group H occupancies more than two stories in height or having more than three thousand square feet of floor area above the first story shall be not less than one-hour fire-resistive construction throughout.

Exception: Dwelling units within an apartment house not over two stories in height may have nonbearing walls of unprotected construction; provided the units are separated from each other and from corridors by construction having a fire-resistive rating of not less than one hour. Openings to such corridors shall be equipped with smoke or draft stop doors conforming to Section 3.33.040 or other equivalent protection.

For attic space partitions and draft stops, see Section 3.32.060. (Ord. 85500 § 1302 as amended by Ord. 101283 § 32; August 10, 1972).

3.13.030 Location on property. Group H occupancies shall front without exit obstruction upon at least one public street or access road, not less than forty feet wide. For fire-resistive protection of exterior walls and openings, as determined by location on property, see Sections 3.05.040, 3.18.030, 3.19.030, 3.20.030, 3.21.030 and 3.22.030. (Ord. 85500 § 1302 as amended by Ord. 101283 § 33; August 10, 1972).

3.13.040 Exit facilities. Stairs, exits, and smokeproof enclosures shall be as specified in Chapter 3.33.

All stairs and exits in group H occupancies shall open directly upon a street or alley or upon a yard or court not less than four feet in width directly connected to a street or alley by means of a passageway not less in width than the stairway opening into such passageway and not less than seven feet in height.

Exception: In buildings of Type I or II construction, fifty percent of required stairs may exit through a lobby or foyer.

Buildings more than one story in height shall have no transoms or ventilating openings from guest rooms to public corridors.

Door openings from guest rooms to public corridors shall be protected with a fire-protection assembly as specified in Section 3.33.040.

Every sleeping room below the fourth floor shall have at least one openable window or exterior door approved for emergency exit or rescue. Where windows are provided they shall have a sill height not more than forty-eight inches above the floor, and shall provide not less than five square feet of openable area with no dimension less than twenty-two inches.

Windows with an area of not less than five square feet with no dimension less than twenty-two inches shall be deemed to meet the requirements

of this section provided sill heights are not over forty-eight inches above the floor. (Ord. 85500 § 1304 as amended by Ord. 101283 § 34; August 10, 1972).

3.13.050 Light, ventilation and sanitation. (a) **LIGHT AND VENTILATION.** All guest rooms, dormitories, and habitable rooms within a dwelling unit shall be provided with natural light by means of windows or skylights with an area of not less than one-tenth of the floor area of such rooms with a minimum of twelve square feet. All bathrooms, water closet compartments, laundry rooms, and similar rooms shall be provided with natural ventilation by means of windows or skylights with an area of not less than one-tenth of the floor area of such rooms with a minimum of three square feet.

Not less than one-half of the required window or skylight area shall be openable to provide natural ventilation.

In lieu of openable windows for natural ventilation, a mechanical ventilation system may be provided. Such system shall be capable of providing two air changes per hour in all guest rooms, dormitories, habitable rooms and in public corridors. One-fifth of the air supply shall be taken from the outside. In bathrooms, water closet compartments, laundry rooms, and similar rooms, a mechanical ventilation system connected directly to the outside and capable of providing five air changes per hour shall be provided.

For the purpose of determining light and ventilation requirements, any room may be considered as a portion of an adjoining room when one-half of the area of the common wall is open and unobstructed and provides an opening of not less than one-tenth of the floor area of the interior room or twenty-five square feet, whichever is greater.

Required windows shall open directly onto a street or public alley or a yard or court located on the same lot as the building.

Exception: Required windows may open into a roofed porch where the porch:

1. Abuts a street, yard, or court; and
2. Has a ceiling height of not less than seven feet; and
3. Has the longer side at least sixty-five percent open and unobstructed.

(b) **SANITATION.** A room in which a water closet is located shall be separated from rooms for food preparation or storage by a tight-fitting door. (Ord. 85500 § 1305 as amended by Ord. 91850 and Ord. 101283 § 35; August 10, 1972).

3.13.060 Yards and courts. (a) **SCOPE.** This section shall apply to yards and courts having required windows opening therein.

(b) **YARDS.** Every yard shall be not less than three feet in width for one-story and two-story buildings. For buildings more than two stories in height, the minimum width of the yard shall be increased at the rate

of one foot for each additional story. For buildings exceeding fourteen stories in height, the required width of yard shall be computed on the basis of fourteen stories.

(c) COURTS. Every court shall be not less than three feet in width. Courts having windows opening on opposite sides shall be not less than six feet in width. Courts bounded on three or more sides by the walls of the building shall be not less than ten feet in length unless bounded on one end by a street or yard. For buildings more than two stories in height, the court shall be increased one foot in width and two feet in length for each additional story. For buildings exceeding fourteen stories in height, the required dimensions shall be computed on the basis of fourteen stories.

Adequate access shall be provided to the bottom of all courts for cleaning purposes. Every court more than two stories in height shall be provided with a horizontal air intake at the bottom not less than ten square feet in area and leading to the exterior of the building unless abutting a yard or public space. The construction of the air intake shall be as required for the court walls of the building, but in no case shall be less than one-hour fire-resistive.

(d) PROJECTION INTO YARDS. Eaves and cornices may project into any required yard not more than two inches for each foot of yard width. Unroofed landings, porches and stairs may project into any required yard; provided no portion except for guardrails extends above the floor level of a habitable room and provided further that no such projection shall obstruct a required exitway. (Ord. 85500 § 1306 as amended by Ord. 101283 § 36; August 10, 1972).

3.13.070 Room dimensions. (a) CEILING HEIGHT. Habitable rooms, storage rooms and laundry rooms shall have a ceiling height of not less than seven feet six inches. Hallways, corridors, bathrooms and water closet rooms shall have a ceiling height of not less than seven feet measured to the lowest projection from the ceiling.

If any room in a building has a sloping ceiling, the prescribed ceiling height for the room is required in only one-half the area thereof. No portion of the room measuring less than five feet from the finished floor to the finished ceiling shall be included in any computation of the minimum area thereof.

If any room has a furred ceiling, the prescribed ceiling height is required in two-thirds the area thereof, but in no case shall the height of the furred ceiling be less than seven feet.

Any portion of a garage shall have an unobstructed headroom clearance of not less than six feet six inches above the finish floor to any ceiling, beam, pipe, or similar construction except for wall-mounted shelves, storage surfaces, racks, or cabinets.

(b) SUPERFICIAL FLOOR AREA. Every dwelling unit shall have at least one room which shall have not less than one hundred twenty

square feet of superficial floor area. Every room which is used for both cooking and living or both living and sleeping purposes shall have not less than one hundred fifty square feet of superficial floor area. Other habitable rooms shall have an area of not less than ninety square feet. Where more than two persons occupy a room used for sleeping purposes, the required superficial floor area shall be increased at the rate of fifty square feet for each occupant in excess of two. Superficial floor area is herein defined as clear floor space, exclusive of fixed or built-in cabinets or appliances.

(c) **WIDTH.** No habitable room other than a kitchen shall be less than seven feet in any dimension.

A water closet compartment shall be not less than thirty inches in width and shall provide a clear space in front of the water closet not less than twenty-four inches.

Fraternity and sorority house sleeping rooms or porches and other rooms or porches similarly used by unrelated students for sleeping purposes only shall meet the following requirements:

- (1) Single or double bunks only shall be used;
- (2) Minimum floor area shall be sixty square feet per single or double bunk;
- (3) There shall be a minimum three-foot aisle from every bunk to an exit;
- (4) There shall be a minimum three-foot aisle between any bunk and a side of any other bunk. (Ord. 85500 § 1307 as amended by Ord. 101283 § 37; August 10, 1972).

3.13.080 Efficiency dwelling units. An efficiency dwelling unit shall conform to the requirements of the code except as herein provided:

- (1) The unit shall have a living room of not less than two hundred twenty square feet of superficial floor area. An additional one hundred square feet of superficial floor area shall be provided for each occupant of such unit in excess of two;
- (2) The unit shall be provided with a separate closet;
- (3) The unit shall be provided with a kitchen sink, cooking appliance and refrigeration facilities each having a clear working space of not less than thirty inches in front. Light and ventilation conforming to this code shall be provided;
- (4) The unit shall be provided with a separate bathroom containing a water closet, lavatory, and bathtub or shower. (Ord. 85500 as amended by Ord. 93964, Ord. 96247 and Ord. 101283 § 38; August 10, 1972).

3.13.090 Enclosure of vertical openings. Exits shall be enclosed as specified in Chapter 3.33.

Elevator shafts, vent shafts, and other vertical openings shall be enclosed and the enclosure shall be as specified in Section 3.17.060. (Ord. 85500 § 1309 added by Ord. 101283 § 39; August 10, 1972).

3.13.100 Fire-extinguishing systems. When required by other provisions of this code, automatic fire-extinguishing systems and standpipes shall be installed as specified in Chapter 3.38, subject to approval of the fire chief. (Ord. 85500 § 1310 added by Ord. 101283 § 40; August 10, 1972).

3.13.110 Heating. Every dwelling unit and guest room shall be provided with heating facilities capable of maintaining a room temperature of seventy degrees Fahrenheit at a point three feet above the floor in all habitable rooms. (Ord. 85500 § 1311 added by Ord. 101283 § 41; August 10, 1972).

3.13.120 Special hazards. The storage and handling of gasoline, fuel oil, and other flammable liquids shall be as specified in the Fire Code.

Doors leading into rooms in which volatile flammable liquids are stored or used shall be protected by a fire assembly having a one-hour fire-protection rating. Such fire assembly shall be self-closing and shall be posted with a sign on each side of the door in one-inch block letters stating: "FIRE DOOR—KEEP CLOSED."

Every boiler room or room containing a central heating plant shall be separated from the rest of the building by not less than a one-hour fire-resistive occupancy separation as defined in Chapter 3.05.

Exception: A separation shall not be required for such rooms with equipment serving only one dwelling unit. (Ord. 85500 § 1312 added by Ord. 101283 § 42; August 10, 1972).

Chapter 3.14

GROUP I OCCUPANCIES — REQUIREMENTS

Sections:

- 3.14.010 Group I occupancies defined.
- 3.14.020 Construction, height and area allowable.
- 3.14.030 Location on property.
- 3.14.040 Exit facilities.
- 3.14.050 Light, ventilation and sanitation.
- 3.14.060 Yards and courts.
- 3.14.070 Room dimensions.
- 3.14.080 Enclosure of vertical openings.
- 3.14.090 Fire extinguishing systems.
- 3.14.100 Heating.
- 3.14.110 Exceptions and deviations.

3.14.010 Group I occupancies defined. Group I occupancies shall be: One and two family dwellings, convents and monasteries with capacity of twelve or less;

Dormitories, residential clubs, maternity homes, sororities and fraternities (each accommodating not more than six persons);

Family day care homes (each accommodating not more than twelve children, including the children of the resident family under the age of twelve years), which have been inspected annually by the fire and building departments. The results of such inspections shall be reported to the Washington State Department of Social and Health Services and to the occupants;

Foster family home (each accommodating not more than six children, including the children of the resident family).

For occupancy separations, see Table No. 5-B.

For occupant load, see Section 3.33.010. (Ord. 85500 § 1401 as amended by Ord. 101283 § 43; August 10, 1972).

3.14.020 Construction, height and area allowable. Buildings or parts of buildings classed in group I because of the use or character of the occupancy shall be limited to the types of construction set forth in Tables No. 5-C and No. 5-D and shall not exceed, in area or height, the limits specified in Sections 3.05.050, 3.05.060 and 3.05.070. (Ord. 85500 § 1402 as amended by Ord. 101283 § 44; August 10, 1972).

3.14.030 Location on property. For fire-resistive protection of exterior walls and openings, as determined by location on property, see Sections 3.05.040, 3.18.030, 3.19.030, 3.20.030, 3.21.030 and 3.22.030. (Ord. 85500 § 1403 as amended by Ord. 101283 § 45; August 10, 1972).

3.14.040 Exit facilities. Stairs and exits shall be provided as specified in Chapter 3.33.

Every sleeping room below the fourth floor shall have at least one openable window or exterior door approved for emergency exit or rescue. Where windows are provided, they shall have a sill height not more than forty-eight inches above the floor and shall provide not less than five square feet of openable area with no dimension less than twenty-two inches.

Windows with an area of not less than five square feet with no dimension less than twenty-two inches shall be deemed to meet the requirements of this section provided sill heights are not over forty-eight inches above the floor. (Ord. 85500 § 1404 as amended by Ord. 101283 § 46; August 10, 1972).

3.14.050 Light, ventilation and sanitation. (a) **LIGHT AND VENTILATION.** All guest rooms, dormitories and habitable rooms within a dwelling unit shall be provided with natural light by means of windows or skylights with an area of not less than one-tenth of the floor area of such rooms with a minimum of twelve square feet. All bathrooms, water closet compartments, laundry rooms, and similar rooms shall be provided with natural ventilation by means of windows or skylights with an area of not less than one-tenth of the floor area of such rooms with a minimum of three square feet.

Not less than one-half of the required window or skylight area shall be openable to provide natural ventilation.

In lieu of openable windows for natural ventilation, a mechanical ventilation system may be provided. Such system shall be capable of providing two air changes per hour in all guest rooms, dormitories, habitable rooms and in public corridors. One-fifth of the air supply shall be taken from the outside. In bathrooms, water closet compartments, laundry rooms and similar rooms, a mechanical ventilation system connected directly to the outside and capable of providing five air changes per hour shall be provided.

For the purposes of determining light and ventilation requirements, any room may be considered as a portion of an adjoining room when one-half of the area of the common wall is open and unobstructed and provides an opening of not less than one-tenth of the floor area of the interior room or twenty-five square feet, whichever is greater.

Required windows shall open directly onto a street or public alley or a yard or court located on the same lot as the building.

Exception: Required windows may open into a roofed porch where the porch:

1. Abuts a street, yard or court; and
2. Has a ceiling height of not less than seven feet; and
3. Has the longer side at least sixty-five percent open and unobstructed.

(b) **SANITATION.** A room in which a water closet is located shall be separated from rooms for food preparation or storage by a tight-fitting door. (Ord. 85500 § 1405 as amended by Ord. 101283 § 47; August 10, 1972).

3.14.060 Yards and courts. Yards and courts having required window openings therein shall comply with the requirements for group H occupancies. (Ord. 85500 § 1406 as amended by Ord. 101283 § 48; August 10, 1972).

3.14.070 Room dimensions. (a) Habitable rooms, storage rooms and laundry rooms shall have a ceiling height of not less than seven feet six inches. Hallways, corridors, bathrooms and water closet rooms shall have a ceiling height of not less than seven feet measured to the lowest projection from the ceiling.

If any room in a building has a sloping ceiling, the prescribed ceiling height for the room is required in only one-half the area thereof. No portion of the room measuring less than five feet from the finished floor to the finished ceiling shall be included in any computation of the minimum area thereof.

If any room has a furred ceiling, the prescribed ceiling height is required in two-thirds the area thereof, but in no case shall the height of the furred ceiling be less than seven feet.

(b) **SUPERFICIAL FLOOR AREA.** Every dwelling unit shall have at least one room which shall have not less than one hundred twenty square feet of superficial floor area. Every room which is used for both cooking and living or both living and sleeping purposes shall have not less than one hundred fifty square feet of superficial floor area. Other habitable rooms shall have an area of not less than ninety square feet. Where more than two persons occupy a room used for sleeping purposes the required superficial floor area shall be increased at the rate of fifty square feet for each occupant in excess of two. Superficial floor area is herein defined as clear floor space, exclusive of fixed or built-in cabinets or appliances.

(c) **WIDTH.** No habitable room other than a kitchen shall be less than seven feet in any dimension.

A water closet compartment shall be not less than thirty inches in width and shall provide a clear space in front of the water closet not less than twenty-four inches. (Ord. 85500 § 1407 as amended by Ord. 101283 § 49; August 10, 1972).

3.14.080 Enclosure of vertical openings. Dumbwaiter shafts, clothes chutes and other vertical openings shall be enclosed and the enclosure shall be as specified in Section 3.17.060. (Ord. 85500 § 1408 as amended by Ord. 101283 § 50; August 10, 1972).

3.14.090 Fire extinguishing systems. Fire extinguishing systems when installed shall conform to the requirements of Chapter 3.38, subject to approval by the fire chief. (Ord. 85500 § 1409 added by Ord. 101283 § 51; August 10, 1972).

3.14.100 Heating. Every dwelling unit and guest room shall be provided with heating facilities capable of maintaining a room temperature of seventy degrees Fahrenheit at a point three feet above the floor in all habitable rooms. (Ord. 85500 § 1410 added by Ord. 101283 § 52; August 10, 1972).

3.14.110 Exceptions and deviations. A group I occupancy constructed on the roof of a multi-storied building shall be considered as an additional story of such building insofar as construction, location, exposure, stairs, exits, and fire extinguishing apparatus are concerned.

A carport or garage (J occupancy) need not have a fire separation from the building it serves and may have unprotected openings. (Ord. 85500 § 1411 added by Ord. 101283 § 53; August 10, 1972).

Chapter 3.15

GROUP J OCCUPANCIES — REQUIREMENTS

Sections:

- 3.15.010 Group J occupancies defined.
- 3.15.020 Construction, height and area allowable.

- 3.15.030 Location on property.
- 3.15.040 Light and ventilation.
- 3.15.050 Special hazards.

3.15.010 Group J occupancies defined. Group J occupancies shall be:

DIVISION 1. Private garages, carports, plant nurseries, sheds and minor buildings used as accessories, not exceeding one thousand square feet in area.

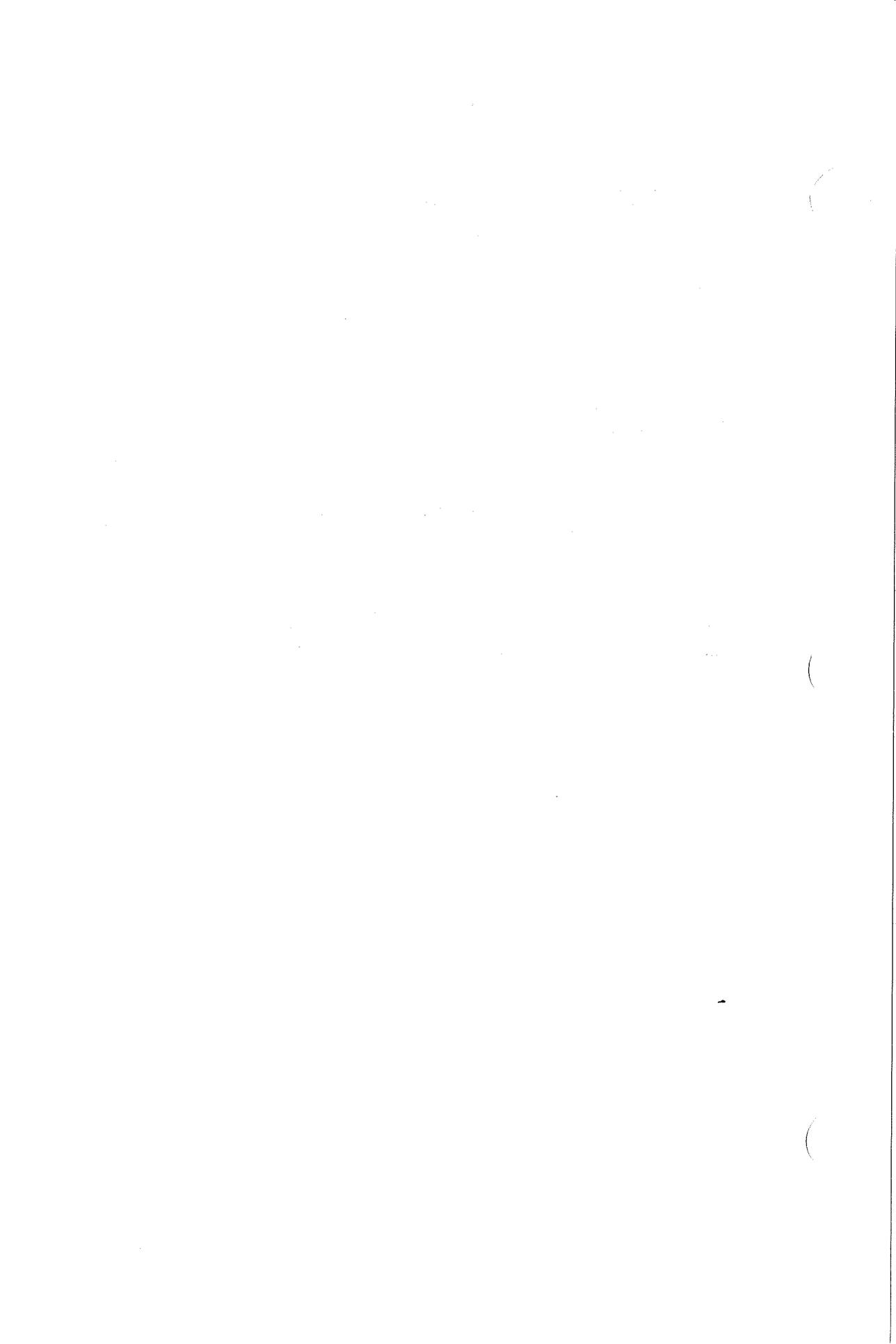
DIVISION 2. Fences over six feet high; radio and television receiving masts over twenty-five feet in height.

DIVISION 3. Towers; tanks for storage of nonflammable and non-combustible liquids; signs.

For occupancy separations see Table No. 5-B.

For occupant load see Section 3.33.010. (Ord. 85500 § 1501; Sept. 10, 1956).

3.15.020 Construction, height and area allowable. Buildings or parts of buildings classed in group J because of the character of the occupancy may be of any construction type permitted by this code. Floor area shall



not to exceed one thousand square feet and height shall not exceed one story. The height of signs shall be measured from adjacent ground or, when over water, from mean high water level.

When any building as defined in Section 3.15.010 exceeds the limits specified in Section 3.15.020, it shall be classed in the occupancy group other than Group J which it most nearly resembles.

Height and area allowable are also subject to regulations under the Zoning Ordinance. Where height and area allowable under this code conflict with those permitted under the Zoning Ordinance the more restrictive requirements shall apply. (Ord. 85500 § 1502; Sept. 10, 1956).

3.15.030 Location on property. For fire resistive protection of exterior walls and openings as determined by location on property see Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030 and 3.22.030.

Location of building is also subject to regulation under the Zoning Ordinance. (Ord. 85500 § 1503; Sept. 10, 1956).

3.15.040 Light and ventilation. Private garages constructed in conjunction with Group H occupancies which have openings into such buildings shall be equipped with fixed louvered or screened openings or exhaust ventilation to the outside within six inches of the floor. The clear area of such openings or exhaust ducts shall be not less than sixty square inches for each two hundred fifty square feet of area of such garage. There shall be no opening from such garage into a room used for sleeping purposes. (Ord. 85500 § 1504; Sept. 10, 1956).

3.15.050 Special hazards. Chimneys shall conform to the requirements of Chapter 3.37. Heating systems shall conform to the applicable requirements of Chapters 3.50 to 3.54, inclusive.

Flammable liquids shall be stored, handled, or used in Group J occupancies only under the provisions of the Fire and Explosion Hazard ordinance (Title 8). (Ord. 85500 § 1505; Sept. 10, 1956).

Chapter 3.16

FIRE ZONES — RESTRICTIONS

Sections:

- 3.16.010 City divided into fire zones.
- 3.16.020 Fire zone one—Boundaries.
- 3.16.030 Fire zone two—Boundaries.
- 3.16.040 Fire zone two—Additional boundaries.
- 3.16.050 Fire zone two—Additional boundaries.
- 3.16.060 Fire zone two—Additional boundaries.
- 3.16.070 Fire zone three—Boundaries.
- 3.16.080 Application of requirements.
- 3.16.090 Restrictions in fire zone one.

3.16.100 Restrictions in fire zone two.

3.16.110 Restrictions in fire zone three.

3.16.010 City divided into fire zones. The city is hereby divided into Fire Zones designated Fire Zones One, Two and Three, as hereinafter set forth. (Ord. 85500 § 1601 as amended by Ord. 85817; Jan. 8, 1957).

3.16.020 Fire zone one—Boundaries. Fire Zone One shall consist of that part of the city described as follows:

Beginning at the intersection of the center line of Alaskan Way and Clay Street; thence northeasterly along the center line of Clay Street to an intersection with the center line of Denny Way; thence easterly along the center line of Denny Way to an intersection with the center line of Yale Avenue; thence southeasterly along the center line of Yale Avenue to an intersection with the center line of East Pine Street; thence easterly along the center line of East Pine Street to an intersection with the center line of Broadway; thence southerly along the center line of Broadway to an intersection with the center line of Columbia Street; thence southwesterly along the center line of Columbia Street to an intersection with the center line of 7th Avenue; thence southeasterly along the center line of 7th Avenue to an intersection with the center line of Yesler Way; thence easterly along the center line of Yesler Way to an intersection with the center line of 7th Avenue South; thence south along the center line of 7th Avenue South to an intersection with the center line of Dearborn Street; thence westerly along the center line of Dearborn Street to an intersection with the center line of Airport Way; thence northwesterly along the center line of Airport Way to an intersection with the center line of 4th Avenue South; thence southerly along the center line of 4th Avenue South to an intersection with the center line of Dearborn Street produced west; thence westerly along said produced center line to the center line of 2nd Avenue South produced south; thence southerly along said produced center line to an intersection with the center line of Connecticut Street; thence westerly along said center line of Connecticut Street to an intersection with the center line of South Alaskan Way; thence northerly and northwesterly along said center line of South Alaskan Way and Alaskan Way to the point of beginning, except Lots 3 and 4, less the south 12 feet of Lot 4, Block 51, D. S. Maynard's Plat of Seattle. (Ord. 85500 § 1601-A, as amended by Ord. 90313; June 12, 1961).

3.16.030 Fire zone two—Boundaries. Fire Zone Two shall include that portion of the city between the boundary of Fire Zone One and the following boundary:

Beginning at the Outer Harbor Line of Elliott Bay and the center line of West Harrison Street; thence easterly along center line of

West Harrison Street to an intersection with the center line of Broad Street; thence northeasterly along the center line of Broad Street to an intersection with the center line of Roy Street; thence easterly and north-easterly along the center line of Roy Street to an intersection with the center line of Valley Street; thence easterly along the center line of Valley Street to an intersection with the center line of Eastlake Avenue; thence southerly along the center line of Eastlake Avenue to an intersection with the center line of Harrison Street; thence easterly along the center line of Harrison Street and East Harrison Street to an intersection with the center line of 14th Avenue East, thence southerly along the center line of 14th Avenue East, 14th Avenue and 14th Avenue South to an inter-section with the center line of Rainier Avenue; thence southeasterly along the center line of Rainier Avenue to an intersection with the center line of Weller Street; thence westerly along the center line of Weller Street to an intersection with the center line of 14th Avenue South produced southerly; thence southerly along said produced line to an intersection with the center line of Lane Street; thence westerly along the center line of Lane Street to an intersection with the center line of 9th Avenue South; thence southerly along the center line of 9th Avenue South to an intersection with the center line of Holgate Street; thence westerly along the center line of Holgate Street to an intersection with the center line of South Alaska Way; thence northeasterly along the center line of South Alaskan Way to an intersection with the center line of West Massachusetts Street; thence northwesterly along the center line of West Massachusetts Street and the production northwesterly thereof to an intersection with the Pier Head lying on the east side of East Waterway; thence northerly along said Pier Head Line to an intersection with the Outer Harbor Line of Elliott Bay at West Connecticut Street; thence northerly along the Outer Harbor Line of Elliott Bay to the point of beginning, except Block 4, Syndicate Addition, and Block 28, Till Tract Addition. (Ord. 85500 § 1601-B, as amended by Ord. 91303; July 16, 1962).

3.16.040 Fire zone two—Additional boundaries. Fire zone two shall include that part of the city known as the Ballard business section lying within the following described boundary lines:

Beginning at a point in the center line of Dock Place midway between Shilshole Avenue and Ballard Avenue; thence northeast on the center line of Dock Place to a point midway between Ballard Avenue and Leary Avenue; thence northwest through the center line of the block between Ballard Avenue and Leary Avenue to a point one hundred (100) feet east of the east line of Twentieth Avenue Northwest;

thence north from said point and parallel with Twentieth Avenue Northwest to a point one hundred (100) feet north of the north line of Market Street; thence west along said line one hundred (100) feet north of the north line of Market Street and parallel thereto to the east line of Twenty-fourth Avenue Northwest; thence south along the east line of Twenty-fourth Avenue Northwest to a point one hundred (100) feet south of the south line of Market Street; thence east along the line one hundred (100) feet south of the south line of Market Street and parallel thereto to the center line of the alley between Shilshole Avenue and Ballard Avenue; thence southeast along the center line of said alley and midway between Shilshole Avenue and Ballard Avenue to the point of beginning. (Ord. 85500 § 1601-C added by Ord. 85817; Jan. 8, 1957).

3.16.050 Fire zone two—Additional boundaries. Fire zone two shall also include that part of the city known as the University business section lying within the following described boundary lines:

Beginning at the center line of Brooklyn Avenue one hundred twenty (120) feet south of the south line of East Fortieth Street; thence east along the line one hundred twenty (120) feet south of the south line of East Fortieth Street to the center line of Fifteenth Avenue Northeast; thence north along the center line of Fifteenth Avenue Northeast to the center line of East Fiftieth Street; thence west along the center line of East Fiftieth Street to the center line of Brooklyn Avenue; thence south along the center line of Brooklyn Avenue to a point one hundred twenty (120) feet north of the north line of East Forty-fifth Street; thence west along the line one hundred twenty (120) feet north of the north line of East Forty-fifth Street to a point ninety (90) feet west of the west line of Roosevelt Way; thence south along a line ninety (90) feet west of the west line of Roosevelt Way and parallel thereto to the center line of East Forty-fifth Street; thence west on the center line of East Forty-fifth Street to a point one hundred (100) feet west of the west line of Roosevelt Way measured on the south side of East Forty-fifth Street; thence southerly along the west line of Lots 1 through 16 in Block A, lots 1 through 16 in Block B and Lots 1 through 16 in Block C, Brooklyn Supplemental Addition, and said west lot line produced southerly to an intersection with the center line of East Fortieth Street; thence east along the center line of East Fortieth Street to the center line of Brooklyn Avenue; thence south on the center line of Brooklyn Avenue to the point of beginning. (Ord. 85500 § 1601-D added by Ord. 85817; Jan. 8, 1957).

3.16.060 Fire zone two—Additional boundaries. Fire zone two shall include that part of the city known as the Green Lake business section within the following described boundary lines:

Beginning at the intersection of the center line of East Seventieth Street and Green Lake Boulevard; thence northwesterly along the center line of Green Lake Boulevard to the center line of Maple Leaf Place; thence northeasterly along the center line of Maple Leaf Place to the center line of East Seventy-third Street; thence easterly along the center line of East Seventy-third Street to the center line of Fifth Avenue Northeast; thence south along the center line of Fifth Avenue Northeast to the center line of East Seventieth Street; thence westerly along the center line of East 70th Street to the place of beginning. (Ord. 85500 § 1601-E added by Ord. 85817 and amended by Ord. 86805; Jan. 7, 1958).

3.16.070 Fire zone three—Boundaries. Fire zone three shall consist of all parts of the city not specified within the geographical boundaries of Fire Zones One and Two. (Ord. 85500 § 1601-F added by Ord. 85817; Jan. 8, 1957).

3.16.080 Application of requirements. (a) BUILDINGS LOCATED IN MORE THAN ONE FIRE ZONE. A building or structure which is located partly in one fire zone and partly in another shall be considered to be in the more highly restricted fire zone when more than one-third of its total floor area is located in such zone.

(b) MOVED BUILDINGS. Any building or structure moved within or into any fire zone shall be made to comply with all the requirements for new buildings in that fire zone.

(c) TEMPORARY BUILDINGS. Temporary buildings such as reviewing stands and other miscellaneous structures conforming to the requirements of this Code, and sheds, canopies or fences used for the protection of the public around and in conjunction with construction work may be erected in Fire Zones No. 1 or 2 by special permit from the Superintendent of Buildings for a limited period of time, and such building or structure shall be completely removed upon the expiration of the time limit stated in such permit.

(d) OPPOSITE LINES OF STREETS. For the purpose of this Chapter, the opposite line of an adjoining street or alley may be considered an adjacent property line. Distance shall be measured at right angles to the street or alley. (Ord. 85500 § 1601-G added by Ord. 85817; Jan. 8, 1957).

3.16.090 Restrictions in fire zone one. (a) GENERAL. Buildings or structures hereafter erected, constructed, moved within or into Fire Zone No. 1 shall be only of Type I, II, III-H.T., III-1 hr., or IV-1 hr. construction and shall meet the requirements of this Section.

(b) LIMITATION OF TYPES OF CONSTRUCTION. Construction shall be as specified in Chapters 3.18, 3.19, 3.20 and 3.21.

Exceptions: 1. Type IV buildings of any permitted occupancy group not more than 2,500 sq. ft. in area when enclosed, or 5,000 sq. ft. in area when completely open on all sides, and not more than one story high need not be fire protected provided they are located not less than sixteen feet from adjacent property lines. Open deck parking garages of Type IV-N shall be permitted as set forth in Section 3.11.090.

2. Walls fronting on a street may be of noncombustible construction with structural members fire protected as required in Part V.

3. Where openings are not otherwise required to be protected, door and window assemblies and ground story store fronts need not be fire resistive.

4. Combustible ground and wall signs may be constructed, provided they do not exceed 200 sq. ft. in area. Combustible ground and wall signs which exceed 200 sq. ft. in area may be constructed provided they are faced with sheet metal or other approved facing materials. Combustible ground and wall signs within 5 feet of property lines shall be limited in area to 200 sq. ft. and shall be separated from other such signs by not less than 5 ft.

5. Noncombustible roof signs may be constructed and need not be fire resistive.

(c) OPENINGS. Openings (except on street fronts) which are less than sixteen feet from adjacent property lines, openings into courts which are less than sixteen feet in least dimension and roof openings shall be protected by Class "E" or "F" fire doors or windows. The sum of the widths of openings in exterior walls, (except on street fronts), within sixteen feet (16') of adjacent property lines or other buildings on the same property shall be limited to 50 per cent of the total length of the walls affected in each story.

(d) ALTERATIONS. No building of the Type IV construction in excess of one thousand square feet (1000 sq. ft.) in floor area nor any building of Type V construction already erected in Fire Zone No. 1 shall hereafter be altered, raised, enlarged, added to or moved, except as follows:

1. Such Type IV buildings may be made to conform to all the provisions of subsections (b) and (c) of this Section.

2. Changes, alterations and repairs to the interior of such Type IV or V buildings or to the front thereof facing a public street may be made, provided such changes do not, in the opinion of the Superintendent of Buildings, increase the fire hazard of such buildings.

3. Roofs of such buildings may be covered only with a "Fire Retardent" roofing as specified in Section 3.32.040. See Section 3.01.040 (g) for repairs.

4. Such buildings may be moved entirely outside the limits of Fire Zone No. 1.

5. Such buildings may be demolished.

(e) OCCUPANCIES PROHIBITED. No Group E, division 2 occupancy having a floor area exceeding fifteen hundred square feet (1500 sq. ft.) shall be permitted in Fire Zone No. 1. No Group E, Division 2 dry cleaning plant using flammable liquids with flash point below 138.5° F. shall be permitted in Fire Zone No. 1.

No Group E, division 5 occupancies shall be permitted in Fire Zone No. 1. (Ord. 85500 § 1602; Sept. 10, 1956).

3.16.100 Restrictions in fire zone two. (a) GENERAL. Buildings or structures hereafter erected, constructed, moved within or into Fire Zone No. 2 may be any one of the Types of Construction as defined in this Code and shall meet the requirements of this Section.

(b) LIMITATION OF TYPES OF CONSTRUCTION. Exterior walls of buildings and protection of openings shall be as set forth in Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030 and 3.22.030.

Exceptions: 1. Exterior walls of Type IV buildings not more than one thousand square feet (1000 sq. ft.) in area shall not be required to be of one-hour fire-resistive construction if three feet (3') or more from adjacent property lines and six feet (6') or more from buildings on the same property.

2. Exterior walls of Type IV buildings shall not be required to be one-hour fire-resistive if sixteen feet (16') or more from an adjacent property line.

3. Exterior walls fronting on a street having a width of at least thirty feet (30') may be of noncombustible construction with all structural members fire-protected as required in Part V.

4. Where openings are not otherwise required to be protected, door and window assemblies and ground story store fronts need not be fire resistive.

5. Combustible ground signs may be constructed, provided they do not exceed 200 sq. ft. in area. Combustible ground signs which exceed 200 sq. ft. in area may be constructed, provided they are faced with sheet metal or other approved facing materials. Combustible roof signs may be constructed.

Roof covering shall be a "Fire-Retardant" roofing as specified in Section 3.32.040. See Section 3.01.040 (g) for repairs.

(c) ALTERATIONS. No building of Type IV construction in excess of one thousand square feet (1000 sq. ft.) in floor area nor any building of Type V construction except as specified in Subsection (b) already

erected in Fire Zone No. 2, shall hereafter be altered, raised, enlarged, added to or moved except as follows:

1. Such building may be made to conform to the provisions of Sub-section (b) of this Section.

2. Changes, alterations and repairs to the interior of such building or to the front thereof facing a public street may be made provided such changes do not, in the opinion of the Superintendent of Buildings, increase the fire hazard of such building.

3. Roofs of such buildings may be covered only with a "Fire Retardant" roofing as specified in Section 3.32.040. See Section 3.01.040 (g) for repairs.

4. Such buildings may be moved entirely outside the limits of Fire Zone No. 2.

5. Such buildings may be demolished.

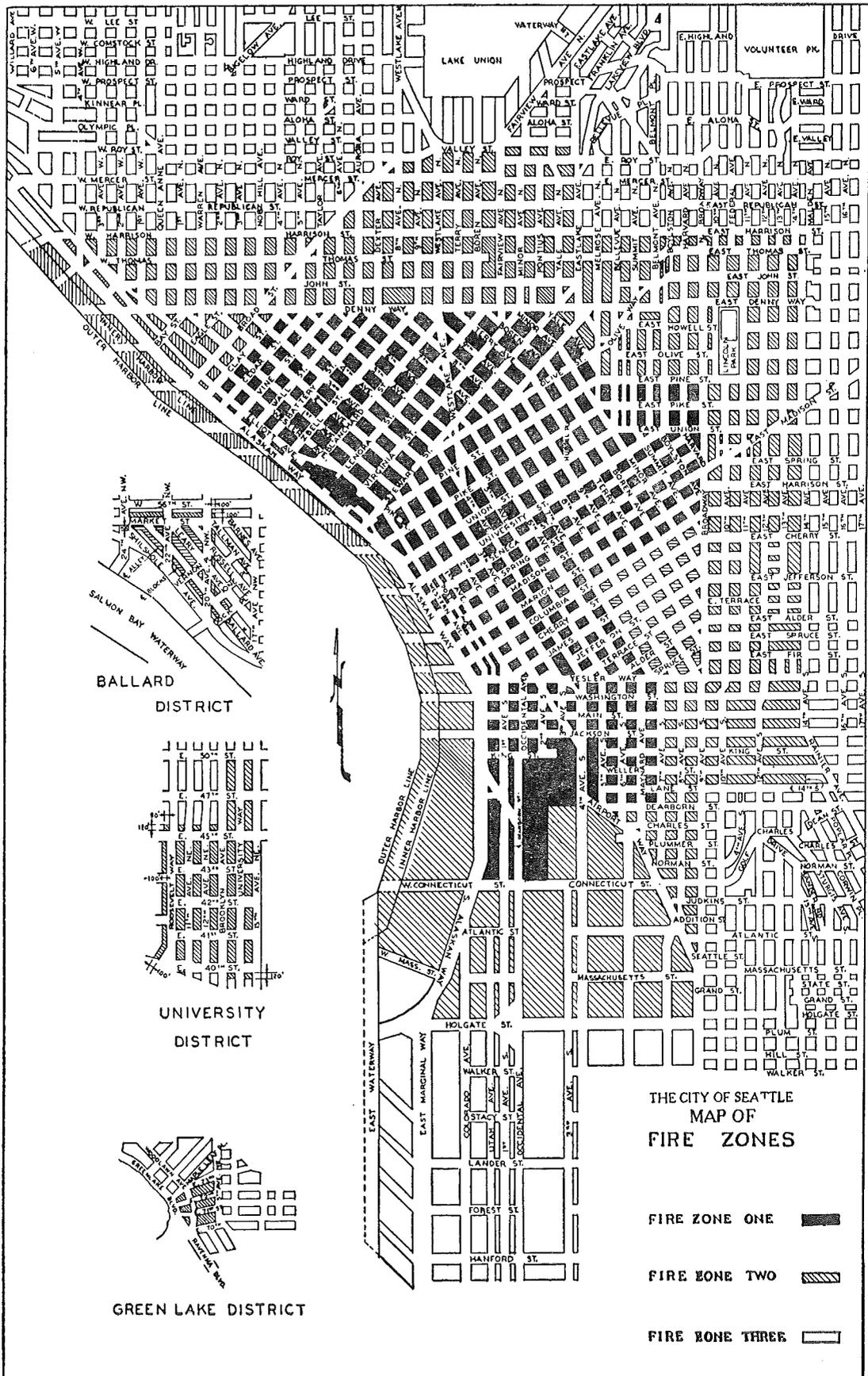
6. Combustible finish on the outside of walls may be replaced by, or covered with exterior plaster as specified in Chapter 3.47.

(d) OCCUPANCIES PROHIBITED. No Group E, Division 2 occupancy, having a floor area exceeding fifteen hundred square feet (1500 sq. ft.) shall be permitted in Fire Zone No. 2.

No Group E, Division 5 occupancies shall be permitted in Fire Zone No. 2.

Exception: This shall not apply to dry cleaning plants not using highly flammable liquids. (Ord. 85500 § 1603; Sept. 10, 1956).

3.16.110 Restrictions in fire zone three. Any building or structure complying with the requirements of this Code may be erected, constructed, moved within or into Fire Zone No. 3. (Ord. 85500 § 1604; Sept. 10, 1956).



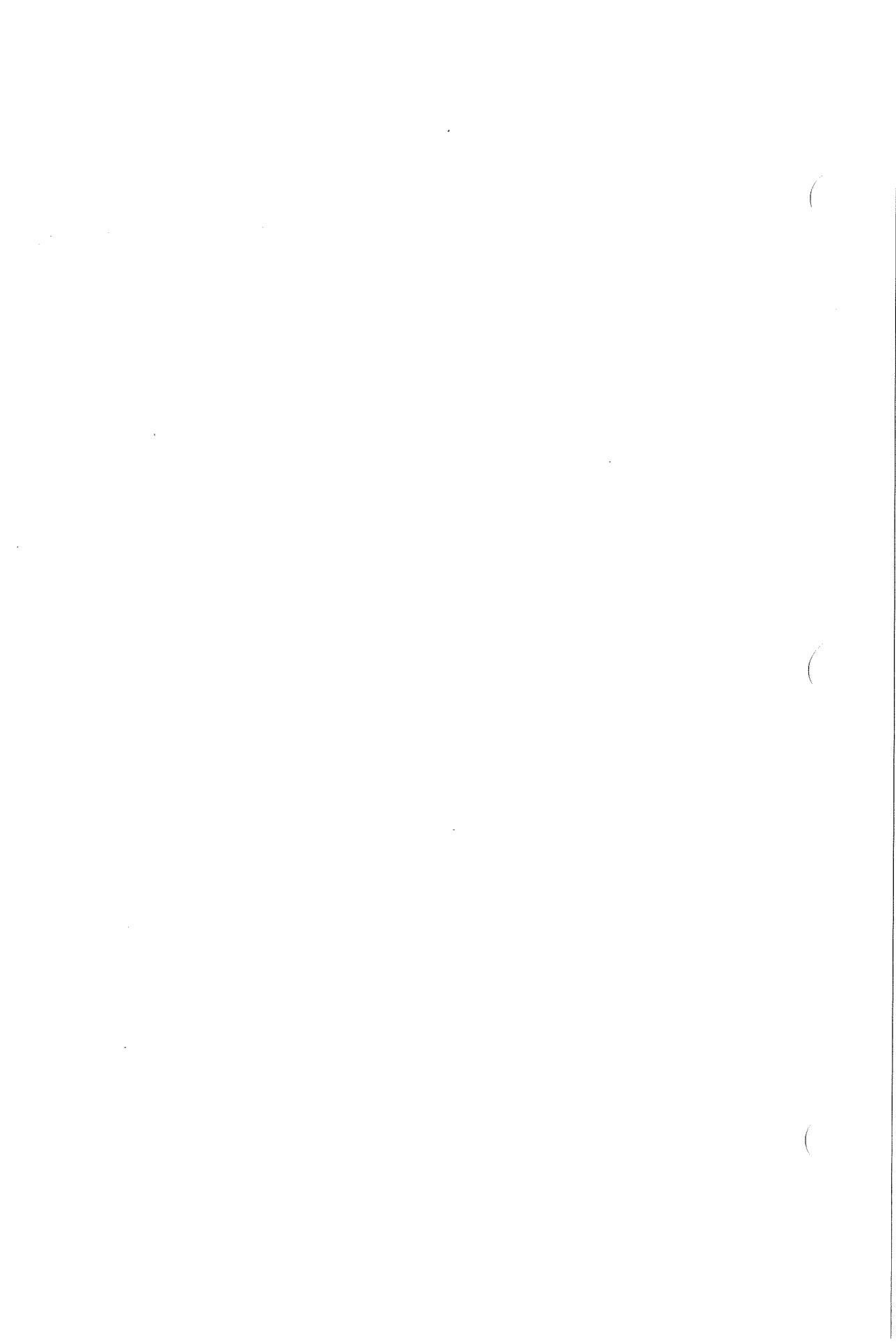
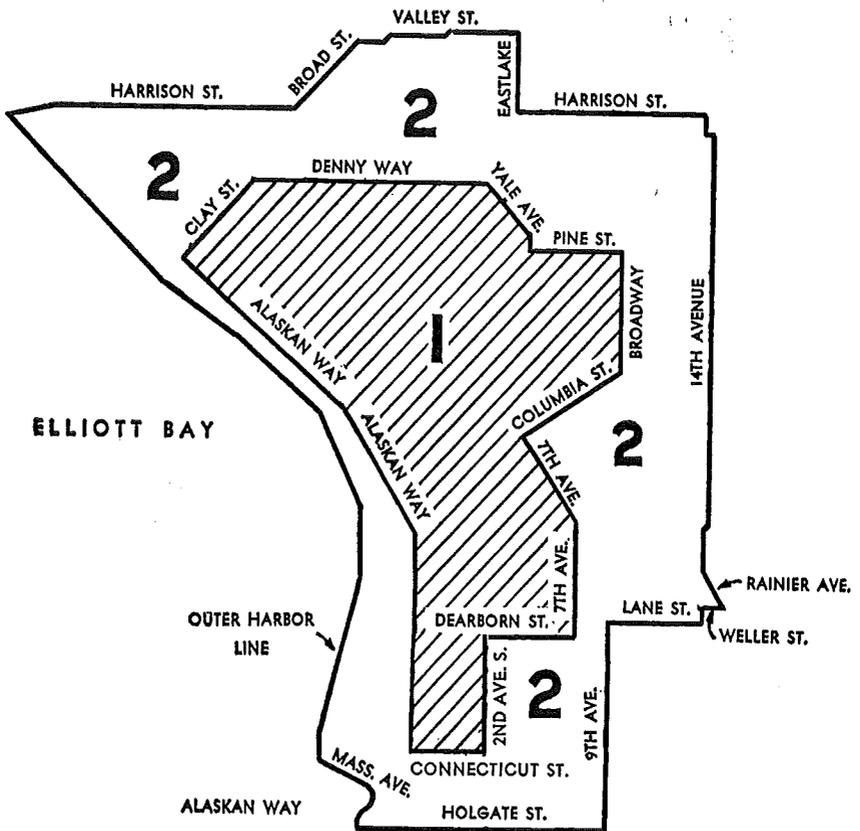


FIG. 16-A CENTRAL FIRE ZONE

NOTE—FOR OTHER FIRE ZONE 2 LOCATIONS, SEE
"BUSINESS ZONES" ON SEATTLE ZONING MAP



NOTE—"Figure 16-A" of the Building Code, to the extent inconsistent with Sections 3.16.010—3.16.070 is superseded by Section 3 of Ord. 85817.

Chapter 3.17

TYPES OF CONSTRUCTION — GENERAL REQUIREMENTS

Sections:

- 3.17.010 General.
- 3.17.020 Structural frames.
- 3.17.030 Usable space under floors.
- 3.17.040 Roof coverings.
- 3.17.050 Unprotected materials allowed.
- 3.17.060 Enclosure of vertical openings.
- 3.17.070 Weather protection.
- 3.17.080 Members carrying masonry.
- 3.17.090 Parapets.
- 3.17.100 Cornices.
- 3.17.110 Electrical service.

3.17.010 General. The requirements of Chapters 3.17 through 3.22 are minimum for the various Types of Construction and represent varying degrees of public safety and resistance to fire. Every building shall be classified by the Superintendent of Buildings into one of the Types of Construction set forth in Table No. 17-A. Any building which does not entirely conform to a Type of Construction set forth in Table No. 17-A shall be classified by the Superintendent of Buildings into a type having an equal or lesser degree of fire resistance.

Exception: Existing "Mill" buildings shall be classified as Type III construction. Such buildings, nonconforming by reason of excessive height, may be altered or added to provided such height is not increased thereby.

No part of a building shall be required to conform to the details of a Type of Construction higher than that type which meets the minimum requirements based on Occupancy (as set forth in Chapters 3.05-3.15, inclusive) or Location in Fire Zone (as set forth in Chapter 3.16) even though such building generally conforms to the details of a higher Type of Construction.

Where specific materials, types of construction or fire-resistive protection are required, such requirements shall be the minimum requirements and any materials, types of construction or fire-resistive protection which will afford equal or greater public safety or resistance to fire may be used.

Portions of buildings separated as specified in Sec. 3.05.050 (d) may be considered a separate building for classification of Types of Construction. When there is no such separation, the area of the entire building shall not exceed the area permitted for the types of construction involved. (Ord. 85500 § 1701; Sept. 10, 1956).

3.17.020 Structural frames. The structural frame shall be considered to be the columns and the girders, beams, trusses and spandrels having direct connections to the columns bearing walls and all other members which are essential to the stability of the building as a whole. The members of floor or roof panels, which have no connection to the columns, shall be considered secondary members and not a part of the structural frame. (Ord. 85500 § 1702; Sept. 10, 1956).

3.17.040 Roof coverings. The following Type V buildings in Fire Zone Three may have ordinary roofing:

1. Those with a roof pitch of more than 4 in 12.
2. One story Group F, G, and H.
3. All Group I and J.

All others shall be fire-retardant.

Skylights shall be constructed as required in Chapter 3.34.

Penthouses shall be constructed as required in Chapter 3.36. (Ord. 85500 § 1704, as amended by Ord. 87090; April 22, 1958).

3.17.050 Unprotected materials allowed. (a) TEMPORARY PARTITIONS. Temporary partitions which are within a space occupied by one (1) tenant, used for dividing portions of stores, offices or similar places, or in other occupancies for enclosing small office spaces having a maximum area of five hundred (500) square feet may be constructed of:

1. Noncombustible or fire-retardant material.
2. One (1) hour fire-resistive construction.
3. Wood panels or similar light construction with filled hollow spaces up to three-fourths ($\frac{3}{4}$) the height of the room in which it is placed; when more than three-fourths ($\frac{3}{4}$) the height of the room, such partition shall have not less than the upper one-fourth ($\frac{1}{4}$) of the partition glazed with plain glass.

Folding doors or similar devices used as temporary partitions shall comply with the flame spread requirements of Chapter 3.42 for the rooms in which they are located. The areas formed by such partitions shall be provided with exits as required by Chapter 3.33, except that approved painted exit signs may be substituted for exit lights.

(b) PERMANENT PARTITIONS. Partitions of approved fire-retardant or noncombustible material may be substituted for one (1) hour fire-resistive partitions in approved locations in Group F-2 or G occupancies.

(c) SHOW WINDOWS AND CASES. Show window frames, aprons, show cases, store fronts and other appurtenances on the first floor of buildings of F-2 and G occupancies may be of wood or unprotected steel or iron.

(d) TRIM. Trim, picture molds, chair rails, baseboards, hand rails or show window backing may be of wood. Unprotected wood doors and windows may be used, except where fire-resistive openings are required.

Materials used for interior finish of walls and ceilings, including wainscoting, shall be as specified in Chapter 12.

(e) **LOADING PLATFORMS.** Exterior loading platforms may be of noncombustible construction or heavy timber construction with wood floors not less than two (2) inches nominal thickness. Such wood construction shall not be carried through the exterior walls except in Type V buildings. Such areas shall not be used for storage except for goods in transit.

Exception: Loading platforms in Fire Zone No. 1 shall be of Type I or IV construction.

(f) **INSULATING BOARDS.** Combustible insulating boards may be used under finished flooring.

(g) **LITURGICAL FIXTURES.** Fixed pews, pulpits, altars, rood screens, confessionals, and other liturgical fixtures may be constructed of wood.

(h) **CHURCH NAVE CEILINGS.** Ceilings of church naves containing fixed seats may be constructed of unprotected structural members of six (6) inch nominal minimum thickness supporting tongued and grooved plank not less than two (2) inches nominal thickness. There shall be no habitable space above such ceilings. Draft stops at least ten (10) inches in depth measured vertically shall divide the ceiling into areas of not over one thousand (1000) square feet. Ceilings shall be treated with fire-retardant paint if they are less than ten (10) feet from floor or balcony. No combustible finish may be applied to unplastered ceilings. (Ord. 85500 § 1705, as amended by Ord. 91546; October 30, 1962).

3.17.060 Enclosure of vertical openings. (a) **GENERAL.** Enclosures for elevator shafts, vent shafts, and other vertical openings shall be as set forth in Table No. 17-A and all openings therein shall be protected by Class "E" or "F" fire doors for exterior openings and Class "B" doors for interior openings. (See Chapter 3.30).

Exception: Openings on street fronts need not be protected.

(b) **CONSTRUCTION.** Exit enclosures shall be constructed as specified in Section 3.33.080.

(c) **GUARD RAIL.** A parapet wall, or hand rail, which is at least thirty-six inches in height shall be provided around all open shaft enclosures extending through the roof. (Ord. 85500 § 1706; Sept. 10, 1956).

3.17.070 Weather protection. Exterior walls, openings, and wall coverings shall be of weathertight materials securely fastened. (Ord. 85500 § 1707; Sept. 10, 1956).

3.17.080 Members carrying masonry. All members carrying more than 10 feet of masonry in exterior walls and interior masonry in buildings over one story in height shall be fire-protected with not less than one-hour fire-protection.

Exception: Fire protection may be omitted from shelf angles or plates that are not a part of the structural frame, and lintels not exceeding 7 feet in length. (Ord. 85500 § 1708; Sept. 10, 1956).

3.17.090 Parapets. Parapet walls not less than thirty inches (30") in height shall be provided on exterior and inner court walls of buildings when the walls are required to be fire-resistant due to their location on property as set forth in Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030, and 3.22.030. A parapet wall shall have the same fire resistance as required for the wall itself.

Exceptions: Parapets shall not be required on the following walls:

1. In buildings of Types III, IV, and V when the roof construction is entirely noncombustible.
2. When the roof within a distance of 5 feet from the property line or the wall of another building has fire resistance as follows:
 - a. In buildings of Type I, II, and III construction—2 hrs.
 - b. In buildings of Type IV and V construction—1 hr.
3. All I and J occupancies, and those G occupancies of Type V construction of less than 1,000 square feet in area in Fire Zone Three. (Ord. 85500 § 1709, as amended by Ord. 87090; April 22, 1958).

3.17.100 Cornices. Except in Type V construction, cornices and similar appendages shall be constructed of substantial noncombustible materials and when over public property as specified in Chapter 3.45. (Ord. 85500 § 1710; Sept. 10, 1956).

3.17.110 Electrical service. In every building hereafter erected, there shall be provided adequate and properly located space for electrical service entrance equipment as required and specified in the Electrical Code. (Title 4). (Ord. 85500 § 1711; Sept. 10, 1956).

TABLE No. 17-A—TYPES OF CONSTRUCTION—FIRE-RESISTIVE REQUIREMENTS
(In Hours)

(For Details See Chapters Under Occupancy and Types of Construction)

Construction	I		II		III		IV		V	
	Noncom- bustible	Sec. 3.18.030	Noncom- bustible	Sec. 3.19.030	1-Hr. or H.T.	Combustible	1-Hr.	Noncombustible	1-Hr.	Combustible
Ext. Bearing Walls		Sec. 3.18.030		Sec. 3.20.030	Sec. 3.20.030	Sec. 3.20.030	1	N	1	N
Int. Bearing Walls		Sec. 3.18.030		Sec. 3.19.030	1	N	1	N	1	N
Ext. Non-Bearing Walls		Sec. 3.18.030		Sec. 3.19.030	Sec. 3.20.030	Sec. 3.20.030	1	N	1	N
Structural Frame	3		2	1 or H.T.	N	N	1	N	1	N
Partitions—Perm.	1		1	1 or H.T.	N	N	1	N	1	N
Vertical Openings	2		2	1 or H.T.	1	1	1	1	1	1
Floors	2		1	1 or H.T.	N	N	1	N	1	N
Roofs	2		1							
Exterior Doors and Windows		Sec. 3.18.060		Sec. 3.19.060	1 or H.T.	N	Sec. 3.21.060	N	1	N
Inner Court Walls		Sec. 3.18.030		Sec. 3.19.030	Sec. 3.20.030	N	N	N	N	N
		Sec. 3.18.030		Sec. 3.19.030	1 or H.T.	1	1	N	1	N

N—No general requirements for fire resistance. H.T.—Heavy Timber

Chapter 3.18

TYPE I BUILDINGS

Sections:

- 3.18.010 Definition.
- 3.18.020 Structural framework.
- 3.18.030 Walls and openings.
- 3.18.040 Floors.
- 3.18.050 Stair construction.
- 3.18.060 Roof construction.

3.18.010 Definition. The structural elements in Type I buildings shall be of steel, iron, concrete, or masonry, except as permitted in Section 3.18.060.

Walls and permanent partitions shall be of noncombustible fire-resistive construction, except as permitted in Chapter 3.17.

Materials of construction and fire-resistive requirements shall be as specified in Chapter 3.17. (Ord. 85500 § 1801 as amended by Ord. 97817 § 1; June 4, 1969).

3.18.020 Structural framework. Structural framework shall be of structural steel or iron as specified in Chapter 3.27, reinforced concrete as in Chapter 3.26, or reinforced masonry as in Chapter 3.24, except as permitted in Section 3.18.060.

For additional requirements for Group E occupancies, See Section 3.10.020(b). (Ord. 85500 § 1802 as amended by Ord. 97817 § 2; June 4, 1969).

3.18.030 Walls and openings. Exterior walls and inner court walls and openings therein shall be as set forth in Table No. 18-A.

TABLE No. 18-A
FIRE RESISTIVE REQUIREMENTS AND OPENING
PROTECTION FOR EXTERIOR & INNER COURT WALLS

Location	Type of Wall	
	Bearing	Nonbearing
Within 5 feet of adjacent property line.	4 hr., no openings.	3 hr., no openings.
5 feet to 16 feet from adjacent property line.	4 hr., protected openings.	2 hr., protected openings.
16 feet to 25 feet from adjacent property line.	4 hr., unprotected openings.	1 hr., unprotected openings.
25 feet and more from adjacent property line.	4 hr., unprotected openings.	Noncombustible, unprotected openings.
Fronting on street.	3 hr., unprotected openings.	Noncombustible, unprotected openings.

Structural members shall be fire protected as set forth in Table No. 17-A.

Where protected openings are required, they shall be Class "E" or "F" fire doors or windows and their aggregate width shall not exceed fifty percent of the total length of walls affected in each story.

Openings in inner court walls of buildings over one story high shall be protected where the least dimension of such court is less than thirty feet. (Ord. 85500 § 1803; Sept. 10, 1956).

3.18.040 Floors. (a) **WOOD SLEEPERS.** Where wood sleepers are used for laying wood flooring on masonry or concrete fire-resistive floors the space between the floor slab and the underside of the wood flooring shall be filled with noncombustible material in such a manner that there will be no spaces under the flooring which will exceed fourteen thousand four hundred cubic inches in volume and such space shall be filled solidly under all permanent partitions so that there is no communication under the flooring between adjoining rooms.

(b) **MEZZANINE FLOORS.** Mezzanine floors shall be of noncombustible materials as approved for one-hour fire-resistive construction or of heavy timber construction as specified for floors in Section 3.25.140 (b).

Not more than two mezzanine floors shall be in any room of a building.

No mezzanine floor or floors shall cover more than fifty percent of the area of any room. (Ord. 85500 § 1804; September 10, 1956).

3.18.050 Stair construction. Stairs and stair platforms shall be constructed of reinforced concrete, iron, or steel with treads and risers of concrete, iron or steel. Brick, marble, tile or other noncombustible materials may be used for the finish of such treads and risers. Stairs shall have the same fire resistance as floors except when enclosed in enclosures of not less than two-hour fire resistive construction.

Stairs shall be designed and constructed as specified in Chapter 3.33. (Ord. 85500 § 1805; September 10, 1956).

3.18.060 Roof construction. Roof construction in Type I buildings shall be two-hour fire-resistive construction except as follows:

(1) Where every part of the structural steel framework of the roof of a Group A, B or C occupancy is eighteen feet or more, and less than twenty-five feet above any floor, mezzanine, balcony or gallery, the roof deck or sheathing may be protected on the underside as required for one-hour fire-resistive construction.

(2) Where every part of the structural steel framework of the roof of a Group A, B or C occupancy is twenty-five feet or more above any floor, mezzanine, balcony or gallery, fire protection of such framework may be omitted.

(3) Where every part of the structural framework of the roof of a Group A, B or C occupancy is twenty-five feet or more above any floor, mezzanine, balcony or gallery, such framework may be of heavy timber as specified in Section 3.25.140 when protected by an approved automatic sprinkler system.

(4) In any occupancy, roof decks or sheathing twenty-five feet or more distant from any floor, mezzanine, balcony or gallery may be of unprotected noncombustible materials.

(5) In any occupancy, roof decks or sheathing thirty feet or more distant from any floor, mezzanine, balcony or gallery may be of heavy timber as specified in Section 3.25.140 when protected on the underside as required for one-hour fire-resistive construction or by an approved automatic sprinkler system.

(6) In any occupancy, roof decks or sheathing may be of reinforced concrete or reinforced gypsum without regard for fire-resistive requirements. (Ord. 85500 § 1906, added by Ord. 97817 § 4, June 4, 1969).

Chapter 3.19 TYPE II BUILDINGS

Sections:

- 3.19.010 Definition.
- 3.19.020 Structural framework.
- 3.19.030 Walls and openings.
- 3.19.040 Floors.
- 3.19.050 Stair construction.
- 3.19.060 Roof construction.

3.19.010 Definition. The structural elements in Type II Buildings shall be of steel, iron, concrete, or masonry, except as permitted in Section 3.19.060.

Walls and permanent partitions shall be of noncombustible fire-resistive construction, except as permitted in Chapter 3.17.

Materials of construction and fire-resistive requirements shall be as specified in Chapter 3.17. (Ord. 85500 § 1901 as amended by Ord. 97817 § 5; June 4, 1969).

3.19.020 Structural framework. Structural framework shall be of structural steel or iron as specified in Chapter 3.27, reinforced concrete as in Chapter 3.26, or reinforced masonry as in Chapter 3.24, except as permitted in Section 3.19.060.

For additional requirements for Group E occupancies, see Section 3.10.020 (b). (Ord. 85500 § 1902 as amended by Ord. 97817 § 6; June 4, 1969).

3.19.030 Walls and openings. Exterior walls and inner court walls and openings therein shall be as set forth in Table No. 19-A.

TABLE No. 19-A

FIRE RESISTIVE REQUIREMENTS AND OPENING PROTECTION FOR EXTERIOR & INNER COURT WALLS

Location	Type of Wall	
	Bearing	Nonbearing
Within 5 feet of adjacent property line.	4 hr., no openings.	3 hr., no openings.
5 feet to 16 feet from adjacent property line.	4 hr., protected openings.	2 hr., protected openings.
16 feet to 25 feet from adjacent property line.	4 hr., unprotected openings.	1 hr., unprotected openings.
25 feet and more from adjacent property line.	4 hr., unprotected openings.	Noncombustible, unprotected openings.
Fronting on street.	3 hr., unprotected openings.	Noncombustible, unprotected openings.

Structural members shall be fire protected as set forth in Table No. 17-A.

Where protected openings are required, they shall be Class "E" or "F" fire doors or windows and their aggregate width shall not exceed fifty percent of the total length of walls affected in each story.

Openings in inner court walls of buildings over one story high shall be protected where the least dimension of such court is less than thirty feet. (Ord. 85500 § 1903; September 10, 1956).

3.19.040 Floors. (a) **WOOD SLEEPERS.** Where wood sleepers are used for laying wood flooring on masonry or concrete fire-resistive floors the spaces between the floor slab and the underside of the wood flooring shall be filled with noncombustible material in such a manner that there

will be no open spaces under the flooring which will exceed fourteen thousand four hundred cubic inches in volume and such space shall be filled solidly under all permanent partitions so that there is no communication under the flooring between adjoining rooms.

(b) **MEZZANINE FLOORS.** Mezzanine floors shall be of noncombustible materials as approved for one-hour fire-resistive construction or of heavy timber construction as specified for floors in Section 3.25.140 (b).

Not more than two mezzanine floors shall be in any room of a building.

No mezzanine floor or floors shall cover more than fifty percent of the area of any room. (Ord. 85500 § 1904; September 10, 1956).

3.19.050 Stair construction. Stairs and stair platforms shall be constructed of reinforced concrete, iron, or steel with treads and risers of concrete, iron or steel. Brick, marble, tile or other noncombustible materials may be used for the finish of such treads and risers. Stairs shall have the same fire resistance as floors except when enclosed in enclosures of not less than two-hour fire-resistive construction.

Stairs shall be designed and constructed as specified in Chapter 3.33. (Ord. 85500 § 1905; September 10, 1956).

3.19.060 Roof construction. Roof construction in Type II buildings shall be one-hour fire-resistive construction except as follows:

(1) Where every part of the structural steel framework of the roof of a Group A, B or C occupancy is twenty-five feet or more above any floor, mezzanine, balcony or gallery, fire protection of such framework may be omitted.

(2) Where every part of the structural framework of the roof of a Group A, B or C occupancy is twenty-five feet or more above any floor, mezzanine, balcony or gallery, such framework may be of heavy timber as specified in Section 3.25.140 when protected by an approved automatic sprinkler system.

(3) In any occupancy, roof decks or sheathing twenty-five feet or more distant from any floor, mezzanine, balcony or gallery may be of unprotected noncombustible materials.

(4) In any occupancy, roof decks or sheathing thirty feet or more distant from any floor, mezzanine, balcony or gallery may be of heavy timber as specified in Section 3.25.140 when protected on the underside as required for one-hour fire-resistive construction or by an approved automatic sprinkler system.

(5) In any occupancy, roof decks or sheathing may be of reinforced concrete or reinforced gypsum without regard for fire-resistive requirements. (Ord. 85500 § 1906 added by Ord. 97817 § 8; June 4, 1969).

Chapter 3.20
TYPE III BUILDINGS

Sections:

- 3.20.010 Definition.
- 3.20.020 Structural framework.
- 3.20.030 Walls, openings, and partitions.
- 3.20.040 Floors.
- 3.20.050 Stair construction.
- 3.20.060 Roofs.

3.20.010 Definition. Structural elements of Type III buildings may be of any materials permitted by this code.

Type III, One-Hour buildings shall be of not less than one-hour fire-resistive construction throughout, but may include heavy timber construction.

Type III, Heavy Timber buildings shall be Heavy Timber Construction, as provided in Section 3.25.140 with exterior walls of noncombustible fire-resistive construction, but may include Type III One-Hour construction.

Exterior walls shall be of noncombustible construction except that one and two-hour fire-resistive walls may use fire retardent framing within the wall assemblies.

Materials of construction and fire-resistive requirements shall be as specified in Chapter 3.17.

For requirements due to occupancy, see Chapters 3.06 to 3.13, inclusive.

For requirements in Fire Zones, see Chapter 3.16. (Ord. 85500 § 2001 as amended by Ord. 95566; February 23, 1967).

3.20.020 Structural framework. Structural framework shall be: of steel or iron as specified in Chapter 3.27, concrete as in Chapter 3.26, masonry as in Chapter 3.24, or wood as in Chapter 3.25. (Ord. 85500 § 2002; Sept. 10, 1956).

3.20.030 Walls, openings, and partitions. (a) **WALLS AND OPENINGS.** Exterior walls and inner court walls and openings therein shall be as set forth in Table No. 20-A.

TABLE No. 20-A
FIRE RESISTIVE REQUIREMENTS AND OPENING PROTECTION FOR EXTERIOR & INNER COURT WALLS

Location	Type of Wall	
	Bearing	Nonbearing
Within 5 feet of adjacent property line.	4 hr., no openings.	3 hr., no openings.
5 feet to 16 feet from adjacent property line.	4 hr., protected openings.	2 hr., protected openings.
16 feet to 25 feet from adjacent property line.	4 hr., unprotected openings.	1 hr., unprotected openings.
25 feet and more from adjacent property line.	3 hr., unprotected openings.	Noncombustible, unprotected openings.
Fronting on street.	3 hr., unprotected openings.	Noncombustible, unprotected openings.

Structural members shall be fire protected as set forth in Table No. 17-A.

Where protected openings are required, they shall be Class "E" or "F" fire doors or fire windows and their aggregate width shall not exceed 50% of the total length of walls affected in each story.

Openings in inner court walls of buildings over one story high shall be protected where the least dimension of such court is less than 30 feet.

(b) **PARTITIONS.** Permanent partitions in Type III, One-Hour buildings shall be of one-hour fire-resistive construction. In Type III, H.T. buildings they shall be of solid wood construction formed by not less than two layers of one-inch by eight-inch nominal matched boards with one-half inch gypsum wallboard between or laminated construction 4 inches (nominal) thickness, or two layers of two inch by six inch nominal tongued and grooved lumber set vertically, or of one-hour fire-resistive construction. Wood partitions shall be constructed as specified in Section 3.25.070. (Ord. 85500 § 2003, as amended by Ord. 87090; April 22, 1958).

3.20.040 Floors. (a) **GENERAL.** Floors may be constructed as speci-

fied in Chapter 3.26 for concrete, Chapter 3.24 for masonry, Chapter 3.25 for wood, and Chapter 3.27 for steel and iron.

Wood joists, beams, and girders supported by masonry walls shall be anchored thereto as specified in Section 3.24.170 (g). Ventilation shall be provided between the ground and a wood floor as specified in Section 3.25.160.

(b) **HEAVY TIMBER FLOORS.** Heavy timber floors shall be constructed as specified in Section 3.25.140 (b).

(c) **WOOD SLEEPERS.** Where wood sleepers are used for laying wood flooring on masonry or concrete fire-resistive floors the space between the floor slab and the underside of the wood flooring shall be filled with noncombustible material in such a manner that there will be no open spaces under the flooring which will exceed 14,400 cu. in. in volume and such space shall be filled solidly under all partitions so that there is no communication under the flooring between adjoining rooms.

(d) **MEZZANINE FLOORS.** Mezzanine floors shall be of noncombustible materials or one-hour fire-resistive construction or of heavy timber construction as specified for floors in Section 3.25.140 (b) in Type III one-hour and heavy timber construction.

Not more than two mezzanine floors shall be in any room of a building.

No mezzanine floor or floors shall cover more than 50 per cent of the area of any room. (Ord. 85500 § 2004, as amended by Ord. 87090; April 22, 1958).

3.20.050 Stair construction. Stairs shall be constructed in one of the following manners:

- (a) With carriages of not less than 4 inch nominal dimension and treads and risers of not less than 2 inch nominal dimension.
- (b) Where built on laminated inclines, as required for floors, treads and risers may be of one inch nominal dimension.
- (c) Any material allowed in this Code when the stair is enclosed as set forth in Section 3.33.080.
- (d) Any material allowed in this Code, provided that soffits and sides (up to treads and to leading edge of risers) are of one-hour fire-resistive or heavy timber construction.

In buildings four or more stories in height, stairs and stair construction shall be as required for Type I buildings.

Stairs and exits shall be designed and constructed as specified in Chapter 3.33. (Ord. 85500 § 2005; September 10, 1956).

3.20.060 Roofs. Roof decks in Type III one-hour or heavy timber shall be as required in Section 3.25.140 (c). Reinforced concrete or reinforced gypsum may be used for roofs, without regard to the fire resistive requirement of Table No. 17-A.

Roof covering shall be a "Fire Retardant" roofing as specified in Section 3.32.040. (Ord. 85500 § 2006; September 10, 1956).

Chapter 3.21

TYPE IV BUILDINGS

Sections:

- 3.21.010 Definition.
- 3.21.020 Structural framework.
- 3.21.030 Walls and openings.
- 3.21.040 Floor construction.
- 3.21.050 Stair construction.
- 3.21.060 Roof construction.

3.21.010 Definition. The structural elements of Type IV buildings shall be fire-retardant or noncombustible materials.

Type IV, one hour buildings shall be of fire-retardant or noncombustible construction and one hour fire-resistive throughout.

Walls and permanent partitions shall be of fire-retardant or noncombustible materials; provided that exterior walls of fire-retardant material shall be weather protected with approved noncombustible material.

Materials of construction and fire-resistive requirements shall be as specified in Chapter 3.17.

For requirements due to occupancy, see Chapters 3.06 to 3.13, inclusive.

For requirements in Fire Zones, see Chapter 3.16. (Ord. 85500 § 2101, as amended by Ord. 90485; August 21, 1961).

3.21.020 Structural framework. Structural framework shall be as specified in Chapter 3.27 for iron and steel, Chapter 3.26 for concrete, Chapter 3.25 for wood, and Chapter 3.24 for masonry. (Ord. 85500 § 2102, as amended by Ord. 90485; August 21, 1961).

3.21.030 Walls and openings. Exterior walls and inner court walls and openings therein shall be as set forth in Table No. 21-A (except as provided for certain Group G occupancies: see Section 3.12.030).

TABLE 21-A

**FIRE RESISTIVE REQUIREMENTS AND OPENING PROTECTION
FOR EXTERIOR AND INNER COURT WALLS**

Location	Type of Wall	
	Bearing	Nonbearing
Within five feet of adjacent property line	Four hour, no openings	Three hour, no openings
Four feet to sixteen feet from adjacent property line	Four hour, protected openings	One hour, protected openings
Sixteen feet to twenty-five feet from adjacent property line	One hour, unprotected openings	Fire-retardant or noncombustible, unprotected openings
Twenty-five feet and more from adjacent property line	Fire-retardant or noncombustible, unprotected openings	Fire-retardant or noncombustible, unprotected openings
Fronting on street	Fire-retardant or noncombustible, unprotected openings	Fire-retardant or noncombustible unprotected openings.

Structural members shall be fire protected as set forth in Table No. 17-A.

Exception: See special conditions in Sections 3.16.020 and 3.16.030.

Where protected openings are required, they shall be Class "E" or "F" fire doors or windows and their aggregate width shall not exceed fifty percent of the total length of walls affected in each story.

Openings in inner court walls of buildings over one story high shall be protected where the least dimension of such court is less than thirty feet. (Ord. 94563 § 9; February 23, 1966: prior Ord. 85500 § 2103 as amended by Ord. 90485; August 21, 1961).

3.21.040 Floor construction. Floor construction shall be of fire-retardant or noncombustible material, provided, however, that a combustible wearing surface or finish may be applied over such fire-retardant or noncombustible material. (Ord. 85500 § 2104, as amended by Ord. 90485; August 21, 1961).

3.21.050 Stair construction. Stairs shall be of fire-retardant or noncombustible materials and shall comply with the requirements of Chapter 3.33. (Ord. 85500 § 2105, as amended by Ord. 90485; August 21, 1961).

3.21.060 Roof construction. Roofs shall be of fire-retardant or noncombustible construction. In Type IV, one hour buildings, reinforced concrete or reinforced gypsum may be used for roofs.

Roof covering shall be of fire retardant roofing as specified in Section 3.32.040.

Warehouses for the storage of noncombustible materials and factories for the manufacture of noncombustible products may have a nominal two inch tongue and groove wood plank roof with wood purline at least six inches in least dimension when the lowest part of the roof is at least twenty feet above the floor. (Ord. 85500 § 2106, as amended by Ord. 90485; August 21, 1961).

Chapter 3.22

TYPE V BUILDINGS

Sections:

- 3.22.010 Definition.
- 3.22.020 Sheathing.
- 3.22.030 Walls and openings.
- 3.22.040 Stair construction.

3.22.010 Definition. Type V buildings may be of any materials allowed by this code.

Type V, One-Hour buildings shall be of one-hour fire-resistive construction throughout and may include heavy timber construction.

Exception: Porches not exceeding ten percent of the area of a building need not be of fire-resistive construction.

Materials of construction and fire-resistive requirements shall be as specified in Chapter 3.17.

For requirements due to occupancy, see Chapters 3.06 to 3.13, inclusive.

For requirements in Fire Zones, see Chapter 3.16. (Ord. 85500 § 2201, as amended by Ord. 87090; April 22, 1958).

3.22.020 Sheathing. Type V buildings three stories in height shall have all exterior walls of the first story covered with solid sheathing as specified in this Section. Such sheathing, when of dimensioned lumber, shall be applied diagonally.

Sheathing shall be one or more of the following materials:

Dimensioned lumber not less than five-eighths inch thick.

Fiberboard not less than seven-sixteenths inch thick complying with U.B.C. Standard No. 22-1.

Gypsum sheathing not less than one-half inch thick complying with U.B.C. Standard No. 22-2.

Plywood not less than five-sixteenths inch thick complying with U.B.C. Standard No. 25-2. (Ord. 85500 § 2202; Sept. 10, 1956).

3.22.030 Walls and openings. Exterior walls and inner court walls and openings therein of all buildings shall be located and protected as set forth in Table No. 22-A.

TABLE NO. 22-A
FIRE RESISTIVE REQUIREMENTS AND OPENING PROTECTION
FOR EXTERIOR & INNER COURT WALLS
 (Distances are from adjacent property line)

Fire Zone	Occupancy Groups	Fire Resistance of Exterior Walls	Openings In Exterior Walls
2	B, C, D-2, D-3 E-5, F	2 hrs. less than 5 ft. 1 hr. elsewhere	Not permitted less than 5 ft. Protected 5 to 16 ft.
	G, H	2 hrs. less than 5 ft. 1 hr. elsewhere	Not permitted less than 5 ft. Protected 5 to 8 ft.
	I, J	1 hr. everywhere	Not permitted less than 3 ft.
	E-1, E-2, E-3 E-4	4 hrs. less than 5 ft. 2 hrs. 5 to 16 ft. 1 hr. elsewhere	Not permitted less than 5 ft. Protected 5 to 16 ft.
3	B, D-2, D-3	2 hrs. less than 5 ft. 1 hr. elsewhere	Not permitted less than 5 ft.
	E-1, E-2, E-3 E-4	3 hrs. less than 5 ft. 2 hrs. 5 to 16 ft. 1 hr. elsewhere	Not permitted less than 5 ft. Protected 5 to 16 ft.
	C, E-5, F, G, H	2 hrs. less than 5 ft.	Not permitted less than 5 ft.
	I, J-1 except one story buildings accessory to H & I occupancies	1 hr. less than 3 ft.	Not permitted less than 3 ft.
	One story J-1 buildings accessory to H & I occupancies, J-2	NOT REGULATED	
J-3	NOT PERMITTED LESS THAN 3 FT.		

Where protected openings are required, they shall be Class "E" or "F" fire doors or fire windows and their aggregate width shall not exceed fifty per cent of the total length of walls affected in each story.

Openings in inner court walls of buildings over one story high shall be protected where the least dimension of such court is less than thirty feet.

In Fire Zone No. 2, cornices and appendages within three feet of property lines shall be of noncombustible construction.

Structural members shall be fire protected as set forth in Table No. 17-A. Structural mullions supporting a roof only in Type V one hour buildings need not be fireproofed.

For enclosure of vertical openings, see Section 3.17.060. (Ord. 85500 § 2203, as amended by Ord. 90485; August 21, 1961).

3.22.040 Stair construction. Stair construction may be of any type permitted in this code and shall conform to the requirements of Chapter 3.33. (Ord. 85500 § 2204; September 10, 1956).

Chapter 3.23 LIVE AND DEAD LOADS

Sections:

- 3.23.010 Definitions.
- 3.23.020 Floor and roof design.
- 3.23.030 Method of design.
- 3.23.040 Unit live loads.
- 3.23.050 Roof loads.
- 3.23.060 Reduction of live loads.
- 3.23.070 Wind pressure.
- 3.23.080 Live loads posted.
- 3.23.090 Retaining walls and basement floors.
- 3.23.100 Footing design.
- 3.23.110 Walls and structural framing.
- 3.23.120 Earthquake resistive requirements.

3.23.010 Definitions. DEAD LOAD. The dead load of a structure is its own weight, including partitions and permanent fixtures and mechanisms.

1. The first part of the paper is devoted to a discussion of the

2. The second part of the paper is devoted to a discussion of the

3. The third part of the paper is devoted to a discussion of the

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LIVE LOAD. The live load includes all loads except dead and lateral loads. (Ord. 85500 § 2301; Sept. 10, 1956).

3.23.020 Floor and roof design. (a) **GENERAL.** Floors and roofs of all buildings shall be designed for actual live loads intended to be applied subject to the provisions in the following sections.

(b) **SPECIAL.** Floor or floors in storage garages for private pleasure cars which are subject to use by motor vehicles heavier than private pleasure cars shall be designed for the appropriate minimum unit live load shown in Table No. 23-A. (Ord. 85500 § 2302; Sept. 10, 1956).

3.23.030 Method of design. Any system or method of construction to be used shall admit of a rational analysis in accordance with well established principles of mechanics. (Ord. 85500 § 2303; Sept. 10, 1956).

3.23.040 Unit live loads. The unit loads set forth in Table No. 23-A shall be taken as the minimum live loads in pounds per square foot of horizontal projection to be used in the design of buildings for the occupancies listed, and loads at least equal shall be assumed for uses not listed in this Section but which create or accommodate similar buildings.

TABLE NO. 23-A—MINIMUM UNIT LIVE LOADS

Apartments	40
Armories	150
Auditoriums—Fixed Seats	50
Movable Seats.....	100
Awnings, Fixed	10
Balconies and Galleries—Fixed Seats.....	50
Movable Seats.....	100
Corridors, A, B, C occupancies and office buildings.....	100
Corridors, D, E, F, G, H, I, J occupancies.....	60
Dance Halls	100
Drill Rooms.....	100
Dwellings	40
Fire Escapes	100
Garages—Storage and Repair, Private passenger cars (and as speciifed in Section 3.11.090).....	50
Garages—Storage and Repair, motor vehicles weighing less than 12,000 lbs.....	75
6,000 lb. axle load (whichever is more critical)	
Garages—Storage and Repair, motor vehicles weighing less than 22,000 lbs.....	100
12,000 pound axle load (whichever is more critical)	
Gymnasiums	100
Hospitals—Wards and Rooms.....	40
Hotels—Guest Rooms and Private Halls.....	40

Libraries—Reading Rooms..... 60
 Stack Rooms 125
 Manufacturing—Light 75
 Heavy 125
 Marquees 25
 Offices 50
 Public Assembly Rooms..... 100
 Rest Rooms 50
 Reviewing Stands and Bleachers..... 100
 Roof Loads 25
 Schools—Class Rooms..... 40
 Skating Rinks 100
 Stairways, A, B, C, D, E, F, G, H occupancies..... 100
 Stairways, I and J occupancies..... 60
 Storage—Load to be determined from proposed occupancy
 Stores—Retail 75
 Wholesale 100

All ceiling joists shall be designed for not less than fifteen (15) pounds per square foot live load.

All balcony railings shall be designed to withstand a horizontal force of twenty (20) pounds per lineal foot, applied at the top of the railing. (Ord. 85500 § 2304 as amended by Ord. 88324; June 24, 1959).

3.23.050 Roof loads. Where the slope is less than twelve (12) inches per foot, roofs shall sustain a vertical live load of twenty-five (25) pounds per square foot of horizontal projection. Where the slope exceeds twelve (12) inches per foot, the live load shall be not less than fifteen (15) pounds per square foot.

Greenhouses shall be designed for a vertical live load of not less than 10 pounds.

Trusses and arches shall be designed to resist the stresses caused by unit live loads on one-half of the span if such loading results in reverse stresses, or stresses greater in any portion than the stresses produced by the required unit live load upon the entire span. (Ord. 85500 § 2305; Sept. 10, 1956).

3.23.060 Reduction of live loads. The unit live loads in Table No. 23-A for floors, may be reduced for all buildings except warehouses to the following:

1. For beams, girders and trusses, carrying 100 sq. ft. or more tributary area:

Percentage of Live Loads Allowed	Tributary Floor Area*
90	100 sq. ft.
85	200 sq. ft.
75 min.	300 sq. ft. or over

*For intermediate floor areas, the percentage shall be interpolated.

2. For determining the total live loads carried by columns, load bearing walls, piers and foundations, the reduced live loads from 1 above may be further reduced to the following:

Location	Percentage of Live Load Allowed
Roof and the top floor	100%
Second floor from top	95%
Third floor from top	90%
Each succeeding floor subtract	5%
Maximum allowable 50%	

(Ord. 85500 § 2306; Sept. 10, 1956).

3.23.070 Wind pressure. (a) **GENERAL.** Buildings and structures and every portion thereof shall be designed and constructed to resist the wind pressure specified in this section. All bracing systems both horizontal and vertical shall be designed and constructed to transfer the wind loads to the foundations.

(b) **WIND PRESSURE.** For purposes of design the wind pressure shall be taken upon the gross area of the vertical projection of buildings and structures at not less than the following pounds per square foot acting in any direction:

	Height from Ground	Pressure
Buildings*	60 feet or less	15
	Above 60 feet	20
Signs	Less than 30 feet	20
	30 feet and more	30
Chimneys, smokestacks, tanks, etc.	Any height	30
Towers	Any height	30

*Except greenhouses which shall be designed for a wind pressure of not less than 10 pounds per square foot.

In calculating the wind pressure on the framework of signs and towers, no shielding of the leeward members shall be assumed.

In calculating the wind pressure on circular chimneys, smokestacks and tanks, the specified wind pressure shall be assumed to act on six-tenths (0.6) of the projected area.

(c) **DESIGN.** The overturning moment calculated from the wind pressure shall in no case exceed two-thirds ($\frac{2}{3}$) of the dead load resisting moment.

The weight of earth superimposed over footings may be used to calculate the dead load resisting moment.

For members carrying wind stresses only, and for combined stresses due to wind and other loads, the allowable unit stresses may be increased one-third ($\frac{1}{3}$). In no case shall the section be less than required for live and dead loads alone.

(d) **COMBINED WIND AND LIVE LOADS.** For the purpose of determining stresses, all vertical design loads plus one-half ($\frac{1}{2}$) of roof live load shall be considered as acting simultaneously with the wind pressure.

(e) **UPLIFT LOADS.** For design purpose, a wind uplift of not less than fifteen (15) pounds per square foot shall be assumed for all exposed roofs, eaves, or other surfaces or structures which may be subject to such uplift loads. (Ord. 85500 § 2307 as amended by Ord. 90196; April 24, 1961 and by Ord. 92060; May 14, 1963).

3.23.080 Live loads posted. The live loads for which each floor or part thereof of a commercial or industrial building is or has been designed, shall have such designed live loads conspicuously posted by the owner in that part of each story in which they apply with figures not less than four (4) inches high, placed not less than seven (7) feet above the floor so as to be plainly visible. One sign shall be so placed per 7,500 square feet or fraction thereof of floor area and it shall be unlawful to remove or deface such signs. (Ord. 85500 § 2308; Sept. 10, 1956).

3.23.090 Retaining walls and basement floors. Retaining walls shall be designed to resist the lateral pressure of the retained material in accordance with accepted engineering practice. Walls retaining drained earth may be designed for pressure equivalent to that exerted by a fluid weighing not less than twenty-five (25) pounds per cubic foot and having a depth equal to that of the retained earth. Any surcharge shall be in addition to the equivalent fluid pressure.

Exception: Walls eight feet (8') or less in height retaining private property which in case of failure would result in no damage to buildings or adjacent property may be designed for fifteen pounds (15 lbs.) per cubic foot of retained material. (Ord. 85500 § 2309; Sept. 10, 1956).

3.23.100 Footing design. Footing shall be designed to minimize differential settlement. (Ord. 85500 § 2310; Sept. 10, 1956).

3.23.110 Walls and structural framing. Walls and structural framing shall be erected true and plumb in accordance with the design. Bracing shall be placed during erection wherever necessary to take care of all loads to which the structure may be subjected. (Ord. 85500 § 2311; Sept. 10, 1956).

3.23.120 Earthquake resistive requirements. (a) **GENERAL.** These requirements are intended to provide minimum standards as design criteria toward making buildings and other structures earthquake-resistive. The provisions of this section apply to the structure as a unit and also to all parts thereof, including the structural frame or walls, floor and roof systems, and other structural features.

The provisions incorporated in this section are general and, in specific cases, may be interpreted as to detail by rulings of the Superintendent of Buildings in order that the intent shall be fulfilled.

Every building or structure and every portion thereof, except buildings of Group I and J-1 occupancies, shall be designed and constructed to resist stresses produced by lateral forces as provided in this section. Stresses shall be calculated as the effect of a force applied horizontally at each floor or roof level above the foundation. The force shall be assumed to come from any horizontal direction.

(b) **DEFINITIONS.** The following definitions apply only to the provisions of this section.

SPACE FRAME: A three dimensional structural system composed of interconnected members, other than shear or bearing walls, laterally supported so as to function as a complete self-contained unit with or without the aid of horizontal diaphragms or floor bracing systems.

SPACE FRAME—VERTICAL LOAD-CARRYING: A space frame designed to carry all vertical loads.

SPACE FRAME—MOMENT RESISTING: A vertical load-carrying space frame in which the members and joints are capable of resisting design lateral forces by bending moments. This system may or may not be enclosed by or adjoined by more rigid elements which would tend to prevent the space frame from resisting lateral forces.

BOX SYSTEM: A structural system without a complete vertical load-carrying space frame. In this system the required lateral forces are resisted by shear walls as hereinafter defined.

SHEAR WALL: A wall designed to resist lateral forces parallel to the wall. Braced frames subjected primarily to axial stresses shall be considered as shear walls for the purpose of this definition.

(c) **SYMBOLS AND NOTATIONS.** The following symbols and notations apply only to the provisions of this section.

C = Numerical coefficient for base shear as defined in Section 3.23.120(d)1.

C_p = Numerical coefficient as defined in Section 3.23.120(d)2 and as set forth in Table No. 23-D.

D = The dimension of the building in feet in a direction parallel to the applied forces.

F_a = Allowable axial stress.

f_a = Computed axial stress.

- F_b = Allowable bending stress.
 f_b = Computed bending stress.
 F_p = Lateral forces on the part of the structure and in the direction under consideration.
 F_x = Lateral force applied to a level designated as x.
 H = The height of the main portion of the building in feet above the base.
 h_x = Height in feet above the base to the level designated as x.
 J = Numerical coefficient for base moment as defined in Section 3.23.120(h).
 K = Numerical coefficient as set forth in Table 23-C.
 $\Sigma w_x h_x$ = Summation of the products of all $w_x \cdot h_x$ for the building.
 M = Overturning moment at the base of the building or structure.
 N = Total number of stories above exterior grade.
 T = Fundamental period of vibration of the building or structure in seconds in the direction under consideration.
 V = Total lateral load or shear at the base.
 W = Total dead load.
 EXCEPTION: W shall be equal to the total dead load plus 25 percent of the floor live load in storage and warehouse occupancies.
 W_p = The weight of a part or portion of a structure.
 w_x = That portion of W which is located at or is assigned to the level designated as x.
 E = Numerical coefficient for foundation effect.

(d) **MINIMUM EARTHQUAKE FORCES FOR BUILDINGS.** 1. **Total lateral force and distribution of lateral force.** Every building shall be designed and constructed to withstand minimum total lateral seismic forces assumed to act non-concurrently in the direction of each of the main axes of the building in accordance with the following formula:

$$V = KCWE$$

The value of K shall be not less than that exhibited in Table 23-C. The value of C shall be determined in accordance with the following formula:

$$C = \frac{0.05}{\sqrt[3]{T}}$$

EXCEPTION: $C = 0.10$ for all one- and two-story buildings. The value of E shall be 1.00 for all foundation bearing values of 3,000 psf or greater. For foundation bearing values less than 1,000 psf or pile supported structures, the value of E shall be

1.20. For foundation bearing values between 1,000 psf and 3,000 psf, the value of E shall be assumed to vary linearly from 1.20 for 1,000 psf foundation bearing values to 1.00 for 3,000 psf foundation bearing values.

T is the fundamental period of vibration of the structure in seconds in the direction considered. Properly substantiated technical data for establishing the period T for the contemplated structure may be submitted.

In the absence of such data, the value of T shall be determined by the following formula:

$$T = \frac{0.05 H}{\sqrt{D}}$$

Exception: $T = 0.10 N$ in all buildings in which the lateral resisting system consists of a moment-resisting space frame which resists 100% of the required lateral forces and which frame is not enclosed by or adjoined by more rigid elements which would tend to prevent the frame from resisting lateral forces.

For the purpose of computing C the value of T need not be less than 0.10 seconds.

The total lateral force " V " shall be distributed over the height of the building in accordance with the following formula:

$$F_x = \frac{V w_x h_x}{\sum wh}$$

Exception 1: One and two story buildings shall have uniform distribution.

Exception 2: Where the height to depth ratio of a lateral force resisting system is equal to or greater than five to one, 10 percent of the total force " V " shall be considered as concentrated at the top story. The remaining 90 percent shall be distributed as provided for in the above formula.

At each level designated as x , the force F_x shall be applied over the area of the building in accordance with the mass distribution on that level.

2. **Lateral force on parts or portions of buildings or other structures.** Parts or portions of buildings or structures and their anchorage shall be designed for lateral forces in accordance with the following formula:

$$F_p = C_p W_p$$

The values of C_p are in Table 23-D. The distribution of these forces shall be according to the gravity loads pertaining thereto.

3. **Foundation ties.** Individual pile footings of every building or foundations on spread footings of bearing values of 1,000 psf or less shall be so interconnected by struts or slabs which can carry by tension and

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compression a horizontal force equal to 10 percent of the larger pile cap or footing loading unless it can be demonstrated that equivalent restraint can be provided by other means.

4. **Vertical acceleration.** The influence of vertical acceleration shall be carefully considered in developing connections between horizontal and vertical systems.

(e) **DISTRIBUTION OF HORIZONTAL SHEAR.** Total shear in any horizontal plane shall be distributed to the various resisting elements in proportion to their rigidities considering the rigidity of the horizontal bracing system or diaphragm as well as the rigidities of the vertical resisting elements.

(f) **DRIFT.** Lateral deflections or drift of a story relative to its adjacent stories shall be considered in accordance with accepted engineering practice.

(g) **HORIZONTAL TORSIONAL MOMENTS.** Provisions shall be made for the increase in shear resulting from the horizontal torsion due to an eccentricity between the center of mass and the center of rigidity. Negative torsional shears shall be neglected. In addition, where the vertical resisting elements depend on diaphragm action for shear distribution at any level, the shear resisting elements shall be capable of resisting a torsional moment assumed to be equivalent to the story shear acting with an eccentricity of not less than five percent of the maximum building dimension at that level.

(h) **OVERTURNING.** Every building or structure shall be designed to resist the overturning effects caused by the earthquake forces specified in this section.

Exception: The axial loads from earthquake force on vertical elements and footings in every building or structure may be modified in accordance with the following provisions:

(1) The overturning moment (M) at the base of the buildings or structure shall be determined in accordance with the following formula:

$$\begin{aligned} M &= J \Sigma F_x h_x \\ \text{WHERE } J &= \frac{0.5}{\sqrt[3]{T^2}} \end{aligned}$$

The required value of J shall be not less than 0.33 nor more than 1 (X).

(2) The overturning moment (M_x) at any level designated as x shall be determined in accordance with the following formula:

$$M_x = \frac{H - h_x}{H} M$$

At any level the overturning moments shall be distributed to the vari-

ous resisting elements in the same proportion as the distribution of the shears in the resisting system. Where other vertical members are provided which are capable of partially resisting the overturning moments, a redistribution may be made to these members if framing members of sufficient strength and stiffness to transmit the required loads are provided.

Where a vertical resisting element is discontinuous, the overturning moment carried by the lowest story of that element shall be carried down as loads to the foundation.

The overturning moment shall not exceed the moment of stability.

(i) **SETBACKS.** Buildings having setbacks wherein the plan dimension of the tower in each direction is at least 75 percent of the corresponding plan dimension of the lower part may be considered as a uniform building without setbacks for the purpose of determining seismic forces.

For other conditions of setbacks the tower shall be designed as a separate building using the larger of the seismic coefficients at the base of the tower determined by considering the tower as either a separate building for its own height or as part of the overall structure. The resulting total shear from the tower shall be applied at the top of the lower part of the building which shall be otherwise considered separately for its own height.

(j) **DESIGN REQUIREMENTS.** 1. **Combined axial and bending stresses in columns forming a part of a space frame.** Maximum allowable extreme fiber stress in columns at intersections of columns with floor beams or girders for combined axial and bending stresses shall be the allowable bending stress for the material used. Within the center one-half of the unsupported length of the column, the combined axial and bending stresses shall be such that

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} \text{ is equal to or less than 1.}$$

When stresses are due to a combination of vertical and lateral loads, the allowable unit stresses may be increased as specified in paragraph (k) of this section.

2. **Building separations.** The effect of contact of non-integral structural elements under deflection from seismic action shall be carefully considered in the design of the affected elements and the structure as a whole.

3. **Combined vertical and horizontal forces.** In computing the effect of seismic force in combination with vertical loads, gravity load stresses induced in members by dead load plus design live load, except roof live load, shall be considered.

TABLE 23-C

Horizontal Force Factor “K” for Buildings or Other Structures

Type or Arrangement of Registering Elements	Value of K
All building framing systems except as hereinafter classified.	1.00
Buildings with a box system as defined in Section 3.23.120(b).	1.33
Buildings with a complete horizontal bracing system capable of resisting all lateral forces, which system includes a moment resisting space frame which, when assumed to act independently, is capable of resisting a minimum of 25% of the total required lateral force.	0.80
Buildings with a moment resisting space frame which when assumed to act independently of any other more rigid elements is capable of resisting 100% of the total required lateral forces in the frame alone.	0.67
Structures other than buildings and other than those listed in Table 23-D	1.50

TABLE 23-D

Horizontal Force Factor “C_p” for Parts or Portions of Buildings or other Structures

Part or Portion of Buildings	Direction of Force	Value of C _p
Exterior bearing and nonbearing walls, interior bearing walls and partitions, interior nonbearing walls and partitions over ten (10) feet in height, masonry or concrete fences over six (6) feet in height.	Normal to flat surface	0.20
Cantilever parapet and other cantilever walls, except retaining walls.	Normal to flat surface	1.00
Exterior and interior ornamentations and appendages.	Any direction	1.00
When connected to or a part of a building: towers, tanks, towers and tanks plus contents, chimneys, smoke stacks, and penthouses. Elevated tanks plus contents not supported by a building.	Any direction	0.20 ¹
When resting on the ground: tank plus effective mass of its contents.	Any direction	0.10
Floors and roofs acting as diaphragms. ²	Any direction	

1. When H/D of any building is equal to or greater than 5 to 1 increase value by 50%.
 2. Floors and roofs acting as diaphragms shall be designed for a minimum value of C_p of 10% applied to loads tributary from that story unless a greater value of C_p is required by the basic seismic formula $V = KCWE$.

4. **Plans and design data.** Plans shall include a statement or other indication of the dead and live loads, seismic base shear, and the design lateral seismic forces applied at each floor level and at the roof. The plans shall clearly define the principal structural elements together with the manner in which they are designed to resist the seismic forces set forth herein.

5. **Reference commentary.** The commentary portion of the Recommended Lateral Forces Requirements and Commentary as published in 1960 and revised in 1963 by the Structural Engineers Association of California shall be considered as an acceptable guide in the interpretation of code requirements and design procedures set forth herein. A copy of said publication is filed with the City Comptroller. (C.F. 258541).

(k) **STRUCTURAL INSPECTION AND ALLOWABLE STRESSES.**

1. Combined stresses and foundation loadings due to dead, live and earthquake loads may exceed those permitted for dead and live loads only by 33-1/3% provided the section thus required is not less than that required for dead and live load alone and provided further that this increase in allowable stresses may be used only if the design and approved inspection of building frame construction is the direct responsibility of the registered structural engineer whose seal appears on the drawings.

2. Approved inspection and supervision shall be in accordance with the provisions of Sections 3.03.040 and 3.03.050.

(l) **ADDITIONS AND ALTERATIONS.** No existing building or structure shall be altered or reconstructed in such a manner that the resistance to the lateral forces will be less than that before alteration or reconstruction unless requirements of this section are retained by the altered structure except that non-bearing partitions and other minor parts may be altered in a manner satisfactory to the Superintendent of Buildings.

(m) **DAMAGE FROM EARTHQUAKE OR OTHER CAUSES.** Any existing building that is damaged by earthquake, to the extent that in the opinion of the Superintendent of Buildings it is not structurally safe, shall not be occupied until repairs are made to make it comply to paragraph (l) above. (Ord. 85500 § 2312, as amended by Ord. 95985; July 26, 1967).

BUILDINGS

Chapter 3.24
MASONRY

Sections:

- 3.24.010 Scope.
- 3.24.020 Definitions.
- 3.24.030 Materials.

- 3.24.040 Tests.
- 3.24.050 Unburned clay masonry.
- 3.24.060 Gypsum masonry.
- 3.24.070 Reinforced gypsum.
- 3.24.080 Glass masonry.
- 3.24.090 Stone masonry.
- 3.24.100 Cavity wall masonry.
- 3.24.110 Plain hollow unit masonry.
- 3.24.120 Plain solid masonry.
- 3.24.130 Plain grouted masonry.
- 3.24.140 Reinforced grouted masonry.
- 3.24.150 Reinforced hollow unit masonry.
- 3.24.160 General construction requirement.
- 3.24.170 General design.
- 3.24.180 Bearing walls.
- 3.24.190 Non-bearing walls.
- 3.24.200 Reinforced columns.
- 3.24.210 Supervision.

3.24.010 Scope. All masonry shall conform to the regulations of this Code. Any masonry material or method not specifically mentioned in this Chapter may be used subject to the provisions of Section 3.01.050. (Ord. 85500 § 2401; Sept. 10, 1956).

3.24.020 Definitions. For the purpose of this Chapter certain terms are defined as follows:

DIMENSIONS. Masonry dimensions given are nominal; actual dimensions may not be decreased by more than one-half inch ($\frac{1}{2}$ ").

GROSS CROSS-SECTIONAL AREA OF HOLLOW UNITS is the total area including cells of a section perpendicular to the direction of loading. Re-entrant spaces are included in the gross area, unless these spaces are to be occupied in masonry by portions of adjacent units.

MASONRY UNIT is any brick, tile, stone or block conforming to the requirements specified in Section 3.24.030. (Ord. 85500 § 2402; Sept. 10, 1956).

3.24.030 Materials. (a) **GENERAL.** Every masonry unit shall conform to the requirements for strength specified in this chapter.

(b) **BRICK MADE FROM CLAY OR SHALE.** Building brick of clay or shale shall be of a quality at least equal to that required by U.B.C. Standard No. 24-1. For exterior surfaces the brick shall be of at least grade MW.

(c) **BRICK MADE FROM SAND LIME.** Building brick made from sand lime shall be of a quality at least equal to that required by U.S.C.

Standard No. 24-2. For exterior surfaces the brick shall be of at least grade MW.

(d) **CONCRETE BRICK.** Building brick of concrete shall be of a quality at least equal to that required by U.B.C. Standard No. 24-3.

(e) **STRUCTURAL CLAY TILE.** Structural clay tile shall be of a quality at least equal to that required by U.B.C. Standard No. 24-8, when used for bearing walls or piers; or equal to U.B.C. Standard No. 24-9; when used for interior non-load-bearing purposes.

(f) **CONCRETE MASONRY UNITS.** Concrete masonry units shall be of a quality at least equal to that required by U.B.C. Standards No. 24-5 or 24-6 when used for bearing walls or piers, or equal to U.B.C. Standard No. 24-7 when used for non-bearing purposes.

Exception: When used for load bearing purposes, units over six (6) inches in thickness, shall have face shells not less than one and one-quarter ($1\frac{1}{4}$) inches thick and units six (6) inches and less shall have face shells not less than one (1) inch thick. Load bearing units with face shells less than one and one-half ($1\frac{1}{2}$) inches thick shall be flared at the top to provide a mortar bed at least one and one-half ($1\frac{1}{2}$) inches wide.

(g) **GYPSUM UNITS.** Gypsum partition tile or block shall be of a quality at least equal to that required by U.B.C. Standard No. 24-12.

(h) **CAST BUILDING STONES.** Cast building stone shall conform to U.B.C. Standard No. 24-21. Every concrete unit more than eighteen (18) inches in any dimension shall conform to the requirements for concrete in Chapter 3.26 of this Code.

(i) **SAND LIME MASONRY UNITS.** Sand lime masonry units shall meet the physical requirements of U.B.C. Standard No. 24-7 or 24-5.

(j) **STONE.** Natural stone shall be sound, clean, and in conformity with other provisions of this Chapter.

(k) **GLASS BLOCK.** Glass block shall have unglazed surfaces to allow adhesion on all mortared faces.

(l) **GLAZED BRICK UNITS.** Glazed brick shall conform to the structural requirements for building brick of clay or shale, and glazed structural tile shall conform to the structural requirements for structural clay tile.

(m) **REINFORCING STEEL.** Reinforcing steel shall conform to the physical and chemical requirements for metal reinforcement in concrete, as specified in Chapter 3.26 of this Code.

(n) **WATER.** Water used in mortar, grout, or masonry work shall be clean and free from injurious amounts of oil, acid, alkali, organic matter, or other harmful substances.

(o) CEMENT. Cement for mortar shall be Portland Cement as specified in U.B.C. Standard No. 26-1. Masonry cement shall be as specified in U.B.C. Standard No. 24-18.

(p) LIME. Quicklime shall conform to U.B.C. Standard No. 24-14. Hydrated lime shall conform to the requirements of U.B.C. Standard No. 24-15. Lime putty shall be made from quicklime or hydrated lime.

If made from pebbled or crushed quicklime, the lime shall be slaked and then screened through a 16-mesh sieve. After slaking, screening, and before using, it shall be stored and protected for not less than ten (10) days. The resulting lime putty shall weigh not less than eighty-three (83) pounds per cubic foot.

(q) MORTAR. (1) Mortar other than gypsum mortar used in masonry construction shall be classified as set forth in Table No. 24-A, as follows:

Table No. 24-A
MORTAR PROPORTIONS

Type	Compressive Strength at 28 Days p.s.i.	Parts by Volume				Aggregate Measured in Damp, Loose Condition
		Portland Cement	Masonry Cement	Hydrated Lime or Lime Putty Minimum	Maximum	
M (A-1)	2500	1	1 (Type II)	.....	.....	Not less than 2¼ and not more than 3 times the sum of the volumes of the cements and lime used.
S (A-2)	1800	½	1 (Type II)	¼	¾	
N (B)	750	.....	1 (Type II)	.....	.....	the sum of the volumes of the cements and lime used.
O (C)	350	1	1 (Type I or II)	½	1¼	
K (D)	75	.....	.....	1¼	2½	used.
		1	.....	2½	4	

- (2) Tests made to classify mortar by compressive strength shall be as specified in U.B.C. Standard No. 24-18.
- (3) Mortar when applied shall have a flow after suction for one (1) minute of not less than seventy per cent (70%) of that immediately before suction when determined by the method of the water retention test of U.B.C. Standard No. 24-18.
- (4) Unless the strength classification of the mortar has been established by tests in accordance with this Section, mortars using the cementitious materials set forth in Table No. 24-A shall be assumed to meet the strength classification shown when mixed with aggregate in proportions required by this section, but in no case may the proportion of cementitious materials deviate from the limits set forth in Table No. 24-A.

(r) GROUT. Grout shall be composed of concrete having a minimum compressive strength of two thousand (2000) p.s.i. as specified in

Chapter 3.26 of this Code or of Type A mortar. Sufficient water shall be added to produce consistency for pouring without segregation of the constituents of the mortar-grout.

In grout spaces in brick masonry two (2) inches or more in horizontal dimension and in grout spaces in filled-cell construction four (4) inches or more in both horizontal dimensions, the grout may contain an addition of pea gravel equal to not more than two (2) parts by volume of cement used. Such pea gravel shall be graded with not more than five per cent (5%) passing the No. 8 sieve and one hundred per cent (100%) passing the three-eighths ($\frac{3}{8}$) inch sieve.

(s) **MORTAR LIMITATIONS.** Mortar used in foundation walls and footings shall be Type A, B or C mortar. Type D mortar shall be used only in interior non-bearing walls.

(t) **AGGREGATES.** Aggregates for mortar shall be of a quality at least equal to that specified by U.B.C. Standard No. 24-20.

(u) **RATE OF ABSORPTION.** At the time of laying, burned clay units and sand lime units shall have a sufficient moisture so that the rate of absorption shall not exceed 0.025 ounces per square inch during a period of one (1) minute. In the absorption test the surface of the unit shall be held one-eighth ($\frac{1}{8}$) inch below the surface of the water.

(v) **RE-USE OF MASONRY UNITS.** Masonry units may be re-used when cleaned, whole, and conforming to the other requirements of this chapter appropriate to the type of unit. (Ord. 85500 § 2403, as amended by Ord. 89827; December 12, 1960).

3.24.040 Tests. (a) Tests of materials shall be made in accordance with the standard method prescribed for the material in question.

(b) When a load test is required, the member or portion of the structure under consideration shall be subject to a superimposed load equal to twice the design live load plus one dead load. This load shall be left in position for a period of 24 hours before removal. If, during the test or upon removal of the load, the member or portion of the structure shows evidence of failure, such changes or modifications as are necessary to make the structure adequate for the rated capacity shall be made; or where lawful, a lower rating shall be established. A flexural member shall be considered to have passed the test if the maximum deflection D at the end of the 24-hour period neither exceeds

$$D = \frac{L}{200} \quad \text{nor} \quad D = \frac{L^2}{4000t}$$

and the beams and slabs show a recovery of at least 75 per cent of the observed deflection within 24 hours after removal of the load.

MASONRY

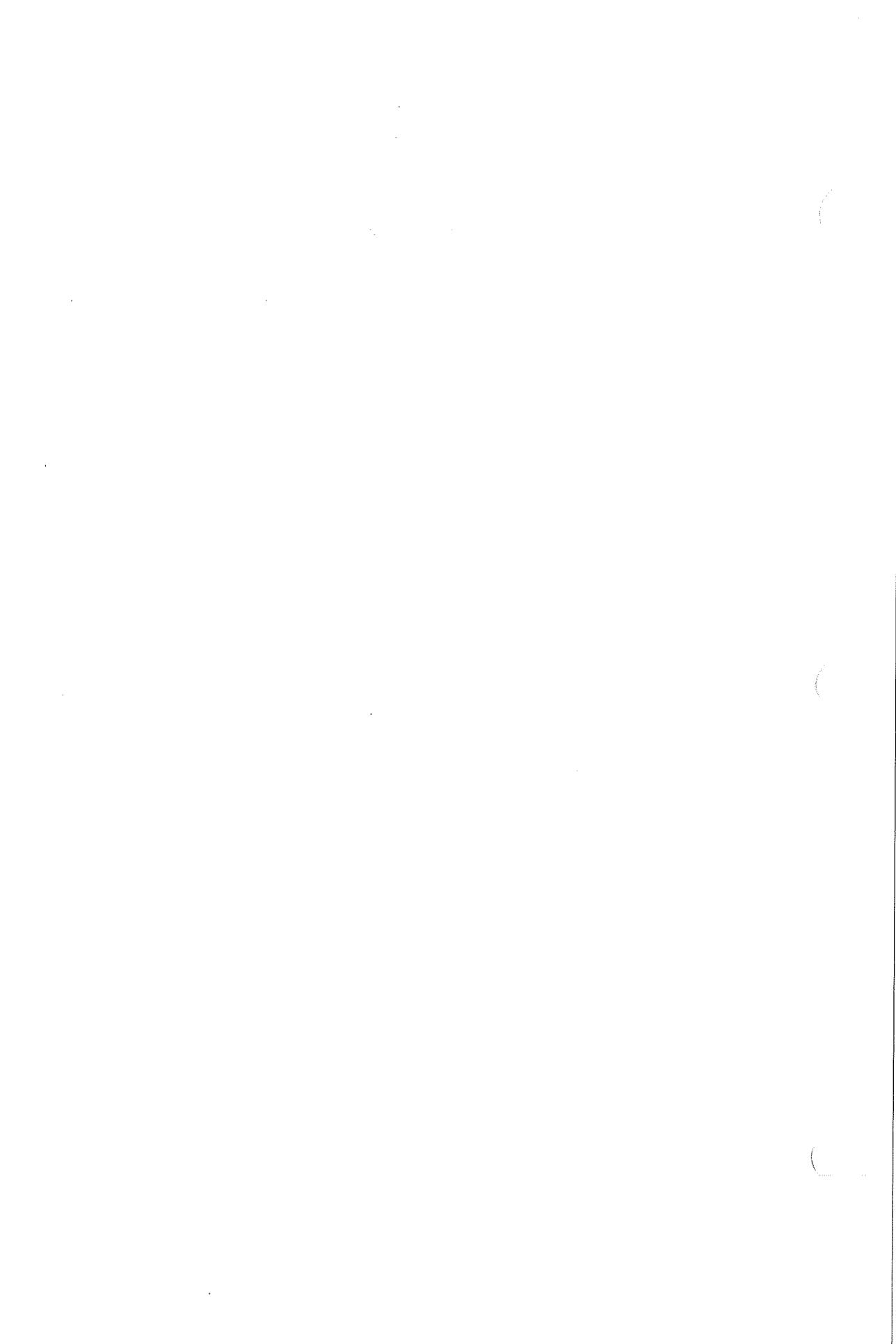
3.24.040

WHERE:

D=deflection of member in inches

L=span of the member in inches

t=thickness or depth of the member in inches



(c) When the strength of masonry for design purposes is to be established by prism tests, the test results, the qualities of the materials and the bonding arrangement used shall be recorded as directed by the Superintendent of Buildings. Similar test prism samples shall be taken during the progress of construction as directed by the Superintendent of Buildings to insure conformance to the basis for design.

The compressive strength of the masonry, f'_m , shall be determined by dividing the ultimate test load by the area of the prisms based on their outside dimensions.

1. In solid masonry tests prisms for beams and slabs shall be approximately eight inches by eight inches by twenty-five inches (8" x 8" x 25"), built in a horizontal position with unselected units laid as stretchers in running bond, two bricks wide and three courses high, with one-half inch ($\frac{1}{2}$ ") joints. Prisms representing walls shall be approximately eight inches by sixteen inches (8" x 16") in plan and sixteen inches (16") high. Those representing columns or pedestals shall be approximately eight inches by eight inches (8" x 8") in plan and sixteen inches (16") high.

2. In hollow unit masonry test prisms shall be built in the form of hollow square eight inches by eight inches (8" x 8") in plan and sixteen inches (16") high or in the form of rectangles eight inches by sixteen inches (16") in plan and sixteen inches (16") high. The hollow core shall not be filled with grout.

3. Prisms tested to establish the strength of masonry for design purposes shall be stored in a moist atmosphere for seven days at a temperature of not less than 65 degrees Fahrenheit and then in air at a temperature of not less than 65 degrees Fahrenheit until tested. Not less than three specimens shall be made for each test and the strength to be used for design shall be based upon the average strength of the specimens. The standard age of test specimens shall be 28 days, but seven-day tests may be used, provided the relation between the seven-day and 28-day strengths of the masonry is established by test for the materials used.

When prism samples are made at the construction site, at least three specimens shall be made of each type of masonry construction upon which the design has been based. Samples shall be made and cured similar to the requirements for the construction of which they are representative. (Ord. 85500 § 2404; Sept. 10, 1956).

3.24.050 Unburned clay masonry. This material not in normal use and requirements, including Table No. 24-B, are deleted. Use may be permitted under provisions of Section 3.01.050. (Ord. 85500 § 2405; Sept. 10, 1956).

3.24.060 Gypsum masonry. (a) GENERAL. Gypsum masonry is that form of construction made with gypsum block or tile in which the units are laid and set in gypsum mortar. Gypsum masonry shall not be used in any

bearing wall or where exposed directly to the weather or where subject to frequent or continuous wetting.

(b) **MATERIALS.** Gypsum masonry shall be gypsum block or tile laid up in gypsum mortar composed of one part gypsum and not more than three parts of sand by weight.

(c) **STRESSES.** All gypsum masonry shall be so constructed that the unit stresses do not exceed those set forth in Table No. 24-G when computed on the gross cross-sectional area.

(d) **BOND.** The bond in gypsum masonry shall conform to the requirements for bond in masonry or hollow units specified in Section 3.24.110.

(e) **METHOD OF LAYING.** All units in gypsum masonry shall be placed in side construction with cells horizontal. The entire bearing surface of every unit shall be covered with mortar spread in an even layer, and all joints shall be filled with mortar. (Ord. 85500 § 2406; Sept. 10, 1956).

3.24.070 Reinforced gypsum. (a) **GENERAL.** Gypsum concrete shall be classified by strength in accordance with the requirements of Standard Specifications for Gypsum Concrete ASTM designation C317-54, as follows:

	Compressive Strength Min. psi
Class A (not more than 12½ per cent by weight of wood chips, shavings, or fibre.)	500
Class B (not more than 3 per cent by weight of wood chips, shavings, or fibre)	1000

The strength of gypsum concrete (fg) shall be determined in accordance with the requirements of Standard Methods of Testing Gypsum and Gypsum Products ASTM Designation C26-54.

(b) **WATER RATIO.** The water ratio shall not exceed 11.0 gallons of water per 100 pounds of Class A mill mixed Gypsum Concrete and not more than 9.0 gallons of water per 100 pounds of mill mixture for Class B mill mixed gypsum concrete.

(c) **ALLOWABLE STRESSES.** 1. **Reinforced Gypsum Concrete.** In the design of reinforced gypsum concrete the stresses in the concrete shall not exceed the following values:

In this tabulation fg indicates the compressive strength of the concrete mixture as determined in accordance with Section 2407 (a).

Compressive stress in bending.....	0.25 fg
Axial compressive or bearing stress.....	0.20 fg
Bond stress	0.02 fg*
Shearing stress	0.20 fg

*Gypsum concrete reinforced with electrically welded wire fabric meeting the requirements of subsection 2 b meets the bond and shear requirements of this Section.

2. STEEL. a. Sub-Purlins. Design stress in tension of steel sub-purlins (f_s) shall not exceed the minimum yield strength of the steel when divided by 1.85.

b. Wires or Wire Fabric Reinforcement. Stress in tension (f_s) shall not exceed 50% of the minimum yield point of the steel used but in no case shall exceed 25,000 psi.

3. MODULUS OF ELASTICITY. In the design of reinforced gypsum concrete, the applicable value given below shall be used as the modulus of elasticity of the gypsum concrete.

Class of Gypsum Concrete	Modulus of Elasticity psi
A	200,000
B	600,000

(d) DESIGN. 1. General. Reinforced gypsum concrete shall be designed to support the loads and to withstand the forces to which it is subject without exceeding the stresses permitted in Section 2407 (c). Except as hereinafter provided, methods of design admitting of rational analysis according to established principles of mechanics shall be used. The general assumption and principles established for reinforced concrete shall also apply to reinforced gypsum concrete insofar as they are pertinent except that the minimum ratio of reinforcement to concrete area for shrinkage and temperature reinforcement shall not apply to gypsum concrete.

For precast gypsum concrete which cannot be analyzed in accordance with established principles of mechanics, the safe load, uniformly distributed, shall be taken as one-fifth of the total load causing failure in a full-size test panel with the load applied along two lines each distant one-fourth of the clear span from the support.

Precast gypsum concrete shall contain not more than 3 per cent by weight of wood chips, shavings, or fibre measured as a percentage by weight of the dry mixture.

2. Protection. The top side of the gypsum concrete slab shall be protected with an adequate waterproof covering. Where such roofs over-

hang the eaves or are similarly exposed, they shall either be poured on cement-asbestos formboards or the undersides shall be otherwise protected against wetting.

3. Minimum Thickness. The minimum thickness of gypsum concrete used structurally shall be 2 in. from the top of the formboards except in the suspension system, where it shall be not less than 3 in. Measurement for minimum thickness shall be taken over primary framing members and at the center line between sub-purlins where such members are used.

The minimum thickness of precast reinforced gypsum concrete shall be two inches. Hollow precast reinforced gypsum units for roof construction shall be not less than three inches thick and the shell shall be not less than one-half inch thick. Precast gypsum units shall be reinforced and, unless the shape or marking of the unit is such as to insure its being placed right side up, the reinforcement shall be placed symmetrically so that the unit can support its load either side up.

4. Maximum Spans. The maximum clear span of the gypsum concrete slab between supports shall not exceed (1) $32\frac{5}{8}$ in. when using sub-purlins and permanent formboards as specified herein, and (2) shall not exceed 3 feet for gypsum concrete over permanent formboards applied directly to primary framing members, and (3) shall not exceed 8 feet for the suspension system.

5. Suspension System. In the construction of slabs by the suspension system, the forms used are temporary, being removed when slabs are set and adequately strong. In this construction the reinforcement shall consist of wires with continuity through multiple spans and anchored at the ends. Anchorage shall be such as to provide adequate resistance to tensile stresses developed in the wire by the design load. The top of the slab shall not be less than $\frac{1}{2}$ in. above the roof or floor beams. The wires shall be encased in gypsum concrete, shall be supported in the top of the slab by the roof or floor beams, and shall be tightly drawn down as near to the bottom of the slab at midspan as fire protection requirements will allow, but not closer than $\frac{1}{2}$ in. Provision shall be made in the framing of the end bays of this system for resisting the forces due to end anchorage of the wires. The wires shall be designed for a tension in pounds per ft. width of slab equal to:

$$\frac{wL^2}{8d}$$

in which: w is the total load in lb. per sq. ft.

L is the clear span in ft.

d is the sag of the wires in ft.

6. Shear on Bolts and Dowels Poured Gypsum

Size	Embedment	Shear
1/4" bolt or dowel	4 in.	170 lbs.
3/8" bolt or dowel	4 in.	280 lbs.
1/2" bolt or dowel	5 in.	440 lbs.

(e) **INSTALLATION.** 1. All materials shall be stored off the ground and shall be kept dry until use. Where necessary to store mill mixtures for gypsum concrete and formboards outside, they shall be properly supported and fully protected from the weather. Materials left on the roof structure between working periods shall be similarly kept dry.

2. Reinforcing fabric shall be placed with the longitudinal wires at right angles to the supporting members. Ends of fabric shall be lapped not less than 6 in. Sides of fabric shall be butted or spaced apart not more than 4 in. Reinforcing fabric shall be cut to fit at all walls, curbs, openings, etc. Reinforcing fabric shall be carried into all areas where gypsum concrete is to be placed, including poured curbs.

Gypsum concrete mill mixture shall have water only added at the site. The amount of water added shall not exceed that specified in Section 3.24.070 (b).

3. Gypsum concrete shall be so deposited that the full required thickness can be obtained in each pour. Double pouring shall not be permitted.

4. Screeds, such as metal bars or wood strips shall be placed as guides to screeding the gypsum concrete to the specified thicknesses. Immediately on pouring, the gypsum concrete shall be spread and screeded. Surface of concrete shall be left smooth enough to receive the roof covering specified for the job.

5. Gypsum concrete shall not be mixed or poured during weather when the temperature and job exposure will allow the concrete to freeze before it takes its complete chemical set.

(f) **INSPECTION.** Gypsum concrete shall be installed only under continuous supervision by an approved inspector. Test cylinders as specified in ASTM Designation C26-54 shall be furnished as required by the Superintendent of Buildings but in no case less than six hours from each day's pour. (Ord. 85500 § 2407; Sept. 10, 1956).

3.24.080 Glass masonry. (a) **GENERAL.** Masonry of glass blocks may be used either isolated or in continuous bands in exterior or interior wall openings which could otherwise be filled with windows. Such masonry shall not be deemed an integral part of the wall, nor shall it bear any load other than its own weight. Panels shall have a minimum thickness of three and one-half inches at the mortar joint and mortared surfaces of blocks shall be treated for mortar bonding.

(b) **SIZE OF PANELS.** No isolated panel or portion of a continuous band shall exceed 144 square feet in area, 20 feet in height, or 25 feet in length without adequate intermediate lateral supports and expansion joints.

Where glass block is used for fire windows see Section 3.43.060 (e) for limitations on size.

(c) **MORTAR.** Block shall be laid in at least Type C mortar with joints not less than one quarter inch and not more than three eighths inch thick, completely filled.

(d) **REINFORCEMENT.** Horizontal mortar joints not more than twenty-four inches on center for blocks eight inches or less in height, and every horizontal mortar joint for blocks over eight inches in height shall be reinforced with:

1. 2 parallel steel wires No. 9 gage or larger, spaced two inches apart by steel cross wires No. 14 gage or larger, welded together at intervals not greater than eight inches.
2. Any approved equal as specified in Section 3.01.050.

All wall reinforcement shall run continuously, from end to end of mortar joints, but shall not bridge expansion joints. Where splices occur, individual lengths shall be lapped at least six inches. (Ord. 85500 § 2408; Sept. 10, 1956).

3.24.090 Stone masonry. (a) **GENERAL.** Stone masonry is that form of construction made with natural or cast stone in which the units are laid and set in mortar, with all joints thoroughly filled.

1. Ordinary Rubble shall be defined as masonry composed of unsquared stones laid without attempting any regularity of courses or bond.

Coursed rubble shall be defined as masonry having approximately level joints, with stones roughly shaped so as to fit approximately, and joints in wall or pier leveled off at intervals not exceeding every three (3) feet, no (0) inches in height and well bonded.

Rubble stone masonry twenty-four inches (24") or less in thickness shall have bond stones with a maximum spacing of three feet (3') vertically and three feet (3') horizontally, and if the masonry is of greater thickness than twenty-four inches (24"), shall have one bond stone for each six square feet (6 sq. ft.) of wall surface on both sides.

2. First Class Masonry shall be defined as masonry built of stone in regular courses, the bearing surfaces and ends of which are roughly tooled off, and the stones laid with alternate headers and stretchers so as to secure bonds.

3. In ashlar masonry, bond stones uniformly distributed shall be provided to the extent of not less than 10 per cent of the area of exposed facets.

(b) **THICKNESS.** Stone masonry walls shall have a minimum thickness of 4" and shall further conform to the requirements of Section 3.24.180 (e) 1, and 2, and Section 3.24.190, except that type (a) 1 (ordinary rubble) may not have an unsupported height to thickness ratio greater than ten (10).

(c) **STRESSES.** The allowable unit working stresses in stone masonry shall not exceed the values set forth in Table No. 24-G. (Ord. 85500 § 2409; Sept. 10, 1956).

3.24.100 Cavity wall masonry. (a) **GENERAL.** Cavity wall masonry is that type of construction made with brick, structural clay tile or hollow concrete masonry units or any combination of such units in which facing and backing are completely separated except for the metal ties which serve as bonding. The resistance to lateral forces of a cavity wall shall be computed as the sum of the resistance of the two wythes acting independently.

(b) **CONSTRUCTION.** 1. In cavity walls neither the facing nor the backing shall be less than four inches (4") in thickness and the cavity shall be not less than one and one-half inches nor more than three inches (3") in width.

2. The facing and backing of cavity walls shall be bonded with not less than three-sixteenths inch diameter individual steel rods or metal ties of equivalent cross sectional area or continuously anchored with approved web type ties embedded in the horizontal joints.

3. Ties shall be of corrosion-resistant metal, or shall be coated with a corrosion-resistant metal or other approved protective coating.

4. Rods bent to rectangular shape shall be used with hollow masonry units, laid with the cells vertical; in other walls, the ends of the ties shall be bent to 90 degree angles to provide hooks not less than two inches (2") long.

5. There shall be at least one metal tie for each three square feet (3 sq. ft.) of wall area.

6. Ties in alternate courses shall be staggered and the maximum vertical distance between ties shall not exceed eighteen inches (18"), and the maximum horizontal distance shall not exceed thirty-six inches (36").

7. Additional bonding ties shall be provided at all openings, spaced not more than three feet (3') apart around the perimeter and within twelve inches (12") of the opening.

(c) **MAXIMUM HEIGHT.** Cavity walls ten inches in thickness shall not exceed twenty-five feet (25') in height. (For ratio of maximum height or length to thickness, see Sections 3.24.180 (e) and 3.24.190.

(d) **STRESSES.** The allowable unit working stresses in cavity wall construction shall not exceed the values set forth in Table No. 24-G. (Ord. 85500 § 2410; Sept. 10, 1956).

3.24.110 Plain hollow unit masonry. (a) **GENERAL.** Hollow unit masonry is that type of construction made with hollow masonry units in which the units may be laid and set in mortar or fastened together with some approved bonding device.

All mortar bonded units shall be laid with full face shell mortar beds. All head and end joints shall be filled solidly with mortar for a distance in the face of the unit or wall not less than the thickness of the longitudinal face shells.

(b) **CONSTRUCTION OF MORTAR BONDED UNITS.** Where two or more hollow units are used to make up the thickness of a wall, the stretcher courses shall be bonded at vertical intervals not exceeding thirty-two inches (32") by lapping at least four inches (4") over the unit below or by lapping at vertical intervals not exceeding sixteen inches (16") with units which are at least 50 per cent greater in thickness than the units below; or by bonding with metal ties conforming to the requirements for cavity walls. There shall be one metal tie for not more than each two square feet (2 sq. ft.) of wall area. Ties in alternate courses shall be staggered, and the maximum vertical distance between ties shall not exceed sixteen inches (16") and the maximum horizontal distance shall not exceed twenty-four inches (24").

(c) **STRESSES.** All hollow unit masonry shall be so constructed that the unit stresses do not exceed those set forth in Table No. 24-G. (For ratio of maximum height or length to thickness, see Section 3.24.180 (e) and 3.24.190.)

(d) **STRUCTURAL MEMBERS.** In walls of hollow unit masonry set in mortar, structural members may be built by filling continuous cores or spaces with concrete or grout in which reinforcement is embedded. Such members may be designed as specified for reinforced masonry in Section 3.24.170 (k). (Ord. 85500 § 2411; Sept. 10, 1956).

3.24.120 Plain solid masonry. (a) **GENERAL.** Plain solid masonry shall be constructed of brick made from clay, shale, concrete or sand-lime or solid load-bearing concrete masonry units, laid contiguously in mortar.

All units shall be laid with full, shoved mortar joints, and all head, bed and wall joints shall be solidly filled with mortar.

(b) **CONSTRUCTION.** Bonding shall be by either of the following methods:

1. The facing and backing shall be bonded so that not less than 4 per cent of the wall surface of each face is composed of bonders (headers) extending not less than four inches (4") into the backing. The distance

between adjacent full-length headers shall not exceed twenty-four inches (24") either vertically or horizontally. In walls in which a single bonder does not extend through the wall, bonders from the opposite sides shall be covered with another bonder course overlapping the bonder below at least four inches (4").

2. The facing and backing shall be bonded with corrosion-resistant metal ties conforming to the requirements for cavity walls. There shall be at least one metal tie for each two square feet (2 sq. ft.) of wall area. Ties in alternate courses shall be staggered, and the maximum vertical distance between ties shall not exceed sixteen inches (16"), and the maximum horizontal distance shall not exceed twenty-four inches (24").

(c) **STRESSES.** All plain solid masonry shall be so constructed that the unit stresses do not exceed those set forth in Table No. 24-G. (For ratio of maximum height or length to thickness, see Section 3.24.180 (e) and 3.24.190.) (Ord. 85500 § 2412; Sept. 10, 1956).

3.24.130 Plain grouted masonry. (a) **GENERAL.** Plain grouted masonry is that form of construction made with brick or concrete brick units in which interior joints of masonry are filled by pouring grout therein as the work progresses.

(b) **MATERIALS.** At the time of laying, all masonry units shall be free from excessive dust and dirt. Only Type A mortar shall be used.

(c) **CONSTRUCTION.** 1. All units in the two outer tiers shall be laid with full shoved head and bed mortar joints.

2. All longitudinal or vertical joints shall be grouted and shall be not less than three-fourths inch ($\frac{3}{4}$ ") in thickness. In members of three or more tiers in thickness, interior bricks shall be embedded into the grout so that at least three-fourths inch ($\frac{3}{4}$ ") of grout surrounds the sides and ends of each unit.

3. One exterior tier may be carried up twelve inches (12") before grouting, but the other exterior tier shall be grouted in lifts not to exceed four inches (4").

4. If the work is stopped for one hour or longer, the horizontal construction joints shall be formed by stopping all tiers at the same elevation and with the grout one inch (1") below the top masonry unit.

(d) **STRESSES.** All plain grouted masonry shall be so constructed that the unit stresses do not exceed those set forth in Table No. 24-G. (For ratio of maximum height or length to thickness, see Section 3.24.180 (e) and 3.24.190.) (Ord. 85500 § 2413; Sept. 10, 1956).

3.24.140 Reinforced grouted masonry. (a) **GENERAL.** Reinforced grouted masonry shall conform to all of the requirements for plain grouted masonry in Section 3.24.130 and also to the following:

(b) **Construction.** The thickness of grout or mortar between brick and steel shall be not less than one-quarter inch ($\frac{1}{4}$ "), except that one-quarter inch ($\frac{1}{4}$ ") bars may be laid in one-half inch ($\frac{1}{2}$ ") horizontal mortar joints.

(c) **Stresses.** All reinforced grouted masonry shall be so designed and constructed that the unit stresses do not exceed those set forth in Table No. 24-H. (For ratio of maximum height or length to thickness, see Section 3.24.180 (e) and 3.24.190).

(d) Reinforcement shall conform to the requirements of Sections 3.24.180 and 3.24.190. (Ord. 85500 § 2414; Sept. 10, 1956).

3.24.150 Reinforced hollow unit masonry. (a) **GENERAL.** Reinforced hollow unit masonry is that type of construction made with hollow masonry units in which certain cells are continuously filled with concrete or grout, and in which reinforcement is embedded.

(b) **CONSTRUCTION.** 1. All reinforced hollow unit masonry shall be built to preserve the unobstructed vertical continuity of the cells to be filled. Walls and cross webs forming such cells to be filled shall be full-bedded in mortar to prevent leakage of grout. All head (or end) joints shall be solidly filled with mortar for a distance in from the face of the wall or unit not less than the thickness of the longitudinal face shells. Bond shall be provided by lapping units in successive vertical courses or by equivalent mechanical anchorage.

2. Vertical cells to be filled shall have vertical alignment sufficient to maintain a clear, unobstructed continuous vertical cell of not less than 6 sq. inch of cross sectional area nor less than $1\frac{1}{2}$ inches in either dimension.

3. Cleanout openings shall be provided at the bottoms of all cells to be filled at each lift or pour of grout where such lift or pour of grout is in excess of three feet (3') in height. Any overhanging mortar or other obstruction or debris shall be removed from the insides of such cell walls. The cleanouts shall be sealed before grouting, after inspection.

4. All cells containing reinforcement shall be filled solidly with grout. Vertical cells containing reinforcement shall be filled solidly with grout in lifts not exceeding four feet in height.

5. When the grouting is stopped for one hour or longer, horizontal construction joints shall be formed by stopping the pour of grout one and one-half inches ($1\frac{1}{2}$ ") below the top of the uppermost unit.

TABLE No. 24-H—MAXIMUM WORKING STRESSES
Reinforced Solid and Hollow Unit Masonry*

Type of Stress	Allowable Unit Stresses For any strength of masonry, f'm, as determined by Section 3.24.170 (k) (pounds per sq. in.)
Compression — Axial	0.20 f'm
Compression — Flexural	0.33 f'm
Shear (No shear reinforcement)	0.03 f'm
Shear (Shear reinforcement taking $\frac{2}{3}$ of entire shear)	0.06 f'm
Bearing	0.25 f'm
Modulus of Elasticity	1000 f'm
Modulus of Rigidity	400 f'm
Bond — Plain Bars	80
Bond — Deformed Bars	130

*All values based on gross area.

(c) **STRESSES.** All reinforced hollow unit masonry shall be so designed and constructed that the unit stresses do not exceed those set forth in Table No. 24-H. f'm shall be calculated on the gross cross section of the wall in all cases except cavity walls. (For ratio of maximum height or length to thickness, see Section 3.24.180 (e) and 3.24.190.)

(d) Reinforcement shall conform to the requirements of Section 3.24.180, or Section 3.24.190. (Ord. 85500 § 2415; Sept. 10, 1956).

3.24.160 General construction requirement. (a) **FREEZING.** All masonry shall be protected against freezing for at least 48 hours after being laid. No masonry shall be built upon frozen material.

(b) **CORBELING.** Corbels of solid masonry may be built into masonry walls eight inches (8") or more in thickness provided that at least one course below the corbel shall be of solid masonry. The projection slope for each course in such corbel shall not exceed one inch and the maximum projection shall not exceed one-third ($\frac{1}{3}$) the total thickness of the wall when used to support structural members, and not more than six inches (6") when used to support a chimney built into the wall. The top course of all corbels shall be a header course.

(c) **WOOD.** No structural masonry shall be supported by wood members, except wood piling as specified in Section 3.28.070. (Ord. 85500 § 2416; Sept. 10, 1956).

3.24.170 General design. (a) **COMBINATION OF UNITS.** In faced or composite walls or other structural members composed of different kinds

or grades of units, materials, or mortars, the maximum stress shall not exceed the allowable stress for the weakest of the combinations of units, materials, and mortars of which the member is composed. The thickness of any facing which is used to resist stress shall be not less than two inches (2").

(b) **THICKNESS OF WALLS.** For arbitrary limits of walls set forth in this Chapter, nominal thickness shall be used. Stresses shall be determined on the basis of the net thickness of the masonry, with consideration for reductions such as raked joints. Narrow sections between openings whose width is less than three times the thickness shall be designed as required for columns in Section 3.24.200.

(c) **ISOLATED PIERS OR COLUMNS.** Every structural unreinforced isolated pier or column shall have a minimum dimension of 12 inches and its unsupported height shall not exceed ten times its least dimension.

(d) **CHASES AND RECESSES.** Chases and recesses in masonry walls shall be designed and constructed so as not to reduce the required strength or required fire resistance of the wall.

(e) **PIPES, CONDUITS, ETC., EMBEDDED IN MASONRY.** No pipe or conduit shall be embedded in any structural masonry or required fireproofing.

Exceptions: 1. Rigid electric conduits may be embedded in structural masonry when their location has been detailed on the approved drawings.

2. Any pipe or conduit may pass vertically or horizontally through any masonry by means of a sleeve at least large enough to pass any hub or coupling on the pipe line. Such sleeves shall be placed not closer than three diameters, center to center, nor shall they unduly impair the strength of construction.

**TABLE No. 24-F—ALLOWABLE SHEAR ON BOLTS
IN PLAIN OR GROUTED MASONRY**

Diameter of Bolt (Inches)	Embedment (Inches)	Plain Masonry (Shear in Pounds)	Grouted Masonry (Shear in Pounds)
1/2	4	350	550
5/8	4	500	750
3/4	5	750	1100
7/8	6	1000	1500
1	7	1250	1850*
1-1/8	8	1500	2250*

*Permitted only with not less than 2500 p.s.i. units.

**TABLE No. 24-G—ALLOWABLE WORKING STRESSES
IN UNREINFORCED UNIT MASONRY****

Material Grade of Unit	Type A Mortar		Type B and C Mortar	
	Compres- sion	Tension In Flexure or Shear	Compres- sion	Tension In Flexure or Shear
Plain Solid Brick Masonry				
4500 plus p.s.i.	250	36	225	30
2500 to 4500 p.s.i.	175	36	160	30
1500 to 2500 p.s.i.	125	36	115	30
Plain Solid Concrete Masonry				
Grade A	175	36	150	30
Grade B	125	36	115	30
Plain Grouted Masonry				
4500 plus p.s.i.	350	36	275	30
2500 to 4500 p.s.i.	275	36	215	30
1500 to 2500 p.s.i.	225	36	175	30
Hollow Unit Masonry	85	36*	75	30*
Cavity Wall Masonry† Solid Units				
Grade A or 2500 p.s.i. plus Grade B or 1500 to 2400 p.s.i.	140	36	110	30
Hollow Units	70	36*	50	30*
Stone Masonry				
Cast Stone	400	12	360	12
First Class and Ashlar Masonry	400	12	360	12
Rubble Masonry	140	8	120	8
Gypsum Masonry	20	—	20	—

*Net area.

** Allowable working stresses p.s.i. gross cross-sectional area (except as noted).

†Stresses are on gross cross-sectional area exclusive of cavity between wythes.

3. Placement of pipes or conduits in unfilled cores of hollow unit masonry shall not be considered as embedment.

(f) ARCHES AND LINTELS. The heads of openings which support masonry shall be of noncombustible materials.

(g) **ANCHORAGE.** Masonry walls that meet or intersect shall be bonded or anchored together.

Wood joists or wood beams shall be anchored to masonry walls at intervals not exceeding four feet (4') by metal anchors having a minimum net cross section of two-tenths of a square inch (0.20 sq. in.).

Where joists run parallel to walls, said anchors shall be carried beyond the third joist and shall be solid bridged to the walls.

Structural members framing into, or supported by, walls or columns shall be anchored to such walls or columns.

(h) **COMBINED AXIAL AND FLEXURAL STRESSES.** Members subject to combined axial and flexural stresses shall be so proportioned that the quantity

$$\frac{f_a + f_b}{F_a \quad F_b} \quad \text{shall not exceed } 1$$

WHERE:

f_a = Computed axial unit stress, determined from total axial load and gross area.

F_a = Axial unit stress permitted by this Code at the point under consideration, if member were carrying axial load only, including any increase in stress allowed by this Section.

f_b = Computed flexural unit stress.

F_b = Flexural unit stress permitted by this Code, for members resisting bending only, including any increase in stress allowed by this Section.

(i) **ALLOWABLE REDUCTION OF BENDING STRESS BY VERTICAL LOAD.** In calculating maximum tensile fiber stress due to wind forces, earth pressure, earthquake, and other lateral forces, the maximum tensile fiber stress may be reduced by the direct stress due to vertical dead loads.

(j) **UNREINFORCED MASONRY.** Design and construction of elements of plain masonry shall be such that unit stresses do not exceed those set forth in tables in this Chapter for the various masonry units.

(k) **REINFORCED MASONRY.** 1. The design and construction of reinforced masonry shall be based on the assumptions, requirements, and methods of stress determination specified for reinforced concrete in Chapter 3.26, except as specified in this Chapter.

Maximum allowable working stresses shall be determined from Table 24-H using the value of f'_m determined below.

2. **Stresses.** With special supervision by an approved inspector (see Section 3.03.050) the compressive strength of reinforced masonry, f'_m assumed for design shall be the average ultimate compressive strength of

the masonry unit based on its gross cross-sectional area as specified for the unit in Section 3.24.030 but with a maximum $f'm$ of 2000 psi.

Without special supervision the compressive strength, $f'm$ assumed for design shall be taken as 75% of the stresses allowed with special supervision.

3. Stresses By Testing. Higher values of $f'm$ may be established by tests of prisms in accordance with Section 3.24.040 (c) but with a maximum $f'm$ of 2500 psi. The value of $f'm$ determined for the combination of masonry units and mortar shall be recorded as directed by the Superintendent of Buildings and shall be accepted for use in design based upon special supervision as outlined in Section 3.03.050. Test prism samples shall be taken during the progress of construction as directed by the Superintendent of Buildings and in accordance with procedures outlined in Section 3.24.040 (c).

(1) **ALLOWABLE STRESSES.** The unit stresses in reinforcement shall not exceed those specified for reinforcement in concrete. Bolt values shall not exceed those set forth in Table No. 24-F. (Ord. 85500 § 2417, as amended by Ord. 87090; April 22, 1958).

3.24.180 Bearing walls. (a) **GENERAL.** Masonry walls shall be designed as specified in Section 3.24.170 and to withstand all vertical and horizontal loads as specified in Chapter 3.23, and with allowances for the effect of eccentric loads.

(b) **END SUPPORT.** Beams, joists, girders, or other concentrated loads supported by a wall or pier shall have bearing at least three inches (3") in length upon solid masonry not less than four inches (4") thick or upon a metal bearing plate of adequate design and dimensions to distribute the loads safely on the wall or pier, or upon a continuous reinforced masonry member projecting not less than three inches (3") from the face of the wall.

(c) **WIDTH IN FLEXURAL COMPUTATIONS.** In computing flexural stresses where reinforcement occurs, the effective width shall be not greater than four times the wall thickness nor greater than the spacing between bars or groups of bars.

(d) **DISTRIBUTION OF CONCENTRATED LOADS.** For calculating wall stresses, concentrated loads may be distributed over a maximum length of wall not exceeding the center to center distance between loads but not more than one-half the height of the wall, measured from the floor to the bearing plate.

(e) **PLAIN MASONRY WALLS.** 1. The ratio of unsupported height to thickness or the ratio of unsupported length to thickness (one or the other but not both) for solid masonry walls or bearing partitions shall

not exceed 20, and shall not exceed 18 for walls of hollow masonry or cavity walls. Any required support shall be adequate as determined by the Superintendent of Buildings. In computing the ratio for cavity walls, the value for thickness shall be the sum of the nominal thicknesses of the inner and outer wythes. In walls composed of different classes of units, the ratio of height or length to wall thickness shall not exceed that allowed for the weakest of the combination of units of which the wall is composed.

Exception: In one-story I and J occupancies, an additional six feet (6') of height may be permitted to the peak of the gable.

2. The minimum thickness of bearing walls of plain masonry shall be eight inches (8").

Exception: Walls in one-story buildings may be of six inch (6") thickness.

(f) **REINFORCED MASONRY WALLS.** 1. The minimum nominal thickness of reinforced masonry bearing walls shall be six inches (6"), and the ratio of unsupported height to thickness shall not exceed 25, or else the ratio of unsupported length to thickness shall not exceed 30. (One or the other, but not both.) Any required support shall be adequate as determined by the Superintendent of Buildings.

2. The axial stress in reinforced masonry bearing walls shall not exceed the value determined by the following formula:

$$f_m = 0.20 f'_m$$

f_m = Compressive unit axial stress in masonry wall.

f'_m = Approved ultimate compressive masonry stress as established in Section 3.24.170 (k) 2.

3. All walls using stress permitted for reinforced masonry shall be reinforced with both vertical and horizontal bars.

The minimum area of total reinforcement shall be not less than 0.002 times the gross cross-sectional area of the wall, not more than two-thirds of which may be used in either direction. Principal wall steel shall be limited to a maximum spacing of four feet (4') on center, except that, when pilasters are used, the vertical steel may be concentrated in the pilasters provided they are not spaced farther than 30 times the wall thickness apart. If the vertical steel is not so concentrated, the required horizontal reinforcement may be concentrated in bond beams and at the tops and bottoms of walls and openings. Horizontal reinforcement shall be placed in the top of footings, at the top of wall openings, at roof and floor levels, and at the top of parapet walls. Only horizontal reinforcement which is continuous in the wall shall be considered in computing the minimum area of reinforcement. (Ord. 85500 § 2418, as amended by Ord. 87090; April 22, 1958).

3.24.190 Non-bearing walls. (a) **GENERAL.** Non-bearing walls may be constructed of any masonry as specified in this Chapter.

(b) **THICKNESS.** Every non-bearing masonry wall shall be so constructed and have a sufficient thickness to withstand all vertical loads and horizontal loads, where specifically required by Chapter 3.23, but in no case shall the thickness of such walls (including plaster when applied) be less than the following fractions of unsupported wall height or length (one or the other, but not both).

- | | |
|--|------|
| 1. Exterior unreinforced walls..... | 1/20 |
| 2. Exterior reinforced walls..... | 1/30 |
| 3. Interior partitions unreinforced..... | 1/36 |
| 4. Interior partitions reinforced..... | 1/48 |

Reinforcing shall be set for as set forth in Section 3.24.180 (f) 3.

(c) **WIRE MESH REINFORCEMENT.** Wire mesh reinforcement may be used to resist tensile stresses when embedded in plaster applied to the surface of any non-bearing wall. Wire mesh reinforcement shall conform to the requirements of Chapter 3.26.

(d) **USE.** Non-bearing walls may be used to carry a superimposed ceiling load of not more than 100 pounds per linear foot.

(e) **ANCHORAGE.** All non-bearing partitions shall be anchored along the top edge to a structural member or a suspended ceiling, or shall be provided with equivalent anchorage along the sides.

All exterior non-bearing walls shall be anchored along all edges to structural members. (Ord. 85500 § 2419; Sept. 10, 1956).

3.24.200 Reinforced columns. (a) **GENERAL.** Reinforced masonry columns shall be constructed as required by this section.

(b) **LIMITING DIMENSIONS.** The least dimension of every masonry column shall be not less than twelve inches (12") unless designed

for one-half ($\frac{1}{2}$) the allowable stresses, in which case the minimum least dimension shall be eight inches (8"). No masonry column shall have an unsupported length greater than twenty (20) times its least dimension.

(c) ALLOWABLE LOADS. When the ratio of unsupported length to the least unsupported lateral dimension is ten (10) or less, the maximum axial load on columns shall be computed by the following formula:

$$P = A_g (0.20f'm + 0.65 P_g f_s)$$

WHERE:

P = Maximum concentric column axial load on short column

A_g = The gross area of the column

f'm = Approved ultimate compressive masonry stress as established in Section 3.24.170(k)-2

P_g = Ratio of the effective cross sectional area of vertical reinforcement to the gross area, A_g

f_s = See Section 3.26.200(c)

When the ratio of the unsupported length to the least unsupported lateral dimension is ten (10) or more the maximum axial load P' shall be

$$P' = P \left(1.3 - 0.03 \frac{h}{t} \right)$$

WHERE:

P' = Maximum concentric column axial load on long column

t = Minimum over-all depth of rectangular column section, or the diameter of a round column

h = Unsupported height of column

(d) REINFORCEMENT. 1. The ratio (P_g) shall be not less than 0.5 per cent nor more than four per cent (4%). The number of bars shall be not less than four (4), nor the diameter less than three-eighths inch ($\frac{3}{8}$ ").

Where lapped splices are used, the amount of lap shall be sufficient to transfer the working stress by bond as specified in Table No. 24-H but in no case shall the length of lapped splices be less than thirty (30) bar diameters, and welded splices shall be full butt welded.

2. Lateral ties shall be at least one-fourth inch ($\frac{1}{4}$ ") in diameter and shall be spaced apart not over sixteen (16) bar diameters, forty-eight (48) tie diameters, or the least dimension of the column. Lateral ties shall be placed not less than one and one-half inches ($1\frac{1}{2}$ ") from the surface of the column. (Ord. 85500 § 2420 as amended by Ord. 88324; June 24, 1959).

3.24.210 Supervision. Special inspectors as specified in Section 3.03.050 (c) shall be employed to furnish inspection on all reinforced masonry work where the design is based on a strength of masonry (f'm) in excess of 1000 pounds per square inch (for construction with hollow masonry units) or 1500 pounds per square inch (for construction with solid

masonry units). Special inspectors shall be employed to furnish inspection on all other types of masonry work where approved design is based on unit stresses greater than those allowed in this Chapter. (Ord. 85500 § 2421; Sept. 10, 1956).

Chapter 3.25

WOOD

Sections:

- 3.25.010 In general.
- 3.25.020 Definitions and notations.
- 3.25.030 Size of structural members.
- 3.25.040 Allowable unit stresses.
- 3.25.050 Columns.
- 3.25.060 Timber connections and fastenings.
- 3.25.070 Vertical members or assemblies.
- 3.25.080 Horizontal members or assemblies.
- 3.25.090 Wood with masonry or concrete.
- 3.25.100 Stressed skin panel design.
- 3.25.110 Wood and plywood diaphragms.
- 3.25.120 Fire stops.
- 3.25.130 Glued construction.
- 3.25.140 Heavy timber framing.
- 3.25.150 Wood joisted residential construction.
- 3.25.160 Durability.
- 3.25.170 Deflection.
- 3.25.180 Inspection of structural glued laminated lumber.

3.25.010 In general. (a) **QUALITY AND DESIGN.** The quality and design of wood members and their fastenings used for load-supporting purposes shall conform to the provisions of this Chapter.

(b) **WORKMANSHIP.** 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) **FABRICATION.** Preparation, fabrication, and installation of wood members, and glues and mechanical devices for the fastenings thereof, shall conform throughout to good engineering practices. Such members may be composed of sawn lumber, plywood, or glued laminated lumber, or combinations of these which, in turn, may be joined together by fastenings or by suitable adhesives as provided in this Chapter.

(d) **GRADE AND SPECIES.** The species and grades of all wood used for load-bearing purposes shall be shown on the drawings filed with the Superintendent of Buildings. (Ord. 85500 § 2501; Sept. 10, 1956).

3.25.020 Definitions and notations. Except where otherwise noted the following terms and symbols used in this Chapter have the meaning indicated in this Section.

(a) **GRADE-LUMBER** is the classification of lumber into quality classes with respect to its physical and mechanical properties.

(b) **NOMINAL SIZE-LUMBER.** The commercial size designation of width, and depth, in standard sawn lumber grades, somewhat larger than the standard net size of dressed lumber.

(c) **PLYWOOD.** A cross-banded assembly made of layers of veneer, or veneer in combination with a lumber core, or plies joined with an adhesive.

(d) **STRESS GRADE-LUMBER.** A lumber grade defined in such terms that a definite working stress may be assigned to it, as set forth in U.B.C. Standard No. 25-3.

(e) **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. Structural glued laminated lumber shall be fabricated in accordance with U.B.C. Standards Nos. 25-19, 25-20, 25-21, or 25-22.

(f) **NOTATIONS**

A—Area in square inches of net cross section.

b—Breadth of beam or of cross section in inches.

c—Compression parallel to grain, allowable unit stress in pounds per square inch.

d—Least dimension of column or depth of beam in inches.

E—Modulus of elasticity.

f—Extreme fiber in bending, allowable unit stress in pounds per square inch.

h—Depth of section, in inches.

H—Horizontal shear, allowable unit stress in pounds per square inch.

l—Span in inches and laterally unsupported length of a column in inches.

N—Allowable unit stress on inclined surface in pounds per square inch.

P—Total load in pounds.

q—Compression perpendicular to grain, allowable unit stress in pounds per square inch.

R—Reaction, in pounds.

V—Vertical shear at section under consideration.

1/d—Ratio of length to least dimension.

P/A—Compression strength or maximum axial load, in pounds per square inch.

-O—Angle between direction of load and the direction of grain, in degrees. (Ord. 85500 § 2502; Sept. 10, 1956).

3.25.030 Size of structural members. (a) **REQUIRED SIZES.** Wood structural members shall be of sufficient size to carry the dead and required live loads without exceeding the allowable unit stresses as hereinafter specified.

(b) **SIZE DETERMINATION.** Minimum sizes of lumber members required by this Code refer to nominal sizes. U.B.C. Standards No. 25-1, No. 25-20, No. 25-21 and No. 25-22 dressed sizes shall be accepted as the minimum net sizes conforming to nominal sizes. Nominal sizes may be shown on the plans. Computations to determine the required sizes of members shall be based on the net dimensions (actual sizes) and not the nominal sizes. If rough sizes or sizes or shapes other than U.B.C. Standards No. 25-1, No. 25-20, No. 25-21, and No. 25-22 dressed sizes are to be used, the actual net sizes shall be specified on the plans. (Ord. 85500 § 2503; Sept. 10, 1956).

3.25.040 Allowable unit stresses. (a) **ALLOWABLE UNIT STRESS ON PLANS.** Where structures are designed for use of stress grade lumber, structural glued laminated lumber, or plywood used structurally, the allowable unit stresses or the species and the grade or grade combination shall be shown on the plans filed with the Building Department.

(b) **STRESSES.** 1. Stresses shall not, except as hereinafter provided, exceed the allowable unit stresses in pounds per square inch for the respective species and grades and grade combinations as set forth in:

Table No. 25-A for solid sawn stress-grade lumber.

Table No. 25-B for Douglas fir plywood.

Table No. 25-C for structural glued laminated lumber. The allowable unit stresses in extreme fiber in bending "f" in Table No. 25-C apply to members with the wide face of the lamination perpendicular to the direction of the load. When the wide face of the lamination is parallel to the direction of the load, the bending stresses in Table No. 25-A shall apply.

The allowable unit stresses in Tables 25-A and 25-C and adjustments thereof and stresses in Table No. 25-B apply also to lumber, structural glued laminated lumber and exterior plywood that have been pressure impregnated by an approved process and preservative.

2. Stresses for grade and species other than those tabulated shall be established by the Superintendent of Buildings; for sawn lumber when

determined in accordance with U.B.C. Standard No. 25-3; and for species and grade combinations used in structural glued laminated lumber otherwise conforming to U.B.C. Standard No. 25-19.

Allowable unit stresses for plywood other than Douglas fir shall be determined according to the species.

3. Induced stresses in pounds per square inch for normal loading of round poles and piles when used as structural members with modulus of elasticity the same as for sawn lumber, shall not exceed sixty per cent of the basic stresses for clear lumber for the species as given in U.B.C. Standard No. 25-3, and the pieces shall meet the requirements of U.B.C. Standard No. 25-27 for poles or U.B.C. Standard No. 28-1 for piles.

(c) IDENTIFICATION. 1. Stresses that exceed those given in Table No. 25-A for the lowest grade of a species shall be used only when the higher grade of that species is identified by a grade-mark, or certificate of inspection, issued by an approved lumber grading or inspection agency. Stresses for lumber, the grade of which is not so identified, shall be established by the Superintendent of Buildings in accordance with the provisions of Section 3.25.040 (b)-2.

2. All plywood when used structurally (including, among others, use for siding, roof and wall sheathing, sub-flooring, diaphragms and build-up beams) shall conform to performance standards for its type in U.B.C. Standard 25-2; it shall be identified as to grade and glue type by an approved agency; and shall further meet all requirements of U.B.C. Standard No. 25-2 covering that particular species of plywood.

3. The stresses in Table No. 25-C for structural glued laminated lumber shall be used only when the material and workmanship are in accordance with U.B.C. Standard No. 25-20 and are inspected and identified in a manner meeting the approval of the Superintendent of Buildings.

(d) CONDITIONS OF SERVICE. The allowable unit stresses as set forth in Table No. 25-A and adjustments thereof apply to sawn lumber used under conditions continuously dry, such as in most covered structures. They also apply with the reduction in stresses as listed under the exception below to lumber used under conditions where the moisture content of the wood is at or above the fiber saturation point, as when continuously submerged.

Exception: When used under continuously wet conditions, the allowable unit stresses in Table No. 25-A for compression parallel to grain shall be reduced ten per cent, for compression perpendicular to the grain shall be reduced one-third, and the values of modulus of elasticity shall be reduced one-eleventh.

The allowable unit stresses for structural glued laminated lumber in Table No. 25-C shall be for dry conditions of use where the moisture content in service is less than 15 per cent, as in most covered structures. For wet conditions of use, the maximum percentage of the dry use stress permitted shall be as indicated in the footnotes applicable to the table.

(e) ADJUSTMENT OF ALLOWABLE UNIT STRESS FOR DURATION OF LOAD. The allowable unit stresses in Table No. 25-A for sawn lumber and Table No. 25-C for structural glued laminated lumber, and the values for mechanical fastenings, as hereinafter established, shall be applicable as follows for the various durations of loading.

1. Where a member is to be fully stressed to the maximum allowable stress continuously, the working stresses used in the design shall not exceed 90 per cent of those in the tables.

2. When the duration of the full maximum load does not exceed two months, as for snow, the allowable unit stresses in the tables may be increased by 15 per cent.

3. For wind or earthquake loads, the allowable unit stresses may be increased by 33 $\frac{1}{3}$ %, provided that the section thus found is not less than that required for the live and dead loads alone.

4. Allowable unit stresses given in the tables for normal loading conditions may be used without regard to impact, if the stress induced by impact does not exceed the allowable unit stress for normal loading.

5. Except for design of members in compression parallel to grain, the provisions of sub-section (e) do not apply to the modulus of elasticity.

(f) HORIZONTAL SHEAR ADJUSTMENT. The unit stress in horizontal shear in members of rectangular section stressed in flexure, shall be computed by use of the following formula:

$$H = \frac{3R}{2bh}$$

R=reaction, pounds, under the following conditions: (1) Distribution of load to adjacent beams through flooring or other members shall be considered; (2) All loads uniform or concentrated, within a distance of the height of the beam from the nearest support shall be neglected; (3) 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.

(g) ADJUSTMENTS OF ALLOWABLE UNIT STRESSES FOR JOINT DETAILS. 1. Compression. In joists supported on a ribbon or ledger board and spiked to the studding, the allowable stress in compression perpendicular to the grain may be increased fifty per cent (50%).

Allowable unit stresses in compression perpendicular to grain, set forth in Tables No. 25-A and No. 25-C shall be increased in accordance with the following factors for bearing less than six inches (6") in length and located three inches (3") or more from the end of a timber.

Length of bearing (inches)	$\frac{1}{2}$	1	1- $\frac{1}{2}$	2	3	4	6 or more
Factor	1.75	1.38	1.25	1.19	1.13	1.10	1.00

For stress under washers or small plates, the same factor may be taken as for a bearing, the length of which equals the diameter of the washer.

2. Shear. Allowable unit stresses for joint details shall be 150 per cent of the horizontal shear values set forth in Tables No. 25-A and No. 25-C.

(h) HOLES AND NOTCHES. 1. Girders, beams, or joists may be notched or bored in any part of the section within three times the beam depth from either support. Such notches or holes shall not exceed one fifth of the depth of beam except at point of support and as hereinafter provided.

2. Where girders, beams, or joists are notched at points of support they shall meet design requirements for net section in bending and in shear. The shear at such point shall not exceed the value calculated by the following formula:

$$V = \frac{2}{3} \left(\frac{bd^2 H}{h} \right)$$

d = actual depth of beam at the notch;
h = total depth of beam

3. Where notches or holes are made in other portions of the beam, the net remaining depth of beam shall be used in determining the bending strength.

(i) COMPRESSION ON INCLINED SURFACES. The unit stress (compression) normal to a plane inclined to the fiber of a wood member shall not exceed that determined from the formula:

$$N = \frac{c q}{c \sin^2 \theta + q \cos^2 \theta}$$

(Ord. 85500 § 2504, as amended by Ord. 90196; April 24, 1961).

3.25.050 Columns. Columns, posts, struts, and other members in compression parallel to grain, shall be designed structurally as provided in this section.

(a) **SIMPLE COLUMNS. 1. Solid Columns.** Simple solid wood columns consist of a single piece of sawn lumber or glued laminated lumber.

The safe load in pounds per square inch of net cross-sectional area, for simple columns or other solid members stressed in compression parallel to the grain, shall be determined by the following formula:

$$P/A = \frac{.3E}{(1/d)^2}$$

but the maximum unit load (P/A) shall not exceed the allowable unit stress in compression parallel to grain "c" as set forth in Tables No. 25-A and No. 25-C.

Columns shall be limited in maximum length between points of lateral support to $l = 50d$, except that the individual members of spaced columns shall be limited in maximum length to $l = 80d$.

2. Round Solid Columns. The safe load on a column of round cross-section shall not exceed that permitted for a square column of the same cross-sectional area.

3. Other Column Shapes. The safe load on a simple solid column of other than rectangular or round cross-section shall be determined by the formula

$$P/A = \frac{\pi^2 E}{2.727 (1/r)^2}$$

WHERE:

r = least radius of gyration of the section.

(b) **MULTIPLE MEMBER COLUMNS OR COMPRESSION MEMBERS. 1. Spaced Columns.** Spaced columns or compression members shall be based upon design principles acceptable to the Superintendent of Buildings, or the design principles set forth for spaced columns in U.B.C. Standard No. 25-25.

(2) **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 U.B.C. Standard No. 25-24.

(c) **Combined Flexural And Axial Loading.** Members subjected to both flexure and axial loading shall be designed in accordance with the provisions of U.B.C. Standard No. 25-29. (Ord. 85500 § 2505, as amended by Ord. 90196; April 24, 1961).

3.25.060 Timber connections and fastenings. (a) **TIMBER CONNECTORS.** Timber connectors may be used to transmit stress between wood members and between wood and metal members. The allowable loads and installation of timber connectors shall be as specified in U.B.C. Standard No. 25-15.

Safe loads and design practices for types of connectors not mentioned or fully covered in U.B.C. Standard No. 25-15 may be determined in a manner approved by the Superintendent of Buildings.

(b) **BOLTS.** Bolted joints, wherein bolts are used to resist or transfer stresses in wood structures, shall be designed in accordance with the principles as set forth in U.B.C. Standard No. 25-14.

(c) **DRIFT BOLTS OR PINS.** Connections of wood structural members involving the use of drift bolts or drift pins, shall be designed in accordance with the provisions set forth in U.B.C. Standard No. 25-17.

(d) **LAG SCREWS.** Connections involving the use of lag screws, shall be designed in accordance with the provisions of U.B.C. Standard No. 25-16.

(e) **WOOD SCREWS.** Connections involving the use of wood screws, shall be designed in accordance with the provisions of U.B.C. Standard No. 25-16.

(f) **NAILS AND SPIKES.** 1. **Safe Material Strength.** A common wire nail driven perpendicular to the grain of the wood, when used to fasten wooden members together, shall not be subjected to a greater load causing shear and bending than the safe lateral strength of the wire nail or spike as set forth in Table No. 25-D.

A wire nail driven parallel to the grain of the wood or toe nailed shall not be subjected to more than two-thirds of the lateral load allowable when driven perpendicular to the grain.

2. **Safe Resistance To Withdrawal.** A wire nail driven perpendicular to the grain of the wood shall not be subjected to a greater load, tending to cause withdrawal, than the safe resistance of the nail to withdrawal, as set forth in Table No. 25-E.

Nails driven parallel to the grain of the wood shall not be allowed for resisting computed tensile stresses.

3. **Spacing And Penetration.** Common wire nails shall have penetration into the pieces receiving the point as shown in Table No. 25-D. Nails or spikes, for which the wire gauges or lengths are not specified in Table No. 25-D, shall have a required penetration of not less than $9\frac{1}{2}$ diameters, and allowable loads may be interpolated.

For wood to wood joints the spacing center to center shall be not less than the required penetration, unless nails are driven in pre-bored holes.

**TABLE No. 25-D—SAFE LATERAL STRENGTH AND
REQUIRED PENETRATION OF COMMON WIRE NAILS
Driven Perpendicular to the Grain of the Wood**

Size of Nail	Stand- ard Length	Wire Gauge	Pene- tration Re- quired	Loads	
				Douglas Fir	Other Species
6d	2"	11½	1"	70 lbs.	As deter- mined by Superin- tendent of Buildings
8d	2½"	10¼	1¼"	100	
10d	3"	9	1½"	120	
12d	3¼"	9	1⅝"	130	
16d	3½"	8	1⅝"	160	
20d	4"	6	2"	190	
30d	4½"	5	2¼"	230	
40d	5"	4	2½"	270	
50d	5½"	3	2¾"	310	
60d	6"	2	3"	360	

**TABLE No. 25-E—SAFE RESISTANCE TO WITH-
DRAWAL OF COMMON WIRE NAILS
Inserted Perpendicular to the Grain of the Wood, in Pounds
Per Linear Inch of Penetration into the Main Member**

Kind of Wood	Size of Nail									
	6d	8d	10d	12d	16d	20d	30d	40d	50d	60d
Douglas Fir or Southern Pine or Redwood	27	29	35	35	39	48	52	56	61	67
Other Species	As determined by the Superintendent of Buildings									

Edge and end distances shall be not less than one-half of the required penetration.

Holes for nails, where necessary to prevent splitting, shall be bored of a diameter smaller than that of the nails.

(g) **JOIST HANGERS AND FRAMING ANCHORS.** Connections depending upon joist hangers or framing anchors, ties, and other mechanical fastenings not otherwise covered, may be used where approved. (Ord. 85500 § 2506; Sept. 10, 1956).

3.25.070 Vertical members or assemblies. (a) COLUMNS OR POSTS. All wood columns and posts shall be framed to true end bearings; shall extend down to supports of such design as to hold the column or post securely in position, and to protect its base from deterioration; and shall be supported in basements by piers projecting at least four inches above the

finished floor and separated therefrom by a barrier impervious to moisture, or when pressure impregnated timber is used it may be placed directly on concrete or masonry. Untreated wood columns in basements, when built into masonry partitions or walls, shall be exposed on at least two sides.

(b) **STUD WALLS AND BEARING PARTITIONS.** 1. **Placing.** Studs in walls and partitions may be placed with their wide faces parallel to the wall or partition, provided the studs are considered as columns and are designed accordingly. Stud walls shall have top and bottom plates, except that joists may be supported by a let-in ribbon, as provided in Section 3.25.040 (g). Plates supporting bearing partitions in basements shall be at least two inches above the finished floor.

2. **Size.** Except as otherwise provided, exterior stud walls and bearing partitions for buildings of two stories or less shall consist of not less than two-inch by four-inch studs; for buildings of three stories, the studding shall be not less than three-inch by four-inch or two-inch by six-inch to the bottom of the second floor joists, and two-inch by four-inch for the two upper stories.

3. **Height.** Unless supported laterally by adequate framing, the maximum height of two-inch by four-inch stud framing shall be twelve feet; and of two-inch by six-inch stud framing shall be sixteen feet.

4. **Spacing.** Except for one-story buildings of Group J Occupancy, where twenty-four inch spacing may be used, no studding shall be spaced more than sixteen inches on centers, unless vertical supporting members in the walls are designed as columns, or such walls may be constructed of not less than four-inch by four-inch posts spaced not more than five feet four inches on centers; or of larger members designed as required in this Chapter; or may be of post and beam framing with plank sheathing not less than one and one-half inches thick.

5. **Corners And Bracing.** Angles, at corners where stud walls or partitions meet, shall be framed solid so no lath may extend from one room to another. All exterior walls and main cross stud partitions shall be effectively and thoroughly braced or sheathed with approved panels adequately nailed along all edges.

6. **Pipes In Walls.** Stud partitions containing plumbing, heating, or other pipes, shall be so framed, and the joists underneath so spaced, as to give proper clearance for piping. Where a partition containing such piping runs parallel to the floor joists, the joists underneath such partitions shall be doubled and spaced to permit the passage of such pipes and shall be bridged. Where plumbing, heating, or other pipes are placed in, or partly in, a partition, necessitating the cutting of the soles or plates, the cut members shall be adequately reinforced.

7. **Separations From Chimneys.** For clearance space between chimneys and combustible materials, see Section 3.37.020 (j).

8. **Top Plates.** In bearing partitions the top plate shall be doubled and lapped at each intersection with walls or partitions. Joints in the upper and lower members of the top plates shall be staggered not less than four feet.

9. **Base Plates.** Stud walls resting on masonry shall have base plates or sills.

10. **Foundation Studs.** Foundation studs shall be not less in size than the studding above, and when exceeding four feet in height, shall be of the size required for an additional story. Foundation studs under bearing walls and partitions shall be thoroughly and effectively braced.

11. **Bridging.** All stud partitions or walls over eight feet in height shall have bridging, not less than two inches in thickness and of the same width as the stud, fitted snugly and spiked into the studs at their mid-height, or other means for giving equal lateral support to the studs. Bridging meeting the requirements of this Section may serve as required fire-stopping.

12. **Headers.** Headers shall be designed to take the superimposed loads. Such headers or trusses shall have not less than two-inch solid bearing at each end to the floor or bottom plate, unless other approved framing method or joint devices are used.

(c) **WALLS WITHOUT STUDS.** One-story buildings may have exterior walls framed without studs, when of vertical 2-inch or thicker planks or, when of Group J occupancy and having a total floor area of not more than five hundred square feet, may be of vertical one-inch boards and battens.

(d) **LAMINATED WALLS AND PARTITIONS.** Walls and partitions may be of laminated construction not less than four inches (4") nominal in thickness with the structural assembly designed to support all loads.

(e) **INTERIOR PARTITIONS.** Interior bearing partitions shall be constructed, framed, and firestopped as specified for exterior walls. There are no requirements for non-bearing partitions.

Where wood-frame walls and partitions are covered on the interior with plaster, tile or similar materials, and are subject to water splash, the framing shall be protected with 15-pound Asphalt-Saturated Felt.

(f) **EXTERIOR WALL COVERINGS.** 1. **GENERAL.** Exterior wood stud walls shall be covered on the outside with weathertight materials securely fastened.

2. **Exterior Plastering.** See Chapter 3.47.

3. Masonry Veneer. See Chapter 3.29. (Ord. 85500 § 2507; Sept. 10, 1956).

3.25.080 Horizontal members or assemblies. (a) **BEARING.** Beams, girders, and joists shall have adequate bearing area and end anchoring.

Wood members bearing on masonry or concrete at or below adjacent ground level shall be impregnated with an approved preservative or provided with a moisture-resistant separation from bearing or contact.

(b) **BUILT-UP MEMBERS. BEAMS.** Laminated built-up beams with laminations parallel to direction of applied loads and fastened together with mechanical fastenings, shall be considered as having the same resistance to bending moment as solid members of the same size and quality, if the laminations are not cut between the ends of the members.

(c) **JOIST AND RAFTER BLOCKING AND BRIDGING.** At ends and at each support rafters and joists shall be adequately stabilized against overturning or buckling from superimposed load.

Between supports: Rafters and joists shall be stabilized every ten feet by blocking or bridging.

(d) **JOISTS UNDER BEARING PARTITIONS.** Joists, under and parallel to bearing partitions, shall be of adequate strength to carry the design load.

(e) **HEADERS.** Header joists shall be hung in joist or beam hangers, or secured by other devices or methods affording equivalent support.

(f) **WOOD MEMBERS ENTERING MASONRY OR CONCRETE.** The ends of wood members less than 4 inches in least dimension, unless treated with an approved preservative, shall be provided with one-half inch air space on sides, and end entering masonry or concrete walls. Ends of wood beams or joists, which are larger than 4 inches in least dimension entering masonry or concrete walls, unless treated with an approved preservative, shall be provided with one-inch air space on sides, and end, and shall be beveled so that top edge does not enter masonry or concrete more than one inch, or shall be otherwise designed to be self-releasing.

(g) **ANCHORS AND TIES.** For anchorage of wood joists or beams to masonry walls see Section 3.24.170. (g).

(h) **FLOORS.** See Section 3.25.140 and Section 3.25.150.

(i) **ROOFS.** See Section 3.25.140 and Section 3.25.150.

(Ord. 85500 § 2508; Sept. 10, 1956).

3.25.090 Wood with masonry or concrete. The vertical dead load of structural masonry or concrete shall not be supported by wood members, other than wood piling. (Ord. 85500 § 2509; Sept. 10, 1956).

3.25.100 Stressed skin panel design. Stressed skin panels shall be de-

signed in accordance with U.B.C. Standard No. 25-26. (Ord. 85500 § 2510; Sept. 10, 1956).

3.25.110 Wood and plywood diaphragms. (a) **GENERAL.** Wood and plywood diaphragms may be used to resist horizontal forces in horizontal and vertical distributing or resisting elements.

In determining the permissible deflection of walls or partitions, the actual elastic properties of the materials (modulus of elasticity, allowable extreme fiber stresses, etc.) may be determined by tests or other data acceptable to the Superintendent of Buildings, or the assigned values for such properties elsewhere herein provided shall be used.

Connections and anchorages capable of resisting the design forces shall be provided between the diaphragms and the resisting elements. Openings in diaphragms which materially affect their strength shall be fully detailed on the plans, and shall have their edges adequately reinforced to transfer all shearing stresses.

Size and shape of diaphragms shall be limited as provided in Table No. 25-F.

TABLE No. 25-F
MAXIMUM DIAPHRAGM DIMENSION RATIOS

	Horizontal Diaphragms	Vertical Diaphragms
	Maximum Span- Width Ratios	Maximum Height- Width Ratios
1. Diagonal Sheathing, Conventional	3:1	2:1
2. Double Diagonal Sheathing, on same side of frame	4:1	3½:1
3. Parallel Sheathing	2:1	2:1
4. Plywood, nailed all edges	Limited by permissible shears and deflections	3½:1
5. Plywood, Blocking omitted at inter- mediate joints	4:1	—

(b) **DIAGONALLY SHEATHED DIAPHRAGMS.** 1. **Conventional Construction.** Such wood diaphragms shall be made up of one-inch (1") nominal sheathing boards laid at an angle of approximately 45 degrees to supports. Sheathing boards shall be directly nailed to each intermediate bearing member with not less than two 8d nails for one-inch by six-inch (1" x 6") boards and three 8d nails for boards eight inches (8") or wider, and in addition three 8d nails and four 8d nails shall be used for six-inch

(6") and eight inch (8") boards respectively at the diaphragm boundaries. End joints in adjacent boards shall be separated by at least one joist or stud space. For horizontal diaphragms in masonry or concrete buildings, there shall be at least two boards between joints on the same support. Boundary members at edges of diaphragms shall be designed to resist direct tensile or compressive chord stresses and shall be adequately tied together at corners.

Stresses shall not exceed those set forth in Table 25-G.

2. **Special Construction.** Special diagonally sheathed diaphragms shall conform to conventional construction and, in addition, shall have boundary members (marginal chords) designed to resist bending.

Each chord or portion thereof shall be considered as a beam, loaded with a uniform load per foot equal to 50 per cent of the unit shear due to diaphragm action. The load shall be assumed as acting normal to chord, in the plane of the diaphragm and either toward or away from the diaphragm. The span of the chord, or portion thereof, shall be the distance between structural members of the diaphragm such as the joists, studs, and blocking, which serve to transfer the assumed load to the sheathing.

Special diagonally sheathed diaphragms shall include conventional diaphragms sheathed with two layers of diagonal sheathing at 90 degrees to each other and on the same face of the supporting members. The requirements as to boundary members do not apply to such double diagonally sheathed diaphragms.

Special diagonally sheathed diaphragms may be used to resist shears, due to wind or seismic loads, provided such shears do not stress the nails beyond their allowable safe lateral strength.

TABLE 25-G

Material	Nails	Load/Lin. Ft.
Diagonal 1 inch Sheathing	8d	200 lbs.
Diagonal 2 inch Sheathing	16d	300 lbs.
1 inch Sheathing perpendicular to Joists	8d	50 lbs.
2 inch Sheathing perpendicular to Joists	16d	75 lbs.

(c) **PLYWOOD DIAPHRAGMS.** Horizontal and vertical diaphragms sheathed with plywood may be used to resist horizontal forces not exceeding those set forth in Table No. 25-H or may be calculated by principles of mechanics without limitation by using values of nail strength and plywood shear values as given elsewhere in this Code. Plywood thickness for horizontal diaphragms shall not be less than that set forth in Table No. 25-I or No. 25-J for corresponding joist spacing and loads.

All boundary members shall be proportioned and spliced where neces-

sary to transmit direct stresses. Framing members shall be at least one and five-eighths inches ($1\frac{5}{8}$ " wide. In general panel edges shall bear on the framing members and butt along their center lines. Nails shall be placed not less than three-eighths inch ($\frac{3}{8}$ " in from the panel edge, not more than twelve inches (12") apart along intermediate supports and six inches (6") along panel edge-bearings, and shall be firmly driven into the framing members. No unblocked panels less than 12" wide shall be used.

Unblocked Horizontal Diaphragms. When blocking is omitted, and the panels are arranged so that load is applied perpendicular to the unblocked edges and to the continuous panel joints, shears shall not exceed two-thirds of the values given for six inch (6") nail spacing in Table No. 25-H. For other panel arrangements shears shall not exceed one-half of the tabulated values for six inch (6") nail spacing.

TABLE 25-H—ALLOWABLE SHEARS FOR WIND OR SEISMIC LOADINGS ON BLOCKED DOUGLAS FIR PLYWOOD DIAPHRAGMS (LBS. PER FOOT)

**For Douglas Fir and Southern Pine Framing
(For other species adjust values accordingly)**

Minimum Plywood*	Common Nail Size	Nail Spacing on All Panel Edges**					
		For Framing Member 2-5/8 inches or More in Width			For Framing Member Less than 2-5/8 inches but not less than 1-5/8 inches in width		
		6"	4"	3"	6"	4"	3"
5/16"	6d	280	420	475	250	375	420
3/8"	8d	400	600	675	360	530	600
1/2"	10d	480	720	820	425	640	730

*For Douglas fir plywood grades having inner plies of species other than Douglas fir use next greater thickness or reduce shears one-fourth.

**When the force acting along either boundary or any line of continuous panel joints exceeds $\frac{3}{4}$ of the tabulated value nail spacing along such boundary or line shall be reduced by one-third. (Ord. 85500 § 2511; Sept. 10, 1956).

3.25.120 Fire stops. Firestopping shall be provided to cut off all concealed draft openings both vertical and horizontal and form an effective fire barrier between stories and between a top story and roof space. Fire stops when of wood shall be two inch nominal thickness. It shall be used in specific locations, as follows:

1. In exterior or interior stud walls, at ceilings and floor levels.

2. In all stud walls and partitions, including furred spaces, so placed that the maximum dimension of any concealed space is not over eight feet.
3. In furred masonry walls.
4. Between stair stringers at least once in the middle portion of each run, at top and bottom, and between studs, along and, in line with, run of stair adjoining such partition.
5. Around top, bottom, sides and ends of sliding door pockets.
6. In spaces between chimneys and floor and roof framing, loose non-combustible materials shall be placed in noncombustible supports; or, a metal collar tightly fitted to the chimney and nailed to the wood framing may be used.
7. Any other locations not specifically mentioned above, such as holes for pipes, shafting, behind furring strips, and similar places which could afford a passage for flames. (Ord. 85500 § 2512; Sept. 10, 1956).

3.25.130 Glued construction. (a) DESIGN. 1. **Design Formulas.** Glued laminated and glued built-up construction members shall be designed by the applicable engineering formulas.

2. **Curvature Factor.** For the curved portion of members, the allowable stress in bending shall be modified by multiplication by the following curvature factor:

$$1 - 2000 \left(\frac{t}{R} \right)^2$$

WHERE:

t = thickness of lamination in inches.

R = radius of curvature of a lamination in inches, and t/R shall not exceed 1/125. No curvature factor shall be applied to stress in the straight portion of an assembly regardless of curvature elsewhere.

3. **Radial Tension Or Compression.** The radial stress induced by bending moment in a curved rectangular member shall be limited to the allowable stress, SR, when computed by the equation:

$$SR = \frac{3M}{2R bh}$$

WHERE:

M = bending moment in inch pounds;

R = radius of curvature at center line of member in inches.

When M is in the direction tending to decrease curvature, (increase radius), the stress is in tension and shall be limited to an allowable stress equal to one-third the allowable stress in shear.

When M is in the direction tending to increase curvature, (decrease radius), the stress is in compression and shall be limited to allowable stress in compression perpendicular to the grain.

(b) **FASTENINGS.** The methods of design of bolts, connectors and the allowable loads for them when used with glued laminated lumber shall be the same as provided for their use with sawn lumber.

(c) **FABRICATION OF MEMBERS.** 1. **General.** Structural glued laminated lumber shall be fabricated in accordance with good practice and as set forth in the applicable U.B.C. Standards No. 25-19, No. 25-20, No. 25-21, or No. 25-22.

2. **Laminations.** The individual laminations in structural glued laminated lumber shall be not more than two inches in thickness and all such laminations in the stressed portion shall be approximately parallel to the neutral plane of the member.

3. **Lumber Grade.** The lumber, at the time of laminating, shall conform to the grade and species specified.

4. **Moisture Content.** The maximum moisture content of the wood at the time of gluing shall not exceed sixteen per cent and shall be not less than seven per cent. The range of moisture content of laminations assembled into a single member shall not exceed five per cent at the time of gluing.

5. **Surfaces.** Surfaces to be glued shall be free from dust, dirt, and grease or any other substance which might impair adhesive bond. Each lamination shall be smoothly surfaced and be of uniform thickness with a maximum allowable variation of one sixty-fourth inch for softwoods and one one-hundredth inch for hardwoods. Lumber surfaces shall not be sanded before gluing, except that factory-sanded plywood shall not be prohibited.

6. **Joints.** Joints in structural glued laminated lumber shall mean the contact surfaces between two adjacent pieces of wood glued together. An edge or face joint is parallel to the grain of the wood. An end joint is at right angles to the grain of the wood. A scarf joint is a sloping or bevel joint, where pieces of wood are lapped together.

(d) **ADHESIVES.** (Structural Gluing, exclusive of plywood) 1. **General.** Adhesives shall provide an adequate bond, shall subject the wood to no deleterious chemical reactions, and shall withstand without deterioration the expected conditions of the service.

2. **Quality.** Adhesives shall conform to U.B.C. Standard No. 25-30.

3. **Use.** Water resistant adhesives may be used only in interior and protected locations where moisture content of the wood will be less than 15 per cent in service. Waterproof adhesives may be used under any conditions of exposure and shall be used where subjected to higher humidity.

4. **Tests.** Where sufficient evidence of the quality of adhesive to be used is not available, the Superintendent of Buildings may require tests to be made as set forth in U.B.C. Standard No. 25-18 or No. 25-30, whichever is applicable.

5. **Adhesive Application.** Gluing practices shall take into consideration the characteristics and limitations of the specific adhesive used, and shall conform to good practices as to preparation of wood surfaces for gluing, control of temperature, and moisture content of materials, maintenance of adequate pressure and compatibility of the adhesive with any other wood treatments employed. Mixing, spreading, storage life, pot life, working life, assembly-time life and time under pressure shall meet approval of the Superintendent of Buildings. (Ord. 85500 § 2513; Sept. 10, 1956).

3.25.140 Heavy timber framing. (a) **GENERAL.** All wood columns in such structural framing shall be directly superimposed, one above the other (no girders or bolsters between columns), and shall be provided with reinforced concrete, steel or iron caps, pintles or base plates, or be connected by timber splice blocks fastened to columns by connectors or by bolts housed within the contact faces. No wood column shall be less than eight inches (8") nominal in its least dimension.

Beams, girders, and joists shall be not less than six inches (6") nominal in least dimension, nor less than forty-eight square inches (48 sq. in.) nominal in cross-sectional area.

Where adjoining ends of girders and beams meet at columns, they shall be closely fitted and cross-tied by approved post caps or metal straps, or shall be inter-tied with columns by through bolted corbel and spliced blocks or side bolsters with load transferred by connectors housed within the contacting faces or by bolts. Approved wall plates, boxes, or hangers shall be provided where wood beams, girders, or trusses rest on masonry or concrete walls.

Framing members of wood roof trusses or arches shall be not less than four inches (4") nominal in least dimension, except that top and bottom chords of truss may be built up of elements of not less than three inches (3") nominal thickness when the building is sprinklered or when the space between parallel elements is either solidly filled or is tightly closed for the full length on the underside thereof with a wood covered plate of two-inch (2") nominal thickness.

(b) **HEAVY TIMBER FLOORS.** Heavy timber constructed floors shall be not less than three inches (3") nominal splined or tongued and grooved plank or may be of laminated slab construction conforming to the provisions of paragraph (d). Structural floors shall be covered with one-inch (1") nominal flooring laid crosswise or diagonally. Such flooring shall not extend closer than one-half inch ($\frac{1}{2}$ ") to walls. Such one-half

inch space shall be covered by a molding fastened to the wall and so arranged that it will not obstruct the swelling or shrinking movements of the floor. Corbeling of masonry walls under floor planks may be used in place of such molding.

(c) **HEAVY TIMBER ROOF DECKS.** Heavy timber roof decks shall be of tongued and grooved or splined lumber of not less than two inches (2") nominal thickness or of a double thickness of one-inch (1") nominal thickness boards with tongued and grooved joints, or with staggered joints, or of square-edged lumber of not less than three inches (3") nominal width set on edge and securely spiked together. When supporting roof loads only, wood bolsters intertying adjoining girders or connecting roof trusses with columns may be used.

(d) **LAMINATED FLOORS OR DECKS.** A laminated lumber floor or deck built up of wood members set on edge, when meeting the following requirements, may be designed as a solid floor or roof deck of the same thickness, and continuous spans may be designed on the basis of the full cross-section using the simple span moment coefficient.

1. Laminations shall be driven up and spiked closely together with a row of nails near each edge at spaced intervals and staggered vertically. Nail spacing in each row shall not exceed eighteen inches (18") for two-by-six-inch (2" x 6") nominal width and be proportional for other plank widths. Nail length shall be not less than two and one-half times the net thickness of each lamination.

2. A single span deck shall have all laminations full length.

3. A continuous deck of two spans shall have not more than each fourth lamination spliced within quarter points adjoining supports.

4. A continuous deck of more than two spans shall have not more than each third lamination spliced within quarter points adjoining supports.

5. Joints shall be closely butted over supports or staggered across the deck but within the adjoining quarter-spans.

6. No lamination shall be spliced more than twice in any span.

(e) **HEAVY TIMBER ROOF ANCHORAGE.** In heavy timber construction every roof girder, and every alternate roof beam, shall be anchored to an exterior or interior wall or to an interior column; roof planking where supported by a wall shall be anchored to such wall at intervals not exceeding twenty feet (20'); every monitor and every saw-tooth construction shall be anchored to the main roof construction. Such anchors shall consist of steel or iron bolts or straps of sufficient strength to resist the computed vertical uplift of the roof. (Ord. 85500 § 2514; Sept. 10, 1956).

3.25.150 Wood joisted residential construction. (a) **GENERAL.** In addition to the other provisions of this Chapter, the following are applicable to residential construction.

(b) **JOISTS AND RAFTERS.** Joists and rafters for residential construction, for which stresses are not given in Section 2504, shall be limited in span as determined by the Superintendent of Buildings who may be guided in such determination by nationally recognized standards, such as the span tables of the Federal Housing Administration.

Roof Framing. The span of roof rafters shall be measured along the rafter from plate to ridge, except that where rafters are braced to ceiling joists and a complete truss is formed, the spans shall be considered as the distance between intersecting points of trussing.

Roof framing and trussing shall be thoroughly and effectively braced. Roof joists when supported on a ribbon board shall be well nailed to the stud.

(c) **PLANK-AND-BEAM CONSTRUCTION.** Floor and roof systems of plank-and-beam construction may be used for dwelling construction as set forth in U.B.C. Standard No. 25-28.

(d) **PLYWOOD SUB-FLOORING.** Where used as structural sub-flooring, plywood shall be of the minimum thickness specified in Table No. 25-I.

**TABLE No. 25-I—MINIMUM THICKNESS OF
PLYWOOD SUB-FLOORS**

**(Plywood Continuous Over 2 or More Spans; and Face Grain
Perpendicular to Supports)**

Plywood Thickness ¹	Maximum Spacing ² of Joists		
	Residential 40 p.s.f.	50 p.s.f.	100 p.s.f.
1/2" rough	16"	16"	16"
5/8" rough	20"	20"	20"
3/4" sanded or rough	24"	24"	24"

¹ Blocking installed at edges, unless twenty-five thirty-seconds-inch (25/32") wood strip finish floor is used. If wood strips are perpendicular to supports, one-half inch (1/2") can be used on twenty-four inch (24") span.

² Limited by possible concentrated loading.

(e) **TABLE No. 25-J—MINIMUM THICKNESS OF PLYWOOD ROOF SHEATHING**

(Plywood Continuous Over Two or More Spans; and Face Grain Perpendicular to Supports.)

Plywood Thickness	Maximum Spacing of Supports, C to C, Inches		
	20 p.s.f.	30 p.s.f.	40 p.s.f.
5/16" rough	16	16	16
3/8" rough	24 ¹	24	24
1/2" rough ²	32 ¹	32	30
5/8" rough ²	42 ¹	42	36
3/4" rough ²	48 ¹	48 ¹	42

¹ These spans shall not be exceeded under any load condition.² Provide adequate blocking or suitable edge support when span exceeds 28 inches for one-half inch; 32 inches for five-eighths inch; and 36 inches for three-quarters inch. (Ord. 85500 § 2515; Sept. 10, 1956).

3.25.160 Durability. (a) **FOUNDATION VENTILATION.** Every building erected without cellar or basement shall have, in the external walls below the first floor level, not less than four (4) ventilators equal in total area to one-tenth (1/10) of one (1) per cent of the ground area of the building and so placed as to insure cross currents of air, and no floor joist shall be less than eighteen (18) inches above the ground. Such openings may be equipped with an approved thermally operated damper device.

Exception: Where a warm air heating system using crawl space for a plenum is installed, ventilation to exterior of such crawl space shall not be required.

(b) **DURABILITY.** All wood used in basements shall be protected against moisture. No wood, except wood treated with an approved preservative, shall be nearer than six (6) inches to any earth unless separated by concrete slab at least three (3) inches thick or concrete wall at least six (6) inches thick. Wood floors below grade may be separated from earth by four (4) inch concrete walls, if provided with a one (1) inch air space and moisture barrier. (Ord. 85500 § 2516, as amended by Ord. 93462; December 28, 1964).

3.25.170 Deflection. Wood members supporting plastered ceilings shall be so proportioned that their deflection under full live load and dead load exclusive of weight of plaster, shall not exceed one three-hundred-and-sixtieth of the span length.

For dry construction deflection shall not exceed one two-hundred-and-fortieth of the span length. (Ord. 85500 § 2517; Sept. 10, 1956).

3.25.180 Inspection of structural glued laminated lumber. No structural glued laminated lumber shall be installed in any building until the materials and conditions of manufacture have been certified by an ap-

3.25.180

BUILDINGS

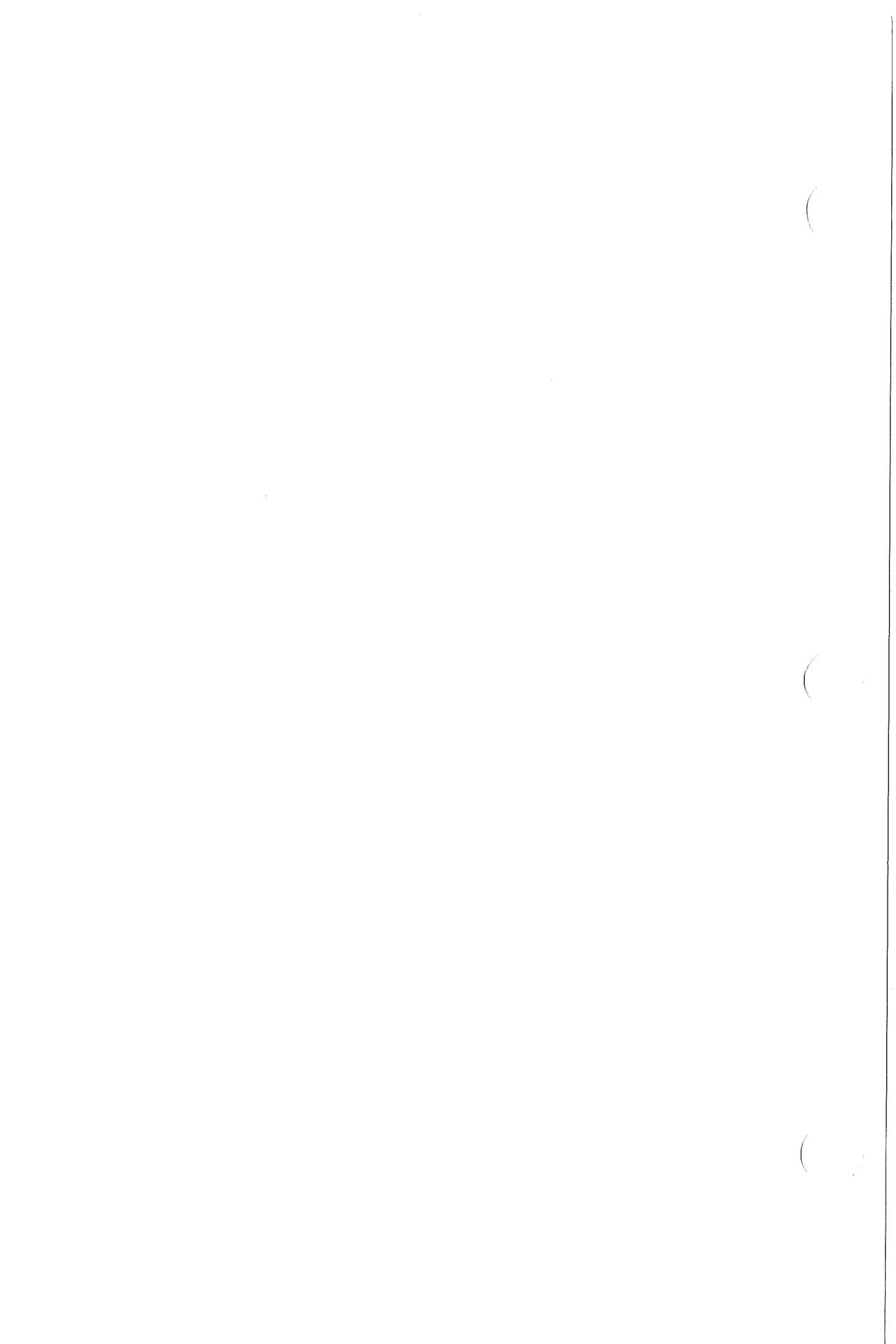
proved special inspector as meeting the requirements of approved drawings and specifications, or unless such lumber is furnished by a certified plant in accordance with the requirements of Section 3.03.050. (Ord. 85500 § 2518; Sept. 10, 1956).

TABLE No. 25-A—ALLOWABLE UNIT STRESSES FOR STRESS-GRADE LUMBER

Normal Loading—See also Section 3.25.040 (d), (e)

ABBREVIATIONS: J. & P.—Joists and Planks; B. & S.—Beams and Stringers; P. & T.—Posts and Timbers; L. F.—Light Framing.

SPECIES AND COMMERCIAL GRADE		Rules under which Graded	Extreme Fiber in Bending "f" and Tension Parallel to Grain "t"	Horizontal Shear "H"	Compression Perpendicular to Grain "cp"	Compression Parallel to Grain "c"	Modulus of Elasticity "E"
ALLOWABLE UNIT STRESSES, LBS. PER SQ. IN.							
Douglas Fir, Coast Region:							
Dense Select Structural	L.F.		2,050	120	455	1,500	1,760,000
Select Structural	L.F.		1,900	120	415	1,400	1,760,000
1500 f Industrial	L.F.		1,500	120	390	1,200	1,760,000
1200 f Industrial	L.F.		1,200	95	390	1,000	1,760,000
Dense Select Structural	J.&P.		2,050	120	455	1,650	1,760,000
Select Structural	J.&P.		1,900	120	415	1,500	1,760,000
Dense Structural	J.&P.		1,750	120	455	1,400	1,760,000
Construction	J.&P.	West Coast	1,500	120	390	1,200	1,760,000
Standard	J.&P.	Lumber	1,200	95	390	1,000	1,760,000
Dense Select Structural	B.&S.	Inspection	2,050	120	455	1,500	1,760,000
Select Structural	B.&S.	Bureau	1,900	120	415	1,400	1,760,000
Dense Construction	B.&S.		1,750	120	455	1,200	1,760,000
Construction	B.&S.		1,500	120	390	1,000	1,760,000
Dense Select Structural	P.&T.		1,900	120	455	1,650	1,760,000
Select Structural	P.&T.		1,750	120	415	1,500	1,760,000
Dense Construction	P.&T.		1,500	120	455	1,400	1,760,000
Construction	P.&T.		1,200	120	390	1,200	1,760,000
Douglas Fir, Inland Region:							
Select Structural	J.&P.		2,150	145	455	1,750	1,760,000
Structural	J.&P.	Western	1,900	100	400	1,400	1,650,000
Common Structural	J.&P.	Fine	1,450	95	380	1,250	1,650,000



Select Structural	P.&T.	Association	455	1,750	1,760,000
Structural	P.&T.		400	1,400	1,650,000
Common Structural	P.&T.		380	1,250	1,650,000
Hemlock, West Coast:					
Select Structural	L.F.	1,600	100	1,100	1,540,000
1500 f Industrial	L.F.	1,500	100	1,000	1,540,000
1200 f Industrial	L.F.	1,200	80	900	1,540,000
Select Structural	J.&P.	1,600	100	1,200	1,540,000
Construction	J.&P.	1,500	100	1,100	1,540,000
Standard	J.&P.	1,200	80	1,000	1,540,000
Construction	B.&S.	1,500	100	1,000	1,540,000
Construction	P.&T.	1,200	100	1,100	1,540,000

NOTES: In tension members the slope of grain limitations applicable to the middle portion of the length of the joist and plank and beam and stringer grades used shall apply throughout the length of the piece.

TABLE No. 25-B—RECOMMENDED WORKING STRESSES FOR PLYWOOD (DOUGLAS FIR)

In bending, tension, and compression (except bearing and 45-degree stresses) consider only those plies with their grain direction parallel to the principal stress

TYPE OF STRESS		DRY LOCATION			
		Exterior A-A (So2S)	Exterior A-B (So/Sld) Exterior A-C (SoS)	Exterior B-C Exterior Sheathing (C-C) Exterior Sheathing (C-D) Exterior Concrete Form (B-B) Interior Concrete Form (B-B)	Interior A-A (So2s) Interior A-B (So/Sld) Interior A-D (SoS) Interior B-D (Sld/LS) (Apply the following percentages to the stresses for the corresponding Exterior grade)
EXTREME FIBER, in bending					
Face grain // to span		2188	2000	1875	100%
Face grain 1 to span		1875	1875	1875	80%
TENSION					
// to face grain (3-ply only*)		2188	2000	1875	100%**
1 to face grain		1875	1875	1875	80%
† 45 degrees to face grain		337	320	310	85%
COMPRESSION					
// to face grain (3-ply only*)		1605	1460	1375	100%**
1 to face grain		1375	1375	1375	70%
† 45 degrees to face grain		496	472	460	80%
BEARING (on face)					
		405	405	405	100%
SHEAR, rolling, in plane of plies:					
// or 1 to face grain		79	72	68	75%
† 45 degrees to face grain		105	96	90	75%
SHEAR, in plane 1 to plies:					
// or 1 to face grain		210	192	180	85%
† 45 degrees to face grain		420	384	360	85%
MODULUS OF ELASTICITY in bending					
Face grain // to span		1,600,000	1,600,000	1,600,000	100%
Face grain 1 to span		1,600,000	1,600,000	1,600,000	70%

* For tension or compression, // to grain, in 5-ply or thicker, use values for 3-ply, but in next lower grade.
 ** For 5 or more plies use 90%.

DAMP OR WET LOCATION

Where moisture content will exceed 16 per cent, decrease by 20 per cent values shown for Dry Location for following properties: Extreme Fiber in Bending, Tension and Compression with both parallel and perpendicular to grain and at 45 degrees and Bearing. (No change in values for shear or modulus of elasticity.)
 Only Exterior Type plywood should be used where moisture content will exceed 18 per cent.

TABLE No. 25-C--ALLOWABLE UNIT STRESSES--STRUCTURAL GLUED LAMINATED DOUGLAS FIR

Allowable Unit Stresses are for Normal Conditions of Loading, Pounds Per Square Inch. Allowable stress values for dry conditions of use shall be applicable for normal loading when the moisture Content in service is less than 15 per cent, as in most covered structures.

COMBINATION NUMBER	SPECIES AND COMMERCIAL GRADE COMBINATION		EXTREME FIBER IN BENDING "F"		TENSION PARALLEL TO GRAIN "T"		COMPRESSION PARALLEL TO GRAIN "C"		COMPRESSION PERPENDICULAR TO GRAIN "C P"		
	1	2	3	4	5	6	7	8	9	10	11
	Grade of laminations at top and bottom	Number at top and bottom	Grade of inner laminations	From 4 to 14 lamina-tions	15 or more lamina-tions	From 4 to 14 lamina-tions	15 or more lamina-tions	From 4 to 14 lamina-tions	15 or more lamina-tions		
D O U G L A S F I R											
1	Clear (Dense)*	One	Dense Select Structural	3000	3000	3000	3000	2400	2500	165	455
2	Clear (Dense)*	One	Dense Constr.	3000	3000	2600	3000	2200	2300	165	455
3	Dense Select Structural	All	Dense Select Structural	2800	3000	3000	3000	2400	2500	165	455
4	Clear (Close-Grain)*	One	Select Structural	2800	2800	2800	2800	2200	2200	165	415
5	Select Structural	All	Select Structural	2600	2800	2800	2800	2200	2200	165	415
6	Select Structural	1/5 of total	Structural Construction	2600	2800	2400	2600	2000	2000	165	415
7	Clear (Medium grain)*	One	Construction	2600	2600	2200	2400	1900	2000	165	390
8	Dense Constr.	All	Dense Constr.	2400	2600	2600	3000	2200	2300	165	455
9	Dense Constr.	1/14 of total	Construction	2400	2600	2200	2400	1900	2000	165	455
10	Select Structural	One	Construction	2400	2600	2200	2400	1900	2000	165	415

TABLE No. 25-C (Continued)

COMBINATION NUMBER	SPECIES AND COMMERCIAL GRADE COMBINATION			EXTREME FIBER IN BENDING "E"	TENSION PARALLEL TO GRAIN "T"	COMPRESSION PARALLEL TO GRAIN "C"	HORIZONTAL ZON-TAL SHEAR "H"	COMPRES-SION PER-PENDICU-LAR TO GRAIN "C P"		
1	2	3	4	5	6	7	8	9	10	11
	Grade of laminations at top and bottom	Number at top and bottom	Grade of inner lamina-tions	From 4 to 14 lamina-tions	From 4 to 14 lamina-tions	From 4 to 14 lamina-tions	From 4 to 14 lamina-tions	From 4 to 14 lamina-tions	From 4 to 14 lamina-tions	From 4 to 14 lamina-tions
11	Select Structural	1/5 of total	Standard	2200	2400	2600	1900	2000	165	415
12	Clear (Medium Grain)*	One	Standard	2200	2000	2400	1800	1900	165	390
13	Select Structural	One	Standard	2200	2000	2400	1800	1900	165	415
14	Construction	All	Construction	2000	2200	2400	1900	2000	165	390
15	Construction	One	Standard	2000	2000	2400	1800	1900	165	390
16	Standard	All	Standard	1600	2000	2400	1800	1900	165	390

NOTES ON TABLE No. 25-C:

Modulus of elasticity, "E," dry conditions of use, 1,800,000.

Allowable stress values for dry conditions of use shall be applicable for normal loading when the moisture content in service is less than 15 per cent as in most covered structures.

For wet conditions of use, the following maximum percentages of Dry Use Stresses shall be permitted:

"E" (Bending) and "T" (tension) 80%.

"H" (horizontal shear) and "M" (modulus of elasticity) 90%.

"C" (compression parallel and perpendicular) 70%.

*The rate of growth and density requirements of inner laminations shall apply to clear outer laminations.

CONCRETE

Chapter 3.26 CONCRETE

Sections:

- 3.26.010 Scope.
- 3.26.020 Permits and inspection.
- 3.26.030 Approval of special systems of design or construction.
- 3.26.040 Load tests of structures—Notation.
- 3.26.050 Static load tests of structures.
- 3.26.060 Criteria for evaluation of load tests.
- 3.26.070 Definitions.
- 3.26.080 Tests of materials.
- 3.26.090 Portland cement.
- 3.26.100 Concrete aggregate.
- 3.26.110 Water.
- 3.26.120 Metal reinforcement.
- 3.26.130 Tests of reinforcement.
- 3.26.140 Admixtures.
- 3.26.150 Storage of materials.
- 3.26.160 Concrete quality—Notation.
- 3.26.170 Concrete quality.
- 3.26.180 Methods of determining the proportions of concrete.
- 3.26.190 Concrete proportions and consistency.
- 3.26.200 Strength test of concrete.
- 3.26.210 Splitting tensile tests of concrete.
- 3.26.220 Mixing of concrete.
- 3.26.230 Preparation of equipment and place of deposit.
- 3.26.240 Conveying concrete.
- 3.26.250 Depositing concrete.
- 3.26.260 Curing concrete.
- 3.26.270 Cold weather requirements.
- 3.26.280 Hot weather requirements.
- 3.26.290 Design of formwork.
- 3.26.300 Removal of forms.
- 3.26.310 Conduits and pipes embedded in concrete.
- 3.26.320 Construction joints.
- 3.26.330 Hooks and bends.
- 3.26.340 Cleaning reinforcement.
- 3.26.350 Placing reinforcement.
- 3.26.360 Spacing of bars.
- 3.26.370 Splices in reinforcement.
- 3.26.380 Lateral reinforcement.
- 3.26.390 Shrinkage and temperature reinforcement.
- 3.26.400 Protective covering of concrete.
- 3.26.410 Pneumatically placed concrete.

- 3.26.420 Bolts.
- 3.26.430 Design—General considerations.
- 3.26.440 Working stress design.
- 3.26.450 Ultimate strength design.
- 3.26.460 Structural systems or elements.
- 3.26.470 Section references, A.C.I. Code.

3.26.010 Scope. (a) The requirements of this chapter shall apply to the design and construction of plain and reinforced concrete or composite structural elements of any structure erected under the provisions of this Code. The design of plain and reinforced concrete structures or structural systems shall be in conformity with the provisions of Parts IV, IV-A, IV-B, V and Appendix of "Building Code Requirements for Reinforced Concrete", ACI 318-63 (1963 Edition, published by the American Concrete Institute) hereinafter referred to as the "A.C.I. Code", a copy of which is filed with the City Comptroller (C.F. 256705). Said provisions of the A.C.I. Code are, by reference, hereby made a part of this chapter, except as modified herein.

(b) For special structures, such as arches, tanks, reservoirs, grain elevators, shells, domes, blast-resistant structures, and chimneys, the provisions of this chapter shall govern so far as they are applicable. (Ord. 85500 § 2601 added by Ord. 95265; November 10, 1966).

3.26.020 Permits and inspection. Detailed requirements for building permits and inspection shall be according to the applicable provisions of Chapter 3.03 and as further provided in this chapter. (Ord. 85500 § 2602 added by Ord. 95265; November 10, 1966).

3.26.030 Approval of special systems of design or construction. The sponsors of any system of concrete design or construction which has been in successful use, or the adequacy of which has been shown by analysis or test, and the design of which is either not consistent with, or not covered by this chapter shall present the data on which their design is based to the Superintendent of Buildings for approval. The Superintendent of Buildings may investigate the data so submitted, require tests, and formulate rules governing design and construction before granting such approval. (Ord. 85500 § 2603 added by Ord. 95265; November 10, 1966).

3.26.040 Load tests of structure—Notation.

- D – service dead load
- L – service live load
- △ – 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 slabs supported on four sides). The span, except as pro-

vided in Section 3.26.060 (c), is the distance between the centers of the supports or the clear distance between supports plus the depth of the member, whichever is smaller (in inches).

t - total thickness or depth of member under load test (in inches).
(Ord. 85500 § 32604 added by Ord. 95265; November 10, 1966).

3.26.050 Static load tests of structures. (a) The Superintendent of Buildings 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 engineer acceptable to the Superintendent of Buildings shall conduct the tests.

(c) A load test of a structure shall not be made until the portion subjected to load is at least fifty-six 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 service 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 forty-eight hours.

(e) Immediately prior to the application of the test load to flexural members (including beams, slabs, and floor and roof constructions), the necessary initial readings 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 service 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 twenty-four hours whereupon readings of the deflections shall be taken. The test load shall be removed and additional readings of deflections shall be taken twenty-four hours after the removal of the test load. (Ord. 85500 § 2605 added by Ord. 95265; November 10, 1966).

3.26.060 Criteria for evaluation of load tests. 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 twenty-four hours after the removal of the test load shall be at least seventy-five per cent 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) 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 seventy-five percent recovery of the deflection may be retested. The second test loading shall not be made until at least seventy-two hours after removal of the test load for the first test. The structure shall show no evidence of failure in the retest, and the recovery of deflection caused by the second test load shall be at least seventy-five per cent. (Ord. 85500 § 2606 added by Ord. 95265; November 10, 1966).

3.26.070 Definitions. The following terms are defined for general use in this chapter; specialized definitions appear in individual chapters of the A.C.I. Code.

ADMIXTURE. A material other than portland cement, aggregate, or water added to concrete to modify its properties.

AGGREGATE. Inert material which is mixed with portland cement and water to produce concrete.

AGGREGATE, LIGHTWEIGHT. Aggregate having a dry, loose weight of seventy pounds per cubic foot or less.

COLUMN. An upright compression member the length of which exceeds three times its least lateral dimension.

COMBINATION COLUMN. A column in which a structural steel member, designed to carry the principal part of the load, is encased in concrete of such quality and in such manner that the remaining load may be allowed thereon.

COMPOSITE COLUMN. A column in which a steel or cast-iron structural member is completely encased in concrete containing spiral and longitudinal reinforcement.

COMPOSITE CONCRETE FLEXURAL CONSTRUCTION. A pre-cast concrete member and cast-in-place reinforced concrete so interconnected that the component elements act together as a flexural unit.

COMPRESSIVE STRENGTH OF CONCRETE (f'_c). Specified compressive strength of concrete in pounds per square inch (psi). Compressive strength shall be determined by tests of standard six by twelve inch cylinders made and tested in accordance with ASTM specifications at twenty-eight days or such earlier age as concrete is to receive its full service load or maximum stress.

CONCRETE. A mixture of portland cement, fine aggregate, coarse aggregate, and water.

CONCRETE, STRUCTURAL LIGHTWEIGHT. A concrete containing lightweight aggregate conforming to Section 3.26.100.

DEFORMED BAR. A reinforcing bar conforming to "Specifications for Minimum Requirements for the Deformations of Deformed Steel Bars for Concrete Reinforcement" (ASTM A 305) or "Specifications for Special Large Size Deformed Billet-Steel Bars for Concrete Reinforcement" (ASTM A 408). Welded wire fabric with welded intersections not farther apart than twelve inches in the direction of the principal reinforcement and with cross wires not more than six gauge numbers smaller in size than the principal reinforcement may be considered equivalent to a deformed bar when used in slabs.

EFFECTIVE AREA OF CONCRETE. The area of a section which lies between the centroid of the tension reinforcement and the compression face of the flexural member.

EFFECTIVE AREA OF REINFORCEMENT. 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 of the reinforcement is to be determined.

LAITANCE. Extremely fine material of little or no hardness which may collect on the surface of freshly deposited concrete or mortar, resulting from the use of excessive mixing water and usually recognized by its relatively light color.

MORTAR OR GROUT. A mixture of portland cement, fine aggregate and water.

NEGATIVE REINFORCEMENT. Reinforcement so placed as to take tensile stress due to negative bending moment.

PEDESTAL. An upright compression member whose height does not exceed three times its average least lateral dimension.

PLAIN BAR. Reinforcement that does not conform to the definition of deformed bar.

PLAIN CONCRETE. Concrete that does not conform to the definition for reinforced concrete.

PNEUMATICALLY PLACED CONCRETE. A mixture of fine aggregate and cement pneumatically applied by suitable mechanism, and to which water is added immediately prior to discharge from the applicator. It shall be considered as concrete for particulars of design as specified in this chapter.

POSITIVE REINFORCEMENT. Reinforcement so placed as to take tensile stress due to positive bending moment.

PRECAST CONCRETE. A plain or reinforced concrete element cast in other than its final position in the structure.

PRESTRESSED CONCRETE. Reinforced concrete in which there have been introduced internal stresses of such magnitude and distribution that the stresses resulting from service loads are counteracted to a desired degree.

RATIO OF REINFORCEMENT. The ratio of the effective area of the reinforcement cut by a section of a member to the effective area of the concrete at that section.

REINFORCED CONCRETE. Concrete containing reinforcement and designed on the assumption that the two materials act together in resisting forces.

REINFORCEMENT. Material that conforms to Section 3.26.120, excluding prestressing steel unless specifically included.

SERVICE DEAD LOAD. The calculated dead weight supported by a member.

SERVICE LIVE LOAD. See "Live Load" as defined in Sections 3.04.130—3.23.010.

SPLITTING TENSILE STRENGTH. See Section 3.26.210.

STRESS. Intensity of force per unit area.

SURFACE WATER. Water carried by an aggregate except that held by absorption within the aggregate particles themselves.

YIELD STRENGTH OR YIELD POINT (fy). Specified minimum yield strength or yield point of reinforcement in pounds per square inch (psi). Yield strength or yield point shall be determined in tension according to applicable ASTM specifications. (Ord. 85500 § 2607 added by Ord. 95265; November 10, 1966).

3.26.080 Tests of materials. (a) The Superintendent of Buildings shall have the right to order from time to time the test of any material entering into the concrete or reinforced concrete to determine whether the materials and methods in use are such as to produce the specified quality. (See Sections 3.26.130).

(b) Tests of materials and of concrete shall be made in accordance with the standards of the American Society for Testing and Materials. ASTM and AWS specifications referred to in this chapter shall be from among those listed in Section 410 of "Building Code Requirements for Reinforced Concrete," (1963 edition, published by the American Concrete Institute) ACI 318-63. 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 retained by the Superintendent of Buildings for that purpose. (See Sections 3.26.130, 3.26.200, 3.26.210). (Ord. 85500 § 2608 added by Ord. 95265; November 10, 1966).

3.26.090 Portland cement. Portland cement shall conform to "Specifications for Portland Cement" (ASTM C 150) or "Specifications for Air-

Entraining Portland Cement" (ASTM C 175). (Ord. 85500 § 2609 added by Ord. 95265; November 10, 1966).

3.26.100 Concrete aggregate. (a) Concrete aggregates used in concrete based on Method 1, Section 3.26.180, shall conform to "Specifications for Concrete Aggregate" (ASTM C 33) or to "Specifications for Lightweight Aggregate for Structural Concrete" (ASTM C 330), except as modified in the following:

Fine aggregate shall conform to the following grading, expressed in percentages by weight, when tested by means of U. S. Standard sieves:

Screen	Maximum per cent Passing	Minimum per cent Passing
No. 4.....	100	98
No. 6.....	100	93
No. 8.....	95	85
No. 16.....	80	63
No. 30.....	60	40
No. 50.....	30	15
No. 100.....	8	2
No. 200.....	2	0

Coarse aggregate shall conform to the following grading expressed in percentages by weight when tested by laboratory screens.

	1½" Aggregate		¾" Aggregate	
	Maximum per cent Passing	Minimum per cent Passing	Maximum per cent Passing	Minimum per cent Passing
Passing 1½"				
square opening	100	100	—	—
Passing 1"				
square opening	80	45	100	100
Passing ¾"				
square opening	—	—	100	95
Passing ¾"				
square opening	60	30	90	60
Passing ½"				
square opening	34	12	60	30
Passing ¼"				
square opening	8	2	20	5
Passing U.S. No. 4 sieve	6	0	8	2

For concrete made with less than seven-eighths inch maximum size aggregate, add one-half sack of cement to each cubic yard in addition to

the minimum shown in Table No. 26-A for the required assumed strength.

(b) Concrete aggregates used in concrete based on Method 2, Section 2618, shall conform to "Specifications for Concrete Aggregates" (ASTM C 33) or to "Specifications for Lightweight Aggregates for Structural Concrete" (ASTM C 330), except that aggregates failing to meet these specifications but which have been shown by special test or actual service to produce concrete of adequate strength and durability may be used subject to approval by the Superintendent of Buildings.

(c) Except as permitted elsewhere in this code, the maximum size of the aggregate shall be not larger than one-fifth of the narrowest dimension between sides of the forms of the member for which the concrete is to be used nor larger than three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars. (Ord. 85500 § 2610 added by Ord. 95265; November 10, 1966).

3.26.110 Water. Water used in mixing concrete shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or steel. Mortar cubes made with nonpotable mixing water shall have seven day and twenty-eight day strengths equal to at least ninety percent of the strengths of similar specifications made with potable water. (Ord. 85500 § 2611 added by 95265; November 10, 1966).

3.26.120 Metal reinforcement. (a) Reinforcing bars shall conform to "Specifications for Billet-Steel Bars for Concrete Reinforcement" (ASTM A 15), "Specifications for Rail-Steel Bars for Concrete Reinforcement" (ASTM A 16), "Specifications for Deformed Rail-Steel Bars for Concrete Reinforcement with sixty thousand psi Minimum Yield Strength" (ASTM A 61), "Specifications for Axle-Steel Bars for Concrete Reinforcement" (ASTM A 160), "Specifications for Special Large Size Deformed Billet-Steel Bars for Concrete Reinforcement" (ASTM A 408), "Specifications for High Strength Deformed Billet-Steel Bars for Concrete Reinforcement with seventy-five thousand psi Minimum Yield Strength" (ASTM A 431), or "Specifications for Deformed Billet-Steel Bars for Concrete Reinforcement with sixty thousand psi Minimum Yield Strength" (ASTM A 432). Deformations on deformed bars shall conform to "Specifications for Deformations of Deformed Steel Bars for Concrete Reinforcement" (ASTM A 305) or "Specifications for Special Large Size Deformed Billet-Steel Bars for Concrete Reinforcement" (ASTM A 408).

If any reinforcing bars are to be welded these ASTM specifications shall be supplemented by requirements assuring satisfactory weldability in conformity with AWS D12.1, "Recommended Practices for Welding Reinforced in Steel, Metal Inserts and Connections in Reinforced Concrete Construction."

(b) Bar and rod mats for concrete reinforcement shall conform to

"Specifications for Fabricated Steel Bar or Rod Mats for Concrete Reinforcement" (ASTM A 184).

(c) Wire for concrete reinforcement shall conform to "Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement" (ASTM A 82).

(d) Welded wire fabric for concrete reinforcement shall conform to "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement" (ASTM A 185) except that the weld shear strength requirements of Section 5b of those specifications shall be extended to include a wire size differential up to and including six gauges.

(e) Wire and strands for prestressed concrete shall conform to "Specifications for Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete" (ASTM A 416) or "Specifications for Wire, Uncoated Stress-Relieved for Prestressed Concrete" (ASTM A 421). Wires used in making strands for post-tensioning shall be cold-drawn and either stress-relieved in the case of uncoated strands, or hot dip galvanized in the case of galvanized strands.

(f) High strength alloy steel bars for post-tensioning shall be proof-stressed to ninety percent of the guaranteed tensile strength. After proof-stressing, the bars shall conform to the following minimum properties:

Yield strength (0.2 percent offset)	0.90 f's
Elongation at rupture in 20 diameters	4 percent
Reduction of area at rupture	25 percent

(Ord. 85500 § 2612 added by Ord. 95265; November 10, 1966).

3.26.130 Tests of reinforcement. (a) All required reinforcement shall be tested in conformity with ASTM specifications or other requirements as may be specified by the Superintendent of Buildings. Deformed bars need not be machined before testing.

EXCEPTION: Unless there is evidence of nonconformity with the ASTM specifications, the following reinforcement need not be tested:

(1) Any reinforcement when the unit stress used in design is not in excess of fifty percent of the allowable stresses (exhibited in Section 1003 of the A.C.I. Code).

(2) Any reinforcement that is properly identified as to manufacturer and grade and when, in the opinion of the Superintendent of Buildings, there is no question as to the reliability of the mill test certificate.

(b) No required reinforcement shall be encased in concrete until there is on file in the office of the Superintendent of Buildings an approved mill test certificate or a certificate from an approved testing agency giving the following information with regard to the reinforcement to be used:

- (1) Place of sampling;
- (2) ASTM designation number;
- (3) Size of reinforcement;
- (4) Number of tons represented by the test;
- (5) Testing agency's lot number and laboratory number;

- (6) Name of manufacturer and brand of deformation, when known;
- (7) Manufacturer's heat identification, when known;
- (8) Manufacturer's chemical analysis, when known;
- (9) Statement that the reinforcement referred to has passed the required tests;
- (10) Signature of person making the certificate and date of execution of the certificate.

The testing agency's lot number may include all sizes of bars of the same heat number but shall not include more than one heat number.

EXCEPTION: When, in the opinion of the Superintendent of Buildings, there is no question as to the quality of reinforcing steel, the above requirements may be waived. (Ord. 85500 § 2613 added by Ord. 95265; November 10, 1966).

3.26.140 Admixtures. (a) **AIR-ENTRAINING ADMIXTURES.** Air-entraining admixtures, if used, shall conform to "Specifications for Air-Entraining Admixtures for Concrete" (ASTM C 260).

(b) **ACCELERATING, RETARDING, AND WATER-REDUCING ADMIXTURES.** Water-reducing admixtures, retarding admixtures, accelerating admixtures, water-reducing and retarding admixtures, and water-reducing and accelerating admixtures, if used, shall conform to "Specifications for Chemical Admixtures for Concrete" (ASTM C 494).

(c) **POZZOLANIC ADMIXTURES.** (1) Fly ash, when used as an admixture, shall conform to "Specifications for Fly Ash for Use as an admixture in Portland Cement Concrete" (ASTM C 350).

(2) Other pozzolans used as admixtures shall conform to "Specifications for Raw or Calcined Natural Pozzolans for Use as Admixtures in Portland Cement Concrete" (ASTM C 402). (Ord. 85500 § 2614 added by Ord. 95265; November 10, 1966).

3.26.150 Storage of materials. Cement and aggregates shall be stored in such a manner as to prevent their deterioration or the intrusion of foreign matter. Any material which has deteriorated or which has been damaged shall not be used for concrete. (Ord. 85500 § 2615 added by Ord. 95265; November 10, 1966).

3.26.160 Concrete quality—Notation. $f'c$ = compressive strength of concrete (See Section 3.26.070).

F_{sp} = ratio of splitting tensile strength to the square root of compressive strength. (Ord. 85500 § 2616 added by Ord. 95265; November 10, 1966).

3.26.170 Concrete quality. (a) For the design of reinforced concrete structures, the value $f'c$ shall be used in determining stresses in Part IV-A, Working Stress Design, and strengths in Part IV-B, Ultimate Strength Design, of the A.C.I. Code.

(b) All plans submitted for approval or used for any project shall clearly show the specified strength, $f'c$, of concrete at the specified age for which each part of the structure was designed.

(c) Concrete that is to be subject to freezing temperatures while wet shall have a water-cement ratio not exceeding six gallons per bag and it shall contain entrained air.

(d) Concrete that will be exposed to sulfate-containing or other chemically aggressive solutions shall be proportioned in accordance with "Recommended Practice for Selecting Proportions for Concrete" (ACI 613-54) and "Recommended Practice for Selecting Proportions for Structural Lightweight Concrete" (ACI 613A-59).

(e) Concrete made in accordance with Method 1, Section 3.26.180, shall require site supervision by special inspectors.

EXCEPTION: For unsupervised concrete, the compressive strength $f'c$ shall be assumed as seventy-five percent of the values in Table 26-A and shall not be greater than one thousand eight hundred seventy-five psi.

(f) Concrete made in accordance with Method 2, Section 3.26.180, shall require supervision in the mixing plant and at the site by special inspectors. (Ord. 85500 § 2617 added by Ord. 95265; November 10, 1966).

3.26.180 Methods of determining the proportions of concrete. The determination of the proportions of cement, aggregate, and water to attain the required strengths shall be made by one of the following methods, but lower water-cement ratios may be required for conformance with Section 3.26.170 (c) and (d).

METHOD 1. — Without Preliminary Tests—Absolute Volume Method. Where preliminary test data on the materials to be used in concrete have not been obtained, the following Absolute Volume Method shall be used.

Aggregates specified in Section 3.26.100 (a) shall be proportioned by the absolute volume method; fine aggregates may vary in proportion but shall not be less than thirty-five nor more than forty-five percent of the total volume of aggregate.

Water content, including free surface water on aggregates, shall be in accordance with Table No. 26-A.

Cement content per cubic yard of concrete shall not be less than the amounts specified in Table No. 26-A.

TABLE NO. 26-A

Minimum number of sacks of cement per cubic yard of concrete	Maximum Water-content U.S. gallon per 94 lb. sack of cement	Maximum* Assumed compressive strength at 28 days For design purposes
5	$7\frac{1}{2}$	2,000
$5\frac{1}{2}$	$6\frac{3}{4}$	2,500
6	6	3,000
$6\frac{1}{2}$	5	4,000

When strengths in excess of four thousand psi are required or when lightweight aggregate or admixtures (other than those exclusively for the purpose of entraining air) are used, the required water-cement ratio shall be determined in accordance with Method 2.

METHOD 2 — For combinations of materials previously evaluated or to be established by trial mixtures.

Water-cement ratios or strengths greater than shown in Table No. 26-A may be used provided that the relationship between strength and water-cement ratio for the materials to be used have been previously established by reliable test data and the resulting concrete satisfies the requirements of Section 3.26.200.

Where previous data are not available, concrete trial mixtures having proportions and consistency suitable for the work shall be made using at least three different water-cement ratios (or cement content in the case of lightweight aggregates) which will produce a range of strengths encompassing those required for the work. These tests shall be made in accordance with the procedure given in the appendix to "Recommended Practice for Selecting Proportions for Concrete" (ACI 613) or "Recommended Practice for Selecting Proportions for Structural Lightweight Concrete" (ACI 613A). For each water-cement ratio (or cement content), at least three specimens for each age to be tested shall be made and cured in accordance with "Method of Making and Curing Concrete Compression and Flexure Test Specimens in the Laboratory" (ASTM C 192) and tested for strength in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C 39).

The strength tests shall be made at twenty-eight days or the earlier age at which the concrete is to receive load, as indicated on the plans. A curve shall be established showing the relationship between water-cement ratio (or cement content) and compressive strength. The maximum permissible water-cement ratio for the concrete to be used in the structure shall be that shown by the curve to produce an average strength to satisfy the requirements of Section 3.26.200, provided that the water-cement ratio shall be no greater than that required by Section 3.26.170(c).

Where different materials are to be used for different portions of the work, each combination shall be evaluated separately. (Ord. 97033 § 5; September 5, 1968; prior Ord. 85500 § 2618 added by Ord. 95265; November 10, 1966).

3.26.190 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.

(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. (Ord. 85500 § 2619 added by Ord. 95265; November 10, 1966).

3.26.200 Strength test of concrete. (a) Tests of concrete which are supervised shall be made as follows: At least three cylinders shall be made for testing each one hundred fifty cubic yards of structural concrete, and not less than three cylinders shall be made for each day's concreting. The Superintendent of Buildings may require a reasonable number of additional tests during the progress of the work. All such tests shall be made by an approved agency, and copies of the results shall be kept on file with the Superintendent of Buildings for a period of not less than two years after the acceptance of the structure. Samples from which compression test specimens are molded shall be secured in accordance with "Method of Sampling Fresh Concrete" (ASTM C 172). Specimens made to check the adequacy of the proportions for strength of concrete or as a basis for acceptance of concrete shall be made and laboratory-cured in accordance with "Method of Making and Curing Concrete Compression and Flexure-Test Specimens in the Field" (ASTM C 31). Additional test specimens cured entirely under field conditions may be required by the Superintendent of Buildings to check the adequacy of curing and protection of the concrete. Strength tests shall be made in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C 39).

(b) The age for strength tests shall be twenty-eight days or, where specified, the earlier age at which the concrete is to receive its full load or maximum stress. Additional tests may be made at earlier ages to obtain advance information on the adequacy of strength development where age-strength relationships have been established for the materials and proportions used.

(c) To conform to the requirements of this chapter, (1) For structures designed in accordance with Part IV-A, Working Stress Design, of the A.C.I. Code, the average of any five consecutive strength tests of the laboratory-cured specimens representing each class of concrete shall be equal to or greater than the specified strength, f'_c , and not more than twenty percent of the strength tests shall have values less than the specified strength. The average strength of concrete, as determined in Section 3.26.180, Method 2, must exceed the specified strength by fifteen percent.

(2) For structures designed in accordance with Part IV-B, Ultimate Strength Design, of the A.C.I. Code and for prestressed structures the average of any three consecutive strength tests of the laboratory-cured specimens representing each class of concrete shall be equal to or greater than the specified strength, f'_c , and not more than ten percent of the strength tests shall have values less than the specified strength. The average strength of concrete, as determined in Section 3.26.180, Method 2, must exceed the specified strength by twenty-five percent.

(d) When it appears that the laboratory-cured specimens will fail to

conform to the requirements for strength, the Superintendent of Buildings shall have the right to order changes in the concrete sufficient to increase the strength to meet these requirements. The strengths of any specimens cured on the job are intended to indicate the adequacy of protection and curing of the concrete and may be used to determine when the forms may be stripped, shoring removed, or the structure placed in service. When, in the opinion of the Superintendent of Buildings, the strengths of the job-cured specimens are excessively below those of the laboratory-cured specimens, the contractor may be required to improve the procedure for protection and curing the concrete.

(e) In addition, when concrete fails to conform to the requirements of (c) of this section or when tests of field-cured cylinders indicate deficiencies in protection and curing, the Superintendent of Buildings may require tests in accordance with "Methods of Securing, Preparing and Testing Specimens from Hardened Concrete for Compressive and Flexural Strength" (ASTM C 42) or order load tests as outlined in Section 3.26.020 for that portion of the structure where the questionable concrete has been placed. (Ord. 85500 § 2620 added by Ord. 95265; November 10, 1966).

3.26.210 Splitting tensile tests of concrete. (a) To determine the splitting ratio, F_{sp} , for a particular aggregate, tests of concrete shall be made as follows:

(1) Twenty-four six by twelve inch cylinders shall be made in accordance with "Method of Making and Curing Concrete Compression and Flexure Test Specimens in the Laboratory" (ASTM C 192), twelve at a compressive strength level of approximately three thousand psi and twelve at approximately four thousand or five thousand psi. After seven days most curing followed by twenty-one days drying at seventy-three degrees Fahrenheit and fifty percent relative humidity, eight of the test cylinders at each of the two strength levels shall be tested for splitting strength and four for compressive strength.

(2) The splitting tensile strength shall be determined in accordance with "Method of Test for Splitting Tensile Strength of Molded Concrete Cylinders" (ASTM C 496), and the compressive strength in accordance with "Method of Test for Compressive Strength of Molded Concrete Cylinders" (ASTM C 39).

(b) The ratio, F_{sp} , of splitting tensile strength to the square root of compressive strength shall be obtained by using the average of all sixteen splitting tensile tests and all eight compressive tests. (Ord. 85500 § 2621 added by Ord. 95265; November 10, 1966).

3.26.220 Mixing of concrete. (a) All concretes shall be mixed until there is a uniform distribution of the materials and shall be discharged completely before the mixer is recharged.

(b) Ready-mixed concrete shall be mixed and delivered in accordance

with the requirements set forth in "Specifications for Ready-Mixed Concrete" (ASTM C 94) and shall conform to the requirements of Sections 3.26.160 through 3.26.210. (Ord. 85500 § 2622 added by Ord. 95265; November 10, 1966).

3.26.230 Preparation of equipment and place of deposit. (a) Before concrete is placed, all equipment for mixing and transporting the concrete shall be clean, 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 clean of ice or other deleterious coatings.

(b) Water shall be removed from excavations before concrete is deposited, unless otherwise directed by the Superintendent of Buildings. Any flow of water into an excavation shall be removed by methods which will avoid washing the freshly deposited concrete.

(c) All laitance and other unsound materials shall be removed from hardened concrete before additional concrete is added. (Ord. 85500 § 2623 added by Ord. 95265; November 10, 1966).

3.26.240 Conveying concrete. (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. (Ord. 85500 § 2624 added by Ord. 95265; November 10, 1966).

3.26.250 Depositing concrete. (a) Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to re-handling 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 material shall be deposited in the structure.

(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 3.26.320.

(c) All concrete shall be thoroughly consolidated by suitable means during placement, and shall be thoroughly worked around the reinforcement and embedded fixtures and into the corners of the forms. Effective vibration is commonly the most suitable means.

(d) Where conditions make consolidation difficult, or where 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. (Ord. 85500 § 2625 added by Ord. 95265; November 10, 1966).

3.26.260 Curing concrete. (a) Concrete shall be maintained above fifty degrees Fahrenheit and in a moist condition for at least the first seven days after placing, except that high-early-strength concrete shall be so maintained for at least the first three days. Other curing periods may be used if the specified strengths are obtained.

(b) When the temperature falls below forty degrees Fahrenheit or rises above one hundred degrees Fahrenheit, a complete record of the temperatures and of the protection given to the concrete while curing shall be kept. (Ord. 85500 § 2626 added by Ord. 95265; November 10, 1966).

3.26.270 Cold weather requirements. 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 reinforcement, 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. (Ord. 85500 § 2627 added by Ord. 95265; November 10, 1966).

3.26.280 Hot weather requirements. During hot weather, steps shall be taken to reduce concrete temperature and water evaporation by proper attention to ingredients, production methods, handling, placing, protection, and curing. (Ord. 85500 § 2628 added by Ord. 95265; November 10, 1966).

3.26.290 Design of formwork. Forms shall conform to the shape, lines, and dimensions of the member as called for on the plans and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shape. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

Temporary openings shall be provided at the base of column and wall forms, and at other points where necessary, to facilitate cleaning and inspection. (Ord. 85500 § 2629 added by Ord. 95265; November 10, 1966).

3.26.300 Removal of forms. (a) No construction loads exceeding the structural design loads shall be supported upon any unshored portion of the structure under construction. No construction load shall be supported upon, nor any shoring removed from any part of the structure under construction until that portion of the structure has attained sufficient strength to support safely its weight and the loads placed thereon. This strength may be demonstrated by job-cured test specimens and by a structural analysis considering the proposed loads in relation to these test strengths. Such analyses and test data shall be furnished by the contractor to the Superintendent of Buildings.

(b) Forms shall be removed in such manner as to insure the complete safety of the structure. Where the structure as a whole is adequately

supported on shores, the removable floor forms, beam and girder sides, column and similar vertical forms may be removed after twenty-four hours provided the concrete is sufficiently strong not to be injured thereby.

(c) Form supports of prestressed members may be removed when sufficient prestressing has been applied to enable them to carry their dead loads and anticipated construction loads. (Ord. 85500 § 2630 added by Ord. 95265; November 10, 1966).

3.26.310 Conduits and pipes embedded in concrete. (a) Electric conduits and other pipes whose embedment is allowed shall not, with their fittings, displace more than four percent of the area of the cross section of a column on which stress is calculated or which is required for fire protection. Sleeves, conduits, or other pipes passing through floors, walls, or beams shall be of such size or in such location as not to impair unduly the strength of the construction; such sleeves, conduits, or pipes may be considered as replacing structurally in compression the displaced concrete, provided they are not exposed to rusting or other deterioration, are of uncoated or galvanized 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. Sleeves, pipes, or conduits of any material not harmful to concrete and within the limitations of this section may be embedded in the concrete with the approval of the Superintendent of Buildings provided they are not considered to replace the displaced concrete. Unless special provision is made in the design, including the amount of coverage under reinforcement, the following requirements shall apply to conduits and pipes in reinforced concrete slabs, walls or beams.

(1) If conduits or pipes are placed in reinforced concrete slabs, they shall be located in the middle half of the slab depth;

(2) No conduit or pipe shall be placed in any slab less than two and three-fourths inches thick;

(3) Embedded pipes or conduits, other than those merely passing through, shall be not 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.

(b) Pipes which will contain liquid, gas, or vapor may be embedded in structural concrete under the following additional conditions:

(1) The temperature of the liquid, gas, or vapor shall not exceed one hundred fifty degrees Fahrenheit.

(2) The maximum pressure to which any piping or fittings shall be subjected shall be two hundred psi above atmospheric pressure.

(3) All piping and fittings shall be tested as a unit for leaks immediately prior to concreting. The testing pressure above atmospheric pressure shall be fifty percent 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 fifty psi 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 psi pressure, is to be placed in the pipes until the concrete has thoroughly set.

(6) In solid slabs the piping, except for radiant heating and snow melting, shall be placed between the top and bottom reinforcement.

(7) The concrete covering of the pipes and fittings shall be not less than one inch.

(8) Reinforcement with an area equal to at least 0.2 percent of the area of the concrete section shall be provided normal to the piping.

(9) The piping and fittings shall be assembled by welding, brazing, solder-sweating, or other equally satisfactory method. Screw connections shall be 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 pressure of not more than one psi above atmospheric pressure need not be tested as required in paragraph 3. (Ord. 85500 § 2631 added by Ord. 95265; November 10, 1966).

3.26.320 Construction joints. (a) Joints not indicated on the plans shall be so made and located as not to impair significantly the strength of the structure. Where a joint is to be made, the surface of the concrete shall be roughened and thoroughly cleaned, removing all laitance and foreign material. In addition to the foregoing, all joints shall be dampened (but not saturated), and slushed with a coat of neat cement grout immediately before placing of new concrete.

(b) A delay at least until the concrete is no longer plastic must occur in columns or walls before concreting 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 this point, in which case the joints in the girders shall be offset a distance equal to twice the width of the beam. Provisions shall be made for transfer of shear and other forces through the construction joint. (Ord. 85500 § 2632 added by Ord. 95265; November 10, 1966).

3.26.330 Hooks and bends. (a) **HOOKS.** The term “standard hook” as used herein shall mean either:

(1) A semicircular turn plus an extension of at least four bar diameters but not less than two and one-half inches at the free end of the bar, or

(2) A ninety degree turn plus an extension of at least twelve bar diameters at the free end of the bar, or

(3) For stirrup and tie anchorage only, either a ninety degree or a one hundred thirty-five degree turn plus an extension of at least six bar diameters but not less than two and one-half inches at the free end of the bar.

(b) **MINIMUM RADII.** The radii of bend measured on the inside of the bar for standard hooks shall not be less than the values in the following table, except that for sizes No. 6 to No. 11, inclusive, in structural and intermediate grades of bars only, the minimum radius shall be two and one-half bar diameters.

MINIMUM RADII OF BEND

Bar Size (No.)	Minimum Radii
3, 4, or 5	2½ bar diameters
6, 7, or 8	3 bar diameters
9, 10, or 11	4 bar diameters
145 or 188*	5 bar diameters

*Special fabrication is required for bends exceeding ninety degrees for bars of these sizes and grades having a specified yield point of fifty thousand psi or more.

(c) **BENDS OTHER THAN STANDARD HOOKS.** (1) Bends for stirrups and ties shall have radii on the inside of the bar not less than one bar diameter.

(2) Bends for all other bars shall have radii on the inside of the bar not less than the values of the table in subsection (b). When such bends are made at points of high stress in the bar, an adequate radius of bend shall be provided to prevent crushing of concrete.

(d) **BENDING.** All bars shall be bent cold, unless otherwise permitted by the Superintendent of Buildings. No bars partially embedded in concrete shall be field bent except as shown on the plans or specifically permitted by the Superintendent of Buildings. (See Sections 918-919 of the A.C.I. Code). (Ord. 85500 § 2633 added by Ord. 95265; November 10, 1966).

3.26.340 Cleaning reinforcement. Metal reinforcement, at the time concrete is placed, shall be free from loose flaky rust, mud, oil, or other coatings that will destroy or reduce the bond. (Ord. 85500 § 2634 added by Ord. 95265; November 10, 1966).

3.26.350 Placing reinforcement. (a) **SUPPORTS.** Reinforcement shall be accurately placed and adequately supported by concrete, metal, or other approved chairs; spacers; or ties and secured against displacement within tolerances permitted.

(b) **TOLERANCES.** Unless otherwise specified by the Superintendent of Buildings, reinforcement shall be placed in specified positions within the following tolerances:

(1) Depth, d , in flexural members, walls, and columns where d is twenty-four inches or less: $\pm \frac{1}{4}$ inch.

(2) Depth, d , in flexural members and columns where d is more than twenty-four inches: $\pm \frac{1}{2}$ inch.

(3) Longitudinal location of bends and ends of bars: ± 2 inches, except that specified concrete cover at ends of members shall not be reduced.

(c) **DRAPED FABRIC.** When wire or other reinforcement, not exceeding one-fourth inch in diameter is used as reinforcement for slabs not exceeding ten feet in span, the reinforcement may be curved from a point near the top of the slab over the support to a point near the bottom of the slab at midspan, provided such reinforcement is either continuous over, or securely anchored to, the support. (Ord. 85500 § 2635 added by Ord. 95265; November 10, 1966).

3.26.360 Spacing of bars. (a) The clear distance between parallel bars (except in columns and between multiple layers of bars in beams) 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.

(b) Where reinforcement in beams or girders is placed in two or more layers, the clear distance between layers shall be not less than one inch, and the bars in the upper layers shall be placed directly above those in the bottom layer.

(c) In walls and slabs other than concrete joist construction, the principal reinforcement shall be centered not farther apart than three times the wall or slab thickness nor more than eighteen inches.

(d) In spirally reinforced and in tied columns, the clear distance between longitudinal bars shall be not less than one and one-half times the bar diameter, one and one-half times the maximum size of the coarse aggregate, nor one and one-half inches.

(e) The clear distance between bars shall also apply to the clear distance between a contact splice and adjacent splices or bars.

(f) Groups of parallel reinforcing bars bundled in contact to act as a unit must be deformed bars with not over four in any one bundle and shall be used only when stirrups or ties enclose the bundle. Bars in a bundle shall terminate at different points with at least forty bar diameters staggered unless all of the bars end in a support. Where spacing limitations are based on bar size, a unit of bundled bars shall be treated as a single bar

of equivalent area. (Ord. 85500 § 2636 added by Ord. 95265; November 10, 1966).

3.26.370 Splices in reinforcement. (a) No splices of reinforcement shall be made except as shown on the design drawings, or as specified, or as authorized by the Superintendent of Buildings. Except as provided herein, all welding shall conform to "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction", AWS D12.1.

(b) Splices in reinforcement in which the critical design stress is tensile —

(1) Lapped splices in tension shall not be used for bar sizes larger than No. 11.

(2) Splices at points of maximum tensile stress shall be avoided wherever possible; such splices where used shall be welded, lapped, or otherwise fully developed. In any case the splice shall transfer the entire computed stress from bar to bar without exceeding three-fourths of the permissible bond values given in the A.C.I. Code; however, the length of lap for deformed bars shall be not less than twenty-four, thirty and thirty-six bar diameters for specified yield strengths of forty thousand, fifty thousand, and sixty thousand psi, respectively, nor less than twelve inches. For plain bars, the minimum length of lap shall be twice that for deformed bars. (Computed stress is based on M for design by Part IV-A and M/ϕ for design by Part IV-B of the A.C.I. Code).

(3) For contact splices spaced laterally closer than twelve bar diameters or located closer than six inches or six bar diameters from an outside edge, the lap shall be increased by twenty percent, or stirrups as prescribed in Section 918(c)2 of the A.C.I. Code or closely spaced spirals shall enclose the splice for its full length.

(4) Where more than one-half of the bars are spliced within a length of forty bar diameters or where splices are made at points of maximum stress, special precautions shall be taken, such as increased length of lap and the use of spirals or closely spaced stirrups around and for the length of the splice.

(c) Splices in reinforcement in which the critical design stress is compressive —

(1) Where lapped splices are used, the minimum amount of lap shall be:

With concrete having a strength of three thousand psi or more, the length of lap for deformed bars shall be twenty, twenty-four and thirty bar diameters for specified yield strengths of fifty thousand psi and under, sixty thousand and seventy-five thousand psi, respectively, nor less than twelve inches. When the specified concrete strengths are less than three thousand psi, the amount of lap shall be one-third greater than the values given above.

For plain bars, the minimum amount of lap shall be twice that specified for deformed bars.

(2) When approved by the Superintendent of Buildings, welded splices or other positive connections may be used instead of lapped splices. Where the bar size exceeds No. 11, welded splices or other positive connections shall preferably be used. In bars required for compression only, the compressive stress may be transmitted by bearing of square-cut ends held in concentric contact by a suitably welded sleeve or mechanical device.

Welding of any reinforcement shall not be permitted except as shown on design drawings or as authorized by the engineer and approved by the Superintendent of Buildings.

(3) 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 shall be provided by metal ties, spirals, or parts of the floor construction. Metal ties or spirals so designed shall be placed near (not more than 8 bar diameters from) the point of bend. The horizontal thrust to be resisted shall 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. See Section 3.26.330(d).

(4) Where column faces are offset three inches or more, splices of vertical bars adjacent to the offset face shall be made by separate dowels overlapped as specified above.

(5) In tied columns the amount of reinforcement spliced by lapping shall not exceed a steel ratio of 0.04 in any three foot length of column.

(d) An approved welded splice is one in which the bars are butted and welded so that it will develop in tension at least one hundred twenty-five percent of the specified yield strength of the reinforcing bar. Approved positive connections for bars designed to carry critical tension or compression shall be equivalent in strength to an approved welded splice.

(e) Metal cores in composite columns shall be accurately milled at splices and positive provisions shall be made for alignment of one core above another. At the column base, provision shall be made to transfer the load to the footing at safe unit stresses in accordance with Section 1002(a) of the A.C.I. Code. (See also Section 3.26.440). The base of the metal section shall be designed to transfer the load from the entire composite column to the footing, or it may be designed to transfer the load from the 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 the reinforced concrete section of the column by means of bond on the vertical reinforcement and by direct compression on the concrete.

(f) Welded wire fabric used as reinforcement in structural slabs shall be spliced in accordance with the following provisions:

(1) Lapped splices of wires in regions of maximum stress (where they are carrying more than one-half of the permissible stress) shall be avoided wherever possible; such splices where used shall be so made that the overlap measured between outermost cross wires of each fabric sheet is not less than the spacing of the cross wires plus two inches.

(2) Splices of wires stressed at more than one-half the permissible stress shall be so made that the overlap measured between outermost cross wires is not less than two inches. (Ord. 85500 § 2637 added by Ord. 95265; November 10, 1966).

3.26.380 Lateral reinforcement. (a) Spiral column reinforcement shall consist of evenly spaced continuous spirals held firmly in place and true to line by vertical spacers. At least two spacers shall be used 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. When spiral rods are five-eighths inch or larger, three spacers shall be used for spirals twenty-four inches or less in diameter and four for spirals more than twenty-four inches in diameter. 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-fourth inch for rolled bars or No. 4 AS&W gauge for drawn wire. Anchorage of spiral reinforcement shall be provided by one and one-half extra turns of spiral rod or wire at each end of spiral unit. Splices when necessary in spiral rods or wires shall be made by welding or by a lap of one and one-half turns. The center-to-center spacing of the spirals shall not exceed one-sixth of the core diameter. The clear spacing between spirals shall not exceed 3 inches nor be 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 to the level of the lowest horizontal reinforcement in the slab drop panel, or beam above. In a column with a capital, the spiral shall extend to a plane at which the diameter or width of the capital is twice that of the column.

(b) All bars for tied columns shall be enclosed by lateral ties at least one-fourth inch in diameter spaced apart not over sixteen bar diameters, forty-eight tie diameters, or the least dimension of the column. The ties shall be so arranged that every corner and alternate longitudinal bar shall have lateral support provided by the corner of a tie having an included angle of not more than one hundred thirty-five degrees and no bar shall be farther than six inches from such a laterally supported bar. Where the bars are located around the periphery of a circle, a complete circular tie may be used.

(c) Compression reinforcement in beams or girders shall be anchored

by ties or stirrups, which shall be not less than one-fourth inch in diameter spaced not farther apart than sixteen bar diameters, or forty-eight tie diameters. At least one tie at each spacing shall extend completely around all longitudinal bars. Such stirrups or ties shall be used throughout the distance where the compression reinforcement is required. (Ord. 85500 § 2638 added by Ord. 95265; November 10, 1966).

3.26.390 Shrinkage and temperature reinforcement. 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 at least the following ratios of reinforcement area to gross concrete area, 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 strengths less than sixty thousand psi are used 0.0020

Slabs where deformed bars with sixty thousand psi specified yield strength or welded wire fabric having welded intersections not farther apart in the direction of stress than twelve inches are used 0.0018

(Ord. 85500 § 2639 added by Ord. 95265; November 10, 1966).

3.26.400 Protective covering of concrete. Required reinforcing steel for any structural member shall be completely embedded in concrete and shall be nowhere nearer the surface than as follows:

	Depth of Embedment (Inches)
Foundations	3
Foundations, top of piles	2
Retaining walls and beams, earth face	2
Surfaces exposed to weather	1½
Columns, girders, beams (to stirrups & ties)	1½
Beams, on prepared grade	2
Joists (to main steel)	1
Slabs, on prepared grade (Protected against moisture)	1
Slabs (Bars)	¾
Slabs (Mesh)	¾

Other methods of covering may be used when approved by the Superintendent of Buildings.

In fire-resistive construction, if the fire-protective covering of reinforcement as specified in Section 3.43.030 is greater in thickness than required above, then such greater thickness shall be used.

Exposed reinforcement bars intended for bonding with future extensions shall be protected from corrosion.

For special requirements for precast construction, see Chapter 24 of the A.C.I. Code and for prestressed construction, see Chapter 27 of the A.C.I. Code. (Ord. 85500 § 2640 added by Ord. 95265; November 10, 1966).

3.26.410 Pneumatically placed concrete. (a) **GENERAL.** For the purpose of this chapter all pneumatically placed concrete shall consist of a mixture of fine aggregate and cement pneumatically applied by suitable mechanism, and to which water is added immediately prior to discharge from the applicator.

Except as specified in the following subsections of this section, all pneumatically placed concrete shall conform to the regulations of this chapter for concrete.

(b) **PROPORTIONS.** The proportion of cement to aggregate, in loose dry volumes, shall be not less than one to four and one-half.

(c) **WATER.** The water content at the time of discharge, including any moisture in the fine aggregate, shall not exceed three and one-half gallons per sack of cement.

(d) **MIXING.** The cement and aggregate shall be thoroughly mixed prior to the addition of water. At the time of mixing, the fine aggregate shall contain not less than three percent moisture.

(e) **REBOUND.** Any rebound or accumulated loose aggregate shall be removed from the surface to be covered prior to placing the initial or any succeeding layers of pneumatically placed concrete.

(f) **JOINTS.** Unfinished work shall not be allowed to stand for more than thirty minutes unless all abrupt edges are sloped to a thin edge. Before resuming work, this sloped portion shall be cleaned and wetted.

(g) **DAMAGE.** Any pneumatically placed concrete which subsides after placement shall be removed. (Ord. 85500 § 2641 added by Ord. 95265; November 10, 1966).

3.26.420 Bolts. Bolts shall be solidly embedded in plain or reinforced concrete and the connection shall be designed so that the shear on every bolt is not more than the values set forth in the following table:

TABLE No. 26-D—ALLOWABLE SHEAR ON BOLTS

Diameter (In Inches)	Embedment (In Inches)	Shear (In Pounds)
1/2	4	750
5/8	4	1000
3/4	5	1500
7/8	6	2000
1	7	2500
1-1/8	8	3000
1-1/4	9	3500

(Ord. 85500 § 2642 added by Ord. 95265; November 10, 1966).

3.26.430 Design—General considerations. In structural analysis and proportioning of members, the provisions of Part IV, Chapter 9, Design-General Considerations, of the A.C.I. Code are hereby adopted with the following exceptions:

(a) A.C.I. Code, Section 906—Requirements for T-beams. Subsection (g) of Section 906 shall read as follows:

(g) Provisions shall be made for the compressive stress at the support in continuous T-beam construction.

(b) A.C.I. Code, Section 919—Anchorage of web reinforcement. Paragraph 2, "Welding to longitudinal reinforcement," under subsection (a) of Section 919 shall be omitted. (Ord. 85500 § 2643 added by Ord. 95265; November 10, 1966).

3.26.440 Working stress design. In structural analysis and proportioning of members, the provisions of Part IV-A, Working Stress Design, Chapters 10 through 14, of the A.C.I. Code are hereby adopted with the following exceptions:

(a) A.C.I. Code, Section 1002—Allowable stresses of concrete. In lieu of Table 1002(a), Allowable stresses on concrete, there is adopted Table 26-B, Allowable Unit Stresses in Concrete, as follows:

Table No. 26-B
ALLOWABLE UNIT STRESSES IN CONCRETE

Description	Allowable Stresses					
	For any strength of concrete in accordance with Section 3.26.180	For strength of concrete shown below				
		$f'_c =$ 2000 psi	$f'_c =$ 2500 psi	$f'_c =$ 3000 psi	$f'_c =$ 4000 psi	$f'_c =$ 5000 psi*
Modulus of elasticity ratio: n For concrete weighing 145 lb per cu ft (See Sec. 1102 A.C.I.) n	29,900,000 $w^{1.5} 33 \sqrt{f'_c}$	11	10	9	8	7
Flexure: f'_c	$0.45f'_c$	900	1125	1350	1800	2250
Extreme fiber stress in compression f'_c						
Extreme fiber stress in tension in plain concrete footings and walls f'_c	$1.6 \sqrt{f'_c}$	71	80	88	102	113
Shear: v (as a measure of diagonal tension at a distance d from the face of the support) Beams with no web reinforcement** v_c	$1.1 \sqrt{f'_c}$	49**	55**	60**	70**	78**
Joists with no web reinforcement v_c	$1.2 \sqrt{f'_c}$	54	61	66	77	86
Members with vertical or inclined web reinforcement or properly combined bent bars and vertical stirrups v	$5 \sqrt{f'_c}$	223	250	274	316	354
Slabs and footings (peripheral shear, Sec. 1207 A.C.I.)** v_c	$2 \sqrt{f'_c}$	89**	100**	110**	126**	141**
Bearing: f'_c						
On full area	$0.25 f'_c$	500	625	750	1000	1250
On one-third area or less †	$0.375f'_c$	750	938	1125	1500	1875

* See Section 3.26.180, Method 2.

** For shear value for lightweight aggregate concrete, see Section 1208 of A.C.I. Code.

† 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.

3.26.450—3.26.460 BUILDINGS

(b) A.C.I. Code, Section 1003—Allowable stresses in reinforcement. There shall be added to Section 1003 a subsection (e) to read as follows:

(e) Where reinforced concrete is placed without special supervision, eighty percent of the allowable stresses in reinforcement shall be used. (See Section 3.26.170 (c)) (Ord. 97033 § 6; September 5, 1968; prior Ord. 85500 § 2644 added by Ord. 95265; November 10, 1966).

3.26.450 Ultimate strength design. In structural analysis and proportioning of members, the provisions of Part IV-B, Ultimate Strength Design, Chapters 15 through 19, of the A.C.I. Code are hereby adopted. (Ord. 85500 § 2645 added by Ord. 95265 and amended by Ord. 95985; July 26, 1967).

3.26.460 Structural systems or elements. In the design of structural systems or elements, the provisions of Part V, Chapters 20 through 26 of the A.C.I. Code are hereby adopted with the following exceptions:

(a) A.C.I. Code, Section 2202—Empirical design of walls. Subsection (k) of Section 2202 shall read as follows:

(k) Exterior basement walls and foundation walls shall not be less than six inches thick.

(b) A.C.I. Code, Section 2404—Details (Precast Concrete). Subsection (b) of Section 2404 shall be omitted.

(c) A.C.I. Code, Section 2409—Non-bearing wall panels. There shall be new subsections (c) and (d) added to Section 2409 which shall read as follows:

Section 2409—Precast wall panels.

(a) Nonload-bearing, precast wall panels shall be exempt from the minimum thickness requirements of Section 2202, A.C.I. Code.

(b) Where panels are designed to span horizontally to columns or isolated footings, the ratio of height to thickness shall not be more than forty-eight. The effect of deep beam action and buckling are provided for in the design in accordance with Section 910, A.C.I. Code.

(c) Precast wall panels may be constructed as bearing walls provided: The panel is adequately anchored; adequate bearing is provided at the bottom of the wall panel; and further, provided the unsupported height or length to thickness ratio is not more than thirty, with a minimum thickness of five inches.

(d) Precast wall panels, load bearing or nonload-bearing, shall be reinforced with an area of steel in each direction, both vertical and horizontal, at least equal to 0.0025 times the cross sectional area of the wall. Reinforcing bars shall be spaced not more than three times the wall thickness or a maximum of eighteen inches. (Ord. 97033 § 7; September 5, 1968: prior Ord. 85500 § 2646 added by Ord. 95265; November 10, 1966).

3.26.470 Section references, A.C.I. Code. The following sections of the A.C.I. Code not adopted by this chapter which are referred to within the adopted parts of the A.C.I. Code shall be understood to read and refer to corresponding sections of this chapter as follows:

A.C.I. CODE	to	BUILDING CODE
Section 104	to	Section 2603
Section 301	to	Section 2607
Section 403	to	Section 2610
Section 405	to	Section 2612
Section 505	to	Section 2621
Section 605	to	Section 2626
Section 703	to	Section 2631
Section 704	to	Section 2632
Section 801	to	Section 2633
Section 805	to	Section 2637
Section 807	to	Section 2639
Section 808	to	Section 2640

(Ord. 85500 § 2647 added by Ord. 95265; November 10, 1966).

Chapter 3.27

STEEL AND IRON

Sections:

- 3.27.010 Design and quality.
- 3.27.020 Allowable unit stresses.
- 3.27.030 Eccentric loads.
- 3.27.150 Expansion.
- 3.27.160 Workmanship.
- 3.27.170 Light gage steel construction.
- 3.27.180 Open web joists.
- 3.27.190 Shop protection.
- 3.27.200 Qualification and certification of welders.

3.27.010 Design and quality. (a) The Superintendent of Buildings may approve any method of steel and iron design and construction which is in accordance with established principles of mechanics and American design specifications, and which permits rational analysis. Any approved method may be used.

(b) Steel and iron structural members shall be straight and true and any member so damaged as to affect its strength shall not be used.

(c) Steel pipe columns may be open hearth or electric furnace process, medium carbon steel, provided that allowable unit stresses for such columns shall be seventy-five per cent (75%) of those set forth in Section 3.27.020. Otherwise steel and iron construction shall be as set forth in the U.B.C. Standards listed in Table No. 27-A as follows:

Table No. 27-A

STEEL AND IRON CONSTRUCTION STANDARDS

U. B. C. Standard	U.B.C. Designation
Structural Steel	27-1
Light Steel for Structural Members	
Materials	27-2
Design	27-3
Steel Pipe	27-4
Cast Steel	27-5
Cast Iron	27-6
Rivet Steel	27-7
High-Tensile Steel Bolts	27-8
Arc and Gas Welding	27-9
Arc-Welding Electrodes	27-10

(d) The Superintendent of Buildings may require that steel and iron used structurally be tested by an approved testing laboratory. (Ord. 85500 § 2701, as amended by Ord. 89827; December 12, 1960).

3.27.020 Allowable unit stresses. The maximum allowable working stresses in pounds per square inch in iron and structural steel as given in the following tables are permitted when material is approved and its fabrication and erection are supervised in accordance with the provisions of this Code.

When material is not submitted for approval and/or its fabrication and erection are not supervised as herein provided, working stresses not

more than eighty (80) per cent of the maximum as given in the tables are permitted.

(a) **Tension**

Structural Steel, net section.....	20,000
Butt Welds, Section through throat.....	20,000
Cast Steel on net section.....	15,000
Cast Iron on net section.....	(not allowed)
Rivets, on area based in nominal diameter.....	20,000
Bolts, at root of thread.....	20,000



(b) **Compression**

1. Columns, gross section

For axially loaded columns with values

l/r not greater than 120..... 17,000-0.485 $\frac{l^2}{r^2}$ (1)

For axially loaded columns (bracing and other secondary members) with values of l/r greater than 120.....

18,000

(for main members, see Subsection (b) 2.) $1 + \frac{l^2}{r^2}$ (2)

18,000r²

2. Slenderness Ratio

The ratio of unbraced length to least radius of gyration l/r for compression members and for tension members other than rods shall not exceed:

For main compression members..... 120

For bracing and other secondary members in compression 200

For main tension members..... 240

For bracing and other secondary members in tension..... 300

The slenderness of a main compression member may exceed 120, but not 200, provided that it is not ordinarily subject to shock or vibratory loads and provided that its unit stress under full design loading shall not exceed the following fraction of that stipulated in Formula (2) for its actual l/r:

$$\frac{1.6 - \frac{l}{200r}}{200r}$$

Plate Girders Stiffeners, gross section..... 20,000

Web crippling of Rolled Sections at toe of fillet..... 24,000

Butt Welds—Section through throat (crushing)..... 20,000

On cast-iron columns, with square or fixed ends:

$$P = 9000 - 40 \frac{l}{r}$$

with a minimum gross diameter of six inches (6") and with the ratio l/r never in excess of 70.

In the foregoing formulas P equals the maximum unit working stress in pounds per square inch; l equals the unsupported length of the column or compression member in inches; and r

equals the least radius of gyration of the column or compression member.

(c) BENDING. Tension in extreme fibers of rolled sections, plate girders and built-up members..... 20,000

Compressive unit stress in pounds per square inch in the flange of any member resisting flexure shall not exceed the value computed from the following formula:

With	$\frac{ld}{bt}$	not in excess of 600.....	20,000
With	$\frac{ld}{bt}$	in excess of 600.....	12,000,000
			$\frac{ld}{bt}$

in which l is the laterally unsupported length and d the depth of the member; b is the width and t the thickness of its compression flange, all in inches, except that l shall be taken as twice the length of the compression flange of a cantilever beam not fully stayed at its outer end against translation or rotation.

On extreme fibers of pins, when the forces are assumed as acting at the center of gravity of the pieces..... 30,000

Fully continuous beams and girders may be proportioned for negative moments at the center line of interior points of support, at a unit bending stress 20 per cent* higher than above stated when these moments are produced by vertical loads; provided that the section modulus used over supports shall be not less than that required for the maximum positive moments in the same beam or girder, and provided that the compression flange shall be regarded as unsupported from the support to the point of contraflexure.

For columns proportioned for combined axial and bending stresses, the maximum unit bending stress FB (Section 3.27.030) may be taken at 24,000 pounds per square inch,* when this stress is induced by the gravity loading of fully or partially restrained beams framing into the columns.

(d) Shearing

Rivets	15,000
Pins and turned bolts in reamed or drilled holes.....	15,000
Unfinished bolts	10,000
Webs of beams and plate girders, gross section.....	13,000
Weld metal on section through throat of fillet weld or on faying surface area of plug or slot weld.....	13,600
Weld metal on section through throat of butt weld.....	13,000

(e) **Bearing**

	Double Shear	Single Shear
Rivets	40,000	32,000
Turned bolts in reamed or drilled holes.....	40,000	32,000
Unfinished bolts	25,000	20,000
Pins	32,000	32,000
Contact Area		
Milled stiffeners and other milled surfaces.....		30,000
Fitted stiffeners		27,000
Expansion rollers and rockers		
(pounds per linear inch).....		600d
in which d is diameter of roller or rocker in inches		

(f) **REVERSAL OF STRESS.** The sectional area of the portion between connections, of members subject to reversal of stress, need not be increased by reason of the reversal, but shall be sufficient in area and disposition to provide for the maximum compression, and the maximum tension, separately.

The sectional area of members subject to loads (other than wind loads) producing alternating tensile and compressive stresses shall be augmented, at the approach to a connection, by riveting or welding on additional material, so that the augmented section shall comply with the following rule:

To the net total compressive stress, and to the net total tensile stress, add arithmetically 50 per cent of the smaller of these two; and proportion the connected material and the connecting rivets, bolts, pins, or welds, for each of the two increased stresses thus separately obtained at the unit stress prescribed in this Section.

(g) **MEMBERS CARRYING WIND LOAD ONLY.** See Section 3.23.070. (Ord. 85500 § 2702, as amended by Ord. 87090; April 22, 1958).

3.27.030 Eccentric loads. (a) All members subject to both axial and bending stresses shall be so proportioned that the quantity

$$\frac{f_a}{F_a} + \frac{f_b}{F_b}$$

shall not exceed unity, in which

F_a = axial unity stress that would be permitted by this Code if axial stresses only existed.

F_b = bending stress that would be permitted by this Code if building stresses only existed.

* This increase shall not apply in the case of members proportioned for combined lateral and vertical loading at the 33½ per cent stress increase permitted in Sections 3.23.070 (c) and 3.23.120.

fa = axial unit stress (actual) = axial stress divided by the area of the member.

fb = bending unit stress (actual) = bending moment divided by the section of the member.

(b) When beams, girders or trusses are subject to both shear and end moment, due to full or partial end restraint, or to continuous or cantilever construction, their connection shall conform to Section 3.27.030 (a).

(c) Shear with tension or compression. Rivets, bolts and welds subject to shearing and externally applied tensile or compressive forces shall be so proportioned that the combined unit stress will not exceed the unit stress allowed for shear. (Ord. 85500 § 2703; Sept. 10, 1956).

3.27.150 Expansion. Proper provision shall be made for expansion and contraction. (Ord. 85500 § 2715; Sept. 10, 1956).

3.27.160 Workmanship. All workmanship shall be equal to the best practice in modern structural shops.

Drifting to enlarge unfair holes shall not be permitted. Holes that must be enlarged to admit the rivets shall be reamed. Poor matching of holes shall be cause for rejection.

All material shall be clean and straight. If straightening or flattening is necessary, it shall be done by a process that will not injure the material. Sharp kinks or bends shall be cause for rejection.

All steel castings shall be properly annealed.

Material may be punched one-sixteenth inch ($1/16''$) larger than the nominal diameter of the rivets, whenever the thickness of the metal is equal to or less than the diameter of the rivets, plus one-eighth inch ($1/8''$). When the metal is thicker than the diameter of the rivet, plus one-eighth inch ($1/8''$), the holes shall be drilled, or subpunched and reamed.

Holes for shop-turned bolts shall be subpunched and reamed or drilled from the solid. Holes for field-turned bolts shall be subpunched in the shop and reamed in the field.

When subpunching and reaming is required, the die used for punching shall be one-sixteenth inch ($1/16''$) smaller than the nominal diameter of the rivet. Rivet holes, after assembling, shall be reamed to a diameter one-sixteenth inch ($1/16''$) greater than the nominal diameter of the rivet. Turned bolt holes, after assembling, shall be reamed (for field bolts in the field) to a diameter one-fiftieth inch ($1/50''$) larger than the diameter of the turned bolt.

Rivets shall be driven hot, and, wherever practicable, by power. Rivet heads shall be of hemispherical shape and uniform in size throughout the work for the same size rivet, full, neatly finished, and concentric with the holes. Rivets, after driving, shall be tight, completely filling the holes, and with heads in full contact with the surface.

Rivets shall be heated uniformly to a temperature not exceeding 1950° F. They shall not be driven after their temperature is below 1000° F. Loose, burned, and other wise defective rivets shall be replaced.

Exception: Rivets may be driven cold provided approved measures are taken to prevent distortion of the riveted material.

Compression joints depending upon contact bearing shall have the bearing surfaces truly faced after the members are riveted. All other joints shall be cut or dressed true and straight.

Finished members shall be true to line and free from twists, bends, and open joints.

Compression members may have a lateral variation not greater than $1/1000$ of the axial length between points which are to be laterally supported.

An allowable variation of one thirty-second inch ($1/32''$) is permissible in the over-all length of members with both ends milled.

Members without milled ends which are framed to other steel parts of the structure may have a variation from the detailed length not greater

than one-sixteenth inch ($1/16''$) for members thirty feet (30') or less in length, and not greater than one-eighth inch ($1/8''$) for members over thirty feet (30') in length.

Planing or finishing of sheared plates or shapes will not be required unless specifically called for on the drawings.

All parts of riveted members shall be well pinned or bolted and rigidly held together while riveting. Drifting done during assembling shall not distort the metal or enlarge the holes.

Gas cutting may be done, provided that (1) the contractor has satisfied the Superintendent of Buildings as to his ability to produce satisfactory gas cuts, and (2) that all such work is done in accordance with accepted standard practices. (Ord. 85500 § 2716; Sept. 10, 1956).

3.27.170 Light gage steel construction. Light gage steel construction consists of structural members cold formed to shape from sheet or strip steel less than $3/16$ inch thick and used for load carrying purposes in structures. Light gage steel construction shall not be permitted where the location or occupancy might lead to excessive corrosion of the structural frame unless such construction is adequately protected. See Section 3.27.010 (a). (Ord. 85500 § 2717; Sept. 10, 1956).

3.27.180 Open web joists. Open web steel joists shall be standard manufactured lightweight steel trusses. See Section 3.27.010 (a). (Ord. 85500 § 2718; Sept. 10, 1956).

3.27.190 Shop protection. Parts not in contact, but inaccessible after assembling, shall be properly protected by paint.

All steel work, except where entirely encased in concrete, shall be thoroughly cleaned and given one coat of approved metal protection well worked into the joints and open spaces.

After inspection and approval and before leaving the shop, all steel work shall be thoroughly cleaned, by effective means, of all loose mill scale, rust, spatter, slag or flux deposit, oil, dirt and other foreign matter. Except where encased in concrete, and excepting edges and surface areas adjacent to edges, to be field welded, all steel work shall be given one coat of approved metal protection, applied thoroughly and evenly and well worked into the joints and other open spaces. All paint shall be applied to dry surfaces.

Parts inaccessible after assembly shall be given two coats of shop paint, preferably of different colors.

Machine-finished surfaces shall be protected against corrosion by a suitable coating.

Surfaces which are to be welded after erection shall where practicable not receive a shop coat of paint. If painted, such paint shall be removed before field welding, for a distance of at least 2 inches on either side of the joint.

Fabricated structural steel and iron shall not be painted until after acceptance by the Superintendent of Buildings.

All steel or iron fasteners connecting members in fire escapes and connecting fire escapes to buildings shall be galvanized. (Ord. 85500 § 2719; Sept. 10, 1956).

3.27.200 Qualifications and certification of weldors. It shall be unlawful to weld any structural steel member regulated by the Building Code without a valid Weldor Certificate of Qualification, application for which shall be made to the Superintendent of Buildings on forms prescribed by him, accompanied by a receipt from the Treasurer of the City of Seattle showing that the applicant has paid a filing fee of Five Dollars (5.00) in connection with such application.

Exception. Weldors of prefabricated or assembly line produced steel produces may qualify for certification as provided elsewhere in this section.

Said Superintendent shall issue such certificate to an applicant therefor who satisfactorily passes the examination hereinafter prescribed or make a showing acceptable to said Superintendent that the applicant has passed a similar qualification examination and has a certificate in connection therewith.

Such certificate shall be valid for a period of one (1) year from the date of issuance subject to the following conditions:

- a. The same may be revoked at any time by the Superintendent of Buildings for negligence or incompetency of the holder in the performance of structural steel welding after review by the Advisory Board for Inspection Approval.
- b. The holder shall have his certificate endorsed once every three (3) months in which he is gainfully employed as a weldor, either by his employer or the Superintendent of Buildings; provided that said Superintendent may accept other written documents in lieu of such endorsement.

A valid certificate may be renewed upon application therefor and payment of the sum of Three Dollars (\$3.00) in the manner prescribed for original application.

EXAMINATION. Examination for a weldor Certificate of Qualification shall consist of the following:

Part 1. General Subject Knowledge Test. An oral or written examination designed to show general knowledge and experience in the subject of structural welding. Selection of proper welding rod and machine adjustment for Part 2 will be included.

Part 2. Performing test welds on specimen plates prepared as shown in Figures 1, 3 and 6.

On Test Plate No. 1 the applicant shall perform a groove weld in a horizontal position on a vertical surface.

On Test Plate No. 2 the applicant shall perform a groove weld in an overhead position, the specimen plate being held in approximately horizontal position, being welded from the under side.

On Test Plate No. 3 the applicant shall perform a groove weld in a vertical position on a vertical surface.

On Test Plate No. 4 the applicant shall perform a fillet weld in the flat position.

On Test Plate No. 5 the applicant shall perform a fillet weld in a vertical position.

All test welds shall be made under the supervision of the Superintendent of Buildings in shops approved by said Superintendent and the applicant shall bear the cost thereof.

Welded specimen plates shall be machined, ground or cut and tested as shown in Figures 2, 4, 5 and 6.

ASSEMBLY LINE PRODUCED STEEL PRODUCTS. All weldors of prefabricated or assembly line produced steel products may be examined and certified by an approved agency under the procedure set up by the American Welding Society covering the type of welding in which the weldor is engaged. Such certification may be an integral part of plant certification as provided in Section 3.03.050 (d).

RESTRICTED CERTIFICATES. Should the applicant fail to pass the qualification test in the overhead position only, he shall be granted a certificate plainly stamped "Restricted to Shop Work in Downhand, Horizontal and Vertical Positions Only". A weldor holding such a restricted certificate shall not engage in field welding.

A weldor qualifying on Test Plates No. 4 and 5 only, shall be given a certificate for light gauge welding and shall be limited to material not heavier than ten (10) gauge.

RE-EXAMINATION. If an applicant fails to meet the requirements of one (1) or more test welds, a re-test may be allowed under the following conditions:

- a. On the same day a re-test may be made which shall consist of two (2) test welds of each type on which the applicant failed, all of which shall meet all of the requirements specified herein.
- b. An applicant may apply in the manner provided for original applications, for a re-test at any time provided that there is evidence that the applicant has had further training or practice; whereupon a complete re-test shall be made, and the applicant shall pay a filing fee of Three Dollars (\$3.00) to the Treasurer of the City of Seattle.

SPECIMEN PLATES FOR STRUCTURAL WELDOR EXAMINATION

Figure 1

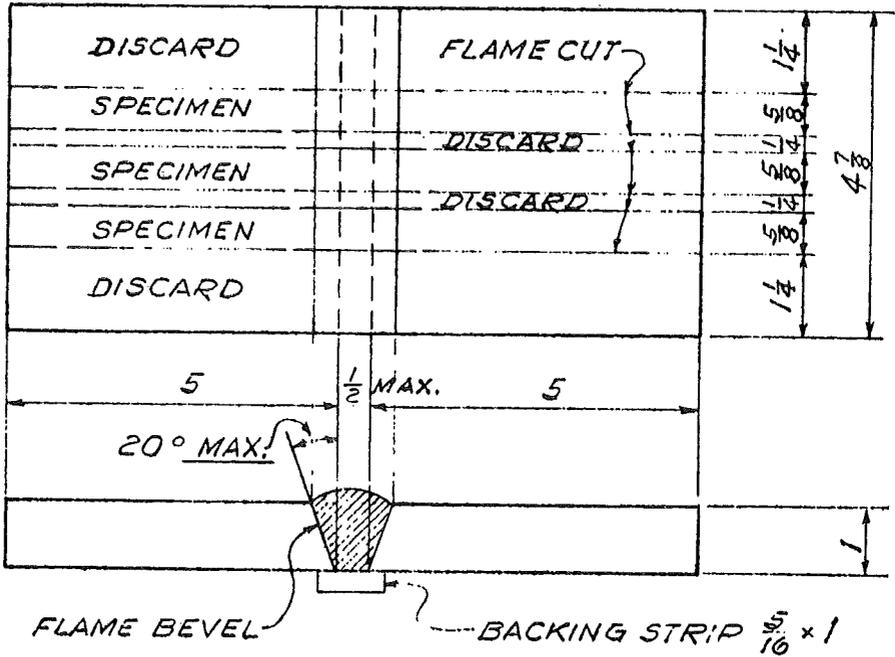
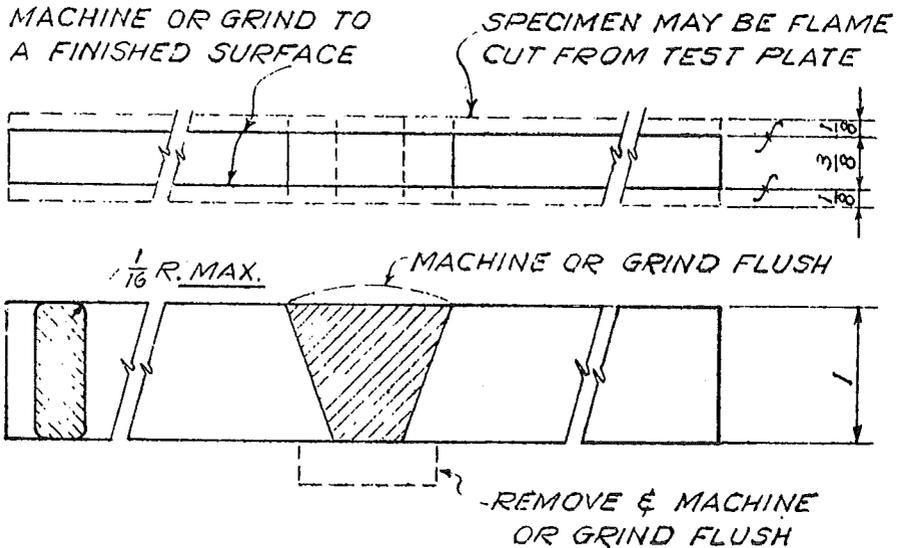


Figure 2



Welder to perform welds on two (2) sets of plates:

1. Horizontal on vertical plane
2. Overhead.

Two (2) coupons shall be selected from each set of test plates and subjected to standard side bend tests.

At the option of the Superintendent of Buildings a tension test to determine the ability of the weld to carry working loads may be required on coupon three from one, or more, test plates.

Figure 3

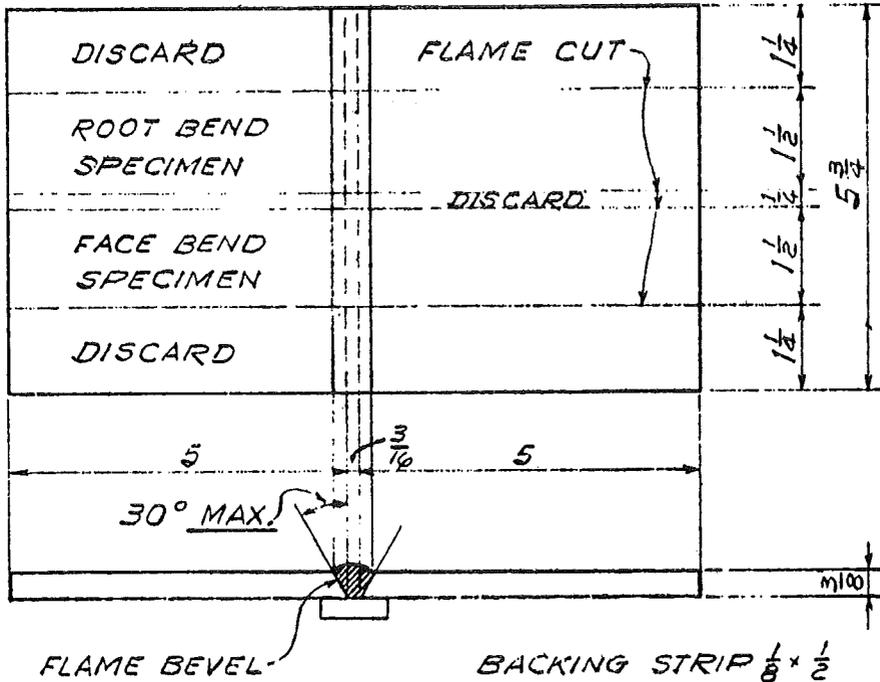
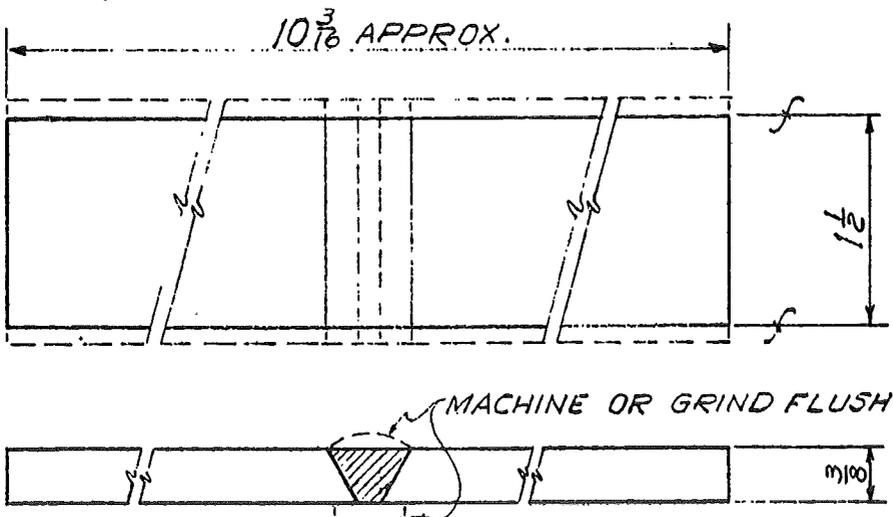


Figure 4

NOTE: Symbol "f" denotes finished surface of 250 microinches (approx.)



Weldor to perform weld on one set of plates:

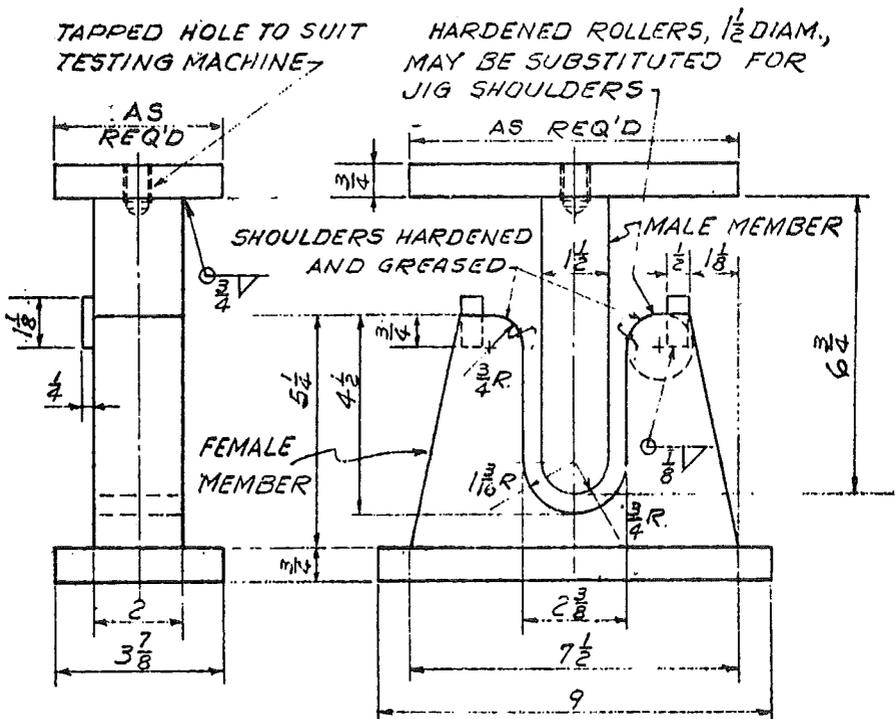
1. Vertical on vertical plane.

Flame cutting may be used to cut specimen from test plate providing that flame cut edges are machined or ground to finished size. Corners may be filed or ground to a radius not exceeding $1/16R$.

Coupons shall be subjected to standard face bend and root bend tests respectively in jig shown in Figure 5.

GUIDED BEND TEST JIG

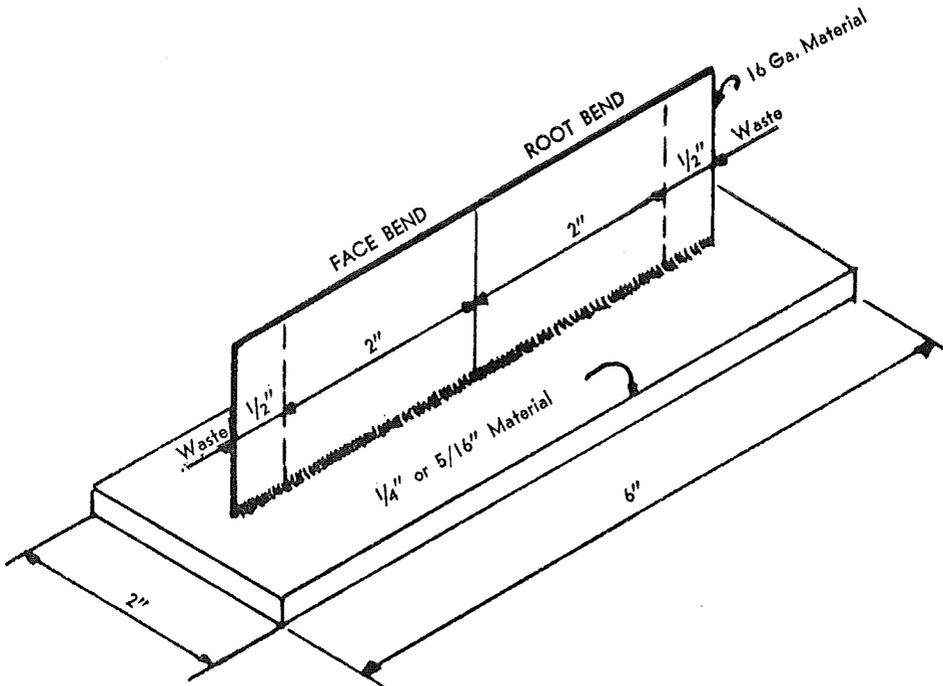
Figure 5



Place finished coupon in jig with weld at mid-span with side showing greater defects face down. Force jig together so that no clearance greater than $1/32$ inch exists between coupon and male part of jig. Cracks or openings greater than $1/8$ inch shall denote failure, except cracks at corners shall not be considered.

LIGHT GAUGE WELDING TEST

Figure 6



Welder to perform welds on two (2) sets of plates.

1. Flat position.
2. Vertical position.

The test shall consist of a fillet weld on one side of the 16 gauge plate without any visible sign of burn-through on the thinner plate.

The 16 gauge plate shall be cut as shown in sketch on one (1) face bend and one (1) root bend made without any visible signs of weld failure. (Ord. 85500 § 2720, as amended by Ord. 89827; December 12, 1960).

Chapter 3.28**EARTHWORK AND FOUNDATIONS****Sections:**

- 3.28.010 Excavations and fills.
- 3.28.020 Soil classification.
- 3.28.030 Allowable soil.
- 3.28.040 Soil requirements.
- 3.28.050 Footings and foundations.
- 3.28.060 Design of footings.
- 3.28.070 Piles.

3.28.010 Excavations and fills. Excavations for buildings and excavations accessory thereto shall be protected and guarded against danger to life and property. No excavation for any purpose shall extend within one foot (1') of the angle of repose or natural slope of the soil under any footing or foundation, unless such footing or foundation is first properly underpinned or protected against settlement.

Any person making or causing an excavation or fill to be made that may endanger any building or structure shall protect such building or structure adequately by proper supporting the ground, or, when necessary, supporting the building or structure. (Ord. 85500 § 2801; Sept. 10, 1956).

3.28.020 Soil classification. For the purpose of this Code the terms used in the following classification shall have interpretations as follows:

CLAY: A fine-grained, inorganic soil possessing sufficient cohesion when dry to form hard, dry lumps which cannot be readily pulverized by the fingers.

HARD CLAY: A clay requiring picking for removal when damp, a fresh sample of which cannot be molded in the fingers, or can be molded only with greatest difficulty.

MEDIUM CLAY: A clay which when damp can be removed by spading, a fresh sample of which can be molded by a substantial pressure of the fingers.

SOFT CLAY: A clay which, when freshly sampled while damp, can be molded under relatively slight pressure of the fingers.

GRAVEL: An uncemented mixture of mineral grains one-quarter ($\frac{1}{4}$) of an inch or more in diameter.

SAND: A type of soil possessing practically no cohesion when dry, and consisting mainly of mineral grains smaller than one-quarter ($\frac{1}{4}$) inch in diameter.

COARSE SAND: A sand consisting mainly of grains which will be retained on a sixty-five (65) mesh sieve.

FINE SAND: A sand consisting mainly of grains which will pass a sixty-five (65) mesh sieve.

COMPACT GRAVEL, COMPACT SAND: Deposits requiring picking for removal and offering high resistance to penetration by excavating tools.

LOOSE GRAVEL, LOOSE SAND: Deposits readily removable by shoveling only.

HARDPAN: A thoroughly compact mixture of clay, sand, gravel and boulders; or a cemented mixture of sand and gravel, with or without boulders, and difficult to remove by picking.



EARTHWORK AND FOUNDATIONS 3.28.030—3.28.040

LOAM: Earthy material containing organic matter. (Ord. 85500 § 2802; Sept. 10, 1956).

3.28.030 Allowable soil. The maximum allowable bearing capacities, in tons per square foot shall, in the absence of satisfactory load tests, be those established in the following classification:

Soft clay, moderately wet; sand, fine, loose.....	1 ton
Sand and clay mixed or in layers.....	2 tons
Sand, coarse, loose; sand, fine, compact; medium clay.....	3 tons
Gravel, sand-gravel mixtures, loose; sand, coarse, compact; hard clay	4 tons
Gravel, sand-gravel mixtures, compact.....	5 tons
Hardpan	6 tons

Except for compacted fills and where deemed satisfactory by the Superintendent of Buildings for buildings not over one (1) story in height, filled material and loam shall be treated as having no bearing capacity. When approved by him for one (1) story buildings, the maximum load on such soil shall not exceed one thousand (1,000) pounds per square foot. (Ord. 85500 § 2803; Sept. 10, 1956).

3.28.040 Soil requirements. Foundations shall not overload the soil upon which they rest. Filled material, loam or soil containing an appreciable amount of organic matter shall not be used to support the foundation of buildings more than one (1) story in height. The kind of soil upon which any structure is erected must be of sufficient thickness and extent to distribute the load over the requisite area of the underlying soil.

Except for residences and buildings appurtenant thereto and one (1) story frame buildings, applications for permits, or plans filed, for new structures shall contain a statement of the assumed allowable soil pressure and character of the soil at the level of the footings. When considered necessary by the Superintendent of Buildings, plans shall include boring or test pit records certified by a licensed civil or structural engineer or a licensed architect which shall show the nature of the soil (in at least one (1) location in every two thousand five hundred (2,500) square feet of building area) down to satisfactory bearing material and thereinto sufficiently to establish its character below the footings. The number, location and depths of such pits or borings, together with the method used in making and reporting them, shall be satisfactory to the Superintendent of Buildings.

When there is doubt as to the character of the soil, or should application be made for permission to impose on the soil loads in excess of those specified herein, the Superintendent of Buildings may permit, or may require tests to be made at the expense of the owner to determine the safe sustaining power of the soil. The Superintendent of Buildings shall be notified of any such test in order that he may be present either in person

or by representative, and a complete record of the test shall be filed with him.

In conducting the above-mentioned soil tests, the following regulations shall govern:

The soil shall be tested at one (1) or more places and at such level or levels as deemed necessary by the Superintendent of Buildings.

Each test shall be made so as to load the soil over an area of at least four (4) square feet and so that the load is applied continuously throughout the test.

The load per square foot which it is proposed to impose upon the soil shall be first applied and allowed to remain undisturbed and readings shall be taken at least once every twenty-four (24) hours or oftener 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 (24) hours.

After the requirements of the preceding paragraph are met, an additional fifty (50) per cent excess load shall be applied and the load allowed to remain undisturbed until no settlement occurs during a period of twenty-four (24) hours, careful measurements and readings being taken once in twenty-four (24) hours or oftener to determine the rate of settlement.

The test shall be considered unsatisfactory and the result unacceptable if the proposed safe load shows more than three-quarters ($\frac{3}{4}$) inch settlement, or the increment of settlement obtained under the fifty (50) per cent overload exceeds sixty (60) per cent of the settlement obtained under the proposed load.

The result of a test load on a small area shall be considered with boring or test pit records elsewhere required to determine whether the sub-soil would be overloaded under proposed foundation loadings. (Ord. 85500 § 2804; Sept. 10, 1956).

3.28.050 Footings and foundations. Footings and foundations shall be constructed of masonry or concrete and shall in all cases be not less than 6 inches thick and extend at least 12 inches below the finish grade.

Exceptions: 1. One story buildings of Type V construction may be constructed on other foundations when approved by the Superintendent of Buildings.

2. Every building used for commercial handling, processing or storage of food, grain, or food products and having the underside of the framing less than 30 inches above the ground, shall be protected from rodent entry by having concrete floors, or by the provision of a rat wall, as further described below.

a. Where the entire ground floor of the building is of concrete rat walls may be omitted, provided that concrete floors below grade shall

be joined to concrete or masonry exterior walls extending upward at least to grade level.

b. Where the entire ground floor of the building is not of concrete, such floor shall be protected with a continuous rat wall around the perimeter in the form of an "L" shape masonry or concrete construction of which the vertical member shall be at least six inches thick and shall extend at least twenty-eight inches below grade. The horizontal member of such "L" shaped wall shall extend outward from the building at least twelve inches and shall be at least four inches thick.

Footings shall be designed to minimize differential settlement. Mortar used in foundation walls and footings shall be as specified in Sec. 3.24.030 (s).

Bearing walls shall be supported on continuous solid masonry, or concrete footings, or piles, which shall be of sufficient size to support safely the loads imposed as determined from the character of the soil. Foundation walls supporting wood shall extend at least six inches above the finished grade adjacent to the wall at all points. Bottom plates shall be bolted to the foundation or foundation wall with not less than one-half inch bolts embedded at least four inches into the masonry, spaced not more than six feet apart, or shall be fastened by other approved means.

Wood mudsills shall be treated under pressure with an approved preservative.

Foundations for all buildings where the surface of the ground slopes more than one foot in six feet shall be level or shall be stepped so that both top and bottom of such foundation are level. (Ord. 85500 § 2805; Sept. 10, 1956).

3.28.060 Design of footings. All portions of footings shall be designed in accordance with the structural provisions of this Code. (Ord. 85500 § 2806; Sept. 10, 1956).

3.28.070 Piles. (a) **GENERAL.** The allowable axial and lateral loads on piles shall be determined by an approved formula, by load tests, or by a foundation investigation by an approved agency. A foundation investigation shall be made if required by the Superintendent of Buildings.

All driven piles shall be spaced not less than thirty inches, and not less than two diameters from center to center.

(b) **ALLOWABLE LOADS.** 1. Axial. The allowable axial load on a friction pile shall not exceed the value given by the following formulas:

$$P \text{ (gravity hammer)} = \frac{2 Wh}{s + 1}$$

$$P \text{ (single-acting steam hammer)} = \frac{2 Wh}{s + 0.1}$$

$$P \text{ (double-acting steam hammer)} = \frac{2 (W + Ap) h}{s + 0.1}$$

$$P \text{ (diesel hammer)} = \frac{2 Wh}{s + 0.2}$$

WHERE W = weight of hammer

h = height of fall

s = final penetration per blow. Average of last 5 blows.

A = area of piston

P = steam pressure

2. **Group Action.** The supporting values of piles depending solely upon friction when driven in clusters or groups, shall be determined by multiplying the bearing value of a single pile by an efficiency factor as determined by the following formula:

$$\text{Efficiency} = \frac{55d}{s [(n-1)m + (m-1)n]} \cdot \frac{1}{1 - \frac{90 mn}{s}}$$

WHERE n = number of piles in a row

m = number of rows

d = maximum diameter of pile

s = center to center spacing of piles, in same unit measure as d .

3. **Static Load Tests.** Whenever jettied piles or cast-in-place piles are used, their allowable bearing capacities shall be subject to tests as herein specified. Tests shall be made upon at least two piles put down and situated under substantial working conditions, including proximity to other piles. When any doubt exists as to the safe bearing capacity of any pile, or when working safe loads are requested other than those specified by the formula herein given, the Superintendent of Buildings may require similar test loads. The allowable bearing capacity of a pile shall in no case be more than two-thirds of the load which can be sustained for forty-eight hours with a settlement, after deducting rebound, of not exceeding one one-hundredth inch per ton of load applied, nor shall the working load produce any observable settlement whatever in the succeeding forty-eight hours.

4. **Column Action.** The safe loads on free standing piles shall be determined by the applicable formula for columns as elsewhere herein prescribed, applied on a section of the pile midway between the top of the pile and the point of fixity in the soil. Piles driven into firm ground may

be considered fixed at five feet below the level of such firm ground, and in soft ground at ten feet below the level of such soft ground. For timber piles, the unsupported length of column to be figured in the column formula shall be taken as the distance from the top of the pile to the point of fixity in the soil. For concrete piles, where the deck or floor structure is of light concrete construction, the unsupported length shall be taken as not less than two-thirds the distance from the top of the pile to the point of fixity in the soil; and where the top of the pile is fixed in all directions by heavy concrete girders into which the pile is framed, the unsupported length shall be taken as not less than one-half the distance from the top of the pile to the point of fixity in the soil. No free standing pile shall be no longer than sixty times the diameter or least lateral dimension of the mid-section of the pile.

5. Piles in Subsiding Areas. Where piles are driven through subsiding fills or other subsiding strata and derive support from underlying firmer materials, consideration shall be given to the downward frictional forces which may be imposed on the piles by the subsiding upper strata.

(c) **PROTECTION OF PILE MATERIALS.** Where the boring records of site conditions indicate possible deleterious action on pile materials because of soil constituents, changing water levels or other factors, such materials shall be adequately protected by methods or processes approved by the Superintendent of Buildings.

(d) **STRUCTURAL STRENGTH OF PILES AND LIMITING VALUES OF STRESSES.** The allowable compressive stresses on all piling materials shall not exceed the values as specified below except that stresses may be increased on submission of satisfactory data for specially protected, selected, or high strength material.

1. Concrete—.32f'c.
2. Structural steel—12,000 pounds per square inch.
3. Wood—The allowable stress in compression parallel to the grain of round Douglas fir wood piles shall not exceed seven hundred pounds per square inch, or a total load of twenty-five tons per pile, except that higher values may be used where justified by load tests as set forth in Section 3.28.070 (b)—3. Other species than Douglas fir may be used when permitted by the Superintendent of Buildings.
4. Reinforcing steel—as in Chapter 3.26.

The full load shall be assumed as carried on the average cross-section of the pile.

(e) **ROUND WOOD PILES.** Wood piles shall be of sound timber, free from wind shakes, short or reverse bends, and shall have a substantially uniform taper. They shall be so straight that a straight line between the center of the butt and the center of the point shall lie wholly within the body of the pile. The diameter of wood piles at the point shall be not

less than six inches and at the butt shall be not less than ten inches for piles twenty-five feet or less in length, and not less than twelve inches at the butt for piles more than twenty-five feet in length. Measurements shall be taken under the bark.

The tops of all wood piles shall be cut off below the surface of permanent saturation, with the exception of creosoted piles as covered herein.

Creosoted piles of Douglas fir when treated with Grade 1 creosote under pressure with the full-cell treatment in such a manner as to provide a final retention of not less than twelve pounds per cubic foot of piling may be used where the cut-off is below ground level but may be above the surface of permanent saturation, provided the tops of the piles are treated with three coats of hot creosote and capped with concrete so that no part of the piles will be exposed to the air.

No creosoted piling shall be used which has been so injured in handling as to penetrate the creosoted shell, except in the case of bolt holes and unavoidable framing, including the top cut-off all of which shall be treated with three coats of hot creosote.

(f) PRE-CAST CONCRETE PILES. Precast concrete piles shall be designed, cast and cured to have the strength necessary for handling and driving. Precast concrete piles shall have a diameter at the point of not less than eight inches and an average diameter of not less than eleven inches. Except as otherwise provided, the length of such piles shall not exceed forty times the diameter or least lateral dimension of the midsection of the pile.

Precast concrete piles shall be reinforced, except as otherwise herein provided, in the manner specified elsewhere herein for tied reinforced concrete columns. The ratio of the area of the longitudinal reinforcement to the cross-sectional area of the pile at mid-length shall be at least two per cent. For a length of four feet at both ends of the pile, lateral ties shall be spaced not over three inches center to center or an equivalent spiral shall be provided. Reinforcing steel shall be at least one and one-half inches from the face of the pile, and in piles exposed to sea water such coverage shall be at least two inches.

The load on a precast and driven concrete pile shall not exceed thirty tons, except that higher values may be used where justified by load tests as set forth in Section 3.28.070 (b) -3.

(g) UNCASED CAST-IN-PLACE FRICTION PILES. 1. **Quality.** Concrete piles cast-in-place against earth in drilled or bored holes shall be made in such a manner as to insure the exclusion of any foreign matter and to secure a full-sized shaft. The length of such pile shall be limited to not more than thirty times the average diameter. Concrete shall have an ultimate compressive strength ($f'c$) of not less than twenty-five hundred pounds per square inch at twenty-eight days. Pressure grouted piles may be used in accordance with requirements of Section 3.28.070 (e).

2. **Friction.** Any uncased cast-in-place pile may be assumed to develop a frictional resistance equal to one sixth of the bearing value of the soil material at minimum depth as stipulated in Section 3.28.030 but not to exceed five hundred pounds per square foot unless a greater value is prescribed by the Superintendent of Buildings after a soil investigation as specified in Section 3.28.040.

3. **Combined Friction and Bearing Prohibited.** Frictional resistance and bearing resistance shall not be assumed to act simultaneously.

(h) **METAL-CASED CONCRETE PILES.** 1. **Dimensions.** Every metal casing for a concrete pile shall have a sealed tip with a diameter of not less than eight inches.

Concrete piles cast in place in metal shells shall have shells driven for their full length in contact with the surrounding soil and left permanently in place. The shells shall be sufficiently strong to resist collapse and sufficiently water tight to exclude water and foreign material during the placing of the concrete.

2. **Concrete.** All concrete used in metal-cased concrete piles shall have an ultimate compressive strength ($f'c$) of not less than twenty-five hundred pounds per square inch at twenty-eight days.

3. **Order of Driving.** Piles shall be driven in such order and with such spacing as to insure against distortion of or injury to piles already in place. No piles shall be driven within four and one-half average pile diameters of a pile filled with concrete less than twenty-four hours old unless approved by the Superintendent of Buildings.

(i) **CONCRETE FILLED STEEL PIPE PILES.** 1. **Steel Pipe.** Steel pipe piles shall conform to U.B.C. Standard No. 28-3. If it is desired to use pipe of other material, satisfactory substantiating data shall be submitted.

2. **Concrete.** The concrete used in concrete filled steel pipe piles shall have an ultimate compressive strength ($f'c$) of not less than twenty-five hundred pounds per square inch at twenty-eight days.

3. **Allowable loads.** The allowable load on the steel of concrete filled steel pipe piles shall not exceed twenty-five per cent of the yield or twelve thousand five hundred pounds per square inch plus .32 of the ultimate compressive strength ($f'c$) of the concrete. Where piles may be subject to corrosive action, one-sixteenth inch shall be deducted from the shell thickness for design purposes, or there shall be other approved provision for corrosion.

(j) **ROLLED STRUCTURAL STEEL PILES.** Structural steel piles shall conform to U.B.C. Standard No. 27-1.

No section shall have a nominal thickness of metal less than three-eighths inch.

(k) **JETTING.** Jetting shall not be used except where and as spe-

cifically permitted by the Superintendent of Buildings. When used, jetting shall be carried out in such a manner that the carrying capacity of existing piles and structures shall not be impaired. After withdrawal of the jet, piles shall be driven down until the required resistance is obtained.

(1) **SPECIAL PILES OR SPECIAL CONDITIONS.** The use of types of piles not specifically mentioned herein, and the use of piles under conditions not specifically covered herein, shall be permitted, subject to the approval of the Superintendent of Buildings, upon permission of acceptable test data, calculations or other information relating to the properties and load-carrying capacity of such piles. (Ord. 85500 § 2807, as amended by Ord. 91130; May 1, 1962).

Chapter 3.29 VENEERED WALLS

Sections:

- 3.29.010 General.
- 3.29.020 Veneer of masonry units.
- 3.29.030 Veneer of non-structural units.
- 3.29.040 Special requirements for glass veneer.

3.29.010 General. (a) **LIMITATIONS.** Veneer regulated by this chapter shall not be assumed to add to the strength of any wall.

(b) **HEIGHT.** Exterior veneer shall not be attached to wood at any point more than thirty feet above the adjacent ground elevation.

Exception: Veneer of masonry units may be attached to wood at any point up to thirty feet above the foundation on which it rests.

(c) **HORIZONTAL FORCES.** Veneer shall not be assumed to resist horizontal forces, except as specifically provided in Section 3.29.020. (Ord. 85500 § 2901; Sept. 10, 1956).

3.29.020 Veneer of masonry units. (a) **SCOPE.** The provisions of this Section shall apply to all veneer which is constructed of masonry conforming to the requirements of Chapter 3.24.

(b) **VERTICAL LOADS.** No veneer shall support any vertical load other than the dead load of the veneer above. Veneer above openings shall be supported upon lintels of noncombustible material.

(c) **ANCHORAGE.** Masonry veneer shall be attached to the supporting wall with corrosion resistant metal ties, or other approved method, designed to resist a horizontal force equal to twice the weight of the attached veneer.

Veneer ties to wood construction shall be sheet metal, not less than 22 U. S. gauge corrugated or other approved material. Ties to masonry construction shall be not less than one No. 8 B.&S. gauge hard drawn wire.

VENEERED WALLS

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Each tie shall support not more than two square feet of wall area and shall be spaced not more than twenty-four inches on center horizontally.

In lieu of such ties, an approved method of grouting the veneer to a paper-backed reinforcement attached direct to the studs may be used.

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(d) **SUPPORT.** All veneer in buildings of skeleton construction and in buildings over two (2) stories high having bearing walls of masonry or concrete, shall be supported at every floor level, and in no case shall the unsupported height of such veneer in any first story exceed forty (40) feet above the established grade. (Ord. 85500 § 2902; Sept. 10, 1956).

3.29.030 Veneer of non-structural units. (a) **SCOPE.** The provisions of this Section shall apply to all veneer of materials not regulated by the requirements of Chapter 3.24.

(b) **LOADS AND STRESSES.** For the purpose of this Section, veneer of non-structural units shall not be assumed to support any super-imposed loads.

(c) **ANCHORAGE.** Non-structural material used as veneer shall be anchored to the supporting wall by: (1) corrosion-resistant metal ties not less in thickness than No. 9 W & M gauge wire, and spaced not more than twelve inches (12") apart both horizontally and vertically; or (2) units of flat tile stone or terra cotta which are manufactured with scored surface or other approved units may be cemented to a masonry or concrete wall or to exterior plaster with special Portland cement mortar, provided the mortar bond is sufficient to withstand a shearing stress of 50 pounds per square inch after curing for twenty-eight (28) days. Construction and mortar shall be in accordance with (d) of this section.

(d) **CERAMIC VENEER.** Buildings may be faced with slabs of terra cotta, which for the purpose of this section are defined as having more than seventy-two square inches (72 sq. in.) of superficial area.

Ceramic facing shall not be considered a part of the required thickness of the wall.

Walls to which ceramic facing is to be applied shall be rigid and free from oil. Just prior to installation the backing wall shall be wire brushed and put in condition to assure proper adhesion.

Ceramic facing one and one-quarter inch (1¼") or more in thickness shall be anchored to backing with substantial noncorrosive metal anchors, not less than No. 6 gauge wire, in horizontal bed joints on not more than sixteen-inch (16") centers. Veneer ties shall be of sufficient strength to support twice the full weight of the veneer in tension. Such facing shall be set back of terra cotta spaced not less than one and one-half inch (1½") from face of backing wall and the space between shall be filled solidly with grout of Portland cement mortar and top gravel in proportion of not less than one to six. Just before setting, the backing wall and the ceramic facing shall be drenched with clean water and shall be distinctly damp when grout is poured.

Ceramic facing units less than one and one-quarter inch (1¼") in thickness shall be adhesive type, shall not exceed thirty inches (30") in any one dimension nor six hundred square inches (600 sq. in.) of superficial area and shall have corrugations of scorings on the back thereof.

Exception: Where "Thin Ceramic Veneer" is used, not over one-half inch ($\frac{1}{2}$ ") in thickness and not exceeding twenty-four inches (24") in any one dimension and having not more than three hundred eighty-four square inches (384 sq. in.) of superficial area, the backs of such units need not be corrugated or scored.

Just before setting ceramic facing, each piece shall be soaked in clean water for not less than one (1) hour and the surface of the backing wall shall be saturated with water. A brush coat of neat Portland cement and water shall then be applied both to the backing and to the back side of the ceramic facing. Mortar shall average three-quarter inch ($\frac{3}{4}$ ") in thickness. The proportions of this mortar shall be as follows:

High calcium slaked lime putty screened and aged at least twenty (20) days, containing not more than 4% magnesium oxide.....	1/2 cu. ft.
Clear sharp siliceous sand.....	4 cu. ft.
Ammonium stearate paste, or approved equal.....	1 quart
Approved Portland cement.....	1 cu. ft.

Half of the mortar shall be applied to the ceramic facing and half to the backing just prior to setting. Pieces disturbed after having been tapped into place shall be removed immediately after which, additional mortar shall be applied as required above and the piece reset. (Ord. 85500 § 2903 as amended by Ord. 88324; June 24, 1959).

3.29.040 Special requirements for glass veneer. (a) **GENERAL.** In addition to the general requirements of this Chapter, all veneer of glass shall comply with the regulations in this Section. For the purpose of this Section, glass veneer is defined as glass attached directly to an exterior wall by adhesion or anchors to serve as a surfacing material.

Glass veneer attached to any exterior wall more than thirty-five feet (35') above the adjoining ground elevation shall be held in place by non-corrosive continuous metal members having on the horizontal edges a lip which covers the face edge of the unit.

(b) **DIMENSION.** Glass veneer units shall be not less than one-eighth inch ($\frac{1}{8}$ ") in thickness. Units less than three-sixteenths inch ($\frac{3}{16}$ ") in thickness shall be not larger in area than one square foot (1 sq. ft.). Units not more than one-quarter inch ($\frac{1}{4}$ ") nor less than three sixteenths inch ($\frac{3}{16}$ ") in thickness shall be not larger in area than four square feet (4 sq. ft.).

No unit shall be larger in area than ten square feet (10 sq. ft.) or more than four feet (4') in length.

(c) **ATTACHMENT.** Every glass veneer unit shall be attached to the backing by approved corrosion-resistant ties and approved adhesive material and shall be supported upon shelf angles.

Exception: Below a point three feet (3') above the adjacent ground elevation, the ties and shelf angles may be omitted.

(d) **ADHESIVE.** The adhesive shall cover not less than one-half the area of the unit after the unit has been set in place and shall be neither less than one-quarter inch ($\frac{1}{4}$ ") nor more than one-half inch ($\frac{1}{2}$ ") in thickness.

The adhesive shall be insoluble in water and shall not lose its adhesive qualities when dry.

Absorbent surfaces shall be sealed by a bonding coat before adhesive is applied. The bonding coat shall be cohesive with the adhesive.

Glass veneer surfaces, to which adhesive is applied, shall be clean and uncoated.

(e) **SHELF ANGLES.** Shelf angles shall be of corrosion-resistant material capable of supporting two times the weight of the supported veneer.

The shelf angles shall be spaced vertically in alternate horizontal joints but not more than three feet (3') apart.

The shelf angles shall be spaced not farther apart horizontally than the width of the supported units.

(f) **BACKING.** Exterior glass veneer shall be applied only upon masonry, concrete, or exterior plaster.

(g) **EXPANSION JOINTS.** Glass veneer units shall be separated from each other and from adjoining materials by an expansion joint at least one thirty-second inch ($\frac{1}{32}$ ") in thickness. There shall be at least one-sixty-fourth inch ($\frac{1}{64}$ ") clearance between bolts and the adjacent glass. (Ord. 85500 § 2904; September 10, 1956).

Chapter 3.30

ENCLOSURE OF VERTICAL OPENINGS

Sections:

- 3.30.010 Enclosure—When required.
- 3.30.020 Extent of enclosures.
- 3.30.030 Air ducts.
- 3.30.040 Refuse chutes.
- 3.30.050 Storage bins.
- 3.30.060 Service openings.

3.30.010 Enclosures—When required. Vertical openings other than stairways, ramps and refuse chutes shall be enclosed as set forth in Table No. 17-A. For enclosures of stairways and ramps, see Chapter 3.33.

Exception: In Type V buildings, chutes and dumbwaiter shafts with a cross sectional area of not more than nine square feet and not ex-

ceeding thirty feet in height may be lines with noncombustible materials equivalent to one-half inch gypsum wallboard covered with not less than 26 U. S. gauge galvanized sheet metal or 24 B. & S. gauge aluminum with all such sheet metal or aluminum lock-lapped. All openings into any such vertical enclosure shall be protected by metal or metal-clad doors with either metal or metal-clad jambs, casings, or frames. (Ord. 85500 § 3001, as amended by Ord. 91850; February 13, 1963).

3.30.020 Extent of enclosures. Every opening between any two stories shall be enclosed. There shall be no direct opening through a floor or ceiling without a vertical enclosure. Horizontal or trap doors shall not be permitted. Communicating openings through a story separation shall be protected both above and below the story separation by fire doors.

Exceptions: 1. One family residences, and two family residences separated vertically, shall be exempt from the requirements of Section 3.30.020.

2. Vertical openings extending only between the first and second floor need not be enclosed if open stairs are permitted as provided in Section 3.33.080.

(Ord. 85500 § 3002 as amended by Ord. 88324; June 24, 1959).

3.30.030 Air ducts. Air ducts shall conform to the requirements of Chapter 3.51. (Ord. 85500 § 3003; September 10, 1956).

3.30.040 Refuse chutes. Refuse chutes shall rest on substantial non-combustible foundations. The enclosing walls of such chutes shall consist of solid brick, or solid concrete blocks, not less than eight inches thick or of reinforced concrete not less than six inches thick, or of an approved alternate. Such chutes shall extend to and not less than two feet above the roof and shall be covered by a metal skylight glazed with single strength glass, or other heat actuated device to open in case of fire. (Ord. 85500 § 3004, added by Ord. 91850; February 13, 1963).

3.30.050 Storage bins. Refuse chutes shall discharge into a room or bin enclosed and separated from any incinerator room by floors, ceilings, and walls of not less than two-hour fire-resistive construction. The opening through which material is transferred from such room or bin to an incinerator room or elsewhere shall be equipped with an automatic closing fire assembly having a one and one-half hour fire-resistive rating. (Ord. 85500 § 3005 added by Ord. 91850 and amended by Ord. 97889 § 3; June 26, 1969).

3.30.060 Service openings. Service openings in refuse chutes shall be equipped with self-closing fire assemblies having a one and one-half hour fire-resistive rating or approved equivalent. (Ord. 85500 § 3006 added by Ord. 91850 and amended by Ord. 97889 § 4; June 26, 1969).

Chapter 3.31
FLOOR CONSTRUCTION

Sections:

- 3.31.010 General.
- 3.31.020 Concrete floors.
- 3.31.030 Steel joisted floors.
- 3.31.040 Cellular steel floors.
- 3.31.050 Wood floors.
- 3.31.060 Mill constructed floors.

3.31.010 General. Floor construction shall be of materials and construction as specified under Occupancy in Part III and under Types of Construction in Part V.

All floors shall be so framed and tied into the framework and supporting walls as to form an integral part of the whole building.

Fire-resistive standards of floor construction are specified in Section 3.43.050. (Ord. 85500 § 3101; September 10, 1956).

3.31.020 Concrete floors. The thickness of concrete slab floors shall be limited by structural requirements as set forth in Chapter 3.26. Topping when poured monolithic with the slab may be included as a structural part of the slab. Sleepers for the nailing of a wood floor shall not decrease the required structural depth of the slab unless placed in the direction of



span and then shall not be placed more than one-half inch ($\frac{1}{2}$ ") into the slab. (Ord. 85500 § 3102; Sept. 10, 1956).

3.31.030 Steel joisted floors. Steel joisted floors shall consist of steel joists in accordance with the requirements of Section 3.27.010. When used in Type I or Type II buildings they shall have a reinforced concrete slab not less than two inches (2") thick placed on and secured to the top thereof, and a fire-resistive ceiling as specified in Section 3.43.050, on the under side thereof, fully covering and protecting the joists. Steel joisted floors need not be fire-protected on the under side except where specifically required under Occupancy in Chapters 3.05 through 3.15, Location in Chapter 3.16, or Type of Construction in Chapters 3.17 through 3.22.

The reinforced concrete slab placed on and secured to the top of the steel joists shall be sufficiently reinforced to support all dead, live or other loads between joists. (Ord. 85500 § 3103; Sept. 10, 1956).

3.31.040 Cellular steel floors. (a) GENERAL. Cellular steel floor construction shall consist of sheet or strip steel formed into an integral system of parallel steel beams which combine the function of load-bearing members and a continuous deck spanning between main supporting girders, beams, or walls.

When used in fire-resistive construction, steel floors shall have a minimum of two inches (2") of concrete fill on top and shall be protected with a fire-resistive ceiling suspended from the underside.

(b) PHYSICAL PROPERTIES. The steel used in the manufacture of steel floor units shall be equal to the requirements of U.B.C. Standard No. 27-2.

(c) DESIGN. Cellular steel floors shall admit of a rational analysis, and such floor assemblies shall have been tested and certified by a recognized testing agency to substantiate stress values used.

Flexural stress values shall not exceed 60 per cent of the yield point specified for the grade steel permitted in Subsection (b) of this Section.

When plastered ceilings are suspended from steel subfloor units, the maximum permissible deflection due to the full live load after the plaster is applied shall not exceed $\frac{1}{360}$ of the span. (Ord. 85500 § 3104; Sept. 10, 1956).

3.31.050 Wood floors. (a) WOOD JOISTED FLOORS. Wood joisted floors shall be framed and constructed and anchored to supporting wood stud or masonry walls as specified in Chapter 3.25. Wood joisted floors need not be fire-protected on the under side except where specifically required under Occupancy in Chapters 3.05 through 3.15, Location in Chapter 3.16, or Type of Construction in Chapters 3.17 through 3.22.

In wood frame floor construction where suspended ceilings occur, the space between the ceiling and the floor above shall be divided into areas

not exceeding one thousand square feet (1,000 sq. ft.) in a manner required for partitioning attic space in Section 3.32.060.

(b) **PLYWOOD FLOORING.** Where used as flooring, plywood shall be of the minimum thickness specified in Table No. 25-I. (Ord. 85500 § 3105; Sept. 10, 1956).

3.31.060 Mill constructed floors. Mill constructed floors shall be not less than three inches (3") nominal splined or tongued and grooved plank covered with one inch (1") nominal flooring laid crosswise or diagonal. (Ord. 85500 § 3106; Sept. 10, 1956).

Chapter 3.32

ROOF CONSTRUCTION AND COVERING

Sections:

- 3.32.010 General.
- 3.32.020 Construction.
- 3.32.030 Design.
- 3.32.040 Roof coverings.
- 3.32.050 Roof insulation.
- 3.32.060 Attics—Access and areas.
- 3.32.070 Roof drainage.

3.32.010 General. Roof covering shall be as required under Occupancy in Chapters 3.05 through 3.15, Location in Part Chapter 3.16 or Types of Construction in Chapters 3.17 through 3.22. All roofs shall be so framed and tied into framework and supporting walls as to form an integral part of the whole building. (Ord. 85500 § 3201; Sept. 10, 1956).

3.32.020 Construction. Construction of roofs shall conform to the engineering regulations for the materials used and to the fire-resistive requirements of the proposed type of construction. (Ord. 85500 § 3202; Sept. 10, 1956).

3.32.030 Design. The design of the roof construction shall be in accordance with engineering regulations for the materials used. (Ord. 85500 § 3203; Sept. 10, 1956).

3.32.040 Roof coverings. (a) **GENERAL.** Roof coverings for all buildings shall be either "Fire-Retardant" or "Ordinary" roof coverings as specifically required either by Location in Chapter 3.16 or by Type of Construction in Chapters 3.17 through 3.22.

(b) **COMPOSITION ROOFING MATERIALS.** For purposes of this Section, certain terms are designated as follows:

Felt—Roofing felt made from organic or asbestos fibers saturated with bituminous compound.

Cap Sheet—Roofing made of organic or asbestos fibers saturated and coated on both sides with a bituminous compounds and surfaced with mineral granules, mica, talc, ilmenite, asbestos fibers or similar materials, except on the unexposed portions of split cap sheets.

Cementing Materials—Built-up composition roof shall be thoroughly mopped solid between layers with bituminous compound using not less than 20 pounds of hot asphalt or not less than one and one-half gallons of cold bituminous compound in accordance with roofing manufacturer's published specifications or hot coal tar pitch, using 30 pounds per one hundred square feet (100 sq. ft.) of roof area.

Spot Cementing—Intermittent application of asphalt sealing agent in an amount not less than 10 pounds per one hundred square feet (100 sq. ft.) of roof area at points not more than twelve inches (12") apart.

Base Sheets—One or more layers of saturated felt or saturated and coated roofing products over which is placed a cap sheet, asbestos shingles, composition shingles, gravel surfacing, ceramic or other similar surfacing materials.

(c) **MATERIALS.** All materials shall be delivered in original packages bearing manufacturer's label. Mineral surfaced cap sheets, asphalt shingles and smooth surface cap sheets shall bear the label of the Underwriters' Laboratories, Inc., for Class A, B or C roofing.

Nails for composition roof shall not be smaller than 12 gauge, with heads not less than three-eighths inch ($\frac{3}{8}$ ") in diameter for shingle application and nine-sixteenths inch ($\frac{9}{16}$ ") for built-up roofs and shall be long enough fully to penetrate the sheathing with a maximum three-fourths inch ($\frac{3}{4}$ "). Smaller head nails may be substituted providing metal discs are used with them. Exposed nails and shingle nails shall be corrosion resistant.

(d) **APPLICATION.** Base sheets shall be fastened to the roof sheathing using not less than one nail or staple to each one and one-third square feet ($1\frac{1}{3}$ sq. ft.) of roof area, or base sheets may be spot cemented to an existing composition roof, or spot cemented or fully mopped to a suitable deck.

Asphalt shingles shall be fastened according to manufacturer's printed specifications, but for strip shingles of square tab type, measuring twelve inches by thirty-six inches (12" x 36"), no less than six nails or staples shall be used per each strip.

Hot asphalt shall be applied at a temperature of not less than 375 degrees Fahrenheit and shall in no case be heated to a temperature higher than 425 degrees Fahrenheit at the kettle.

Coal tar pitch shall not be heated above 375 degrees Fahrenheit.

(e) **FIRE-RETARDANT ROOF COVERINGS.** A fire-retardant roof covering shall be any roof covering which meets the requirements speci-

fied for any one of the following roofings, 1 to 7 inclusive, or shall be any roof assembly bearing the label of the Underwriters' Laboratories, Inc., for Class A or B roofing.

1. Any built-up composition roofing consisting of materials whose fire-retardant values as set forth in Table No. 32-A equal not less than 15 points. A top covering selected from parts (b), (c), or (d) of said table shall be used.

2. Hydraulic compressed rigid shingles not less than one-eighth inch ($\frac{1}{8}$ ") thick, composed of portland cement and asbestos fibers, laid over a layer of saturated felt weighing not less than 14 pounds to the one hundred square feet (100 sq. ft.) or hydraulic compressed rigid sheets not less than seven thirty-seconds inch ($\frac{7}{32}$ ") thick, composed of portland cement and asbestos fibers. The aforesaid felt may be omitted when the compressed shingles are placed over an existing roof covering.

3. Asphalt-saturated mineral-surfaced prepared composition shingles laid so there are not less than two thicknesses at any point. The combined weight of such shingles shall be not less than 200 pounds to the one hundred square feet (100 sq. ft.) of completed roof area. Such shingles shall not be laid on roofs with rise of less than 4 in 12.

4. Concrete slab roofs, constructed as specified in Chapter 3.26 without additional roof covering.

5. Metal roof covering of not less than No. 30 U. S. gauge metal or equivalent. All flat metal roof coverings shall be laid on solid sheathing. Corrugated or standing seam metal roof covering shall be designed to support the required live load between supporting members.

6. Slate shingles securely fastened with copper nails or with copper nails and No. 14 B. and S. gauge copper wire, with nails of such length as to provide not less than three-fourths inch ($\frac{3}{4}$ ") of penetration into the nailing strips or sheathing. Under all such shingles there shall be placed at least one layer of asphalt saturated felt weighing not less than 30 pounds to 108 square feet.

7. Clay or concrete roof tile securely fastened with copper nails or copper wire; provided that for roofs not exceeding a rise of eight inches (8") in twelve inches (12"), galvanized nails may be used, and provided further that tile with projection lugs need not be nailed or wired in place where rise does not exceed 12 in 12. Wire shall be not smaller than No. 14 B. and S. gauge. Nails shall penetrate the supporting roof construction not less than three-fourths inch ($\frac{3}{4}$ ").

Roof tile shall not absorb more than 15 per cent of the dry weight of the tile during a 48-hour immersion test.

(f) ORDINARY ROOFINGS. "Ordinary" roofing shall be any roof covering which meets the requirements specified for any one of the follow-

ing roofs, 1 to 3 inclusive, or shall be any roofing meeting the Class C Specifications of the Underwriters' Laboratories, Inc.

1. Any composition roofing or any built up composition roofing consisting of layers of roofing felt, roll roofing, felt membrane or gravel, the sum of whose fire-retardant values as set forth in Table No. 32-A equals not less than 10.

2. Asphalt shingles laid in one or more layers.

3. Wood shingles of clear vertical grain all-heart wood.

(g) **ROOFINGS FOR GROUP J OCCUPANCIES.** On buildings housing Group J Division 1 occupancies any roofing having a fire-retardant value equal to not less than 6, as set forth in Table No. 32-A, may be used, unless otherwise required because of location as specified in Chapters 3.16 and 3.17 through 3.22 of this Code. (Ord. 85500 § 3204; Sept. 10, 1956).

3.32.050 Roof insulation. The use of cork, fiberboard and other combustible roof insulation shall be permitted in all types of construction provided it is covered with approved roof coverings applied directly thereto. (Ord. 85500 § 3205; Sept. 10, 1956).

3.32.060 Attics—Access and areas. All buildings over one story in height shall have access provided to the attic space by means of a stairway or attached ladder to a scuttle where there is more than three (3) feet clear headroom in such attic space. The openings provided through the ceiling for such access shall be not less than twenty-two inches by thirty inches (22" x 30"), shall have the same fire resistive value as such ceilings and shall be located in the hallway or corridor of buildings three stories or more in height.

In wood frame construction, where ceilings occur, the space between ceilings and roofs shall be divided into horizontal areas of not more than twenty-five hundred square feet (2500 sq. ft.) with tight one-inch (1") partitions of matched wood or one-half inch (1/2") thick exterior type plywood, or approved noncombustible materials. All openings through these partitions shall be protected by self-closing doors of thickness and materials equivalent to the partitions.

Exception: Where the attic is fully sprinklered, undivided horizontal areas may be increased to 7,500 square feet.

Draft stops shall be installed in trussed roofs between the roof and bottom chord of trusses, in all buildings exceeding twenty thousand square feet of floor area. Such stops shall extend from the roof to the bottom of the chord or twelve (12) feet whichever is less. (Ord. 85500 § 3206; Sept. 10, 1956).

3.32.070 Roof drainage. All buildings shall be provided with roof drainage to downspouts connected to sewers, when necessary to protect

3.32.070

BUILDINGS

adjacent property from damage or to prevent water from flowing across sidewalks.

Exceptions: When roof drainage connection to sewers is deemed impractical by the City Engineer, connection to dry wells may be permitted. (Ord. 85500 § 3207, as amended by Ord. 91546; October 30, 1962 and by Ord. 92060; May 14, 1963).

TABLE No. 32-A—FIRE-RETARDANT VALUES OF ROOFING MATERIALS

	Shipping Weight (In lbs.)	Types of Materials	Min. Wt. Per 100 Sq. Ft. of Roof Area (In lbs.)	Fire Retardant Value
(a) BASE SHEETS ONLY	15	Asphalt Saturated Felt.....	14	3
	30	Asphalt Saturated Felt.....	28	6
	20	Asphalt Saturated and Coated Dampcourse.....	18	4
	40	Asphalt Smooth Surfaced Roofing.....	37	6
	15	Asphalt Saturated Asbestos Felt.....	14	5
	20	Asphalt Saturated Asbestos Felt.....	18	5
(b) BASE OR CAP SHEETS	45	Asphalt Saturated Asbestos Felt (Black Top).....	41	9
	55	Asphalt Saturated Asbestos Felt (Black Top).....	50	10
	15	Asphalt Saturated Asbestos Felt (Minimum 2 layers).....	28	10
	55	Mineral Surfaced Split Sheets (Minimum 2 layers).....	106	12
(c) CAP SHEETS ONLY	58	Imenite Surfaced Split Sheets (Minimum 2 layers).....	106	12
	58	Imenite Surfaced Roofing.....	55	7
	90	Mineral Surfaced Asphalt Cap Sheet.....	83	10
	75	Smooth Surfaced Cap Sheet.....	68	9
	65	Smooth Surfaced Cap Sheet.....	60	7
	55	Smooth Surfaced Cap Sheet.....	50	6
	39	Asphalt Saturated Asbestos Roofing (White Top).....	37	9
	55	Asphalt Saturated Asbestos Roofing (White Top).....	52	10
(d) GRAVEL, CERAMIC AND OTHER SIMILAR SURFACING MATERIALS		Gravel 1/4" to 1/2" in size.....	400	6
		Slag 1/4" to 1/2" in size.....	300	6
		Ceramics and other surfacing materials.....	{300	4
		1/2" to 1/2" in size.....	{400	6

Chapter 3.33

STAIRS, EXITS AND OCCUPANT LOADS

Sections:

- 3.33.010 General.
- 3.33.020 Exits required.
- 3.33.030 Doors.
- 3.33.040 Corridors.
- 3.33.050 Stairs.
- 3.33.060 Ramps.
- 3.33.070 Horizontal exits.
- 3.33.080 Exit enclosure.
- 3.33.090 Smoke proof enclosures.
- 3.33.100 Exit outlets.
- 3.33.110 Exit courts.
- 3.33.120 Exit signs and illumination.
- 3.33.130 Aisles.
- 3.33.140 Seats.
- 3.33.150 Bleacher seats.
- 3.33.160 Exits—Group A occupancies.
- 3.33.170 Exits—Group B occupancies.
- 3.33.180 Exits—Group C occupancies.
- 3.33.190 Exits—Group D occupancies.
- 3.33.200 Exits—Group E occupancies.
- 3.33.210 Exits—Group F occupancies.
- 3.33.230 Mezzanine exits.
- 3.33.240 Special hazards.

3.33.010 General. (a) **PURPOSE.** The purpose of this chapter is to establish occupant load standards and to provide minimum exit facilities for buildings.

(b) **SCOPE.** Every building shall be provided with exits as required by this chapter. Requirements of this chapter may be waived for tanks and areas occupied exclusively by mechanical equipment, provided no manifest hazard exists as determined by the Superintendent of Buildings.

Exception: Buildings of Groups I and J occupancy shall have at least one (1) exit door three feet (3'-0") wide and shall conform to Section 3.33.050. Otherwise they are exempt from the requirements of Chapter 3.33.

(c) **DEFINITIONS.** "Panic hardware": A bar which extends across at least half the width of each door leaf, or is a floor plate below the full width of each door opening; either of which will release the door if subjected to pressure.

(d) **OCCUPANT LOAD.** The occupant load of a room or building shall be obtained by dividing the floor area by the square feet per occupant set forth in Table No. 33-A.

Exception: In assembly areas using fixed seats, the occupant load shall be the actual number of fixed seats.

(e) **BENCHES.** Where benches or pews are used the number of seats shall be based on one person for each twenty inches (20") of length of the pews or benches.

(f) **MIXED OCCUPANCIES.** The capacity of a building containing mixed occupancies shall be determined by adding the number of occupants of the various portions as set forth in Table No. 33-A.

Exception: In churches containing social halls, occupant load for the purpose of determining Group Occupancy may be computed as the sum of the area reasonably expected to be occupied at one time: i.e., Nave and Sunday School, Nave and Social Hall, or Social Hall and Sunday School. Total building capacity shall be posted in the foyer and a letter filed with the Superintendent of Buildings by the official body of the church. Exits shall be computed on total capacity.

(g) **MORE THAN ONE OCCUPANCY.** The capacity of a room or building which is used for different occupancies or uses shall be determined by the occupant load which gives the largest number of persons.

TABLE NO. 33-A

DENSITIES OF HUMAN OCCUPANCIES BASED ON USE

Purpose of Use	Number of Square Feet Per Person
1. Art Galleries, Museums, Libraries, Music, Art and Health Studios	50
2. Auditoriums	7
3. Bowling Alleys (Not including area of alleys)	10
4. Cafeterias, Cabarets, Restaurants and Dining Rooms	15
5. Churches	
a. Nave, Balcony, Sunday School Assembly, Unfurnished Parlor	15
b. Nursery, Parlor, when furnished with club chairs, davenport, etc., Raised Chancel or Platform Without Seats, Sunday School Classrooms (Capacity not exceeding 50)	25
6. Dance Halls, Social Halls, Lodge Halls and Skating Rinks	15
7. Factory, Workshop	100
8. Homes for Children and Retired Persons.....	50
9. Hotels, other than public spaces.....	100
10. H Occupancies	175
11. Offices	100
12. Pool and Card Rooms.....	25
13. Sales—Retail	
Basement	20
First Floor	30
Upper Floors	50
14. Schools	
Art Rooms, Drafting Rooms, Libraries, Reading Rooms, Shops, Vocational Class Rooms, Study Rooms, Cooking Rooms and Laboratories.....	50
Class Rooms	30
Gymnasiums	15
15. Swimming Pools	25
16. Repair Garages	300
17. Trade School	40
18. Warehouses, Storage and Parking Garage.....	500

Areas from which occupant loads are computed shall be net areas, excluding foyers, corridors, halls, toilets, stairs, elevator enclosures, and other service facilities.

When the square foot per occupant is not given for a particular occupancy, it shall be determined by the superintendent of buildings, based on the square feet given for the occupancy it most nearly resembles.

(h) **ROOM CAPACITY POSTED.** The maximum room capacity shall be conspicuously posted by means of durable metal signs placed in each assembly room, auditorium or room used for a similar purpose where fixed seats are not installed and where capacity exceeds fifty, and it shall be unlawful to remove, conceal or deface such notice or to permit more than this legal number of persons within such space.

(i) **CHANGE IN ELEVATION.** Changes in elevation of less than twelve inches, in any corridor within a building, shall be by means of ramps except for occupant loads less than ten. (Ord. 85500 § 3301 as amended by Ord. 88324; June 24, 1959).

3.33.020 Exits required. (a) **NUMBER OF PERSONS.** The number of persons permitted in any building or portion thereof shall not exceed those set forth in Section 3.33.010.

Exception: In occupancies other than A-2, B-1 and B-2 where additional exit facilities are provided the occupancy load may be increased in accordance with Section 3.33.020 (b) and (c).

(b) **NUMBER OF EXITS.** The minimum number of exits for any building or any occupancy in a building shall in no case be less than those set forth in Table No. 33-B below, but shall also conform to the applicable requirements of Section 3.33.160—3.33.240, inclusive.

Where floors or areas thereof have grade and exit conditions similar to those of the ground floor then egress may be based on the requirements of the first floor.

In one or two-story apartment houses, a single means of egress will be permitted, provided that such means of egress opens directly to the outside approximately at grade, or is an independent stair from each apartment leading directly to the outside, and such stairs shall be enclosed as required by Section 3.33.080.

TABLE NO. 33-B—NUMBER OF EXITS

OCCUPANCY	OCCUPANT LOAD	NO. OF EXITS
B, C, E, F, G	50 to 500	2
D	More than 10	2
E-2	See Sec. 3.10.080 (c) 4	2
H	More than 15	2
G or H (Balcony Exit Type)	Load immaterial	2 or more (See Sec. 3.33.220)
Any	500 or more	3

Not less than two exits shall be provided in all buildings as follows:

1. On each floor above the first floor.

Exception: Office buildings not higher than two stories, nor exceeding three thousand square feet on the second floor may have one exit provided it is enclosed.

2. In basements. (See Section 3.33.050 (e)).
3. In all cellars. (See Section 3.33.050 (e)).

(c) **WIDTH.** The total width of exits in feet or fraction thereof shall be not less than the total occupant load served divided by fifty nor less than three feet. Such width of exits shall be divided approximately equally among separate exits, except as provided in Sections 3.33.160, 3.33.170, and 3.33.180.

The width of exits from any story of a building shall be determined from the occupant load in that story plus one-half the tributary occupant load in the story, basement, or cellar next above or below, provided the resulting width is not less than that required for the upper or lower story considered separately. The maximum exit width required for any story shall be maintained until exit is provided to a street or alley. Where two or more building exits are required, they shall be placed as far apart as possible.

(d) **ARRANGEMENTS OF EXITS.** Where two or more room exits are required they shall be placed as far apart as is reasonably practicable.

The maximum allowable horizontal travel distance from any point in a building shall not exceed one hundred fifty feet. This distance may be increased to two hundred feet when the building is provided with standard automatic sprinkler system.

Exceptions: 1. No point in a building of Group D occupancy shall be more than one hundred feet from such exits, unless completely sprinklered when such distance may be increased to one hundred fifty feet.

2. Maximum distance of travel from any exit door to open stairs or stair enclosure in "exit balcony" building of Group G or H occupancies.

3. In all warehouses and those factories of Group F-2 and G occupancies, except as further provided in Exception 4, maximum distance of travel permitted may be increased to not more than two hundred twenty-five feet. An additional increase in such occupancies of fifty feet shall be permitted when a standard automatic sprinkler system is provided.

4. In those Group G factories occupied as steel mills and cement mills only, housed in Type I buildings of noncombustible construction throughout, maximum distance of horizontal travel may be increased to three hundred feet. (Ord. 85500 § 3302, as amended by Ord. 93964; June 15, 1965).

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3.33.030 Doors. (a) **GENERAL.** This section shall apply to every exit door serving an occupant load of more than ten (10), and those from hazardous rooms or areas, and main exit doors from areas open to the public.

(b) **SWING.** Exit doors shall swing in the direction of exit travel when serving an occupant load of fifty (50) or more.

(c) **OPERATION.** 1. All doors in line of exit travel shall be arranged so as to be readily opened from the side from which exit is made except as provided in this subsection.

2. No door in the line of exit travel in occupancy groups A, B and C shall be equipped with any fastening device other than panic hardware when the capacity exceeds fifty (50) persons in A and B occupancies and one hundred (100) persons in C occupancies. (See Section 3.33.160-i 3.33.170-a-b, 3.33.180-g).

3. No door in line of exit travel in occupancy groups A, B, C, D and H shall be equipped with an inside key lock, head or foot bolts, a padlock or other detached locking device except as provided in Section 3.33.190-f, g, h for mental institutions and places of detention.

4. Exterior exit doors in occupancy groups E, F and G may have head or foot bolts provided such bolts may be released from the inside without the use of a key or other detached device.

5. Exit doors in occupancy groups E, F and G, with a total occupant load not exceeding one hundred (100) may be equipped with inside key locks, padlocks and other detached locking devices, provided, when the building or premises are occupied, that such doors shall be unlocked.

6. Exit doors in occupancy groups F, Division 2, and Group G with a total occupant load exceeding one hundred (100) may have inside key operated locks or detached locking devices provided they comply with the following regulations:

a. All detached locking devices shall be removed and all key operated locks shall be unlocked when the building or premises are open to the public.

b. When the building or premises are not open to the public and are occupied only by employees, there shall be unlocked exit doors sufficient to accommodate the total number of employees in accordance with the requirements of Section 3.33.020 (c) and (d).

c. The Superintendent of Buildings shall periodically test all delayed exit and secured doors to determine whether such are in working order.

d. Whenever any inside key locks, detached locking devices or delayed operation locks are installed on any exit door serving occu-

pancies of Group F, Division 2 or Group G with an occupant load in excess of one hundred (100) persons, compliance with this subsection shall be guaranteed by a surety bond in the amount of \$500.00 deposited with the Superintendent of Buildings. The Superintendent of Buildings shall declare such bond forfeit to the City of Seattle at any time he finds a violation of Section 3.33.030 (c). Upon forfeiture of this bond no exit door shall be locked by an inside key lock, padlock, or other similar device or a delayed lock until a new bond shall have been deposited with the Superintendent of Buildings.

(d) **WIDTH AND HEIGHT.** The required width of a door opening shall not be reduced more than three inches (3") by any projection.

No required doorway shall be less than thirty-six inches (36") in width, nor less than six feet eight inches (6'-8") in height.

(e) **DOOR LEAF WIDTH.** No leaf of an exit door shall exceed four feet (4') in width.

(f) **SPECIAL DOORS.** Revolving, vertical or horizontal sliding, and overhead doors shall not be used as required exit doors, except that approved sliding doors may be used as exit doors in Group F or G occupancy warehouses, garages and factories, provided they shall not constitute more than fifty per cent (50%) of the required exit width.

Exit doors set in larger doors (commonly called "pilot" doors) shall not be used as a main exit, but may be used as a secondary exit door when the doorway opening is clear to within three inches (3") of the floor.

(g) **EXIT FROM DOOR.** Every exit door or doorway from every area or building shall open into a corridor, an exit balcony as permitted in Section 3.35.030, enclosed stairway, exterior stairway where permitted by Section 3.33.050 (h) as an exit, an exterior exit court or a public street or alley.

(h) **DOORS OPENING INTO STAIRWAY.** Every door opening into a stairway shall open on a landing within two inches (2") of the floor level. The width of such landing shall not be reduced more than six inches (6") by the door during its swing or when fully open. (Ord. 85500 § 3303 as amended by Ord. 88324; June 24, 1959).

3.33.040 Corridors. (a) **GENERAL.** This section shall apply to every corridor serving as a required exit for an occupant load of more than ten (10).

(b) **WIDTH AND HEIGHT.** Every required corridor shall be not less in width than forty-four inches (44"), nor less than seven feet (7') in height.

(c) **PROJECTIONS.** The required width and height of corridors shall be unobstructed.

Exception. 1. Trim and handrails may project three and one-half inches (3½").

2. Doors, when fully open, may project six inches.

(d) ACCESS TO EXITS. Floors above the first and cellar shall have exits so arranged that it is possible to go from any room or area in two directions along a corridor to a stairway or other legal exit, except for dead ends as permitted in subsection (f).

(e) WALLS. Public corridor walls and ceilings shall be of not less than one-hour fire-resistive construction.

Exception. One story buildings of F occupancy, all buildings of G occupancy, and wholesale and retail stores of more than one story when sprinklered may have noncombustible partitions in lieu of one-hour fire-resistive construction, and openings may be unprotected. One story buildings of Group C occupancy may have noncombustible partitions in lieu of one-hour fire-resistive construction when approved by the Superintendent of Buildings.

(f) CORRIDOR DEAD END. There shall be no dead end in any public corridor or hall more than twenty-five feet beyond the exit stair, exit door or a point where two means of exit are available.

Exception: 1. In Types I and II buildings, areas used for offices only, dead ends may be not more than seventy-five feet long provided total distance of travel does not exceed one hundred fifty feet.

2. In existing office buildings, distance of travel in dead end corridors shall be limited only by Section 3.33.020.

(g) OPENINGS. Where public corridor walls are required to be one-hour fire-resistive, doors shall be Class "E" or steel or a one and three-eighths inch solid core wood door and other interior openings shall be of one-fourth inch wire glass set in steel or other approved metal frames. Openings, other than doors, shall not exceed twenty-five per cent of the area of the corridor walls. (Ord. 85500 § 3304, as amended by Ord. 88324; June 24, 1959).

3.33.050 Stairs. (a) WIDTH. Stairways serving an occupant load of more than fifty shall be not less in width than forty-four inches.

Stairways serving an occupant load of fifty or less and more than ten shall be not less in width than thirty-six inches.

Stairways serving an occupant load of ten or less shall be not less in width than thirty inches.

Trim and handrails may project three and one-half inches into the required width of any stairway.

(b) RISE AND RUN. The rise of every step in a stairway shall not exceed seven and one-half inches, and the run shall be not less than ten inches. Rise and run shall be constant in any flight of stairs.

Exception. In stairways serving an occupant load of ten or less or serving temporary reviewing stands, the rise may be eight inches and the run may be nine inches.

(c) **WINDERS AND CURVED STAIRS.** In Group I occupancies and in unrequired stairways in any occupancy, winders may be used if the required width of run is provided at a point not more than twelve inches from the side of the stairway where the treads are the narrower, but in no case shall any width of run be less than six inches at any point. Curved stairs may be used as a required exit if complying with requirements for exit stairs, including a minimum ten-inch width of run.

(d) **LANDINGS.** Every stair shall be required to have a top and bottom landing. In one-family dwellings, a door which swings away from a stair shall be construed to create a landing in the area of its swing.

Landings shall be not less in width than the stair they serve. Doors may swing over landings, but shall not reduce the required width of any landing more than six inches when fully opened. Exit doors shall not swing both against travel and over a stair landing. Top and bottom landings shall have clear net width equal to that of stair and length as follows:

1. In A, B and C occupancies, equal to stair width but not required to be longer than four feet, and may be three feet when door swings away from stairs.
2. In D occupancies, equal to stair width.
3. In E, F, G, H, I and J occupancies, not less than three feet.

Exception: When no door swings over landing and no change of travel direction occurs over landing, such length may be reduced to thirty inches.

Intermediate landings shall be as wide as the stair and not less than three feet in clear length (mean distance) measured from riser to riser across the landing.

Where two or more flights of stairs terminate on one landing, the landing shall extend across the full width of all flights and shall be of a net length at least equal to the width of the widest stair flight. In every case, total length of landing shall be not less than exit width as set forth in Section 3.33.020(c), and length shall not be reduced by more than six inches by the swing of the door.

A required stair shall have not less than two risers.

(e) **BASEMENT AND CELLAR STAIRWAYS.** In other than buildings of Group I occupancies where a basement stairway and a stairway to an upper story terminate in the same vestibule or other space, the basement or cellar shall be cut off by a one hour fire-resistive partition and a self-closing Class "B" fire door. A barrier or other means shall be provided which will, when necessary, prevent persons from upper floor from continuing on into the basement.

Basements and cellars shall have exits as provided for similar occupancies on the second floor and shall have no less than two exits. A basement or cellar immediately below the first story having an area not to ex-

ceed three thousand square feet may have one stairway and a vertical ladder for second means of exit. Where ladder is permitted for a second exit, exit through an exterior door or window opening not less than thirty inches by thirty inches will be permitted. Basements and cellars with an occupant load of ten or less and a maximum area of one thousand square feet need have one exit only.

Exception: In basements of F and G occupancies with an occupant load not exceeding one hundred or six thousand square feet in area, fifty percent of the required exit width may discharge through the first floor.

(f) **DISTANCE BETWEEN LANDINGS.** There shall be not more than twelve feet vertically between landings, except for unrequired stairways with a rise per step of six inches or less.

(g) **HANDRAILS.** Stairways shall have handrails on each side, and every stairway more than eighty-eight inches in width shall have intermediate handrails dividing the stairway into portions not more than eighty-eight inches in width.

Handrails shall be placed not less than thirty inches nor more than thirty-four inches above the nosing of treads. Handrails or balustrade at open landings shall be not less than thirty-six inches in height.

Exceptions: 1. Stairways three feet and six inches or less in width may have one handrail.

2. Handrails shall not be required for monumental stairways, steps between the nave and chancel of a church and other short stairways.

(h) **EXTERIOR STAIRWAYS.** Walls between an exterior stairway and the interior of the building shall be not less than one hour fire-resistive construction.

All openings under any part of an exterior stair used as a required exit serving a third floor shall be fixed fire windows or self-closing Class "E" fire doors. Exterior stairs used as required exits shall discharge into an exit court and shall be not less than five feet net from an adjoining property line.

Exception: All one-family dwellings and one-story two-family dwellings are exempt from all requirements of the last preceding paragraph.

(i) **STAIRWAY CONSTRUCTION—INTERIOR.** Interior stairways shall be constructed as specified in Chapters 3.17 through 3.22 of this Code. Stairs serving as exits from corridors which are required to be one-hour fire-resistive construction in Section 3.33.040 (e) shall have walls and soffits of one-hour fire-resistive construction. Where there is enclosed usable space under stairways of wood or unprotected metal, the soffits of the stairs shall be protected as required for one-hour fire-resistive con-

struction. No boiler, compressor or other equipment capable of possible explosion shall be placed under or adjacent to a required exit stairs or mezzanine stairs without a separation adequate to protect individuals using such stairs from the hazards of explosion as determined by the Superintendent of Buildings.

(j) **STAIRWAY CONSTRUCTION — EXTERIOR.** Exterior stairs shall be of noncombustible material except that on Type V buildings not exceeding two stories in height in Fire Zone No. 3 they may be of wood not less than two inches in nominal thickness. Exterior stairs serving Groups A, B, C and D occupancies and those serving other occupancies in Types I, II, III and IV construction shall be noncombustible.

(k) **STAIRWAY TO ROOF.** In every building more than three stories in height, one stairway shall extend to the roof surface unless the roof has a slope greater than four in twelve.

(l) **HEADROOM.** Every required stairway shall have headroom clearance of not less than six feet and eight inches measured vertically from the nearest nosing to the nearest soffit. (Ord. 94563 § 10; February 23, 1966; prior Ord. 85500 § 3305 as amended by Ord. 92306; September 4, 1963).

3.33.060 Ramps. A ramp used as a required exit shall conform to the following, except exterior ramps not within confines of the building in Groups E, F, G and H occupancies are exempt from these requirements:

1. **Width.** The width of ramps shall be as required for stairs.
2. **Slope.** The slope of a ramp more than six feet in length shall not exceed one in six.
3. **Handrails.** A ramp more than six feet in length with slope exceeding one in eight shall have handrails as required for stairways.
4. **Construction.** Ramps shall be constructed as required for stairways.
5. **Surface.** The surface of ramps shall be roughened or shall be of non-slip material. (Ord. 85500 § 3306 as amended by Ord. 88324; June 24, 1949).

3.33.070 Horizontal exits. (a) **USED AS A REQUIRED EXIT.** If conforming to the provisions of this Chapter, horizontal exits may be used for not to exceed fifty per cent of required exit width. An arcade used as a required exit shall be of Type I, II, or IV construction.

(b) **DISCHARGE AREAS.** A horizontal exit shall lead into a floor area having capacity for an occupant load not less than the occupant load served by such exit. The capacity shall be determined by allowing three square feet of net clear floor area per occupant. The area into which the horizontal exit leads shall be provided with exits as required by Section 3.33.020, at least one of which shall lead directly to a public street or alley. (Ord. 85500 § 3307; Sept. 10, 1956).

3.33.080 Exit enclosures. (a) **GENERAL.** Every interior stairway, ramp or escalator shall be enclosed as specified in this section.

Exceptions: 1. In occupancies other than Group C and D, an enclosure will not be required for a stairway, ramp or escalator serving only the second floor and not connected with corridors or stairways serving any other floor or basement.

2. In sprinklered buildings, a stairway that is not a required exit serving only the basement need not be enclosed, provided such stairs are not connected to corridors or other stairs serving other floors.

3. In sprinklered buildings of Type I construction housing Group F and G occupancies, enclosures are not required for escalators.

4. Stairs serving mezzanine floors only need not be enclosed.

5. Stairs are not required to be enclosed in those factories of Group G occupancies such as steel mills and cement mills housed in Type I buildings of noncombustible construction throughout.

(b) **ENCLOSURE CONSTRUCTION.** Enclosure walls shall be of not less than two-hour fire-resistive construction in buildings more than four stories in height and shall be of not less than one-hour fire-resistive construction elsewhere.

(c) **OPENINGS INTO ENCLOSURES.** There shall be no openings into exit enclosures except exit doorways and openings in exterior walls. Every interior exit door in an exit enclosure shall be a self-closing Class "B" fire door. Every exterior opening in an exterior wall forming part of an exit enclosure shall be protected as required for openings in exterior walls or inner courts. In Group C occupancies, automatic fire doors fused at one hundred twenty-five degrees Fahrenheit may be used in lieu of self-closing fire doors.

(d) **EXTENT OF ENCLOSURE.** Stairway and ramp enclosures shall include all walls, floors and ceilings together with landings and parts of floors connecting stairway flights and shall also include a corridor on the ground floor leading from the stairway to the exterior of the building. Enclosed corridors or passageways are not required from unenclosed stairways.

Exception: A stairway connecting not more than two floors may be enclosed in the lower floor only. In Type I buildings, such single story enclosure shall be of not less than two-hour fire-resistive construction. (Ord. 85500 § 3308, as amended by Ord. 93964; June 15, 1965).

(b) **DISCHARGE AREAS.** A horizontal exit shall lead into a floor area having capacity for an occupant load not less than the occupant load served by such exit. The capacity shall be determined by allowing three square feet of net clear floor area per occupant. The area into which the horizontal exit leads shall be provided with exits as required by Section 3.33.020, at least one of which shall lead directly to a public street or alley. (Ord. 85500 § 3307; Sept. 10, 1956).

3.33.080 Exit enclosures. (a) **GENERAL.** Every interior stairway, ramp or escalator shall be enclosed as specified in this section.

Exceptions: 1. In occupancies other than Group C and D, an enclosure will not be required for a stairway, ramp or escalator serving only the second floor and not connected with corridors or stairways serving any other floor or basement.

2. In sprinklered buildings, a stairway that is not a required exit serving only the basement need not be enclosed, provided such stairs are not connected to corridors or other stairs serving other floors.

3. In sprinklered buildings of Type I construction housing Group F and G occupancies, enclosures are not required for escalators.

4. Stairs serving mezzanine floors only need not be enclosed.

5. Stairs are not required to be enclosed in those factories of Group G occupancies such as steel mills and cement mills housed in Type I buildings of noncombustible construction throughout.

(b) **ENCLOSURE CONSTRUCTION.** Enclosure walls shall be of not less than two-hour fire-resistive construction in buildings more than four stories in height and shall be of not less than one-hour fire-resistive construction elsewhere.

(c) **OPENINGS INTO ENCLOSURES.** There shall be no openings into exit enclosures except exit doorways and openings in exterior walls. Every interior exit door in an exit enclosure shall be a self-closing Class "B" fire door. Every exterior opening in an exterior wall forming part of an exit enclosure shall be protected as required for openings in exterior walls or inner courts. In Group C occupancies, automatic fire doors fused at one hundred twenty-five degrees Fahrenheit may be used in lieu of self-closing fire doors.

(d) **EXTENT OF ENCLOSURE.** Stairway and ramp enclosures shall include all walls, floors and ceilings together with landings and parts of floors connecting stairway flights and shall also include a corridor on the ground floor leading from the stairway to the exterior of the building. Enclosed corridors or passageways are not required from unenclosed stairways.

Exception: A stairway connecting not more than two floors may be enclosed in the lower floor only. In Type I buildings, such single story enclosure shall be of not less than two-hour fire-resistive construction. (Ord. 85500 § 3308, as amended by Ord. 93964; June 15, 1965).

3.33.090 Smoke proof enclosures. (a) **GENERAL.** A smoke proof enclosure shall consist of a continuous stairway enclosed from the roof to grade by walls of two-hour fire-resistive construction. The supporting structural frame shall be of four-hour fire-resistive construction.

(b) **WHERE REQUIRED.** In buildings five stories or more in height, one of the required exits shall be a smokeproof enclosure.

(c) **CONSTRUCTION.** Stairs in smokeproof enclosures shall be of noncombustible construction and shall be of one of the following three types:

1. **Tower Stairs.** Access to such stair shall be through a vestibule with minimum opening of sixteen square feet to the outside or by way of an open balcony. Such openings may have fire windows actuated to open automatically in case of fire and further equipped with a device for manual operation.

2. **Fire Shield Stairs.** Access to such stair shall be through a vestibule with a minimum opening of sixteen square feet, and there shall be no access direct to the stair from the interior of the building. The vestibule shall be vented to the outside by means of a smoke shaft of not less than fifty square feet area unobstructed from the bottom to the sky.

3. **Outside Stairways.** Access to such stair may be direct from the interior of the building. At every floor above the first there shall be an unobstructed opening in the exterior wall not less than sixteen square feet, provided that such opening may be screened.

(d) **DOORS.** Exit doors to smokeproof enclosures and vestibules shall be self-closing Class "B" fire doors.

(e) **OUTLET.** A smokeproof enclosure shall exit into a street or alley or into a passageway leading to a street or alley. The passageway shall be without other openings and shall have walls, floors and ceiling of two-hour fire-resistance.

(f) **BARRIER.** A smokeproof enclosure stair shall not continue below the grade level exit unless a barrier is provided at the ground floor level which will, when necessary, prevent persons from continuing on into the basement. (Ord. 85500 § 3309 as amended by Ord. 88324; June 24, 1959).

3.33.100 Exit outlets. (Repealed by Ord. 88324; June 24, 1959).

3.33.110 Exit courts. (a) **DISCHARGE.** Every exit court shall discharge into a street or alley or passageway leading to a street or alley. The passageway shall be without other openings and shall have walls, floors, and ceilings of the same period fire resistance as the walls, ceilings and floors of the building but in no case of less than one-hour construction.

STAIRS, EXITS AND OCCUPANT LOADS 3.33.120—3.33.130

(b) **WIDTH.** Every exit court shall be not less in width than the aggregate width of the required tributary exits nor less than five feet (5').

(c) **SLOPE AND SURFACING.** The slope of exit courts shall not exceed one in ten for A, B, C and D occupancies, all others not to exceed one in eight. Surface of exit shall be improved with proper drainage to permit easy exit.

(d) **OPENINGS.** Openings to an exit court less than sixteen feet (16') wide serving a Group A or B occupancy shall be protected by a self-closing Class "E" or "F" fire door or fire windows.

Exception: Openings more than twenty feet (20') above the floor of the exit court may be unprotected.

(e) **OBSTRUCTIONS.** The required width of exit courts shall be unobstructed except for trim and handrails which may project not more than three and one-half inches (3½") into the required width. (Ord. 85500 § 3311 as amended by Ord. 88324; June 24, 1959).

3.33.120 Exit signs and illumination. (a) **EXIT ILLUMINATION.** Exits shall be illuminated at all times when conditions of occupancy require that an exit be available with light having an intensity of not less than one (1) foot candle at floor level.

(b) **EXIT SIGNS.** At every exit doorway, and wherever otherwise required, approved illuminated exit signs to clearly indicate the direction of egress with green letters at least five inches (5") high shall be provided from all areas serving the occupant load specified in subsection (c). In interior stairways the floor level leading directly to the exterior shall be clearly indicated.

Exception: Exit signs shall not be required on unenclosed stairways serving exterior balconies.

(c) Groups A, B, C, D and H occupancies with an occupant load of more than fifty (50) and all other occupancies serving an occupant load of more than one hundred (100) shall meet all the requirements of this section. (Ord. 85500 § 3312 as amended by Ord. 88324; June 24, 1959, and by Ord. 92060; May 14, 1963).

3.33.130 Aisles. (a) **GENERAL.** Every portion of every building in which are installed seats, tables or equipment shall be provided with aisles leading to an exit as set forth in this section.

Every aisle serving more than fifty (50) persons shall be so arranged as to provide exit in two directions, provided that such aisles may have dead ends not exceeding twenty-five feet (25') in length.

In applying for a building permit, a traffic flow pattern showing the path of exit for emergency conditions shall be required on all Group A and B occupancies with fixed seats.

(b) **WIDTH.** Aisles shall have a minimum width as follows:

Every aisle shall have at least one foot (1') of width for each fifty (50) persons served and no aisle shall be less than three feet (3') wide.

Exceptions: 1. Aisles in bleachers only shall have at least one foot (1) of width for each eighty (80) persons served.

2. Aisles in theatres only shall have at least eighteen inches (18") of width for each one hundred (100) persons served and may be tapered increasingly in width in the direction of exit.

3. Aisles in bleachers of Type I or II construction shall have at least one (1) foot of width for each one hundred forty (140) persons served.

Aisles in assembly rooms or spaces shall be not less than three feet six inches (3'-6") wide where there are seats on both sides.

(c) **DISTANCE TO NEAREST EXIT.** In areas occupied by seats, regardless of occupancy, and in Group A and B occupancies without seats, the distance of travel from any point to the entrance to (1) an enclosed stairway or passageway or (2) an exterior door, by an aisle shall not exceed the limits set forth in Section 3.33.020.

(d) **AISLE RAMPS AND STEPS.** The maximum ramp grade shall not exceed one vertical in eight horizontal. Where level seat platforms are used in conjunction with a ramped aisle, the platform passageway shall be ramped to the aisle.

There shall be no steps in cross aisles. Steps in other aisles shall be the full width of the aisle and the rise shall not exceed seven and one-half inches (7½") nor shall the tread be less than nine inches (9").

In stepped aisles, except those of sports arenas, there shall be provided at each row of seats a landing, level with the seat platform and not less than eighteen inches (18") in depth, measured from the front edge of the seat platform.

(e) **CROSS AISLES.** Cross aisles shall be used to connect main aisles wherever necessary to provide two ways to an exit, or to provide access to exits within maximum travel distance. When used as a foyer or vomitory, or to exit traffic from more than one side aisle, a cross aisle shall be as wide as all required tributary aisles combined.

Exception: Theatre cross aisles shall not be less than four feet (4') wide and shall be a minimum of eighteen inches (18") for each one hundred (100) persons served, and may be tapered increasing in width in the direction of exit.

Cross aisles shall be required to connect all main aisles or to connect main aisles to side exits at intervals of not more than thirty (30) rows of seats.

Exception: Where three or more banks of seats are used, cross aisles across the main bank may be eliminated.

(f) **AISLE SPACING.** Aisles shall be spaced as follows:

1. With "Standard" spacing as set forth in Section 3.33.140 (a)

there shall be not more than six (6) seats intervening between any seat and the nearest aisle.

2. With "Continental" seating as set forth in Section 3.33.140 (a) there shall be not more than twelve (12) seats intervening between any seat and the nearest aisle.

3. With "Continental" seating where there is at least three feet (3') measured horizontally between the seat in its down position and the back of the chair in the preceding row with its back in the inclined position, there shall be no limit in the number of seats between aisles except the distance of travel.

(g) FOYERS. In Group A and B-1 theaters, there shall be provided a foyer with an area of not less than three-fourths square foot ($\frac{3}{4}$ sq. ft.) per person for the occupant load to connect the main exit to the assembly room. The foyer elevation shall be at, or near, street level, and any difference in elevation ramped. Such foyer shall either:

1. Extend across the assembly room a width sufficient to connect main aisles and any side aisles, or

2. Extend along the side of the assembly room with cross aisles connecting to main aisles. Such side foyers shall discharge directly into main exits or into four-hour fire-resistive corridors having no openings into other parts of the building.

Exceptions: 1. No foyer shall be required when the assembly room discharges directly through a main exit onto a street or outer court parallel to a street and without obstruction.

2. No foyer shall be required when all merging (i.e. nonparallel) columns of traffic converge into an area having a continuous width at least twenty per cent (20%) greater than the combined width of such converging exit columns.

3. A vomitory may be used in lieu of a foyer. When so used, such vomitory shall be subject to the requirements of Section 3.33.130 (g). (Ord. 85500 § 3313, as amended by Ord. 90196; April 24, 1961).

3.33.140 Seats. (a) SPACING. The spacing of rows of seats shall be as follows:

1. "Standard" spacing. The spacing of rows of seats measured from back to back shall be not less than thirty-three (33) inches nor less than eight (8) inches measured horizontally between the seat in its down position and the back of the chair in the preceding row with its back in its inclined position.
2. "Continental" spacing. The spacing of rows of seats measured from back to back shall be not less than forty-six (46) inches nor less than twenty (20) inches measured horizontally between the seat in its down position and the back of the chair in the preceding row with its back in its inclined position.

(b) **PORTABLE SEATS.** In all A and B-1 occupancies, and in other occupancies with stepped floors or platforms, portable seats for use of the public shall be fastened together in banks of four (4) or arranged in other approved manner.

Exception. Seats in multi-purpose rooms in schools, churches and similar occupancies and seats arranged around tables used for eating purposes shall be exempt from the requirements of Section 3.33.140

(b) provided aisles conforming to Section 3.33.130 (a), (b) and (c) are installed. (Ord. 85500 § 3314, as amended by Ord. 90196; April 24, 1961).

3.33.150 Bleacher seats. Fixed stadium and sports arena seats, and rollaway, telescoping and fold-up bleacher seats without backs shall conform to the requirements of this section, and such seats shall be used only in stadiums and sports arenas.

Banks of seats shall contain not more than twenty (20) rows of seats. Minimum spacing of seats back to back shall be as follows:

1. Backless seats, twenty-two inches (22").
2. Seats with backs, thirty inches (30").

Banks of seats shall be provided with aisles.

Exception: Bleachers with not more than eleven (11) rows of backless seats need not be provided with aisles.

There shall be no more than nine (9) seats between any seat and an aisle.

In bleachers of Type I or II construction, there shall not be more than fifteen (15) seats between any seat and an aisle.

The width of aisles shall be as specified in Section 3.33.130 (b). The rise of stepped aisles not to exceed twelve inches (12").

Where bleacher sections are placed on platforms above the main floor, a cross-aisle and guard railing shall be provided at the front of such sections.

Open end sections shall be provided with railings for that portion above the first row of seats. Where the back of a bleacher section is not placed against a wall, a railing shall be provided at the back of the section.

Any increase of occupant load because of the addition of bleachers shall require additional exit facilities. (Ord. 85500 § 3315, as amended by Ord. 90196; April 24, 1961).

3.33.160 Exits—Group A occupancies. (a) **GENERAL.** The main and secondary exits shall not discharge to the same street or open area.

The total exit width discharging into a street, alley or court shall not exceed the street, alley or court width. For the purpose of the above requirement, street width may be construed to include the width of any outer court parallel thereto.

(b) **MAIN EXITS.** Every Group A occupancy shall have one main exit.

Exception: All Group A occupancies without fixed seats, and gymnasiums, restaurants, stadiums, sports arenas and similar buildings need not have one main exit, provided that an aggregate width of exits conforming to the requirement for main exits as set forth in Section 3.33.160(d) shall be provided for main exits and provided that the aggregate width of all exits shall be not less than that required under Section 3.33.020.

(c) **SECONDARY EXITS.** Every secondary exit herein required shall open directly upon a street or alley or upon an exit court. Every secondary exit which does not open directly on a street, alley or exit court at least sixteen feet (16') wide shall be equipped with Class "D" fire doors.

Every such exit court shall be at least as wide as the aggregate width of the exits it serves and in no case less than ten feet (10'), and otherwise shall conform to Section 3.33.110.

Any difference in the levels of the floors of such exit courts or passages shall be overcome by ramps having a slope of not more than one in ten. The street or alley end of the court or passage shall be level with the grade.

(d) **EXIT WIDTHS.** Main and secondary exit widths shall be provided as follows:

CAPACITY	MAIN EXIT	SECONDARY EXITS
Under 1,000	1 ft./60 persons of entire capacity	1 ft./100 persons of entire capacity
1,000 - 2,000	1 ft./75 persons of entire capacity	1 ft./90 persons of entire capacity
2,000 and over	1 ft./100 persons of entire capacity	1 ft./80 persons of entire capacity

In no case shall these widths be less than the total width of all required ansles and stairways leading thereto.

(e) **BALCONY EXITS.** Every balcony shall have a principal exit leading from the balcony to the foyer or to an exterior exit on a street. The principal exit shall be one foot (1') wide for each one hundred (100) persons of the balcony capacity but in no event less than four feet (4').

Exceptions: 1. Balconies with a capacity under five hundred (500) may, in lieu of the principal exit, have two exits, one on each side, leading by open stair to the foyer or to the main floor where no foyer is required or through enclosed stairs leading to a street exit.

2. When no principal exit is provided, the exit on each side shall be one foot (1') for each eighty (80) balcony seats with a minimum width of three feet (3') net.

3. Balconies having a capacity of fifty (50) or less may have one exit, not less than three feet (3') net width, provided the total dead end thus produced does not exceed thirty feet (30').

4. Principal exits may be excepted per Section 3.33.160 (b) for main exits.

The principal exit may be a center vomitory or may lead from the center front or rear by open stairs to the foyer. Principal and side exits shall be separated as approved by the Superintendent of Buildings.

Every balcony shall be provided with secondary exits on each side except as provided in Exceptions 2 and 3 above. The secondary exits on each side shall be of sufficient width to accommodate one-third ($\frac{1}{3}$) of the total occupant load of the balcony but not less than three feet (3'). Secondary side exits shall open directly into an exit court or a ramp or stairway leading to an exit court and secondary side exits from balconies above the first balcony shall be by way of a stairway or ramp in a smokeproof enclosure. Secondary side exits shall be accessible from a cross aisle or a side aisle.

(f) **STAGE EXITS.** There shall be at least two (2) exits located, one on each side, from every stage and from the substage or basement of the stage. Such exits shall be not less than three feet (3') wide. At least one (1) such exit from the basement shall be to an enclosed stairway. A permanent noncombustible ladder may be used as an emergency means of exit if not extending through the stage floor.

Every dressing room shall have access to two (2) exits.

There shall be one (1) exit to the roof from the gridiron.

There shall be no opening from the stage portion into a corridor or passage into which there are also openings from other occupancies in the building.

Exception: Stages in school auditoriums shall be exempt from the requirements of Section 3.33.160 (f).

(g) **DOOR SWING.** All exit doors shall swing outward and no door shall swing into the required width of any corridor or passage.

(h) **FALSE DOORS, DRAPES.** No decorative treatment shall be used to give the appearance of a door or exit when no such door or exit exists. All draperies and decorations shall be flameproof and maintained in a nonflammable condition as approved by the Chief of the Fire Department.

(i) **PANIC HARDWARE.** An exit door from a Group A occupancy room or space having an occupant load of more than fifty (50) shall not

be provided with a latch or lock unless it is panic hardware. No door shall have a key operated inside lock. (Ord. 85500 § 3316 as amended by Ord. 88324; June 24, 1959).

3.33.170 Exits—Group B occupancies. (a) GROUP B, DIVISION 1. Division 1 occupancies shall have exits as required by Section 3.33.160.

(b) GROUP B, DIVISIONS 2 and 3. Every main exit or exit court serving such main exit shall discharge onto a street or an outer court and have no obstruction in the line of exit traffic.

An exit door for any Group B occupancy, Divisions 2 and 3, having an occupant load of more than fifty (50), shall not be provided with a latch or lock unless it is panic hardware.

Stadiums and reviewing stands shall have exits as set forth in Sections 3.33.160 or 3.33.170 (b) depending on their capacity. (Ord. 85500 § 3317 as amended by Ord. 88324; June 24, 1959).

3.33.180 Exits—Group C occupancies. (a) GENERAL. Every building containing a Group C occupancy shall have at least two (2) exits. Every room with a capacity of fifty (50) or more in a Group C occupancy shall have at least two (2) exits. Assembly rooms in schools shall have exits as set forth in Sections 3.33.160 or 3.33.170, depending on capacity.

Every main exit or exit court serving a main exit shall discharge onto a street or an outer court and have no obstruction in the line of exit traffic.

(b) CORRIDORS. The width of a corridor in a Group C occupancy shall be the width required by Section 3.33.020 plus two feet (2'), but no corridor shall be less than six feet (6') wide.

Corridor walls and ceilings shall be as set forth in Section 3.33.040 (e).

There shall be no change of elevation of less than two feet (2') in a corridor unless ramps are used.

(c) CORRIDORS SERVING AUDITORIUMS. An exit serving both an auditorium and other rooms need provide only for the capacity of whichever requires the greater width if the auditorium is not to be used simultaneously with the other rooms.

(d) STAIRS. Each floor above or below the ground floor level shall have not less than two (2) exit stairs and the required exit width shall be equally divided between such stairs, provided that no stair serving an occupant load of more than one hundred (100) shall be less than five feet (5') in width exclusive of rails.

Exception: This subsection does not apply to rooms used for maintenance, storage, and similar purposes.

(e) **DOORS.** Exit doors in school rooms shall swing in the direction of exit. Exit doors in schools and their assemblies, such as auditoriums and gymnasiums, may have fixed center mullions.

(f) **EXTERIOR EXIT.** Any floor which is below grade and which is used by pupils shall have at least one (1) exit leading directly to the exterior of the building, and such exit shall be not less in width than one-half ($\frac{1}{2}$) the required aggregate width of exits from such rooms.

(g) **SELF-RELEASING DEVICE.** Exit doors from rooms having an occupant load of more than one hundred (100) and from corridors shall not be provided with a latch or lock unless it is panic hardware. (Ord. 85500 § 3318 as amended by Ord. 88324; June 24, 1959).

3.33.190 Exits—Group D occupancies. (a) **GENERAL.** Every main exit or exit court serving such main exit shall discharge onto a street or an outer court and have no obstruction in the line of exit traffic.

(b) **SEPARATE EXITS.** Every room in a Group D occupancy shall have access to two (2) separate exits.

(c) **CORRIDORS.** There shall be no change of elevation of less than two feet (2') in a corridor unless ramps are used.

The corridors shall be not less than six feet (6') wide in occupancies where bedridden patients are housed.

(d) **BASEMENT EXITS.** One exit from rooms below grade housing persons shall be directly to the exterior.

(e) **RAMPS.** Every portion of a Group D occupancy, Division 2, in buildings of Types II, III, IV and V housing bedridden patients, shall have access to a horizontal exit or a ramp leading to the exterior.

(f) **DOORS.** Exit doors serving areas housing bedridden patients shall be not less than three feet eight inches (3'-8") in width.

(g) **LOCKS.** No exterior door shall be locked from the inside, except sanitariums for mental patients.

(h) **PLACES OF DETENTION.** No requirements of this chapter shall be so construed as to prohibit the construction of cell blocks in jails or prevent use of any locks or safety devices in buildings conforming to the provisions of this Code where it is necessary forcibly to restrain the inmates.

(i) **EXCEPTIONS.** Where construction meets the requirements of Section 3.09.020 (b), the exterior doors may be fastened with locks, pro-

STAIRS, EXITS AND OCCUPANT LOADS 3.33.200—3.33.240

vided that room doors shall not be fastened by other means than latch sets or similar devices which can be opened readily from the corridor side without the use of keys. (Ord. 85500 § 3319 as amended by Ord. 88324; June 24, 1959).

3.33.200 Exits—Group E occupancies. Every portion of a building used as a Group E-2 occupancy having a floor area of two hundred square feet or more shall be served by at least two separate exits. For additional exit requirements in Group E-2 occupancies, see Section 3.10.080 (c) 4. (Ord. 85500 § 3320; Sept. 10, 1956).

3.33.210 Exits—Group F occupancies. The maximum distance of travel permitted in Section 3.33.020 may be increased by fifty feet for F-3 garages and roof parking areas. Where buildings are designed with exit balconies as permitted in Chapter 3.35, see Section 3.33.220 for exit requirements. (Ord. 85500 § 3321 as amended by Ord. 88324; June 24, 1959).

3.33.230 Mezzanine exits. Means of exit from any mezzanine shall be so arranged that the distance of travel to a means of exit shall not exceed that prescribed for means of exit of the occupancy group for which the mezzanine is used. Mezzanine stairs need not be enclosed; provided, that there shall be no open sides of such stairs unprotected by a wall or railing. Mezzanines with a capacity of more than fifty persons shall have at least two stairs.

Mezzanine stairs when serving an area of not to exceed four thousand square feet and serving an area having a density of human occupancy of not more than one person per one hundred square feet need not be more than thirty inches wide, with handrail on one side only. (Ord. 85500 § 3323; September 10, 1956).

3.33.240 Special hazards. Where area exceeds five hundred square feet, boiler rooms and rooms containing a furnace or incinerator shall be provided with at least two means of exit, one of which may be a ladder leading to an exterior opening. (Ord. 85500 § 3324 as amended by Ord. 88324; June 24, 1959).

Chapter 3.34

SKYLIGHTS

Sections:

- 3.34.010 Plastic skylights.
- 3.34.020 Wired glass skylights.
- 3.34.030 Ordinary glass skylights.
- 3.34.050 Floor and sidewalk lights.
- 3.34.060 Sliding glass doors.
- 3.34.070 Safety glazing material.

3.34.010 General. Skylights shall be glazed with wire glass unless specifically excepted by sections in this chapter. Glass skylights, except those in buildings of Group I and J occupancy, shall be constructed with metal frames which shall be designed to carry loads for roofs as set forth in Section 3.23.050. All skylights glazed with glass which is set at an angle of less than forty-five (45) degrees from the horizontal, if located above the first story, shall be set at least eight (8) inches above the roof. See Chapter 3.57 for plastic skylights. Skylight curbs may be of the same construction as the roof, except if more than two (2) feet in height they shall be constructed as required for inner court walls. (Ord. 85500 § 3401 as amended by Ord. 88324; June 24, 1959).

3.34.020 Wired glass skylights. Spacing between supports for flat wired glass shall not exceed twenty-five (25) inches. Corrugated wired glass may have supports not to exceed five (5) feet apart in the direction of the corrugation. (Ord. 85500 § 3402; September 10, 1956).

3.34.030 Ordinary glass skylights. Ordinary glass may be used in lieu of wired glass as follows:

- (a) In all greenhouses.
- (b) When a skylight is at a distance from a property line equivalent to that which would permit unprotected openings as set forth in Sections 3.18.030, 3.19.030, 3.20.030, 3.21.030, and 3.22.030, ordinary glass may be used in

1. Buildings of I and J occupancy, regardless of construction type.
 2. One story buildings of Types III and IV in Fire Zone 3.
 3. One story buildings of Type V construction in Fire Zones 2 and 3.
- (Ord. 85500 § 3403; Sept. 10, 1956).

3.34.050 Floor and sidewalk lights. Glass used for the transmission of light, if placed in floors or sidewalks, shall be supported by metal or reinforced concrete frames, and such glass shall be not less than one-half ($\frac{1}{2}$) inch in thickness. Any such glass over sixteen (16) square inches in area, shall have wired mesh embedded in the same or shall be provided with a wire screen underneath. All portions of the floor lights or sidewalk

lights shall be of the same strength as is required by this Code for floor or sidewalk construction, except in cases where the floor is surrounded by a railing not less than three feet six inches (3'6") in height, in which case the construction shall be calculated for not less than roof loads. (Ord. 85500 § 3405; Sept. 10, 1956).

3.34.060 Sliding glass doors. The glass in sliding glass doors and sliding glass door assemblies hereafter installed in new or remodeled buildings shall be of safety glazing material and shall bear a warranty in the form of a label, decal or etching in the lower corner which shall be visible after installation and which shall identify the manufacturer and warrant that the glass is of a type of safety glazing material and that it meets the tests therefor, as set forth in Section 3.34.070. (Ord. 85500 § 3406, as amended by Ord. 92306; September 4, 1963).

3.34.070 Safety glazing material. Safety glazing material is glazing material so constructed, treated or combined with other materials as to reduce substantially, in comparison with ordinary sheet glass or plate glass, the likelihood of injury to persons by these safety glazing materials when they may be cracked or broken. The materials shall be of the following types and shall meet the following tests:

(a) Fully tempered glass:

1. Particle test—the fully tempered safety glass panel shall be fractured by impact with a spring loaded center punch or by striking a regular center punch with a hammer. The point of impact shall be one-half ($\frac{1}{2}$) inch to one (1) inch from any glass edge. When fractured, there shall be no individual fragment larger than 0.15 ounces.

(2) Impact test—as in test No. 8 as set forth in American Standard Safety Code Z26.1, edition of 1950, published by the American Standards Association, a copy of which is filed with the City Comptroller (C.F. 249228).

(b) Laminated glass:

(1) Boil test—as in test No. 4 as set forth in American Standard Safety Code Z26.1, edition of 1950, published by the American Standards Association.

(2) Impact test—as in tests No. 9 and 12 as set forth in American Standard Safety Code Z26.1, edition of 1950, published by the American Standards Association.

(c) Wire glass: impact test—as in test No. 11 as set forth in American Standard Safety Code Z26.1, edition of 1950, published by the American Standards Association. (Ord. 85500 § 3407, added by Ord. 92306; September 4, 1963).

Chapter 3.35
BAYS, PORCHES AND EXTERIOR
BALCONIES

Sections:

- 3.35.010 Bay and oriel windows.
- 3.35.020 Balconies and porches.
- 3.35.040 Marquees—Size.
- 3.35.050 Marquees—Material.
- 3.35.060 Marquees—Drainage.
- 3.35.070 Fixed Awnings—Size.
- 3.35.080 Fixed Awnings—Material.
- 3.35.090 Retractable awnings and canopies.

3.35.010 Bay and oriel windows. Construction of walls and floors in bay and oriel windows shall conform to the construction allowed for exterior walls and floors of the type of construction of the building to which they are attached. The roof covering of a bay or oriel window shall conform to the requirements for roofing of the main roof of the building. (Ord. 85500 § 3501; September 10, 1956).

3.35.020 Balconies and porches. Exterior balconies attached to or supported by walls required to be of masonry shall have brackets or beams constructed of noncombustible material. Railings of a minimum height of thirty-six inches are required on balconies and porches, except in Group I occupancies. The intermediate members in open-type railings shall be spaced no more than nine inches apart.

Porches and exterior balconies may be constructed of the materials allowed for the building to which they are attached. Structural steel or iron members shall be adequately protected against corrosion but need not be fire-protected. (Ord. 94563 § 11; February 23, 1966; prior Ord. 85500 § 3502 as amended by Ord. 88324; June 24, 1959).

PENTHOUSE AND ROOF STRUCTURES 3.35.040—3.36.010

3.35.040 Marquees—Size. No marquee shall project more than sixteen feet from the face of the building to which it is attached. (Ord. 85500 § 3504, added by Ord. 91546; October 30, 1962).

3.35.050 Marquees—Material. Marquees shall be constructed of non-combustible or one hour fire-resistive material. (Ord. 85500 § 3505, added by Ord. 91546; October 30, 1962).

3.35.060 Marquees—Drainage. Marquees shall be provided with metal conductors for water, which shall drain back to the building line and be connected to a sewer, or if approved by the City Engineer, to a dry well or under a sidewalk to a gutter. (Ord. 85500 § 3506, added by Ord. 91546; October 30, 1962).

3.35.070 Fixed awnings—Size. The maximum area of the upper surface of a fixed awning shall be three hundred square feet, and the maximum projection from the face of the building to which it is attached shall be six feet. (Ord. 85500 § 3507, added by Ord. 91546; October 30, 1962).

3.35.080 Fixed awnings—Material. Fixed awnings shall be constructed of noncombustible or one hour fire resistive material, except that in Fire Zone 3 fire retardant material may be used. (Ord. 85500 § 3508, added by Ord. 91546; October 30, 1962).

3.35.090 Retractable awnings and canopies. Retractable awnings and canopies shall be constructed of approved materials. (Ord. 85500 § 3509, added by Ord. 91546; October 30, 1962).

Chapter 3.36

PENTHOUSES AND ROOF STRUCTURES

Sections:

3.36.010 Penthouses and roof structures.

3.36.020 Towers and spires.

3.36.010 Penthouses and roof structures. No penthouses or other projection (except towers, steeples and spires) above the roof in buildings of Types I or II construction shall exceed thirty feet (30') in height above the roof and in buildings of other construction types shall not extend more than twenty feet (20') in height above the roof. For roof signs, see Chapter 3.46.

Exception: In areas where a secondary water supply is required, water tank enclosures shall be exempt from the above height limitations.

Roof structures of Type I and II buildings shall be constructed with walls, floors and roof as required for the main portion of the building.

Exception: Exterior walls and roofs of penthouses which are five feet or more from the exterior wall of the main portion of the building may be of one-hour fire-resistive construction.

Walls of roof structures generally parallel to and within five feet of the exterior walls of Type III buildings shall be constructed the same as the exterior wall of the story immediately below.

Exception: In Group E, Division 2 occupancies, such structures within 20 feet and generally parallel to exterior walls shall be constructed the same as the exterior wall immediately below.

Such wall shall project two feet above the roof and two feet beyond the sides of such roof structures, except that the side projection shall not be required when the adjoining side walls are of masonry. Walls other than those occurring within five feet of an exterior wall on Type III buildings shall be of not less than one-hour fire resistive construction or its equivalent. (Ord. 85500 § 3601 as amended by Ord. 86257; June 18, 1957).

3.36.020 Towers and spires. Towers or spires when enclosed shall have exterior walls as required for the building to which they are attached. Towers not enclosed and which are permitted to and do extend more than seventy-five feet above grade shall have their framework constructed of iron, steel or reinforced concrete. No tower or spire shall occupy more than one-fourth of the street frontage of any building to which it is attached and in no case shall the base area exceed sixteen hundred square feet unless it conforms entirely to the type of construction requirements of the building to which it is attached and is limited in height as a main part of the building. The fire resistance of roof covering of spires shall be not less than that required for the main roof of the structure.

Radio or television masts placed on the roof of any building shall be constructed entirely of noncombustible materials when more than twenty-five feet in height and shall be directly supported on an adequate framework. They shall be designed to withstand a wind load from any direction as specified in Section 3.23.070 in addition to any other load. (Ord. 85500 § 3602; September 10, 1956).

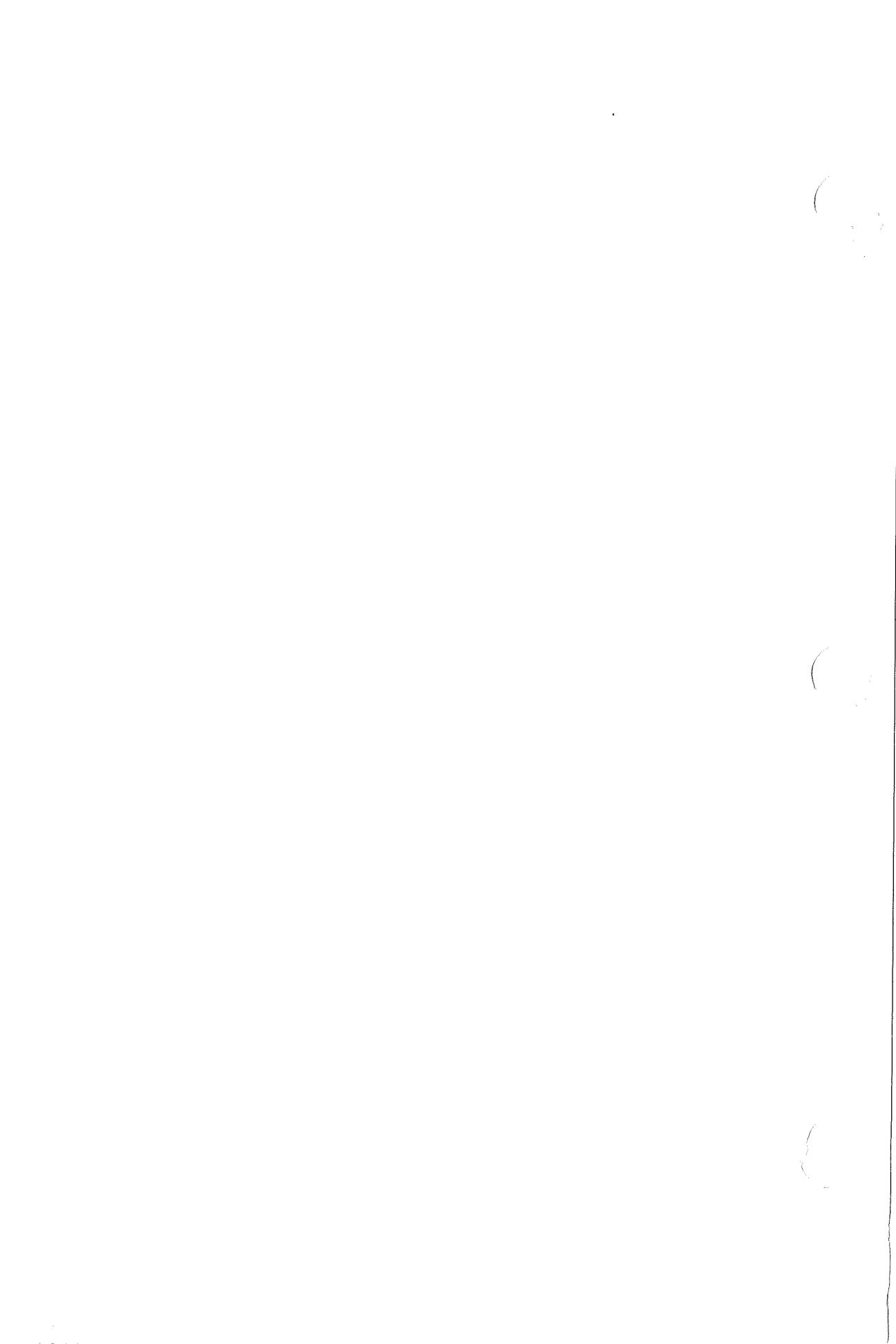
Chapter 3.37

CHIMNEYS, FLUES, VENTS AND FIREPLACES

Section:

- 3.37.010 Scope.
- 3.37.020 Chimneys.
- 3.37.030 Commercial and industrial chimneys.
- 3.37.040 Metal smoke stacks.
- 3.37.050 Types A flues or vents.
- 3.37.060 Type B flues or vents.
- 3.37.070 Flue vent connectors.
- 3.37.080 Type C flues or vents.
- 3.37.090 Special type "A" flues or vents.
- 3.37.100 Smoke pipes.
- 3.37.110 Interconnection of vents.
- 3.37.120 Vent manifold.
- 3.37.130 Fire places.

3.37.010 Scope. (a) **GENERAL.** Chimneys, flues, vents and fireplaces, and their connections, carrying products of combustion, shall conform to the requirements of this Chapter.



CHIMNEYS, FLUES, VENTS AND FIREPLACES 3.37.010

(b) **EQUIPMENT AND APPLIANCES.** Equipment and appliances shall be of approved types and shall be installed in full compliance with the conditions of approval, special limitations of use, and the manufacturer's instructions. Products of combustion from all appliances burning solid or liquid fuels and certain appliances burning gas (see Section 3.54.050 b) shall be discharged to the outside by means of chimneys, flues, vents, or fireplaces.

(c) **DEFINITIONS. Appliances, High Heat,** are any installation or equipment in which the temperature of the flue gases as they enter the flue is above 1,500 degrees F. to be measured at the outlet of the appliance or at the outlet of the draft hood attached to the appliance.

Appliances, Low Heat, are any installation or equipment in which the temperature of the flue gases is not more than 550 degrees F. to be measured at the outlet of the appliance or at the outlet of the draft hood attached to the appliance.

Appliances, Medium Heat, are any installation or equipment in which the temperature of the flue gases as they enter the flue is between 550 degrees F. and 1,500 degrees F. to be measured at the outlet of the appliance or at the outlet of the draft hood attached to the appliance.

Chimneys, Flues Or Vents are conduits or passageways, vertical or nearly so, for conveying products of combustion to the outer air.

1. **Type A.** Chimneys, flues or vents of masonry, reinforced concrete, metal smoke stacks and approved special flues.
2. **Type B.** Flues or vents of noncombustible, corrosion-resistant material of sufficient thickness, cross-sectional area, and heat insulating quality to avoid excess temperature on adjacent combustible material identified as to manufacturer and certified by a nationally recognized testing agency.
3. **Type BW.** Approved special flues for use only with vented recessed heaters, identified as to manufacturer and certified by a nationally recognized testing agency.
4. **Type C.** Flues or vents of sheet copper of not less than No. 24 gauge U.S. Standard or 16 oz. or of galvanized steel of not less than No. 20 gauge U.S. Standard or of other approved corrosion-resistant material.

Firebrick is any refractory fire-clay brick which meets U.B.C. Standard No. 37-1.

Fire-Clay Flue Lining is flue lining made of materials conforming to the definition of fire clay as described in U.B.C. Standard No. 37-2.

Flue Or Vent Connector is the pipe connecting a low heat appliance with the flue or vent.

Smoke Pipe is the pipe connecting a medium or high heat appliance with the flue or vent.

Vent (See definition for Chimneys, Flues, or Vents). (Ord. 85500 § 3701; Sept. 10, 1956).

3.37.020 Chimneys. (a) **STRUCTURAL DESIGN.** Chimneys shall be designed, anchored, supported and reinforced when so designed as required in this Chapter and Chapters 3.23 and 3.28. No chimney shall support any structural load other than its own weight. Chimneys in wood frame buildings shall be anchored laterally at the ceiling line and at each floor line which is more than six feet (6') above grade, except when entirely within the framework. Racked or offset chimneys may be permitted, provided that racking or offsetting does not exceed one third the width of the base, when constructed of unreinforced masonry.

(b) **WALLS.** Every chimney shall have solid masonry or reinforced concrete walls at least eight inches (8") thick in addition to the lining of fire-clay flue lining or firebrick.

Exception: Chimneys not exceeding thirty feet (30') in height and serving medium heat appliances may have a fire-clay flue lining surrounded by four inches (4") of brick or concrete, or eight inches (8") concrete without flue lining. (See Section 3.37.130 for Fireplaces and their Chimneys). Chimneys not exceeding one hundred forty-four square inches (144 sq. in.) in cross sectional area in buildings of Group I occupancy and chimneys for stoves or small furnaces or boilers in other buildings may have brick or concrete walls not less than six inches (6") thick without flue lining. All walls in any horizontal plane shall be of the same material.

(c) **FLUE LINING.** Fire-clay flue lining shall be not less than five-eighths inches (5/8") thick. The lining shall extend from eight inches (8") below the lowest inlet (except where inlet is at bottom of chimney) or, in the case of fireplaces, from the throat of the fireplace to a point at least four inches (4") above enclosing masonry walls. Fire-clay flue or other approved linings shall be installed ahead of the construction of the chimney as it is carried up, carefully bedded one on the other in fire-clay mortar, with close-fitting joints left smooth on the inside. Brick or other approved materials may be used in place of fire-clay flue lining and shall be not less than two inches (2") thick.

Exception: Flue lining in reinforced concrete chimneys serving medium heat appliances need not extend beyond twenty-five feet (25') above point of intake.

(d) **FLUE AREA.** No masonry flue shall be smaller in area than the flue connection on the appliance attached thereto nor less than as set forth in Table No. 37-A.

TABLE No. 37-A—FLUE AREA FOR SOLID OR LIQUID FUELS, NATURAL DRAFT

Type Of Equipment	Minimum Area Of Flue		
	Lined		Unlined
	Round	Rectangle	
Small stoves, heaters, ranges, warm air furnaces or boilers (not exceeding 140,000 B.T.U.)	6" I. D. 28 sq. in. flue area 30 sq. in.	8"x8" nominal 30 sq. in. flue area	
Fireplaces	1/12 of opening minimum	1/10 of opening minimum	1/8 of opening minimum
Warm air furnaces or boilers (exceeding 140,000 B.T.U.)	8" I. D. 50 sq. in. flue area	8"x12" nominal 53 sq. in. flue area	

(e) **HEIGHT.** Every chimney shall extend at least two feet (2') above the part of the roof through which it passes and at least two feet (2') above the highest elevation of any part of the building within ten feet (10') of the chimney. The Superintendent of Buildings may approve a chimney of a lesser height installed with an approved vent cowl having a spark arrester whose opening shall be not less than six feet (6') from any part of the building measured horizontally.

(f) **CORBELING.** No chimney shall be corbeled from a wall more than six inches (6"); nor shall a chimney be corbeled from a wall which is less than twelve inches (12") in thickness unless it projects equally on each side of the wall. In the second story of a two-story building of Group I occupancy, corbeling of chimneys on the exterior of the enclosing walls may equal the wall thickness. In every case the corbeling shall not exceed one inch (1") projection for each course of brick.

(g) **CHANGE IN SIZE OR SHAPE.** No change in the size or shape of a chimney where the chimney passes through the roof shall be made within a distance of six inches (6") above or below the roof joists or rafters.

(h) **SEPARATION OF CHIMNEY LINERS.** When more than two flues or vents are contained in the same chimney, masonry separation at

least four inches (4") thick bonded into the masonry wall of the chimney shall be provided to separate flues in pairs or singly.

(i) **CLEARANCE.** Wood structural framing shall not be placed closer than one and one-half inches (1½") of smoke chambers, or chimneys, except that where chimneys are constructed two inches (2") thicker than required, clearance may be reduced to one-half inch (½"). For special conditions covering fireplaces see Section 3.37.130.

(j) **CLEAN OUT.** Every breeching and every chimney shall be provided with an accessible clean out.

(k) **THIMBLES.** Thimbles in Class A chimneys for receiving the furnace breeching shall be made of masonry or black steel U.S. Gauge 20 minimum thickness or equivalent beaded on the outside and properly secured into the chimney. (Ord. 85500 § 3702, as amended by Ord. 90196; April 24, 1961).

3.37.030 Commercial and industrial chimneys. (a) **LOW HEAT APPLIANCES.** Masonry chimneys serving low heat appliances shall be lined with fire-clay flue lining or firebrick and have walls of solid masonry or reinforced concrete not less than eight inches (8") in thickness.

(b) **MEDIUM HEAT APPLIANCES.** Masonry chimneys serving medium heat appliances other than incinerators shall be of solid masonry or reinforced concrete not less than eight inches (8") in thickness and shall be lined with not less than four inches (4") of firebrick laid in fire-clay mortar, starting not less than two feet (2') below the smoke pipe entrance and extending for a distance of at least twenty-five feet (25') above the smoke pipe entrance.

(c) **HIGH HEAT APPLIANCES.** Masonry chimneys serving high heat appliances shall be built with double walls, each not less than eight inches (8") in thickness with an air space of not less than two inches (2") between them. The inside of the interior walls shall be of firebrick not less than four inches (4") in thickness laid in fire-clay mortar or refractory cement.

Chimneys of cupola furnaces, blast furnaces and similar devices hereafter erected, shall extend at least twenty feet (20') above the highest point of any roof within a radius of fifty feet (50') thereof. No woodwork or other combustible material or construction, whether protected or unprotected, shall be erected or placed within three feet (3') of any part of such chimney.

Exception: Small furnaces with capacity not exceeding 100 lbs. of metal may be served by Type A flues extending not less than 6 ft. above the roof and with not less than 6 inches clearance from combustible material or construction whether protected or not. (Ord. 85500 § 3703; Sept. 10, 1956).

CHIMNEYS, FLUES, VENTS AND FIREPLACES 3.37.040

3.37.040 Metal smokestacks. (a) **THICKNESS.** Metal smokestacks shall be designed and constructed in accordance with the standards set forth in Chapter 3.27.

(b) **CONSTRUCTION AND SUPPORT.** Metal smokestacks shall be properly riveted or welded and, unless structurally self-supporting, shall be guyed securely, or firmly anchored to or otherwise supported by the building or structure served thereby.

Metal smokestacks used for high heat appliances shall be lined with four inches (4") firebrick laid in fire-clay mortar extending not less than twenty-five feet (25') above the smoke pipe entrance.

(c) **HEIGHT.** The height of metal smokestacks shall be as specified in Sections 3.37.020 (e) and 3.37.030.

(d) **CLEAN OUT.** Every smokestack shall be provided with an accessible clean out.

(e) **EXTERIOR STACKS.** Metal smokestacks, or parts thereof, erected on the exterior of a building shall have a clearance of twenty-four inches (24") from combustible walls and four inches (4") from noncombustible walls. No such stack shall be nearer than twenty-four inches (24") in any direction from a door, window, or other wall opening or from an exit.

(f) **INTERIOR STACKS.** Metal smokestacks of any permitted size may be used from boilers or furnaces which are so located that the stack goes through no partition, floor or attic, but only through the roof. In such cases the stack shall be kept clear of all combustible material by a distance equal to the diameter of the stack but in no case less than twelve (12) inches. However, the distance need not exceed thirty (30) inches. Provided, further, that metal smokestacks may be used in any building if the stack is enclosed with fireproof walls not less than six (6) inches thick which shall be kept at least six (6) inches clear of the metal stack. Metal smoke pipes shall not pass through combustible walls or partitions. Where metal smoke pipes pass through noncombustible walls or partitions, there shall be a one inch air space between such pipes and the noncombustible material.

Metal smokestacks as above specified may be used from stoves and heaters, subject to the following additional provisions:

1. The heating unit to which the stack is connected shall be in the highest story of the building in which it is located, and the stack shall pass through no floor, attic or ceiling space, but only through the roof.
2. The stack shall be of galvanized iron or steel not lighter than No. 18 gauge and be securely constructed, with all joints either riveted or securely bolted.
3. The stack shall be vertical, without offsets, and shall extend from the heating unit to the same distance above the roof as required for

a masonry chimney. If protected by a cowl it shall have at least twelve (12) inches clearance between the top of the pipe and the inside of the cowl. (Ord. 85500 § 3704, as amended by Ord. 90196; April 24, 1961).

3.37.050 Type A flues or vents. Type A flues or vents shall consist of chimneys, metal smokestacks and approved special flues. Type A flues or vents shall be required for (1) solid and liquid fuel burning heating equipment, and (2) gas-burning equipment which produces flue gas temperatures in excess of 550 degrees F. at the outlet of the appliance or the draft hood when burning gas at the input rating specified by the manufacturer of such equipment. (Ord. 85500 § 3705; Sept. 10, 1956).

3.37.060 Type B flues or vents. (a) **MATERIALS.** Type B flues or vents shall consist of approved vent piping of non-combustible, corrosion-resistant material of sufficient thickness, cross-sectional area and heat insulating quality to avoid excess temperature on any adjacent combustible material as determined by tests made by a recognized testing laboratory.

(b) **USE.** Type B flues or vents may be used only to vent appliances approved for maximum flue gas temperature of 550 degrees F. at the outlet of the appliance or the draft hood. (See Chapter 3.54).

(c) **INSTALLATION.** No installation shall be made that is not at least equal to that described in the test of the recognized testing laboratory.

1. **Joints.** Type B flues or vents shall be made up with tight joints. Flue pipe cement if used shall be acid resisting.

2. **Clearances.** Type B flues or vents shall be installed with a clearance to combustible material as approved by the Superintendent of Buildings, based on the conditions of approval and listing by a recognized testing laboratory, except as specifically set forth in Section 3.54.050 (e).

3. **Protection Against Injury.** Suitable provisions shall be made to prevent mechanical injury to Type B flues and vents where they extend through walls, floors or roof.

4. **Support.** Flue or vent piping shall be securely supported to prevent sag.

5. **Size.** The gravity flue or vent to which the flue or vent connector is connected shall be of a size not less than the flue collar on the appliance attached thereto. In no case shall the area be less than the area of three-inch (3") diameter pipe. When more than one appliance vents into a flue or vent, the flue or vent area shall be not less than the area of the largest flue or vent connector plus 50 per cent of the areas of the additional flue or vent connectors; provided that a gravity flue or vent may be sized in accordance with an approved vent-sizing formula. An oval flue or vent

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may be used provided its flue gas venting capacity is equal to the capacity of round pipe for which it is substituted. Unless approved by the Superintendent of Buildings, no damper shall be installed in any gas vent or flue.

6. **Height.** Each gravity vent shall extend above the roof surface and through its flashing and shall terminate in an approved cap with a venting capacity not less than that of the vent. The outlet opening of any such vent shall be not less than twelve inches (12") from any portion of the building, nor less than four feet (4') from any of that portion of the building structure which extends at an angle of more than 45 degrees upward from the horizontal. No such vent outlet shall terminate less than four feet (4') from or one foot (1') above any door, window, or air intake.

7. **Offset.** A single portion of any flue or vent may not extend at an angle of more than 60 degrees from the vertical unless permitted by an approved vent formula. (Ord. 85500 § 3706 as amended by Ord. 86257; June 18, 1957).

3.37.070 Flue or vent connectors. (a) **MATERIALS.** Flue or vent connectors shall be approved Type B vents or of galvanized steel of not less than 26 gauge U.S. Standard, aluminum, terra cotta, asbestos-cement, or other approved durable material and shall be exposed to view throughout their entire length. Flue or vent connectors serving portable appliances shall be not less than 30 gauge U.S. Standard.

(b) **SIZE.** Flue or vent connectors shall be not less in diameter than the flue or vent outlet in the appliance; provided that a flue or vent connector may be sized in accordance with an approved vent-sizing formula.

(c) **PITCH.** Flue or vent connectors shall have a rise of not less than one-half inch ($\frac{1}{2}$ ") to the foot.

(d) **LENGTH AND SUPPORT.** The horizontal projected length of the flue or vent connector shall not exceed 75 per cent of the vertical projected length of the flue or vent. Horizontal runs shall be as short and as direct as possible. Connectors shall be securely supported to prevent sag.

(e) **CONNECTION TO FLUE OR VENT.** When flue or vent connectors enter flues or vents installed in exterior walls or outside of buildings, provision for removal of any condensate which might collect shall be provided. Any two inlets shall be separated vertically by not less than the diameter of the larger inlet.

(f) **CLEARANCES.** 1. Clearances between Type C flue or vent connectors and combustible material shall be not less than those specified for type C flues or vents in Subsection 3.37.080 (c).

2. Clearances between Type B flue or vent connectors shall be not less than those specified for Type B flues or vents in Subsection 3.37.060 (c), paragraph 2.

(g) **LOCATION.** Each appliance connected to a common Type A or B vent (or type C where permitted) shall be located so as to provide the maximum possible vent rise permitted by the building structure between the draft diverter and the point at which the vent becomes a common vent. (Ord. 85500 § 3707 as amended by Ord. 86257; June 18, 1957).

3.37.080 Type C flues or vents. (a) **WHEN ALLOWED.** Where Type A or Type B flues or vents are not required, Type C flues or vents may be used provided they meet the limitations of use as specified in this Section and those set forth in Section 3.54.050 (e).

(b) **GENERAL.** Type C flues or vents shall be used only for runs directly from the space in which the appliance is located through a roof to the outer air without passing through any attic, concealed space, or floor. No such vent shall extend more than three feet (3') above the roof through which it passes. No such flue or vent shall be used in connection with water heaters.

(c) **CLEARANCES.** Clearances between Type C flues or vents and combustible material shall be not less than six inches (6") when used with approved appliances except warm air heating furnaces. Clearances between Type C flues or vents and combustible material shall be not less than nine inches (9") when used with untested appliances or warm air heating furnaces. Such clearances may be reduced in accordance with the terms of Table No. 50-A.

(d) **OFFSET.** A single portion of any flue or vent may not extend at an offset of more than 60 degrees from the vertical, unless permitted by an approved vent formula. (Ord. 85500 § 3708 as amended by Ord. 86257; June 18, 1957).

3.37.090 Special type "A" flues or vents. Special Type "A" flues or vents shall be of approved types and shall be installed in full compliance with the conditions of approval, special limitations of use, and the manufacturer's instructions. (Ord. 85500 § 3709; Sept. 10, 1956).

3.37.100 Smoke pipes. (a) **MATERIALS.** Smoke pipes serving fixed appliances shall be of substantial metal construction, but never less than No. 24 gauge U. S. Standard. Smoke pipes serving portable appliances shall be of not less than No. 30 gauge U. S. Standard.

(b) **SMOKE PIPE CONNECTIONS.** Two or more smoke pipes shall not be joined to a single flue or vent unless the common smoke pipe and flue or vent is of sufficient size to serve all the appliances thus connected. No flue or vent shall have smoke pipe connections in more than one story of a building, unless provision is made for effectively closing smoke pipe openings with devices made of noncombustible materials whenever their use is discontinued temporarily, and completely closing them with masonry

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when discontinued permanently. Smoke pipes shall be exposed to view throughout their entire length.

(c) **CLEARANCES.** Clearances between smoke pipes and combustible material shall be eighteen (18) inches when used on medium heat appliances and thirty-six (36) inches when used on high heat appliances. These clearances may be reduced as set forth in Table No. 50-A. (Ord. 85500 § 3710, as amended by Ord. 91587; November 14, 1962).

3.37.110 Interconnection of vents. No flue or vent connector from a gas appliance shall be interconnected with any other flue or vent connector, smoke pipe, or flue, unless such gas appliances are equipped with an automatic device to prevent the escape of unburned gas at the main burner or burners. Where a gas appliance flue or vent connector is joined with a smoke pipe from an appliance burning some other type of fuel for connection into a single flue opening, they shall be joined by a Y-fitting located as close as practicable to the chimney. With liquefied petroleum gases, the automatic device to prevent the escape of unburned gas shall shut off the pilot light as well as the main burner or burners. (Ord. 85500 § 3711; Sept. 10, 1956).

3.37.120 Vent manifold. When two or more gas appliances are connected to a common vent manifold, the following rules shall be observed:

1. The size of the manifold shall be determined according to an approved vent sizing formula using the aggregate B.t.u. input of all appliances connected to the manifold. The input per manifold shall not exceed 320,000 B.t.u. per hour. No manifold less than 19 sq. in. in cross-sectional area shall be installed.

2. The length of manifold shall not exceed the length of lateral allowed by an approved vent sizing formula for an individual vent having the same height, size, and total heat input.

3. The manifold and lateral shall have a rise of not less than $\frac{1}{2}$ inch per foot.

4. A minimum vertical rise from each connector to the manifold shall be maintained according to an approved vent sizing formula. (Ord. 85500 §3712; Sept. 10, 1956).

3.37.130 Fireplaces. (a) **MASONRY FIREPLACES.** Masonry fireplaces, smoke chambers, and fireplace chimneys shall conform to the following minimum requirements:

1. Structural walls of fireplaces shall be not less than four inches (4") in thickness, except that, on walls six feet or more in length such walls shall have a four inch wythe every three feet of length anchored into the outside walls, or else be at least six inches thick. Back walls of fireboxes shall be not less than seven inches (7") in thickness, if on the outside of the building and not less than 11" thick within a building.

2. Approved metal heat circulators may be installed in fireplaces.

3. Smoke chamber walls shall be not less than eight inches (8") in thickness. Smoke chamber back walls on exterior fireplaces shall be not less than six inches (6") in thickness.

4. Fireplace chimney walls shall be not less than six inches in thickness, or when lined with fire-clay flue lining, not less than four inches (4") in thickness. Outer walls shall be not less than four inches thick. See Section 3.37.020 (b).

5. Structural wood framing shall not be placed within one and one-half inches (1½") of fireplaces, smoke chambers, or chimneys. Combustible materials shall not be placed within six inches (6") of the fireplace opening.

6. The net cross-sectional area of the flue and of the throat between the firebox and the smoke chamber of a fireplace shall be not less than as set forth in Table No. 37-A. Where dampers are used, damper openings shall be not less in area, when fully opened, than the required flue area.

7. Lintels supporting masonry shall be noncombustible.

8. Every fireplace shall be provided with a brick, concrete, stone or other approved noncombustible hearth slab at least twelve inches (12") wider on each side than the fireplace opening and projecting at least eighteen inches (18") therefrom. This slab shall be not less than four inches (4") thick and shall be supported by noncombustible materials or reinforced to carry its own weight and all imposed loads. Combustible forms and centering shall be removed.

9. Firestopping between chimneys and wooden construction shall meet the requirements of Section 3.25.120.

10. Imitation fireplaces not conforming to the other requirements of this Section shall not exceed six inches (6") in depth. Gas-burning appliances may be installed in such non-conforming fireplaces provided that compliance is made with the requirements of this Chapter on flues or vents.

11. Fireplaces shall be supported on foundations designed in accordance with standards set forth in Chapters 3.23, 3.24 and 3.28.

(b) OTHER FIREPLACES: Fireplaces of other materials and design may be permitted, subject to approval by the Superintendent of Buildings. (Ord. 85500 § 3713, as amended by Ord. 87090; April 22, 1958).

Chapter 3.38
FIRE EXTINGUISHING SYSTEMS

Sections:

- 3.38.010 Scope.
- 3.38.020 Automatic fire-extinguishing systems.
- 3.38.030 Dry standpipes.
- 3.38.040 Wet standpipes.
- 3.38.050 Combination standpipes.
- 3.38.060 Buildings under construction.

3.38.010 Scope. (a) **GENERAL.** All fire-extinguishing systems required in this Code shall be installed in accordance with the requirements of this chapter.

All hose threads used in connection with fire-extinguishing systems shall comply with the standards of the fire department.

(b) **APPROVALS.** All fire-extinguishing systems including automatic sprinklers, combination standpipes, dry and wet standpipes, and special automatic extinguishing systems shall be approved and shall be subject to such periodic tests as may be required. The location of all fire department connections shall be approved by the fire chief.

(c) **DEFINITIONS.** For the purpose of this chapter, certain terms are defined as follows:

“Combination standpipe” is a fire line system with a constant water supply and installed for the use of the fire department and the occupants of the building.

“Dry standpipe” is a fire line system without a constant water supply and equipped with fire department inlet and outlet connections and installed exclusively for the use of the fire department.

“Fire department hose connection” is a hose connection at grade or street level for use by the fire department only.

“Wet standpipe” is an auxiliary fire line system with a constant water supply installed primarily for emergency fire use by the occupants of the building.

(d) **STANDARDS.** Fire-extinguishing systems shall comply with U.B.C. Standards No. 38-1 and No. 38-2. (Ord. 85500 § 3801 added by Ord. 97889 § 8 (part); June 26, 1969).

3.38.020 Automatic fire-extinguishing systems. (a) **GENERAL.** Automatic fire-extinguishing systems shall comply with the provisions of this section.

(b) **WHERE REQUIRED.** Standard automatic fire-extinguishing systems shall be installed and maintained in operable condition as specified in this chapter in the following locations:

(1) In any story having a floor area of more than fifteen hundred square feet, unless at least one exterior wall of such story is provided with

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a minimum of twenty square feet of opening, entirely above the adjoining ground level, for each fifty lineal feet or fraction thereof of the perimeter of exterior walls of the story. Openings shall have a minimum dimension of not less than thirty inches. Such openings shall be maintained readily accessible to the fire department and shall not be obstructed in a manner that fire fighting or rescue cannot be accomplished from the exterior.

When openings in a story are provided on only one side and the opposite wall of such story is more than seventy-five feet from such openings, the story shall be provided with an approved automatic fire-extinguishing system or openings as specified above shall be provided on at least two sides of the exterior walls of the story.

For the purpose of this section, portions of a building which are separated by area separation walls shall be considered separate buildings.

(2) In any basement or cellar used for storage or sale of combustible materials. (In existing buildings in the First Fire Zone constructed prior to 1913 and in any building in the Second and Third Fire Zone, the water service connection may be of two-inch diameter.)

Exceptions: Exemption from the above requirements shall be permitted in the following basements and cellars:

A. All those in Group I and J occupancies.

B. Portions not used for storage or sale of combustible materials when separated from the portions so used with one-hour fire-resistive construction and one and three-fourths inch wood slab self-closing doors.

C. Spaces not exceeding five hundred square feet in area when enclosed with one-hour fire-resistive construction and one and three-fourths inch wood slab self-closing doors, provided that no more than three such spaces shall be permitted in any one basement and further provided that there shall be no direct openings between such spaces.

D. In one story buildings of Types I, II or III construction which front on at least two streets and/or alleys not less than sixteen feet wide, spaces not more than seventy-two hundred square feet in area, which are not partitioned and are at least one-third above grade with openings as specified in subdivision (b) (1) of this section.

E. Spaces which are at least one-third above grade with openings having a minimum dimension of not less than thirty inches fronting on streets, or alleys or exterior courts not less than sixteen feet wide when such space is within a radius of forty feet from such openings and is separated from any other unprotected space by partitions of one-hour fire-resistive construction with fire assemblies having a three-fourths-hour fire-resistive rating.

(3) Under the roof and gridiron, in the tie and fly galleries and in all places behind the proscenium wall of stages, over enclosed platforms in excess of five hundred square feet in area; and in dressing rooms, workshops and storerooms accessory to such stages or enclosed platforms.

Exceptions: A. Stages or enclosed platforms open to the auditorium room on three or more sides.

B. Altars, pulpits, or similar platforms and their accessory rooms.

C. Stage gridirons when side wall sprinklers with one hundred thirty-five degrees Fahrenheit rated heads with heat-baffle plates are installed around the entire perimeter of the stage at points not more than thirty inches below the gridiron, nor more than six inches below the baffle plate.

D. Understage or under enclosed platform areas less than four feet in clear height used exclusively for chair or table storage and lined on the inside with materials approved for one-hour fire-resistive construction.

(4) In any enclosed, usable space below or over a stairway in Groups B, C and D occupancies.

Exception: Type I or II buildings.

(5) In waterfront structures as specified in Sections 3.56.050(c) and 3.56.060(j).

(6) In Group E occupancies as follows: Divisions 1 and 2 occupancies having an area of more than fifteen hundred square feet; Division 3 occupancies used for tire rebuilding plants and having an area of more than fifteen hundred square feet; all other Division 3 occupancies having an area of more than three thousand square feet and Division 4 occupancies more than one story in height.

(7) At the top of rubbish and linen chutes and in their terminal room in other than Group I occupancies. Chutes extending through three or more floors shall have additional sprinkler heads installed within such chutes at alternate floors. Sprinkler heads shall be accessible for servicing.

(8) In Group F, Division 2 occupancies used for retail sales when the occupancy is over sixteen thousand square feet in a single floor area or more than two stories in height; however, the respective increases for area and height set forth in Sections 3.05.060 and 3.05.070 shall be permitted.

(9) In warehouses, factories, workshops, garages (except those covered by Section 3.11.090) and stores which are not otherwise covered by this section and where height exceeds four stories.

(10) In garage occupancies which open into other occupancies as follows:

A. All F-1 garages exceeding one story in height.

B. All garages opening into A, B-1, B-3, C and D occupancies.

C. All F-1 garages, and those F-3 garages exceeding two tiers in height opening into any occupancy exceeding two stories.

Exception: Where there is provided a vestibule having fire-resistive construction of the same rating as required for the occupancy or area separation.

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(11) In every boiler room or room containing a central heating plant below usable space in Group C occupancies.

(12) In all Group C, D, E and F occupancies and all assembly rooms having an occupant load of one hundred or more when such occupancy or assembly room is located above the sixth story within any building.

Exception: F-3 open deck parking garages. See Section 3.11.090(d).

(c) DETAILED REQUIREMENTS. Automatic fire-extinguishing systems shall be installed in accordance with Section 3.38.010(d).

Exceptions: (1) Automatic fire-extinguishing systems shall have at least one automatic water supply of adequate pressure, capacity and reliability.

(2) Automatic fire-sprinkling systems may be connected to the domestic water supply main when approved by the superintendent of buildings and the fire chief provided the domestic water supply is of adequate pressure, capacity and sizing for the combined domestic and fire-sprinkler requirements. In such case, the fire-sprinkler system connection shall be made between the public water main or meter and the building shutoff valve and there shall not be intervening valves or connections. The fire department connection may be omitted when approved by the fire chief.

(3) The sprinkler alarm valve for an automatic fire-sprinkling system may be omitted when the sprinkler system serves less than six heads or where the system is connected to an approved fire alarm system.

Where unenclosed escalators are permitted according to Section 3.33.080, automatic sprinklers are required and shall be installed in the following manner:

The top of the escalator opening at each story shall be provided with a draft curtain. Such draft curtain shall enclose the perimeter of the unenclosed opening and shall extend from the ceiling downward at least twelve inches on all sides. Automatic sprinklers shall be provided around the perimeter of the opening and within two feet of the draft curtain. The distance between the sprinklers shall not exceed six feet center-to-center. (Ord. 85500 § 3802 added by Ord. 97889 § 8 (part); June 26, 1969).

3.38.030 Dry standpipes. (a) GENERAL. Dry standpipes shall comply with the requirements of this section.

(b) WHERE REQUIRED. All buildings more than three stories but not exceeding six stories in height shall be equipped with one or more dry standpipes, except where a combination standpipe system may be provided in accordance with Section 3.38.050.

(c) LOCATION. There shall be one dry standpipe outlet connection located at every floor level landing, or approved intermediate landing, of every smokeproof enclosure or other approved enclosed stairways. No point

within a building requiring dry standpipes shall be more than one hundred and fifty feet travel distance from a dry standpipe outlet connection.

Exception: Such travel distance may be increased to two hundred feet when the building is equipped with an automatic sprinkler system throughout.

Portions of dry standpipe systems not located within an enclosed stairway or smokeproof enclosure shall be protected by a degree of fire resistance equal to that required for vertical enclosures in the building in which they are located.

A dry standpipe outlet connection shall not be located in a stairway vestibule.

(d) DETAILED REQUIREMENTS. (1) Construction. Fittings and connections shall be of sufficient strength to withstand three hundred pounds per square inch of water pressure when ready for service. All dry standpipes shall be tested hydrostatically to withstand not less than three hundred pounds per square inch of pressure for two hours, but in no case shall the pressure be less than fifty pounds per square inch above the maximum working pressure.

(2) Piping. All horizontal runs of dry standpipe systems shall be pitched at the rate of one-fourth inch to ten feet for purposes of draining.

Where pipe traps occur in such standpipe systems including fire department connections, they shall be provided with drains.

(3) Size. The size of the standpipe shall be not less than four inches in buildings in which the highest outlet is seventy-five feet or less above the fire department connection and shall be not less than six inches where the highest outlet is higher than seventy-five feet above the fire department connection.

(4) Fire department connections. All four-inch dry standpipes shall be equipped with a two-way fire department connection. All six-inch dry standpipes shall be equipped with a four-way fire department connection. All fire department connections shall be located on a street front, not less than eighteen inches nor more than four feet above grade and shall be equipped with an approved straightway check valve and substantial plugs or caps. All fire department connections shall be protected against mechanical injury and shall be visible and accessible. More than one fire department connection may be required.

(5) Outlets. Each standpipe shall be equipped with an approved two and one-half inch outlet not less than two feet nor more than four feet above the floor level of each story. All dry standpipes shall be equipped with a two-way, two and one-half inch outlet above the roof line of the building when the roof has a pitch of less than four inches in twelve inches. All outlets shall be installed so that a twelve-inch long wrench may be used in connecting the hose with clearance for the wrench on all sides of the

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outlet. Standpipe outlets in stairway enclosures or smoke towers shall be so located that the exit doors do not interfere with the use of the outlet.

(6) Signs. An approved, durable sign with raised letters of at least one inch in height shall be permanently attached adjacent to all fire department street connections. Such sign shall read, "DRY STANDPIPE". (Ord. 58800 § 3803 added by Ord. 97889 § 8 (part); June 26, 1969).

3.38.040 Wet standpipes. (a) GENERAL. Wet standpipes shall comply with the requirements of this section.

(b) WHERE REQUIRED. All buildings of Group A and D occupancies shall be equipped with wet standpipes extending from the cellar or basement into the topmost story, provided, however, in such buildings exceeding six stories in height, the standpipe system shall be a combination standpipe system.

Exceptions: (1) Wet standpipes are not required in buildings equipped throughout with an automatic fire-extinguishing system.

(2) Wet standpipes are not required in basements or cellars equipped with a complete automatic fire-extinguishing system.

(c) LOCATION. Wet standpipe outlets shall be located so that all portions of the building are within one hundred feet of travel distance of a wet standpipe outlet. Travel distance may be increased to such distances permitted for dry standpipe outlets as provided in Section 3.38.030(c) upon approval by the superintendent of buildings and fire chief. In Group A occupancies, wet standpipe outlets shall be located on each side of any stage, on each side at the rear of the auditorium, and on each side of the balcony.

(d) DETAILED REQUIREMENTS. (1) Construction. Wet standpipes shall be installed and tested by the installer as required for the water distribution system within the building.

(2) Size. The size of the standpipe shall be not less than two and one-half inches in diameter when the height of the riser is fifty feet or more above the source and shall be not less than two inches in diameter when the height of the riser is less than fifty feet above the source.

(3) Outlets. All interior wet standpipes shall be equipped with a one and one-half inch valve in each story, including the basement or cellar of the building and located not less than three feet nor more than six feet above the floor.

(4) Water supply. The wet standpipe system shall be connected to the city water system and shall deliver not less than seventy-five gallons of water per minute at not less than fifty pounds pressure per square inch at a single topmost outlet. When more than one interior wet standpipe is required in the building, such standpipes may be connected at their bases or highest points by pipes of equal size. Where combination standpipes are installed, the one and one-half inch outlet system may be supplied from the combination system with a two-inch connecting line.

(5) Fire pumps. Fire pumps shall be approved and shall deliver not

less than the required fire flow and pressure. Such pumps shall be supplied with adequate power source and shall be automatic in operation. Where the wet standpipe system is supplied with water from the domestic supply of the building, approved fire pumps shall not be required provided the domestic pump used delivers the required fire flow.

(6) Hose and hose reels. Each wet standpipe outlet shall be supplied with approved hose not less than one and one-half inches in diameter and one hundred feet in length. Such hose shall be equipped with a suitable controlling nozzle. An approved hose reel rack or cabinet shall be provided and shall be located so as to make the hose accessible. The hose reel rack or cabinet shall be recessed in the wall or protected by suitable cabinets.

(7) Connection to fire-extinguishing systems. Wet standpipe systems may be supplied from a fire-extinguishing system complying with U.B.C. Standard No. 38-1 and shall be connected as required in Section 3.08.010.

(8) Pressure reduction. Where the static pressure at any standpipe outlet exceeds one hundred pounds per square inch, an approved pressure reduction device shall be permanently installed at the outlet to reduce the water flow so that the nozzle pressure does not exceed eighty pounds per square inch. (Ord. 58800 § 304 added by Ord. 97889 § 8 (part); June 26, 1969).

3.38.050 Combination standpipes. (a) **GENERAL.** All combination standpipes shall comply with the requirements of this section. Where a combination standpipe is installed in accordance with this section, separate wet and/or dry standpipe systems need not be installed.

(b) **WHERE REQUIRED.** All buildings exceeding six stories in height shall be equipped with a combination standpipe system.

(c) **LOCATION.** Combination standpipe systems shall have connections as for dry standpipes located as required in Section 3.38.030(c) and shall have connections as for wet standpipes as required in Section 3.38.040(c).

Combination standpipes shall be maintained constantly charged with water, as required for a wet standpipe system. In locations subject to freezing, such standpipes shall be adequately insulated or otherwise protected from freezing.

(d) **DETAILED REQUIREMENTS.** Combination standpipes shall be installed in accordance with requirements for construction, piping, size, connections, and outlets as specified in Section 3.38.030(d) for a dry standpipe system. Requirements for water supply shall be as specified in Section 3.38.040(d). In addition, the following requirements shall apply:

(1) Combination standpipe systems having more than one standpipe shall be suitably inter-connected and each individual riser shall be equipped with an OS and Y shutoff valve at its base and an approved valve for draining purposes.

(2) An approved durable sign with raised letters at least one inch

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high shall be permanently attached to all fire department connections and such sign shall read: "COMBINATION STANDPIPE". (Ord. 85500 § 3805 added by Ord. 97889 § 8 (part); June 26, 1969).

3.38.060 Buildings under construction. (a) **GENERAL.** During the construction of a building, an approved fire protection system shall be provided in accordance with this section.

(b) **WHERE REQUIRED.** Every building exceeding six stories in height shall be provided with not less than one combination standpipe for fire department use, during construction. Such standpipes shall be installed when the progress of construction is not more than fifty feet in height above grade. Such standpipe shall be provided with fire department inlet connections at accessible locations adjacent to usable stairs. Such standpipe systems shall be extended as construction progresses to within one floor of the highest point of construction having secured decking or flooring.

Outlet valves shall be provided on each floor, as required for combination standpipe installations. Where construction height requires, fire pumps or other approved means for maintaining pressure shall be installed to serve the standpipe.

(c) **DETAILED REQUIREMENTS.** Standpipe systems for buildings under construction shall be installed as required for permanent standpipe systems.

Exception: A temporary standpipe may be provided, in place of the permanent system, providing it is designed to furnish seventy-five gallons of water per minute, at fifty pounds pressure per square inch, at a single topmost outlet. If a temporary standpipe is used, it shall be not less than four inches in diameter, with outlets provided at each floor level, and pumping equipment, as necessary, to maintain pressure in accordance with the requirements for combination standpipe systems. (Ord. 85500 § 3806 added by Ord. 97889 § 8 (part); June 26, 1969).

Chapter 3.39 STAGES AND PLATFORMS

Sections:

- 3.39.010 Stage ventilators.
- 3.39.020 Gridirons.
- 3.39.030 Room accessory to stage.
- 3.39.040 Proscenium walls.
- 3.39.050 Stage floors.
- 3.39.060 Platforms.
- 3.39.070 Miscellaneous.
- 3.39.080 Flame-retarding requirements.

3.39.010 Stage ventilators. There shall be one or more ventilators constructed of metal or other noncombustible material near the center, and above the highest part, of any working stage raised above the stage roof, and having a total ventilation area equal to at least ten per cent of the floor area within the stage walls. The entire equipment shall conform to the following requirements or their approved equivalent:

1. Doors shall open by force of gravity sufficient to overcome the effects of neglect, rust, dirt, frost, snow or expansion by heat or warping of the framework.

2. Ventilators must be glazed and glass must be protected against falling on the stage. A wire screen, if used under the glass, must be so placed that, if clogged, it cannot reduce the required ventilating area, or interfere with the operating mechanism, or obstruct the distribution of water from the automatic sprinklers.

3. The doors and other covers shall be arranged to open instantly after the outbreak of fire, by the use of approved automatic fusible links which will fuse and separate at not more than 160 degrees Fahrenheit. A manual control must also be provided by a cord running down to the stage at a point on each side of the stage designated by the Superintendent of Buildings.

4. The fusible link and the cord must hold the doors closed against a force of at least 30 pounds excess counterweight tending to open the door. The fusible links shall be placed in the ventilator above the roof line and in at least two other points in each controlling cord and so located as not to be affected by the sprinkler heads above. (Ord. 85500 § 3901; Sept. 10, 1956).

3.39.020 Gridirons. Gridirons, fly galleries and pin-rails shall be constructed of noncombustible materials and fire-protection of steel and iron may be omitted. Gridirons and fly galleries shall be designed to support not less than 75 pounds live load per square foot.

The main counterweight sheave beam shall be designed to support a horizontal and vertical uniformly distributed live load equal to not less than five pounds per square foot over the area of the gridiron directly back of the proscenium opening. (Ord. 85500 § 3902; Sept. 10, 1956).

3.39.030 Rooms accessory to stage. In buildings having a stage, the dressing room section, workshops, and storerooms shall be located on the stage side of the proscenium wall and shall be separated from each other and from the stage by not less than a "Two-Hour Fire-Resistive Occupancy Separation." (Ord. 85500 § 3903; Sept. 10, 1956).

3.39.040 Proscenium walls. A stage as defined in Section 3.04.200 shall be completely separated from the auditorium by a proscenium wall of not less than two-hour noncombustible construction. The proscenium

wall shall extend not less than four feet (4') above the roof over the auditorium.

Proscenium walls may have, in addition to the main proscenium opening, one opening at the orchestra pit level and not more than two openings at the stage level, each of which shall be not more than twenty-five square feet (25 sq. ft.) in area.

Openings in the proscenium wall of a stage shall be protected by single Class "A" fire doors. The proscenium opening, which shall be the main opening for reviewing performances, shall be provided with a self-closing fire-resistive curtain as provided in Chapter 3.41. (Ord. 85500 § 3904; Sept. 10, 1956).

3.39.050 Stage floors. All parts of stage floors shall be of Type I construction except the part of the stage extending back from and the full width of the proscenium opening, which may be constructed of steel or heavy timbers covered with a wood floor not less than two inches (2") nominal thickness. No part of the combustible construction except the floor finish shall be carried through the proscenium opening. All parts of the stage floor shall be designed to support not less than 125 pounds per square foot.

Openings through stage floors shall be equipped with tight-fitting trap doors of wood not less than two inches (2") nominal thickness. (Ord. 85500 § 3905; Sept. 10, 1956).

3.39.060 Platforms. (a) CONSTRUCTION. Walls and ceiling of an enclosed platform as defined in Section 3.04.170 in an assembly room shall be of not less than one-hour fire-resistive construction.

Any usable space having headroom of four feet (4') or more under a raised platform of an assembly room shall be of not less than one-hour fire-resistive construction.

(b) ACCESSORY ROOMS. In buildings having an enclosed platform, the dressing-room section, workshops, and storerooms shall be separated from each other and from the rest of the building by not less than a "One-Hour Fire-Resistive Occupancy Separation," except that a chair-storage area having headroom of not more than four feet (4') need not be so separated. (Ord. 85500 § 3906; Sept. 10, 1956).

3.39.070 Miscellaneous. A protecting hood shall be provided over the full length of the stage switchboard. (Ord. 85500 § 3907; Sept. 10, 1956).

3.39.080 Flame-retarding requirements. No highly combustible scenery, drops, props, decorations, or other highly combustible effects shall be placed on any enclosed platform unless treated with an effective fire-retardant solution and maintained in a non-flammable condition as approved by the Chief of the Fire Department. (Ord. 85500 § 3908; Sept. 10, 1956).

Chapter 3.40

MOTION PICTURE PROJECTION BOOTHS

Sections:

- 3.40.010 Projection room required.
- 3.40.020 Construction.
- 3.40.030 Exit.
- 3.40.040 Ports.
- 3.40.050 Ventilation.
- 3.40.060 Sanitary requirements.

3.40.010 Projection room required. In any Group A or B occupancy, every motion picture machine using electric arc projection equipment and ribbon type film of seven-eighths (7/8) inches wide, together with all electrical devices, rheostats, machines, and all such film, shall be enclosed in a projection room. Such room shall have a minimum floor area of eighty (80) square feet for the first such motion picture machine, plus an additional forty (40) square feet for each additional such motion picture machine, used, or intended to be used, therein, and, in any case, shall be large enough to permit an operator to walk freely on either side and in back of any machine therein. (Ord. 85500 § 4001, as amended by Ord. 91636; November 27, 1962).

3.40.020 Construction. Every projection room shall be of not less than one-hour fire-resistive construction throughout, and the walls and ceiling shall be finished with incombustible material. The ceiling shall be not less than eight (8) feet from the finished floor. (Ord. 85500 § 4002, as amended by Ord. 91636; November 27, 1962).

3.40.040 Exit. Every projection room shall have at least one (1) door not less than thirty (30) inches wide and eighty (80) inches high. Every such door shall be a Class "C" fire door, shall open outward, and shall not be equipped with any latch. (Ord. 85500 § 4003, as amended by Ord. 91636; November 27, 1962).

3.40.040 Ports. In every projection room there shall be, for each motion picture machine therein, not more than one (1) projection port, not over seven hundred twenty (720) square inches in area, and not more than one (1) observation port, not over two hundred and forty (240) square inches in area. There may also be not more than three (3) rectangular combination ports, for observation and for spot lights, flood lights or stereoptican machines, the dimensions of which shall be not over twenty-four (24) inches by thirty (30) inches. Each port opening shall be completely covered with a single pane of polished plate glass not less than one-quarter (1/4) inch in thickness. (Ord. 85500 § 4004, as amended by Ord. 91636; November 27, 1962).

3.40.050 Ventilation. A fresh-air inlet from the exterior of the building, remote from other outside vents or flues, not less than one hundred and forty-four (144) square inches in area, and protected with wire netting, shall be installed within two (2) inches of the floor in every projection room. Ventilation shall be provided by one or more mechanical exhaust systems which shall draw air from each arc lamp housing and from one or more points near the ceiling. Such systems shall exhaust to outdoors either directly or through an incombustible flue used for no other purpose. Exhaust capacity shall be not less than fifteen (15) cubic feet per minute for each arc lamp, plus two hundred (200) cubic feet per minute for the room itself. Systems shall be controlled from within the projection room and have pilot lights to indicate operation. The exhaust system serving the projection room may be extended to cover rooms associated therewith such as rewind rooms, but ventilation of these rooms shall not be connected in any way with ventilating or air-conditioning systems serving other portions of the building. No dampers shall be installed in projection room exhaust systems. Exhaust ducts shall be of incombustible material, and shall either be kept one (1) inch from combustible material or covered with one-half (1/2) inch of incombustible heat insulating material. (Ord. 85500 § 4005, as amended by Ord. 91636; November 27, 1962).

3.40.060 Sanitary requirements. Every projection room shall be provided with an unenclosed water closet and lavatory. (Ord. 85500 § 4006, as amended by Ord. 91636; November 27, 1962).

Chapter 3.41

PROSCENIUM CURTAINS

Sections:

- 3.41.010 General requirements.
- 3.41.020 Curtain coverings.
- 3.41.030 Design and construction.
- 3.41.040 Operating equipment.
- 3.41.050 Tests.
- 3.41.060 New designs.

3.41.010 General requirements. Proscenium curtains when required shall be made of noncombustible materials constructed and mounted so as to intercept hot gases, flames, and smoke, and to prevent glow from severe fire on the stage showing on the auditorium side within a period of five minutes.

The curtains shall be wide enough to extend into steel smoke grooves on each side of the proscenium opening at least eight (8) inches and shall overlap the top and sides of the proscenium opening at least twelve (12) inches.

The closing of the curtain from the full opening position shall be effected in less than thirty seconds, but the last five (5) feet of travel shall require not less than five seconds. (Ord. 85500 § 4101; Sept. 10, 1956).

3.41.020 Curtain coverings. The proscenium curtain shall be made of one thickness of asbestos cloth weighing not less than three and one-fourth ($3\frac{1}{4}$) pounds per square yard.

The asbestos curtain cloth shall be Standard D677-50, 1950 grade, wire inserted crysotile asbestos cloth containing at least 80% but not more than 85% crysotile asbestos by weight, exclusive of the wire insert.

The cloth shall be plain weave with twenty-one (21) warp ends and ten (10) filler ends (plus or minus one (1) per inch.)

Wire used to reinforce the yarn shall be 0.008 inches in diameter, brass or nickel. The tensile strength of each wire shall be sufficient to support a load of not less than three (3) pounds at ordinary temperatures.

The strength of the cloth in tension when tested by the strip method shall be not less than 160 pounds per inch of width of warp and 52 pounds per inch of filling.

When required by the Superintendent of Buildings, a sample of the cloth of sufficient size for testing shall be submitted.

After installation, the curtain shall be painted on both sides with a mineral paint having a silicate of soda binder which will completely fill the cloth. Filler paint shall have not less than four (4) parts of casein in each ten (10) parts of silicate of soda. This paint shall be well brushed into the cloth so that no light or smoke can come through. (Ord. 85500 § 4102; Sept. 10, 1956).

3.41.030 Design and construction. The curtain shall be made of continuous vertical strips of asbestos cloth. The width of cloth shall overlap at the seams not less than one (1) inch and shall be sewed with a double row of stitching of asbestos thread.

Six (6) inch pockets shall be sewed in the top and the bottom of the curtain to hold the pipe battens. The sides shall be hemmed at least six (6) inches deep. A two (2) inch pipe batten shall be placed at the top and one and one-half (1½) inch batten at the bottom.

For stage openings over forty (40) feet in width, the bottom batten shall be not less than two and one-half (2½) inches diameter. The battens shall be reinforced at the joints with twelve (12) inch sections of pipe housed and riveted.

Number sixteen (16) U. S. gauge galvanized metal shall be bent and placed vertically along each side hem of the curtain materials so that both faces of the hem are covered not less than six (6) inches. This material edging shall be fastened to the side hem with rivets spaced not more than six (6) inches on center.

The curtain shall be held within the smoke pockets with one-fourth (¼) inch, seven (7) strand guide wire threaded through all iron curtain guides riveted to the side hems not more than eighteen (18) inches on center. Each curtain guide shall be fastened to the curtain with not less than three (3) bolts or rivets.

The top of the curtain shall have a smoke stop fitted to make it as smoke tight as practicable. The bottom of the curtain shall have a yielding

pad or pocket made of noncombustible material not less than three (3) inches thick. (Ord. 85500 § 4103; Sept. 10, 1956).

3.41.040 Operating equipment. Smoke grooves which protect the sides of the curtain shall be of structural steel shapes or plates not less than one quarter ($\frac{1}{4}$) inch thick. These grooves shall be not less than fourteen (14) inches deep and six (6) inches wide and shall be set back from the face of the arch at least six (6) inches. Grooves shall extend from the stage floor to a point three (3) feet above the top of the raised curtain, and shall be securely bolted to the proscenium wall.

Support for the curtain shall be by means of one quarter ($\frac{1}{4}$) inch flexible steel cables with tensile strength of not less than two thousand (2000) pounds. These cables shall be spaced not more than twelve (12) feet on centers, and the end overhang shall be not more than fifteen (15) inches. The supporting cables shall pass through loft blocks bolted to the gridiron beams, or to iron brackets bolted to the proscenium wall, and thence through a head block and terminated by attaching to the counterweight carriage. The loft blocks and head blocks shall be not less than sixteen (16) inches in diameter with roller bearings and enclosed in steel case.

The head block shall be installed sufficiently higher than the loft blocks to prevent cables from fouling on loft block housings.

The counterweight carriage shall be of cast iron sufficiently heavy to accommodate safely the required load. The top and bottom sections shall be connected with rods not less than three-fourths ($\frac{3}{4}$) inches in diameter with one (1) tie plate for every four (4) feet of rod. Weights shall be of cast iron grooved to drop into place on top of the lower carrying weight. Turnbuckles connecting the supporting cables to the top of the carriage shall be attached to eyebolts attached to the top section.

The counterweight carriage shall be guided by a lattice type counterweight track securely anchored to proscenium wall. These guide tracks shall extend from the gridiron a length equivalent to the length of the carriage, plus the travel of the curtain, plus five (5) feet. A structural steel stop shall be provided at the bottom of the arbor. The operating hand line shall be not less than three-fourths ($\frac{3}{4}$) inch in diameter, manila rope and shall be secured to the top and bottom of the counterweight carriage, and passed over the loft block and under a floor block not less than twelve (12) inches diameter. The floor block shall be adjustable for tension.

There shall be safety stay chains of straight welded link, fastened to the top curtain batten, of sufficient strength to support safely the weight of the curtain. There shall be one more stay chain than the number of supporting cables, and, except for the stay chains at the end of the curtain, they shall be centered between the supporting cables. The stay chains shall be securely attached to the top batten of the curtain and thence to the gridiron, if of steel construction, or shall be supported through the

proscenium wall with three-fourths ($\frac{3}{4}$) inch bolts. Safety chains shall be so adjusted so they support the curtain when it is lowered and the bottom batten is resting on the pad supported by the floor.

The balance between the curtain and the counter-balance shall be approximately equal and an overweight shall be suspended directly over the top batten of the curtain by means of an emergency control line. The emergency control line shall be of cotton sash cord, fitted with not less than four (4) fusible links fusing at 165 degrees F., one on each side of the stage, and two overhead in the gridiron, which when the links are fused or the sash cord broken, will allow the overweight to lower the curtain automatically.

This control line shall extend up both sides of the proscenium arch and across the gridiron and shall be so arranged that when released, it will automatically open the stage ventilators.

This control line shall be secured to the proscenium wall by means of a one and one-half ($1\frac{1}{2}$) inch diameter iron ring held in place by a three-eighths inch ($\frac{3}{8}$ ") diameter pin secured in wall. The control line shall be of sufficient length to extend not more than four feet six inches ($4'-6''$) from stage floor when ring is released and fire curtain is in down position. Excess cord shall be coiled in open top metal box secured to the proscenium wall.

On each side of the proscenium arch, at a location in plain sight, shall be located an easily read sign, bearing the inscription:

"In case of FIRE release ring."

Details of the installation rigging and methods of attachments shall be submitted to the Superintendent of Buildings for approval. (Ord. 85500 § 4104; Sept. 10, 1956).

3.41.050 Tests. The complete installation of every proscenium curtain shall be subjected to operating tests, and any auditorium in which such proscenium curtain is required shall not be opened to public performances until after the proscenium curtain and the operation thereof, have been approved by the Superintendent of Buildings. (Ord. 85500 § 4105; Sept. 10, 1956).

3.41.060 New designs. Curtains and operating equipment of other designs and materials of at least equal fire resistance and strength may be used subject to approval of the Superintendent of Buildings. (Ord. 85500 § 4106; Sept. 10, 1956).

Chapter 3.42
FIRE RESISTIVE STANDARDS
—INTERIOR WALL AND CEILING FINISH

Sections:

- 3.42.010 General.
- 3.42.020 Testing and classification of materials.
- 3.42.030 Application of controlled interior finish.
- 3.42.040 Finishes based on occupancy.

3.42.010 General. Interior wall and ceiling finish shall mean interior wainscoting, paneling, or other finish applied structurally or for decoration, acoustical correction, surface insulation or similar purposes. Suspended fixtures, translucent panels and decoration, covering more than ten per cent of any ceiling area shall be considered as ceiling finish for the purposes of this Chapter.

Requirements for finishes shall not apply to trim, doors, windows or their frames, nor to materials which are less than one-twenty-eighth inch (0.036") in thickness, cemented to the surface of walls or ceilings; if these materials have flame-spread characteristics no greater than paper of this thickness cemented to a noncombustible backing. (Ord. 85500 § 4201; September 10, 1956).

3.42.020 Testing and classification of materials. (a) **TESTING.** Flame-spread characteristics of materials used for interior wall or ceiling finish shall be determined by one of the following methods:

1. The "Tunnel Test" as described in U.B.C. Standard No. 42-1.
2. The "Federal Standard Test" as described in U.B.C. Standard No. 42-1-58.
3. Any other nationally recognized method of test procedure for determining the flame-spread characteristics of finish materials that will give comparable results.

(b) **APPLICATION OF TERMS.** The terms used in Table No. 42-A apply only to finish materials as specified in this Chapter.

(c) **CLASSIFICATION.** Classes of interior finish materials based on their flame-spread characteristics under the "Tunnel Test" or "Federal Standard Test" shall be as set forth in Table No. 42-A.

TABLE No. 42-A—FLAME-SPREAD CLASSIFICATION

Class	Material Qualified By:	
	Tunnel Test	Federal Standard Test
I	0 — 30	Class A
II	31 — 75	Class B
III	76 — 225	(See Note)

NOTE: The Federal Standard Test shall not be recognized for Class III materials.

(Ord. 85500 § 4202 as amended by Ord. 88910; January 5, 1960).

3.42.030 Application of controlled interior finish. Where interior finish materials, applied to walls and ceilings, are regulated as set forth in Table No. 42-B for purposes of limiting flame-spread, the following provisions shall apply.

1. Ceiling and wall finishes shall be cemented or otherwise fastened in place in such a manner that they will not readily become detached when subjected to room temperature of four hundred degrees Fahrenheit (400° F.) for thirty (30) minutes.

Exception: Translucent plastic ceiling panels shall be exempt from the above requirement, provided that

1. The plastic does not exceed .036 in. in thickness nor a flame-spread rating of twenty-five (25).
2. Installation in sprinklered areas shall be subject to approval by the Chief of the Fire Department.

See Chapter 3.57 for additional requirements.

TABLE No. 42-B—MINIMUM INTERIOR FINISH CLASSIFICATION

Occupancy	Vertical Enclosures	Horizontal Exitways	Rooms Or Areas
A-1	I	I	II
A-2	I	I	II
B	I	II	III*
C	I	II	III*
D	I	I	II
E	I	II	III
F	I	II	III*
G	II	II	III
H	I	II	III*
I	NO RESTRICTIONS		
J	NO RESTRICTIONS		

* Class II materials shall be used where room or area exceeds 3,000 sq. ft. in area between walls or beams projecting at least ten inches (10").

2. On walls or ceilings required by this Code to be noncombustible or fire-resistive, finish material shall be applied as follows:

- a. Directly against such wall or ceiling; or
 - b. Against furring strips with maximum thickness of one and three-quarters inch, where strips are applied directly against wall or ceiling, and where intervening spaces are either filled with non-combustible material or are fire-stopped at maximum intervals of eight feet in any direction.
3. Where noncombustible or fire-resistive walls and ceilings are required, and are set out, or dropped, more than one and three-quarters inch, control of fire draft in concealed spaces shall be assured and all hanging and supporting members shall be noncombustible. Noncombustible materials shall be used, except that finish materials as specified in Table No. 42-B may be used, under the following conditions:
- a. When they are protected on both sides by automatic sprinklers; or
 - b. When they are attached directly to a noncombustible backing; or
 - c. When they are applied on furring strips as in paragraph 2-b, which strips are attached directly to a noncombustible backing.
4. Finish materials may be installed directly against the wood decking or planking of Heavy-Timber Construction, or to furring strips which are applied directly to such decking or planking and are firestopped as specified in paragraph 2.
5. All wall or ceiling finish materials of classes other than Class I which are less than one-quarter inch in thickness shall be applied directly against a noncombustible backing. (Ord. 85500 § 4203 as amended by Ord. 88910 and Ord. 97889 § 5; June 26, 1969).

3.42.040 Finishes based on occupancy. The minimum flame spread classification of wall and ceiling finishes as determined by tests shall be based on occupancy as set forth in Table No. 42-B.

Exceptions: 1. Class III finish materials may also be used in Group A occupancies:

- a. For wainscoating up to four feet above the floor in rooms.
 - b. For tack or bulletin boards covering not more than five per cent of the wall area.
2. Where approved full automatic fire extinguishing systems as specified in Chapter 3.38 are provided, the flame spread classification for rooms or areas may be relaxed one classification but in no case shall materials having a classification greater than III be used.
3. The exposed faces of Type III, Heavy Timber structural members and decking and planking, where otherwise permissible under this Code are exempt from the flame spread requirements of this chapter. (Ord. 85500 § 4204 as amended by Ord. 91130; May 1, 1962).

Chapter 3.43
FIRE RESISTIVE STANDARDS—MATERIALS

Sections:

- 3.43.010 General.
- 3.43.020 Fire-resistive materials.
- 3.43.030 Protection of structural members.
- 3.43.040 Walls and partitions.
- 3.43.050 Floor-ceilings or roof-ceilings.
- 3.43.060 Fire-resistive assemblies for protection of openings.
- 3.43.070 Roof coverings.

3.43.010 General. In addition to all the other requirements of this Code, fire-resistive materials shall meet the requirements for fire-resistive construction given in this chapter. (Ord. 85500 § 4301 added by Ord. 97889 § 10 (part) ; June 26, 1969).

3.43.020 Fire-resistive materials. (a) **GENERAL.** Materials and systems used for fire-resistive purposes shall be limited to those specified in this chapter unless accepted under the procedure given in subsection (b), and shall conform to the applicable U.B.C. Standards.

The materials and details of construction for the fire-resistive systems described in this chapter shall be in accordance with all other provisions of this Code except as modified herein.

(b) **TESTS.** For the purpose of determining the degree of fire resistance afforded, the materials of construction listed in this chapter shall be assumed to have the fire-resistance rating indicated. Any material or assembly of materials of construction tested in accordance with the requirements set forth in U.B.C. Standard No. 43-1 shall be rated for fire-resistance in accordance with the results and conditions of such tests.

(c) **CONCRETE.** Grade A concrete is made with aggregates such as limestone, calcareous gravel, trap rock, slag, expanded clay, shale, slate or any other aggregates possessing equivalent fire-resistive properties.

Grade B concrete is all concrete other than Grade A concrete and includes concrete made with aggregates containing more than forty percent quartz, chert or flint.

(d) **PNEUMATICALLY-PLACED CONCRETE.** Pneumatically-placed concrete without coarse aggregate shall be classified as Grade A or B concrete in accordance with the aggregate used. (Ord. 85500 § 4302 added by Ord. 97889 § 10 (part) ; June 26, 1969).

3.43.030 Protection of structural members. (a) **GENERAL.** Structural members having the fire-resistive protection set forth in Table No. 43-A shall be assumed to have the fire-resistance ratings set forth therein.

(b) **PROTECTIVE COVERINGS.** (1) **Thickness of protection.** The

thickness of fire-resistive materials required for protection of structural members shall be not less than set forth in Table No. 43-A, except as modified in this section. The figures shown shall be the net thickness of the protecting materials and shall not include any hollow space back of the protection.

(2) **Unit masonry protection.** Where required, metal ties shall be embedded in transverse joints of unit masonry for protection of steel columns. Such ties shall be as set forth in Table No. 43-A or be equivalent thereto.

(3) **Reinforcement for cast-in-place concrete column protection.** Cast-in-place concrete protection for steel columns shall be reinforced at the edges of such members with wire ties of not less than .18 inch in diameter wound spirally around the columns on a pitch of not more than eight inches.

(4) **Embedment of pipes.** Conduits and pipes shall not be embedded in required fire protection of structural members.

(5) **Column jacketing.** Where the fire-resistive covering on columns is exposed to injury from moving vehicles, the handling of merchandise or other means, it shall be protected in an approved manner.

(6) **Ceiling protection.** Where a ceiling forms the protective membrane for fire-resistive assemblies, the constructions and their supporting horizontal structural members need not be individually fire protected except where such members support directly applied loads from more than one floor or roof. The required fire resistance shall be not less than that required for individual protection of members.

Ceilings shall form continuous fire-resistive membranes, but may have openings for copper, sheet steel, or ferrous plumbing pipes, ducts and electrical outlet boxes provided the areas of such openings through the ceiling aggregate not more than one hundred square inches for any one hundred square feet of ceiling area.

Individual electrical outlet boxes shall be of steel and not greater than sixteen square inches in area. All duct openings in such ceilings shall be protected by approved fire dampers.

Exception: Larger openings than permitted above may be installed where such openings and the assemblies in which they are utilized are in accordance with the results of tests pursuant to the provisions of Section 3.43.020 (b).

(c) **PROTECTED MEMBERS.** (1) **Attached metal members.** The edges of lugs, brackets, rivets, and bolt heads attached to structural members may extend to within one inch of the surface of the fire protection.

(2) **Reinforcing.** Thickness of protection for concrete or masonry reinforcement shall be measured to the outside of the reinforcement except that stirrups and spiral reinforcement ties may project not more than one-half inch into the protection.

(3) **Bonded prestressed concrete tendons.** For members having a single tendon or more than one tendon installed with equal concrete cover measured from the nearest surface, the cover shall be not less than that set forth in Table No. 43-A.

For members having multiple tendons installed with variable concrete cover, the average tendon cover shall be not less than that set forth in Table No. 43-A provided:

A. The clearance from each tendon to the nearest exposed surface is used to determine the average cover.

B. In no case can the clear cover for individual tendons be less than one-half of that set forth in Table No. 43-A. A minimum cover of three-fourths inch for slabs and one inch for beams is required for any aggregate concrete.

C. For the purpose of establishing a fire-resistive rating, tendons having a clear covering less than that set forth in Table No. 43-A shall not contribute more than fifty percent of the required ultimate moment capacity for members less than three hundred fifty square inches in cross-sectional area and sixty-five percent for larger members. For structural design purposes, however, tendons having a reduced cover are assumed to be fully effective.

(d) **FIRE PROTECTION OMITTED.** Fire protection may be omitted from the bottom flange of lintels, spanning not over six feet, shelf angles, or plates that are not a part of the structural frame. (Ord. 85500 § 4303 added by Ord. 97889 § 10 (part); June 26, 1969).

3.43.040 Walls and partitions. (a) **GENERAL.** Fire-resistive walls and partitions shall be assumed to have the fire-resistance ratings set forth in Table No. 43-B.

(b) **COMBUSTIBLE MEMBERS.** Combustible members framed into a wall shall be protected at their ends by not less than one-half the required fire-resistive thickness of such wall.

(c) **EXTERIOR WALLS.** In fire-resistive exterior wall construction the fire-resistive rating shall be maintained for such walls passing through attic areas. (Ord. 85500 § 4304 added by Ord. 97889 § 10 (part); June 26, 1969).

3.43.050 Floor-ceilings or roof-ceilings. (a) **GENERAL.** Fire-resistive floor-ceiling or roof-ceiling construction systems shall be assumed to have the fire-resistance ratings set forth in Table No. 43-C.

(b) **FLOORS.** Fire-resistive floors shall be continuous and all openings for mechanical and electrical equipment shall be enclosed as specified in Chapter 3.30.

Exceptions: 1. Occasional pipes, conduits, sleeves and electrical outlets of copper, sheet steel or ferrous construction may be installed within

or through fire-resistive floor systems provided such installations do not unduly impair the required fire-resistance of the assembly.

2. The provisions of this section shall not apply when such openings are in accordance with the results of tests conducted pursuant to the provisions of Section 3.43.020 (b).

(c) **ROOFS.** Fire-resistive roofs may have the same openings as permitted for floors and may contain other openings as permitted by this Code. See Chapter 3.34 for skylight construction.

(d) **UNUSABLE SPACE ABOVE OR BELOW.** In one-hour fire-resistive construction the ceiling may be omitted over unusable space and flooring may be omitted where unusable space occurs above. (Ord. 85500 § 4305 added by Ord. 97889 § 10 (part) ; June 26, 1969).

3.43.060 Fire-resistive assemblies for protection of openings. (a) **GENERAL.** Where required by this Code for the fire-protection of openings, fire-resistive assemblies shall meet the requirements of this chapter. For additional requirements for dual purpose fire exit doors, see Chapter 3.33.

(b) **DEFINITIONS.** "Fire assembly" is the assembly of a fire door, fire window, or fire damper, including all required hardware, anchorage, frames, and sills.

"Fire assembly, automatic closing," is a fire assembly which may remain in an open position and which will close automatically if subjected to either of the following:

- (1) An increase in temperature.
- (2) Products of combustion.

Unless otherwise specified, the closing device shall be one rated at a maximum temperature of one hundred sixty-five degrees Fahrenheit. If products of combustion are being detected to actuate the closing device, the closing device shall operate by the activation of an approved unit-type smoke and heat-activated detector or an approved detection device having an equivalent response to smoke and products of combustion. Unit-type smoke detectors shall conform to the requirements specified in U.B.C. Standard No. 43-6.

"Fire assembly, self-closing," is a fire assembly which is kept in a normally closed position and is equipped with an approved device to insure closing and latching after having been opened for use.

(c) **IDENTIFICATION OF FIRE ASSEMBLIES.** All fire assemblies having fire-protection ratings of three hours, one and one-half hours, one hour, and three-fourths hour shall bear the label or other identification showing the rating thereof. Such label shall be issued by an approved testing agency having a service for the inspection of materials and workmanship at the factory during fabrication and assembly.

Exception: A three-fourths-hour labeled fire assembly may be used where a one-hour rating is required provided the door is tested, to-

gether with a type of hardware not necessarily specified in this Code, for a period of one hour in accordance with the requirements specified in U.B.C. Standard No. 43-2.

(d) **FIRE-RESISTIVE TESTS.** The fire-protection rating of all types of required fire assemblies shall be determined in accordance with the requirements specified in U.B.C. Standards No. 43-2 and No. 43-4. A minimum transmitted temperature end point shall not be required except for fire-exit doors in stairway enclosures where the temperature shall not exceed four hundred fifty degrees Fahrenheit at the end of thirty minutes of the fire exposure specified in U.B.C. Standard No. 43-2.

(e) **HARDWARE.** Every fire assembly required to have a three-hour fire-protection rating shall be of an automatic closing type as specified in Section 3.43.060(b). Every fire assembly required to have a one and one-half hour, one-hour, or three-fourths-hour fire-protection rating shall be of an automatic or self-closing type as specified in Section 3.43.060(b). Hardware requirements for swinging fire doors shall be as set forth in Table No. 43-D.

Exceptions: (1) Dual purpose fire-exit doors shall have closing devices as set forth in Chapter 3.33.

(2) Closing devices may be omitted on three-fourths-hour fire-protection assemblies required as protection for openings in exterior and inner court walls.

Heat-actuated devices used in automatic fire assemblies shall be installed, one on each side of the wall at the top of the opening and one on each side of the wall at ceiling height where the ceiling is more than three feet above the opening.

Devices detecting products of combustion shall meet the approval of the superintendent of buildings as to installation and location, and shall be subject to such periodic tests as may be required.

(f) **GLAZED OPENINGS IN FIRE DOORS.** Glazed openings in fire doors shall not be permitted in a fire assembly required to have a three-hour fire-resistive rating.

The area of glazed openings in a fire door required to have one and one-half-hour or one-hour fire-resistive rating shall be limited to one hundred square inches with a minimum dimension of four inches. When both leaves of a pair of doors have observation panels, the total area of the glazed openings shall not exceed one hundred square inches for each leaf.

Glazed openings shall be limited to twelve hundred and ninety-six square inches in wood and plastic-faced composite or hollow metal doors, per light, when fire-resistive assemblies are required to have a three-fourths-hour fire-resistive rating.

In addition to the general requirements set forth in this subsection, glazed openings in dual purpose fire-exit doors shall meet the requirements set forth in Chapter 3.33.

(g) **GLAZED OPENINGS IN FIRE WINDOWS.** Windows required to have a three-fourths-hour fire-resistive rating may have an area not greater than eighty-four square feet with neither width nor height exceeding twelve feet.

(h) **GLAZING.** Glazing shall be glass not less than one-fourth inch thick and shall be reinforced with mesh No. 24 gauge or heavier embedded in the glass with openings not larger than one inch square. Glass not conforming to these requirements may be used when qualified by tests in accordance with U.B.C. Standard No. 43-2 (for doors) or No. 43-4 (for windows). Glass shall be held in place by steel glazing angles except that in casement windows wire clips may be used.

(i) **TIN-CLAD DOORS.** If constructed as specified in U.B.C. Standard No. 43-3, tin-clad fire doors installed on each side of openings requiring protection shall be considered as providing a fire assembly having a three-hour fire-protection rating provided each door bears the label of an approved testing agency showing the classification thereof.

(j) **INSTALLATION.** A fire assembly shall be installed as specified in U.B.C. Standard No. 43-5.

(k) **SIGNS.** A sign shall be displayed permanently near or on each required fire door in letters not less than one inch high to read as follows:

“FIRE DOOR
DO NOT OBSTRUCT”

(Ord. 85500 § 4306 added by Ord. 97889 § 10 (part); June 26, 1969).

3.43.070 Roof coverings. Fire-retardant roof coverings shall be as specified in Section 3.32.040. (Ord. 85500 § 4307 added by Ord. 97889 § 10 (part); June 26, 1969).

TABLE No. 43-A—MINIMUM PROTECTION OF STRUCTURAL PARTS BASED ON TIME PERIODS FOR VARIOUS NONCOMBUSTIBLE INSULATING MATERIALS

Structural Parts to be Protected	Item Number	Insulating Material Used	Minimum Thickness of Insulating Material for Following Fire-Resistive Periods (In Inches)				
			4 Hr.	3 Hr.	2 Hr.	1 Hr.	
Steel Columns and All Members of Primary Trusses	1	Grade A concrete, members 6"x6" or greater (not including sandstone, granite and siliceous gravel) ¹	2½	2	1½	1	
	2	Grade A concrete, members 8"x8" or greater (not including sandstone, granite and siliceous gravel) ¹	2	1½	1	1	
	3	Grade A concrete, members 12"x12" or greater (not including sandstone, granite and siliceous gravel) ¹	1½	1	1	1	
	4	Grade B concrete and Grade A concrete excluded above, members 6"x6" or greater ¹	3	2	1½	1	
	5	Grade B concrete and Grade A concrete excluded above, members 8"x8" or greater ¹	2½	2	1	1	
	6	Grade B concrete and Grade A concrete excluded above, members 12"x12" or greater ¹	2	1	1	1	
	7	Clay or shale brick with brick and mortar fill ¹	3¾			2¼	
	8	4" Hollow clay tile in two 2" layers; ½" mortar between tile and column; ¾" metal mesh (wire diameter = .046) in horizontal joints; tile fill	4				
	9	2" Hollow clay tile; ¾" mortar between tile and column; ¾" metal mesh (.046" wire diameter) in horizontal joints; Grade A concrete fill; ¹ plastered with ¾" gypsum plaster	3				
	10	2" Hollow clay tile with outside wire ties (.08" diameter) at each course of tile or ¾" metal mesh (.046" diameter wire) in horizontal joints; Grade A concrete fill; extending 1" outside column on all sides			3		
	11	2" Hollow clay tile with outside wire ties (.08" diameter) at each course with or without Grade A concrete fill; ¾" mortar between tile and column				2	
	12	Solid gypsum blocks with woven wire mesh; in horizontal joints, laid with 1" mortar on flanges ¹ and plastered with ½" gypsum plaster	2½	2½			

Table 43-A (Continued)

Structural Parts to be Protected	Item Number	Insulating Material Used	Minimum Thickness of Insulating Material for Following Fire-Resistive Periods (In Inches)				
			4 Hr.	3 Hr.	2 Hr.	1 Hr.	
(Cont'd) Steel Columns and All Members of Primary Trusses	13	Hollow gypsum blocks with 7/8" wide No. 12 gauge metal cramps and woven wire mesh ² in horizontal joints. PL denotes 1/2" gypsum plaster.	3 1/2 PL	3 1/2 PL	3	3	
	14	Wood-fibered gypsum plaster poured solid, (reentrant space filled) and reinforced with 4"x4"xNo. 14 gauge wire mesh	2	1 1/2	1	1	
	15	Portland cement plaster over metal lath wire tied to 3/4" cold-rolled vertical channels with No. 18 gauge wire ties spaced 3" to 6" on center. Plaster mixed 1:2 1/2 by volume, cement to sand					
	16	Vermiculite concrete, 1:4 mix by volume over paper-backed wire fabric lath wrapped directly around column with additional 2"x2" No. 16/16 gauge wire fabric placed 3/4" from outer concrete surface. Wire fabric tied with No. 18 gauge wire spaced 6" on center for inner layer and 2" on center for outer layer	2		2 1/2 ³	7/8	
	17	Perlite or vermiculite gypsum plaster over metal lath wrapped around column and furred 1 1/4" from column flanges. Sheets lapped at ends and tied at 6" intervals with No. 18 gauge tie wire. Plaster pushed through to flanges	2				
	18	Perlite or vermiculite gypsum plaster over self-furring metal lath wrapped directly around column, lapped 1" and tied at 6" intervals with No. 18 gauge wire	1 1/2	1			
	19	Perlite or vermiculite gypsum plaster on metal lath applied to 3/4" cold-rolled channels spaced 24 inches apart vertically and wrapped flatwise around column	1 3/4	1 3/8	1		
	20	Perlite or vermiculite gypsum plaster over 2 layers of 1/2" plain full-length gypsum lath applied tight to column flanges. Lath wrapped with 1" hexagonal mesh of No. 20 gauge wire and tied with doubled No. 18 gauge wire ties spaced 23" on center. For three-coat work the plaster mix for the second coat shall not exceed 100 pounds of gypsum to 2 1/2 cubic feet of aggregate for the three-hour system	1 1/2			2	

Table 43-A (Continued)

Structural Parts to be Protected	Item Number	Insulating Material Used	Minimum Thickness of Insulating Material for Following Fire-Resistive Periods (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
(Cont'd) Steel Columns and All Members of Primary Trusses	21	Perlite or vermiculite gypsum plaster over one layer of ½" plain full-length gypsum lath applied tight to column flanges. Lath tied with doubled No. 18 gauge wire ties spaced 23" on center and scratch coat wrapped with 1" hexagonal mesh No. 20 gauge wire fabric. For three-coat work the plaster mix for the second coat shall not exceed 100 pounds of gypsum to 2½ cubic feet of aggregate	2			
	22	Perlite or vermiculite gypsum plaster over ¾" perforated gypsum lath applied tight to column flanges and tied with doubled No. 18 gauge wire ties spaced 15" on center. For three-coat work the plaster mix for the second coat shall not exceed 100 pounds of gypsum to 2½ cubic feet of aggregate for the two-hour system	1¾	1¾		
	23	Gypsum plaster over ¾" perforated gypsum lath applied tight to column flanges and tied with doubled No. 18 gauge wire ties spaced 15" on center	2%	1¾	1¾	¾
	24	Multiple layers of ½" gypsum wallboard adhesively ⁴ secured to column flanges and successive layers. Wallboard applied without horizontal joints. Corner edges of each layer staggered. Wallboard layer below outer layer secured to column with doubled No. 18 gauge wire ties spaced 15" on center. Exposed corners taped and treated				
	25	Three layers of ¾" Type "X" gypsum wallboard. First and second layer held in place by ¾" diameter by 1¾" long ring shank nails with 5/16" diameter heads spaced 24" on center at corners. Middle layer also secured with metal straps at mid-height and 18" from each end, and by metal corner bead at each corner held by the metal straps. Third layer attached to corner bead with 1" long gypsum wallboard screws spaced 12" on center		2	1	1
						1¾

Table 43-A (Continued)

Structural Parts to be Protected	Item Number	Insulating Material Used	Minimum Thickness of Insulating Material for Following Fire-Resistive Periods (In Inches)				
			4 Hr.	3 Hr.	2 Hr.	1 Hr.	
(Cont'd) Steel Columns and All Members of Primary Trusses	26	Three layers of 5/8" Type "X" gypsum wallboard, each layer screw attached to 1 1/2" steel studs (No. 25 gauge) at each corner of column. Middle layer also secured with No. 18 gauge double strand the wire, 24" on center. Screws are No. 6 by 1" spaced 24" on center for inner layer, No. 6 by 1 1/2" spaced 12" on center for middle layer and No. 8 by 2 1/4" spaced 12" on center for outer layer				1 7/8	
	26 A	Wood-Fibered gypsum plaster mixed 1:1 by weight gypsum to sand aggregate applied over metal lath. Lath lapped 1" and tied 6" on center at all ends, edges and spacers with No. 18 gauge tie wire. Lath applied over 1/2" spacers made of 3/4" furring channel with 2" legs bent around each corner. Spacers located 1" from top and bottom of member and a maximum of 40" on center and wire tied with a single strand of No. 18 gauge wire. Corner bead tied to the lath at 6" on center along each corner to provide plaster thickness				1 5/8	
Webs or Flanges of Steel Beams and Girders	27	Grade A concrete (not including sandstone, granite and siliceous gravel) with 3" or finer metal mesh placed 1" from the finished surface anchored to the top flange and providing not less than .025 square inch of steel area per foot in each direction	2	1 1/2	1	1	
	28	Grade B concrete and Grade A concrete excluded above with 3" or finer metal mesh placed 1" from the finished surface anchored to the top flange and providing not less than .025 square inch of steel area per foot in each direction	2 1/2	2	1 1/2	1	
	29	Portland cement plaster on metal lath attached to 3/4" cold-rolled channels with No. 18 gauge wire ties spaced 3" to 6" on center. Plaster mixed 1:2 1/2 by volume, cement to sand				2 1/2 ³	7/8

Table 43-A (Continued)

Structural Parts to be Protected	Item Number	Insulating Material Used	Minimum Thickness of Insulating Material for Following Fire-Resistive Periods (in Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
(Cont'd) Webs or Flanges of Steel Beams and Girders	29 A	Two layers of 5/8" Type "X" gypsum wallboard are attached to U-shaped brackets spaced 24" on center. No. 25 gauge 1 1/2" deep by 1" galvanized steel runner channels are first installed parallel to and on each side of the top beam flange to provide a 1/2" clearance to the flange. The channel runners are attached to steel deck or concrete floor construction with approved fasteners spaced 12" on center. U-shaped brackets are formed from members identical to the channel runners. At the bent portion of the U-shaped bracket the webs of the channel are cut out so that 1 1/2" deep corner channels can be inserted without attachment parallel to each side of the lower flange. As an alternate No. 24 gauge 1"x2" runner and corner angles may be used in lieu of channels and the web cutouts in the U-shaped brackets may be omitted. Each angle is attached to the bracket with 1/2" long No. 8 self-drilling screws. The vertical legs of the U-shaped bracket are attached to the runners with one 1/2" long No. 8 self-drilling screw. The completed steel framing provides a 2 7/8" and 1 1/2" space between the inner layer of wallboard and the sides and bottom of the steel beam, respectively. The inner layer of wallboard is attached to the top runners and bottom corner channels or corner angles with 1 1/4" long No. 6 self-drilling screws spaced 16" on center. The outer layer of wallboard is applied with 1 3/4" long No. 6 self-drilling screws spaced 8" on center. The bottom corners are reinforced with metal corner beads.				1 1/4
	29 B	Vermiculite Gypsum plaster on a metal lath cage, wire tied to No. 8 steel wire hangers wrapped around beam and spaced 16" on center. Metal lath tie spaced approximately 5" on center at cage sides and bottom			7/8	

Table 43-A (Continued)

Structural Parts to be Protected	Item Number	Insulating Material Used	Minimum Thickness of Insulating Material for Following Fire-Resistive Periods (In Inches)				
			4 Hr.	3 Hr.	2 Hr.	1 Hr.	
Bonded Tendons in Prestressed Concretes	30	Grade A ⁶ concrete } Beams or girders Solid slabs	4 ⁷	3 ⁷	2½ ⁷	1½	
Reinforcing Steel in Reinforced Concrete	31	Grade A concrete, members 12" or larger, square or round (Size limit does not apply to beams and girders monolithic with floors)	1½	1½	1½	1½	
Columns, Beams, Girders and Trusses	32	Grade B concrete, members 12" or larger, square or round (Size limit does not apply to beams and girders monolithic with floors)	2	1½	1½	1½	
Reinforcing Steel in Reinforced Concrete Joists ⁹	33	Grade A concrete	1¼	1¼	1	¾	
Reinforcing and Tie Rods in Floor and Roof Slabs ⁹	34	Grade B concrete	1¾	1½	1	¾	
	35	Grade A concrete	1	1	¾	¾	
	36	Grade B concrete	1¼	1	1	¾	

1. Reentrant parts of protected members to be filled solidly.
 2. Woven wire mesh consists of three-eighths-inch (¾") mesh of No. 17 gauge wire.
 3. Two layers of equal thickness with a three-fourths-inch (¾") air space between.
 4. An approved adhesive qualified under U.B.C. Standard No. 43-1.
 5. Cover for end anchorages shall be twice that shown for the respective ratings. Where lightweight Grade A concrete aggregates producing structural concrete having an oven-dried weight of 110 pounds per cubic foot or less are used, the tabulated minimum cover may be reduced 25 per cent.
 6. For Grade B concrete increase tendon cover 20 per cent.
 7. Adequate provisions against spalling shall be provided by U-shaped or hooped stirrups spaced not to exceed the depth of the member with a clear cover of one inch (1").
 8. Prestressed slabs shall have a thickness not less than that required in Table No. 43-C for the respective fire-resistive time period.
 9. For use with concrete slabs having a comparable fire endurance where members are framed into the structure in such a manner as to provide equivalent performance to that of monolithic concrete construction.
 (Table 43-A added by Ord. 97889 § 10 (part); June 26, 1969).

TABLE NO. 43-B—RATED FIRE-RESISTIVE PERIODS FOR VARIOUS WALLS AND PARTITIONS

Material	Item Number	Construction ¹	Minimum Finished Thickness Face-to-Face ² (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
Brick of Clay or Shale	1	Solid units (at least 75 per cent solid)	8		6 ³	4
	2	Solid units plastered each side with $\frac{5}{8}$ " gypsum or Portland cement plaster. Portland cement plaster mixed 1:2 $\frac{1}{2}$ by weight, cement to sand			4 $\frac{3}{4}$ ⁴	
	3	Hollow brick units ⁵ at least 71 per cent solid		8		
	4	Hollow brick units ⁵ at least 71 per cent solid, plastered each side with $\frac{5}{8}$ " gypsum plaster	8 $\frac{3}{4}$			
	5	Hollow (rowlocks)	12		8	
Hollow Clay Tile, Non-load-bearing (End or Side Construction)	6	Hollow (rowlocks) plastered each side with $\frac{5}{8}$ " gypsum or Portland cement plaster. Portland cement plaster mixed 1:2 $\frac{1}{2}$ by weight, cement to sand		9		4 $\frac{1}{4}$
	7	Hollow cavity wall consisting of two 4" nominal clay brick units with air space between	10			
	8	One cell in wall thickness, units at least 50 per cent solid, plastered each side with $\frac{5}{8}$ " gypsum plaster				4 $\frac{1}{4}$
	9	Two cells in wall thickness, units at least 45 per cent solid				6
	10	Two cells in wall thickness, units at least 45 percent solid. Plastered each side with $\frac{5}{8}$ " gypsum plaster			7	
Hollow Clay Tile, Load-bearing (End or Side Construction)	11	Two cells in wall thickness, units at least 60 per cent solid. Plastered each side with $\frac{5}{8}$ " gypsum plaster			5	
	12	Two cells in wall thickness, units at least 40 per cent solid				8
	13	Two cells in wall thickness, units at least 40 per cent solid. Plastered one side with $\frac{5}{8}$ " gypsum plaster			8 $\frac{1}{2}$	
	14	Two cells in wall thickness, units at least 49 per cent solid			8	
	15	Three cells in wall thickness, units at least 40 per cent solid			12	

Table No. 43-B (Continued)

Material	Item Number	Construction ¹	Minimum Finished Thickness Face-to-Face ² (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
(Cont'd) Hollow Clay Tile, Load-bearing (End or Side Construction)	16	Two units and three cells in wall thickness, units at least 40 per cent solid		12		
	17	Two units and four cells in wall thickness, units at least 45 per cent solid	12			
	18	Two units and three cells in wall thickness, units at least 40 per cent solid. Plastered one side with $\frac{3}{8}$ " gypsum plaster	12 $\frac{1}{2}$			
	19	Three cells in wall thickness, units at least 43 per cent solid. Plastered one side with $\frac{5}{8}$ " gypsum plaster		8 $\frac{1}{2}$		
	20	Two cells in wall thickness, units at least 40 per cent solid. Plastered each side with $\frac{5}{8}$ " gypsum plaster		9		
	21	Three cells in wall thickness, units at least 43 per cent solid. Plastered each side with $\frac{5}{8}$ " gypsum plaster	9			
	22	Three cells in wall thickness, units at least 40 per cent solid. Plastered each side with $\frac{5}{8}$ " gypsum plaster	13			
	23	Hollow cavity wall consisting of two 4" nominal clay tile units (at least 40 per cent solid) with air space between. Plastered one side (exterior) with $\frac{3}{4}$ " Portland cement plaster and other side with $\frac{5}{8}$ " gypsum plaster. Portland cement plaster mixed 1:3 by volume, cement to sand				
	24	4" Brick and 8" tile	12			
	25	4" Brick and 4" tile		8		
	26	4" brick and 4" tile plastered on the tile side with $\frac{5}{8}$ " gypsum plaster	8 $\frac{1}{2}$			
	27	Expanded slag or pumice	4.7	4.0	3.2	2.1
	28	Expanded clay or shale	5.7	4.8	3.8	2.6
	29	Limestone, cinders or air cooled slag	5.9	5.0	4.0	2.7
	30	Calcareous gravel	6.2	5.3	4.2	2.8
	31	Horizontal reinforcement not less than 0.25 per cent and vertical reinforcement not less than 0.15 per cent. (Three-fourths as much for welded wire fabric)		6 $\frac{1}{2}$	6	5
Solid Concrete			7 $\frac{1}{2}$	6 $\frac{1}{2}$	5 $\frac{1}{2}$	4 $\frac{1}{2}$

Material	Item Number	Construction ¹	Minimum Finished Thickness Face-to-Face ² (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
Hollow Gypsum Tile	32	3" tile not less than 70 per cent solid				3 ⁴
	33	3" tile plastered one side with $\frac{3}{8}$ " gypsum plaster			3 $\frac{3}{4}$	
	34	4" tile plastered one side with $\frac{1}{2}$ " gypsum plaster		4 $\frac{1}{2}$		
	35	3" tile plastered both sides with $\frac{1}{2}$ " gypsum plaster	4 ⁴			
	36	4" tile plastered both sides with $\frac{1}{2}$ " gypsum plaster	5 ⁴			
	37	One 2" unit cored 15 per cent maximum and one 4" unit cored 25 per cent maximum with $\frac{3}{8}$ " mortar filled collar joint. Unit positions reversed in alternate courses		6 $\frac{3}{8}$		
Glazed or Unglazed Facing Tile, Nonload-bearing	38	One 2" unit cored 15 per cent maximum and one 4" unit cored 40 per cent maximum with $\frac{3}{8}$ " mortar filled collar joint. Plastered one side with $\frac{3}{4}$ " gypsum plaster. Two wythes tied together every fourth course with No. 22 gauge corrugated metal ties		6 $\frac{3}{4}$		
	39	One unit with three cells in wall thickness, cored 29 per cent maximum			6	
Unglazed Facing Tile, Nonload-bearing	40	One 2" unit cored 22 per cent maximum and one 4" unit cored 41 per cent maximum with $\frac{1}{4}$ " mortar filled collar joint. Two wythes tied together every third course with No. 22 gauge corrugated metal ties			6	
	41	One 4" unit cored 25 per cent maximum with $\frac{3}{4}$ " gypsum plaster on one side			4 $\frac{3}{4}$	
Unglazed Facing Tile, Nonload-bearing	42	One 4" unit with two cells in wall thickness, cored 22 per cent maximum				4
	43	One 4" unit cored 30 per cent maximum with $\frac{3}{4}$ " vermiculite gypsum plaster on one side			4 $\frac{1}{2}$	
Unglazed Facing Tile, Nonload-bearing	44	One 4" unit cored 39 per cent maximum with $\frac{3}{4}$ " gypsum plaster on one side				4 $\frac{1}{2}$
	45	$\frac{3}{4}$ " by No. 16 gauge vertical cold-rolled channels, 16" on center with 2.5-pound flat metal lath applied to one face and tied with No. 18 gauge wire at 6" spacing. Gypsum plaster each side mixed 1:2 by weight, gypsum to sand aggregate				2 ⁴

Table No. 43-B (Continued)

Material	Item Number	Construction ¹	Minimum Finished Thickness Face-to-Face ² (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
(Cont'd) Solid Gypsum Plaster	46	Studless with 1/2" full-length plain gypsum lath and gypsum plaster each side. Plaster mixed 1:1 for scratch coat and 1:2 for brown coat, by weight, gypsum to sand aggregate				2 ⁴
	47	3/4" by No. 16 gauge cold-rolled channels 16" on center with metal lath applied to one face and tied with No. 18 gauge wire at 6" spacing. Perlite or vermiculite gypsum plaster each side. For three-coat work the plaster mix for the second coat shall not exceed 100 pounds of gypsum to 2 1/2 cubic feet of aggregate for the one-hour system			2 1/2 ⁴	2 ⁴
	48	Studless with 1/2" full-length plain gypsum lath and perlite or vermiculite gypsum plaster each side			2 1/2 ⁴	2 ⁴
	49	Studless partition with 3/8" rib metal lath installed vertically, adjacent edges tied 6" on center with No. 18 gauge wire ties, gypsum plaster each side mixed 1:2 by weight, gypsum to sand aggregate				2 ⁴
Solid Perlite and Portland Cement	50	Perlite mixed in the ratio of 3 cubic feet to 100 pounds of Portland cement and machine applied to stud side of 1 1/2" mesh by No. 17 gauge paperback woven wire lath nailed to 4" deep steel trussed wires studs 16" on center with 1" long by No. 11 gauge by 7/16" head annular ring shank nails			3 1/8 ⁴	
Solid Neat Wood Fibered Gypsum Plaster	51	3/4" by No. 16 gauge cold-rolled channels, 12" on center with 2.5-pound flat metal lath applied to one face and tied with No. 18 gauge wire at 6" spacing. Neat gypsum plaster applied each side				2 ⁴
Solid Gypsum Wallboard Partition	52	One full-length 1/2" Type "X" gypsum wallboard laminated to each side of 1" full length V-edge gypsum coreboard with approved laminating compound. Vertical joints of face layer and coreboard staggered at least 3"				2 ⁴
	53	One full-length layer of 1/2" gypsum wallboard laminated to each side of 1" full length interlocking factory laminated gypsum coreboard with approved laminating compound. Vertical joints of face layer and coreboard staggered				2 ⁴

Table No. 43-B (Continued)

Material	Item Number	Construction ¹	Minimum Finished Thickness Face-to-Face ² (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
Hollow (Studdless) Gypsum Wallboard Partition	54	One full-length layer of 5/8" Type "X" gypsum wall-board attached to both side of wood or metal top and bottom runners laminated to each side of 1"x6" full-length gypsum coreboard ribs spaced 24" on center with approved laminating compound. Ribs centered at vertical joints of face plies and joints staggered 24" in opposing faces. Ribs may be recessed 6" from the top and bottom				2 1/4 ⁴
	55	1" Regular gypsum "V" edge full-length backing board attached to both sides of wood or metal top and bottom runners with nails or 1 1/2" drywall screws at 24" on center. Minimum width of runners 1 1/2". Face layer of 1/2" regular full-length gypsum wallboard laminated to outer faces of backing board with approved laminating compound			4 5/8 ⁴	
Noncombustible Studs—Interior Partition with Plaster Each Side	56	3 1/4" by No. 18 gauge steel studs spaced 24" on center. 5/8" Gypsum plaster on metal lath each side mixed 1:2 by weight, gypsum to sand aggregate				4 3/4 ⁴
	57	3 5/8" No. 16 gauge approved nailable studs spaced 24" on center. 5/8" Neat gypsum wood fibered plaster each side over 3/8" rib metal lath nailed to studs with 6d common nails, 8" on center. Nails driven in 1 1/4" and bent over			5 5/8	
Noncombustible Studs—Interior Partition with Plaster Each Side	58	2 1/2" steel studs 16" on center formed with No. 16 gauge angle flanges and No. 7 gauge wire diagonals. 3/8" perforated gypsum lath attached to the studs each side with No. 12 gauge wire clips at horizontal and vertical joints. 1/2" Gypsum plaster applied each side mixed 1:2 by weight, gypsum to sand aggregate				4 1/4 ⁴
	59	2 1/2" Steel studs 16" on center formed with No. 16 gauge angle flanges and No. 7 gauge wire diagonals. 3/8" perforated gypsum lath attached to the studs each side with No. 12 gauge approved steel wire clips. End joints of lath held by approved end joint clips. 3/4" Perlite or vermiculite gypsum plaster applied each side			4 3/4 ⁴	

Material	Item Number	Construction ¹	Minimum Finished Thickness Face-to-Face ² (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
(Cont'd)						
Noncombustible Studs—Interior Partition with Plaster Each Side	60	4" No. 18 gauge channel-shaped steel studs at 16" on center. On each side approved resilient clips pressed onto stud flange at 16" vertical spacing, 1/4" pencil rods snapped into or wire-tied onto outer loop of clips, metal lath wire-tied to pencil rods at 6" intervals, 1" perlite gypsum plaster, each side		7 3/4 ⁴		
	60-A	2 1/2" No. 18 gauge steel studs spaced 16" on center. Wood fibered gypsum plaster mixed 1:1 by weight gypsum to sand aggregate applied on 3.4 pound metal lath wire tied to studs, each side. 3/4" Plaster applied over each face, including finish coat			4 1/4 ⁴	
Wood Studs Interior Partition with Plaster Each Side	61	2"x4" wood studs 16" on center with 3/8" gypsum plaster on metal lath. Lath attached by 4d common nails bent over or No. 14 gauge by 1 1/4"x3/4" crown width staples spaced 6" on center. Plaster mixed 1:1 1/2 for scratch coat and 1:3 for brown coat, by weight, gypsum to sand aggregate				5 3/4
	62	2"x4" Wood studs 16" on center with metal lath and 7/8" neat wood fibered gypsum plaster each side. Lath attached by 6d common nails, 7" on center. Nails driven 1 1/4" and bent over			5 3/4 ⁴	
	63	2"x4" wood studs 16" on center with 3/8" perforated or plain gypsum lath and 1/2" gypsum plaster each side. Lath nailed with 1 1/8" by No. 13 gauge by 19/64" head plasterboard blued nails, 4" on center. Plaster mixed 1:2 by weight, gypsum to sand aggregate				5%
	64	2"x4" Wood studs 16" on center with 3/8" Type "X" gypsum lath and 1/2" gypsum plaster each side. Lath nailed with 1 1/8" by No. 13 gauge by 19/64" head plasterboard blued nails, 5" on center. Plaster mixed 1:2 by weight, gypsum to sand aggregate				5%
	65	2"x4" Wood studs 16" on center with 3/8" plain gypsum lath and 1/2" neat wood-fibered gypsum plaster each side. Lath nailed with 4d common wire nails, 5" on center				5%

Material	Item Number	Construction ¹	Minimum Finished Thickness Face-to-Face ² (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
(Cont'd) Wood Studs Interior Partition with Plaster Each Side	66	2"x4" Wood studs 16" on center with $\frac{3}{8}$ " perforated gypsum lath and $\frac{1}{2}$ " perite or vermiculite gypsum plaster each side. Lath nailed with 1 $\frac{1}{8}$ " by No. 13 gauge by 19/64" head plasterboard blued nails, 5" on center. For three-coat work the plaster mix for the second coat shall not exceed 100 pounds of gypsum to 2 $\frac{1}{2}$ cubic feet of aggregate				5%
	67	2"x4" Wood studs 16" on center with $\frac{3}{8}$ " perforated gypsum lath with 1" hexagonal mesh of No. 20 gauge wire furred out 5/16" and 1" perite or vermiculite gypsum plaster each side. Lath nailed with 1 $\frac{1}{8}$ " by No. 13 gauge by 19/64" head plasterboard blued nails spaced 5" on center. Mesh attached by 1 $\frac{3}{4}$ " by No. 12 gauge by $\frac{3}{8}$ " head nails with $\frac{3}{8}$ " furrings, spaced 8" on center. For three-coat work the plaster mix for the second coat shall not exceed 100 pounds of gypsum to 2 $\frac{1}{2}$ cubic feet of aggregate			6%	
Noncombustible Studs—Interior Partition with Gypsum Wallboard Each Side	68	No. 25 gauge channel shaped studs 24" on center with one full-length layer of $\frac{5}{8}$ " Type "X" gypsum wall-board applied vertically attached with 1" long No. 6 drywall screws to each side. Screws are 8" on center around the perimeter and 12" on center on the intermediate stud				2 $\frac{7}{8}$ " ⁴
	69	No. 25 gauge channel-shaped studs 24" on center with two full-length layers of $\frac{5}{8}$ " Type "X" gypsum wall-board applied vertically each side. First layer attached with 1" long, No. 6 drywall screws, 8" on center around the perimeter and 12" on center on the intermediate stud. Second layer applied with vertical joints offset one stud space from first layer using an approved adhesive				6 $\frac{1}{8}$ " ⁴

Table No. 43-B (Continued)

Material	Item Number	Construction ¹	Minimum Finished Thickness Face-to-Face ² (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
(Cont'd) Noncombustible Studs—Interior Partition with Gypsum Wallboard Each Side	70	No. 25 gauge channel-shaped studs 24" on center with two full-length layers of 1/2" Type "X" gypsum wallboard applied vertically each side. First layer attached with 1" long, No. 6 drywall screws, 8" on center around the perimeter and 12" on center on the intermediate stud. Second layer applied with vertical joints offset one stud space from first layer using 1 5/8" long, No. 6 drywall screws spaced 9" on center along vertical joints, 12" on center at intermediate studs and 24" on center along top and bottom runners				3 5/8 ⁴
Wood Studs Interior Partition with Gypsum Wallboard Each Side	71	No. 16 gauge approved nailable metal studs ⁹ 24" on center with full-length 5/8" Type "X" gypsum wallboard applied vertically and nailed 7" on center with 6d cooler nails. Approved metal fastener grips used with nails at vertical butt joints along studs				4 7/8
Wood Studs Interior Partition with Gypsum Wallboard Each Side	72	2"x4" Wood studs 16" on center with two layers 5/8" regular gypsum wallboard each side, 4d cooler nails 8" on center first layer, 5d cooler nails 8" on center second layer with laminated compound between layers. Joints staggered. First layer applied full length vertically, second layer applied horizontally or vertically				5 1/8
Wood Studs Interior Partition with Gypsum Wallboard Each Side	73	2"x4" Wood studs 16" on center with two layers 1/2" regular gypsum wallboard applied vertically or horizontally each side, joints staggered. Nail base layer with 5d cooler nails at 8" on center, face layer with 8d cooler nails at 8" on center				5 5/8
Wood Studs Interior Partition with Gypsum Wallboard Each Side	74	2"x4" Wood studs 16" on center with 5/8" Type "X" gypsum wallboard applied vertically or horizontally nailed with 6d cooler nails 7" on center with end joints on nailing members				4 7/8
Wood Studs Interior Partition with Gypsum Wallboard Each Side	75	2"x4" Fire-retardant treated wood studs spaced 24" on center with one layer of 5/8" thick Type "X" gypsum wallboard applied with face paper grain (long dimension) parallel to studs. Wallboard attached with 6d cooler nails spaced 7" on center				4 7/8 ⁴

Material	Item Number	Construction ¹	Minimum Finished Thickness Face-to-Face: (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
(Cont'd) Wood Studs Interior Partition with Gypsum Wallboard Each Side	76	2"x4" Wood studs 16" on center with two layers 5/8" Type "X" gypsum wallboard each side. Base layers applied vertically and nailed with 6d cooler nails 9" on center. Face layer applied vertically or horizontally and nailed with 6d cooler nails 7" on center. For nail-adhesive application, base layers are nailed 6" on center. Face layers applied with coating of approved wallboard adhesive and nailed 12" on center				6 1/8
	76 A	Fire-retardant treated wood studs spaced 24" on center with one layer of 5/8" thick Type "X" gypsum wallboard applied with face paper grain (long dimension) at right angles to studs. Wallboard attached with 6d cement coated box nails spaced 7" on center				3 3/4 *
Exterior or Interior Walls	77	3/4" Drop siding or 3/8" exterior type plywood over 1/2" gypsum sheathing on 2"x4" wood studs at 16" on center on exterior surface with interior surface treatment as required for one-hour rated extension or interior 2"x4" wood stud partitions. Gypsum sheathing nailed with 1 1/4" by No. 11 gauge by 7/16" head galvanized nails at 8" on center. Siding nailed with 7d galvanized smooth box nails. Plywood nailed with 6d galvanized siding or casing nails, 6" on center around the perimeter and 12" on center elsewhere				Varies
	78	2"x4" Wood studs 16" on center with metal lath and 3/4" exterior cement plaster ¹⁰ on each side. Lath attached with 6d common nails 7" on center driven to 1" minimum penetration and bent over. Plaster mix 1:2 scratch coat and 1:3 brown coat, by weight, cement to sand				5 1/2
	79	2"x4" Wood studs 16" on center with 7/8" exterior cement plaster (measured from the face of studs) on the exterior surface with interior surface treatment as required for interior wood stud partitions in this Table. Plaster mix 1:2 scratch coat and 1:3 brown coat, by weight, cement to sand				Varies

Table No. 43-B (Continued)

Material	Item Number	Construction	Minimum Finished Thickness Face-to-Face ² (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
(Cont'd) Exterior or Interior Walls	80	3% No. 16 gauge noncombustible studs 16" on center with 7/8" exterior cement plaster (measured from the face of the studs) on the exterior surface with interior surface treatment as required for interior, nonbearing, incombustible stud partitions in this Table. Plaster mix 1:2 for scratch coat and 1:3 for brown coat, by weight, cement to sand				
	81	2 1/4"x3 3/4" Clay face brick with cored holes over 1/2" gypsum sheathing on exterior surface of 2"x4" wood studs at 16" on center and two layers 5/8" Type "X" gypsum wallboard on interior surface. Sheathing placed horizontally or vertically with vertical joints over studs nailed 6" on center with 1 3/4" by No. 11 gauge by 7/16" head galvanized nails. Inner layer of wallboard placed horizontally or vertically and nailed 8" on center with 6d cooler nails. Outer layer of wallboard placed horizontally or vertically and nailed 8" on center with 8d cooler nails. All joints staggered with vertical joints over studs. Outer layer joints taped and finished with compound. Nailheads covered with joint compound. No. 20 gauge corrugated galvanized steel wall ties 3/4"x6 5/8" attached to each stud with two 8d cooler nails, every sixth course of brick				Varies ⁴
	82	2"x6" Fire-retardant treated wood studs 16" on center. Interior face has two layers of 5/8" Type "X" gypsum wallboard with the base layer placed vertically and attached with 6d box nails 12" on center. The face layer is placed horizontally and attached with 8d box nails 8" on center at joints and 12" on center elsewhere. The exterior face has a base layer of 5/8" Type "X" gypsum wallboard placed vertically with 6d box nails 8" on center at joints and 12" on center elsewhere. An approved building paper is next applied, followed by self-furred exterior lath attached with 8d x 2 1/2" long galvanized roofing nails spaced 6" on center along each stud. Exterior cement plaster consisting of a 1/2" scratch coat, a bonding agent and a 1/2" brown coat is then applied. The scratch coat is mixed in the proportion of 1:3 by weight, cement to sand with 10 pounds of hydrated lime and 3 pounds of asbestos fiber per sack of cement. The brown coat is mixed in the same proportion of 1:4 by weight, cement to sand with the same amounts of hydrated lime and asbestos fiber used in the scratch coat				10%

Table No. 43-B (Continued)

1. Staples with equivalent holding power and penetration may be used as alternate fasteners to nails for attachment to wood framing.
2. Thicknesses shown for brick and clay tile are nominal thicknesses unless plastered, in which case thicknesses are net. Thicknesses shown for concrete masonry units are "equivalent thicknesses" as defined in U.B.C. Standard No. 24-5. Thickness includes plaster, lath and gypsum wallboard where mentioned. Plaster thickness is measured from face of lath or other plaster base unless otherwise stated.
3. Single wythe brick.
4. Shall be used for nonbearing purposes only.
5. Hollow brick units four-inch by eight-inch by twelve-inch ($4'' \times 8'' \times 12''$) nominal with two interior cells having a one and one-half inch ($1\frac{1}{2}''$) web thickness between cells and one and three-fourths-inch ($1\frac{3}{4}''$) thick face shells.
6. Rowlock design employs clay brick with all or part of bricks laid on edge with the bond broken vertically.
7. See also Footnote No. 2. The equivalent thickness may include the thickness of gypsum or Portland cement plaster applied in accordance with the requirements of Chapter 47 of the Code.
8. Studs are doubled trussed wire studs each with No. 3 gauge flange wires and No. 11 gauge truss wires, welded together.
9. Nailable metal studs consist of two channel studs spot welded back-to-back with a crimped web forming a nailing groove.
10. Three pounds of asbestos fiber added for each bag of Portland cement. (Table 43-B added by Ord. 97889 § 10 (part); June 26, 1969).

TABLE NO. 43-C—MINIMUM PROTECTION FOR FLOOR AND ROOF SYSTEMS¹

Floor or Roof Construction	Item Number	Ceiling Construction	Thickness of Floor or Roof Slab (In Inches)						Minimum Thickness of Ceiling (In Inches)	
			4 Hr.	3 Hr.	2 Hr.	1 Hr.	4 Hr.	3 Hr.		2 Hr.
Concrete-Excluding Expanded Clay Shale or Slate (by Rotary Kiln Process) or Expanded Slag	1	Slab (no ceiling required)	6½	5½	4½	3½ ²				
Concrete-Expanded Clay Shale or Slate (by Rotary Kiln Process) or Expanded Slag	2	Slab (no ceiling required)	5	4½	4	3				
Reinforced Concrete Joists	3	Slab with suspended ceiling of vermiculite gypsum plaster over metal lath attached to ¾" cold-rolled channels spaced 12" on center. Ceiling located 6" minimum below joists	3	2	1	¾				
	3 A	5½" Type "X" gypsum wall-board attached to No. 25 gauge by 7/8" deep by 2½" hat-shaped galvanized steel channels with 1" long No. 6 screws. The channels are spaced 24" on center, span 35" and are supported along their length at 35" intervals by No. 21-gauge galvanized steel flat strap hangers having formed edges which engage the lips of the channel. The strap hangers are attached to the side of the concrete joists with 5/32" by 1¼" long powder-driven fasteners. The wallboard is installed with the long dimension perpendicular to the channels. All end joints occur								

Table No. 43-C (Continued)

Floor or Roof Construction	Item Number	Ceiling Construction	Thickness of Floor or Roof Slab (In Inches)					Minimum Thickness of Ceiling (In Inches)					
			4 Hr.	3 Hr.	2 Hr.	1 Hr.	4 Hr.	3 Hr.	2 Hr.	1 Hr.			
(Cont'd) Steel Joist Construction with a Reinforced Concrete Slab on Top Poured on a Metal Lath Form ³	7	Perlite or vermiculite gypsum plaster on $\frac{3}{8}$ " perforated gypsum lath attached to $\frac{3}{4}$ " cold-rolled channels with approved clips giving continuous support to lath. Channels attached to or suspended below joists and held to bottom chord of joists	2	2	2	2	1% ^{s,s}	$\frac{7}{8}$ ⁶ 17, 8	$\frac{7}{8}$ ⁷	1			
	8	Gypsum plaster on $\frac{3}{8}$ " perforated gypsum lath attached to $\frac{3}{4}$ " cold-rolled channels, with approved clips giving continuous support to lath. Channels attached to or suspended below joists and wire tied to bottom chord of joists			2					1 ^s			
	9	$\frac{5}{8}$ " Type "X" gypsum wall-board attached to approved nailing channels 16" on center with 1 $\frac{1}{4}$ " by No. 11 gauge by 5/16" head nails with annular ring shanks spaced 7" on center. Double channels at end joints. Channels attached to bottom chord of joists with doubled No. 18 gauge wire ties or suspended below joists on wire hangers			2				2				$\frac{5}{8}$
	10	Ceiling of $\frac{5}{8}$ " Type "X" wall-board attached to $\frac{3}{8}$ " deep by 2 $\frac{1}{2}$ " by No. 25 gauge hat-shaped furring channels 12" on center with 1" long No. 6 wallboard screws at 8" on center. Channels wire tied to bottom chord of joists with doubled No. 18 gauge wire or suspended below joists on wire hangers							2				$\frac{5}{8}$
									2 $\frac{1}{2}$				$\frac{5}{8}$

Table No. 43-C (Continued)

Floor or Roof Construction	Item Number	Ceiling Construction	Thickness of Floor or Roof Slab (In Inches)					Minimum Thickness of Ceiling (In Inches)		
			4 Hr.	3 Hr.	2 Hr.	1 Hr.	4 Hr.	3 Hr.	2 Hr.	1 Hr.
3" Deep Cellular Steel Deck with Concrete Slab on Top. Slab Thickness Measured to Top of Cells	15	Perlite or vermiculite gypsum plaster on 3/8" perforated gypsum lath attached to 3/4" cold-rolled channels with approved clips. Channels supported by No. 8 gauge hanger wire through units between cells		2 1/2		1 Hr. <td>4 Hr. <td>3 Hr. <td>2 Hr. <td>1 Hr.</td> </td></td></td>	4 Hr. <td>3 Hr. <td>2 Hr. <td>1 Hr.</td> </td></td>	3 Hr. <td>2 Hr. <td>1 Hr.</td> </td>	2 Hr. <td>1 Hr.</td>	1 Hr.
	16	Suspended ceiling of vermiculite gypsum plaster base coat and vermiculite acoustical plastic on metal lath attached at 6" intervals to 3/4" cold-rolled channels spaced 12" on center and secured to 1 1/2" cold rolled channels spaced 36" on center with No. 16 gauge wire. 1 1/2" channels supported by No. 8 gauge wire hangers at 36" on center. Beams within envelope and with a 2 1/2" air space between beam soffit and lath have a 4-hour rating		2 1/2				7/8		
1 1/2" Deep Steel Roof Deck on Steel Framing. Insulation Board, 30 lbs. per Cubic Foot Density. Composed of Wood Fibers with Cement Binders of Thickness Shown Bonded to Deck with Unfinished Asphalt Adhesive. Covered with a Fire-retardant Roof Covering	17	Ceiling of gypsum plaster on metal lath. Lath attached to 3/4" furring channels with No. 18 gauge wire ties spaced 6" on center. 3/4" channel saddle-tied to 2" channels with doubled No. 16 gauge wire ties. 2" Channels spaced 36" on center suspended 2" below steel framing and saddle-tied with No. 8 gauge wire. Plaster mixed 1:2 by weight, gypsum to sand aggregate		2 1/2					1 1/8	1 1/8

Table No. 43-C (Continued)

Floor or Roof Construction	Item Number	Ceiling Construction	Thickness of Floor or Roof Slab (In Inches)					Minimum Thickness of Ceiling (In Inches)	
			4 Hr.	3 Hr.	2 Hr.	1 Hr.	4 Hr.		3 Hr.
1½" Deep Steel Roof Deck on Steel Framing Wood Fiber Insulation Board, 17.5 lbs. per Cubic Foot Density on Top Applied Over a 15-lb. Asphalt Saturated Felt. Fire-retardant Roof Covering	18	Ceiling of gypsum plaster on metal lath. Lath attached to ¾" furring channels with No. 18 gauge wire ties spaced 6" on center. ¾" Channels saddle-tied to 2" channels with doubled No. 16 gauge wire ties. 2" Channels spaced 36" on center suspended 2" below steel framing and saddle-tied with No. 8 gauge wire. Plaster mixed 1:2 for scratch coat and 1:3 for brown coat, by weight, gypsum to sand aggregate for one-hour system. For two-hour system plaster mix is 1:2 by weight, gypsum to sand aggregate				1 ½	1	7/8	3/4
1½" Deep Steel Roof Deck on Steel Framing Insulation of Rigid Board Consisting of Expanded Perlite and Fibers Impregnated With Integral Asphalt Waterproofing; Density 9 to 12 Lbs./Cu. Ft. Secured to Metal Roof Deck by ½" Wide Ribbons of Waterproof, Cold-process Liquid Adhesive Spaced 6" Apart. Steel Joist or Light Steel Construction with Metal Roof Deck, Insulation, and Built-up Fire-retardant Roof Covering	19	Gypsum - vermiculite plaster on metal lath wire-tied at 6" intervals to ¾" furring channels spaced 12" on center and wire-tied to 2" runner channels spaced 32" on center. Runners wire-tied to bottom chord of steel joists							7/8

Table No. 43-C (Continued)

Floor or Roof Construction	Item Number	Ceiling Construction	Thickness of Floor or Roof Slab (In Inches)					Minimum Thickness of Ceiling (In Inches)				
			4 Hr.	3 Hr.	2 Hr.	1 Hr.	4 Hr.	3 Hr.	2 Hr.	1 Hr.		
Plywood Stressed Skin Panels Consisting of 5/8" Thick Interior C-D (Exterior Glue) Top Stressed Skin on 2"x6" Nominal (Minimum) Stringers. Adjacent Panel Edges Joined with 8d Common Wire Nails Spaced 6" on Center	26	1/2" Thick wood fiberboard weighing 15 to 18 lbs. per cu. ft. installed with long dimension parallel to stringers using 5d cooler nails spaced 12" on center. Second layer of 5/8" Type "X" gypsum wallboard applied with long dimension perpendicular to joists and attached with 8d cooler nails spaced 6" on center at end joints and 8" on center elsewhere. Wallboard joints staggered with respect to fiberboard joints	4 Hr.	3 Hr.	2 Hr.	1 Hr.	4 Hr.	3 Hr.	2 Hr.	1 Hr.		
Vermiculite Concrete Slab Proportioned 1:4 (Portland Cement to Vermiculite Aggregate) on a 1 1/2" Deep Steel Deck Supported on Individually Protected Steel Framing. Slab Reinforced with 4"x8" No. 12/14 Welded Wire Mesh	27	None								1		
Perlite Concrete Slab Proportioned 1:6 (Portland Cement to Perlite Aggregate) on a 1 1/4" Deep Steel Deck Supported on Individually Protected Steel Framing. Slab Reinforced with 4"x8" No. 12/14 Welded Wire Mesh	28	None								3 1/2		

Table No. 43-C (Continued)

Floor or Roof Construction	Item Number	Ceiling Construction	Thickness of Floor or Roof Slab (In Inches)				Minimum Thickness of Ceiling (In Inches)			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.	4 Hr.	3 Hr.	2 Hr.	1 Hr.
Perlite Concrete Slab Proportioned 1:6 (Portland Cement to Perlite Aggregate) on 1 3/4" Deep Steel Deck Supported on Individually Protected Steel Framing. Slab Reinforced with No. 19 Gauge Hexagonal Wire mesh. Fire-retardant roof covering on top	28 A	None	4 Hr.	3 Hr.	2 Hr.	1 Hr.	4 Hr.	3 Hr.	2 Hr.	1 Hr.
Perlite Concrete Slab Proportioned 1:6 (Portland Cement to Perlite Aggregate) on a 9/16" Deep Steel Deck Supported by Steel Joists 4' on Center. Fire-retardant Roof Covering on Top	29	Perlite gypsum plaster on metal lath wire tied to 3/4" furring channels attached with No. 16 gauge wire ties to lower chord of joists	2 1/2	1 1/2	1 1/2	1 1/2	2 1/2	1 1/2	1 1/2	3/4
Floor and Beam Construction Consisting of 3" Deep Cellular Steel Floor Units Mounted on Steel Members with 1:4 (Proportion of Portland Cement to Perlite Aggregate) Perlite Concrete Floor Slab on Top	30	Suspended envelope ceiling of perlite gypsum plaster on metal lath attached to 3/4" cold-rolled channels, secured to 1 1/2" cold-rolled channels spaced 42" on center supported by No. 6 wire 36" on center. Beams in envelope with 3" minimum air space between beam soffit and lath have a 4-hour rating	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	1 1/2

1. Staples with equivalent holding power and penetration may be used as alternate fasteners to nails for attachment to wood framing.
2. The thickness may be reduced to three inches (3") where limestone aggregate is used.
3. Slab thickness over steel joists measured at the joists.
4. Portland cement plaster with 40 pounds of asbestos fiber per bag of cement.

Table No. 43-C (Continued)

5. Portland cement plaster with 15 pounds of hydrated lime and three pounds of asbestos fiber per bag of cement.
6. One inch (1") by No. 20 gauge hexagonal wire mesh installed below lath and tied to each furring channel at joints between lath.
7. No. 14 gauge wire spaced eleven and three-tenths inches (11.3") on center or ten inches (10") on center [for channel spacing of sixteen inches (16") and twelve inches (12") respectively] installed below lath sheets in a diagonal pattern. Wires tied to furring channels or clips at lath edges.
8. Furring channels spaced twelve inches (12") on center.
9. Allowable working stress for bulb tees to be based upon a factor of safety of four applied to the yield point for negative bending and six and five-tenths applied to the yield point for positive bending.
10. Six-inch (6") hollow clay tile with two-inch (2") concrete slab above.
11. Four-inch (4") hollow clay tile with one and one-half-inch (1½") concrete slab above.
12. Thickness measured to bottom of steel form units.
13. Five-eighths inch (⅝") of vermiculite gypsum plaster plus one-half inch (½") of approved vermiculite acoustical plastic.
14. Double wood floor may be either of the following [see also Section 4305(d) for conditions where flooring or ceiling may be omitted]:
 - (a) Subfloor of one-inch (1") nominal boarding, a layer of asbestos paper weighing not less than 14 pounds per one hundred square feet (100 sq. ft.) and a layer of one-inch (1") nominal tongue and groove finish flooring; or
 - (b) Subfloor of one-inch (1") nominal tongue and groove boarding or one-half-inch (½") interior type plywood with exterior glue, a layer of .010-inch thick rosin sized building paper and a layer of one inch (1") nominal tongue and groove finish flooring or five-eighths-inch (⅝") interior type tongue and groove plywood finish flooring.
15. Thickness measured to top of steel deck unit.

(Table 43-C added by Ord. 97389 § 10 (part); June 26, 1969).

**TABLE NO.43-D
HARDWARE REQUIREMENTS FOR SWINGING FIRE DOORS¹**

Door Rating, Hour	Steel, Mortise or Surface Hinges ² :			
	Maximum Door		Minimum Hinge Size	
	Width	Height ³	Height	Thickness
3, 1½, 1, ¾	4'	10'	4½"	0.180
3, 1½, 1, ¾	4'	8'	4½"	0.134
	Locks or Latches ⁴ :			
3	3-point type or approved ¾" throw single point			
1½, 1, ¾	Minimum ½" throw single point ⁵			
	Closing Devices:			
3, 1½, 1, ¾	Hydraulic, Gravity, or other approved type			

1. For detailed requirements on other fire door installation, refer to NFPA Standard for Fire Doors and Windows, Pamphlet No. 80, published by the National Fire Protection Association.
2. Mortise hinges shall be secured to wood and plastic covered composite doors with No. 12 by 1¼" self-tapping sheet-metal screws. Surface hinges shall be secured with steel through bolts. For other types of doors, hinges shall be secured to reinforcements in the door with machine screws or bolted through the door. Hinges shall be secured to door frames in an approved manner consistent with their attachment to the doors. Hinges shall be of the ball-bearing type.
3. Doors up to 60" in height shall be provided with two hinges and an additional hinge for each additional 30" of height or fraction thereof.
4. Heavy duty locks and latches shall be of an approved type. Where panic devices are required to meet egress requirements, the panic hardware shall cause the door latch to release when pressure of not to exceed 15 pounds is applied to the releasing devices.
5. For pairs of doors, approved astragals and two-point locking devices for the inactive leaf shall be provided.
(Table 43-D added by Ord. 97889 § 10 (part); June 26, 1969).

Chapter 3.44

PROTECTION OF THE PUBLIC AND OF PUBLIC PROPERTY DURING CONSTRUCTION OR DEMOLITION

Protection of the public and of sidewalks, streets, and other public property during construction or demolition is required under other ordinances. (Title 19). See City Engineer's office. (Ord. 85500 § c 44; Sept. 10, 1956).

Chapter 3.45

PERMANENT OCCUPANCY OF PUBLIC PROPERTY

Any encroachment of a building or structure on, over, or under sidewalks, streets, and other public property is subject to approval by the Board of Public Works under other ordinances. (Title 19). (Ord. 85500 § c 45; Sept. 10, 1956).

Chapter 3.46

SIGNS AND OUTDOOR DISPLAY STRUCTURES

Sections:

- 3.46.010 Scope.
- 3.46.020 Definitions.
- 3.46.030 Permit required.
- 3.46.040 Permit applications.
- 3.46.050 Permit fees.
- 3.46.060 Liability insurance.
- 3.46.070 Loads, allowable stresses and materials.
- 3.46.080 Ground signs.
- 3.46.090 Roof signs.
- 3.46.100 Wall signs.
- 3.46.110 Projecting signs.
- 3.46.120 Marquee signs.
- 3.46.130 Signs on canopies and awnings.
- 3.46.140 Temporary signs.
- 3.46.150 Electrical equipment.
- 3.46.160 Conflict with traffic code.
- 3.46.170 Obstruction of exits.
- 3.46.180 Limitation on use of approved plastics.

3.46.010 Scope. This chapter prescribes construction, erection, and maintenance requirements for signs and outdoor display structures with respect to safety, size, and attachment or anchorage. (Location of any

particular sign may be subject to regulation under the Zoning Ordinance. (Ord. 85500 § 4601, as amended by Ord. 91546; October 30, 1962).

3.46.010 Definitions. Words or phrases used in this chapter shall have the meanings listed below:

APPROVED PLASTICS. Approved plastic materials shall be those specified in U. B. C. Standard No. 52-1 which have a flame-spread rating of 225 or less and a smoke density not greater than that obtained from the burning of untreated wood under similar conditions when tested in accordance with U. B. C. Standard No. 42-1 in the way intended for use. The products of combustion shall be no more toxic than the burning of untreated wood under similar conditions.

DISPLAY SURFACE means the surface made available by the structure, either for the direct mounting of letters and decoration or for the mounting of facing material intended to carry the entire advertising message.

FACING means the surface of the sign upon, against, or through which the message of the sign is exhibited.

GROUND SIGN means any "sign" which is supported by one or more uprights or braces in or upon the ground.

LETTERS AND DECORATIONS means the letters, illustrations, symbols, figures, insignia, and other devices employed to express and illustrate the message of the sign.

MARQUEE SIGN means a sign placed on, constructed in, or attached to a marquee.

PROJECTING SIGN means any sign which is affixed to any building wall or structure and extends beyond any exterior wall or parts thereof more than fifteen (15) inches.

ROOF SIGN means any "sign" erected, constructed, and maintained on the roof of any building, which sign does not extend more than fifteen (15) inches beyond any exterior wall of such building.

SIGN means any medium, including its structure and component parts, which is used or intended to be used out of doors to attract attention to the subject matter for advertising purposes, other than paint on the surface of a building.

STRUCTURAL TRIM means the molding, battens, cappings, nailing strips, latticing, and platforms which are attached to the sign structure.

TEMPORARY TRIM means any sign, banner, pennant, valance, or advertising display constructed of cloth, canvas, light fabric, cardboard, wallboard, or other light materials, intended to be displayed for a limited period of time only.

WALL SIGN means a "sign" which is affixed to an exterior wall of any building, when such shall project not more than fifteen (15) inches

from the building wall or parts thereof. (Ord. 85500 § 4602, as amended by Ord. 91546; October 30, 1962).

3.46.030 Permit required. It is unlawful to place, erect, construct, reconstruct or alter any sign without a sign permit issued by the Superintendent of Buildings, except as follows:

1. Ground and wall signs with an area not exceeding six (6) square feet and having no provision for illumination.

2. Ground and wall signs with an area not exceeding twenty-four (24) square feet to be used on construction projects only for the duration of the construction period.

3. A temporary sign located entirely on private property.

4. An existing sign may be repainted or repaired or the advertising copy thereon may be changed, but it shall not be structurally altered. (Ord. 85500 § 4603, as amended by Ord. 91546; October 30, 1962).

3.46.040 Permit applications. To obtain a permit required herein, the applicant shall file an application which shall:

1. Clearly indicate precise location of proposed sign.

2. Be accompanied with adequate plans and specifications.

3. Be signed by owner or authorized agent.

4. Be accompanied with permit fee.

Exception: The Superintendent of Buildings may waive requirement No. 2 when structural problem, in his opinion, is of minor importance. (Ord. 85500 § 4604, as amended by Ord. 91546; October 30, 1962).

3.46.050 Permit fees. Permit fees shall be as specified in the Permit Fee Ordinance (see Chapter 3.60). (Ord. 85500 § 4605, as amended by Ord. 91546; October 30, 1962).

3.46.060 Liability insurance. The City shall maintain liability insurance to indemnify and save it harmless from any and all claims, damages, losses, actions, suits or judgments which may be presented, sustained, brought or secured against the City or any of its officials by reason of any accidents resulting from construction, erection or maintenance, alteration or removal of any sign. Such liability insurance shall protect the City in the amount of \$50,000 damage to any one person and \$100,000 total damages per sign. (Ord. 85500 § 4606, as amended by Ord. 91546; October 30, 1962).

3.46.070 Loads, allowable stresses and materials. (a) INTENSITY OF WIND PRESSURE. 1. For the purpose of determining wind pressure, all signs shall be classified as either open or solid. Signs in which the projected area exposed to wind consists of seventy percent (70%) or more of the gross area as determined by the overall dimensions shall be classified as solid signs; those in which the projected exposed area is derived from open letters, figures, strips and structural framing members, the

aggregate total area of which is less than seventy percent (70%) of the gross area so determined shall be classed as open signs.

2. All signs shall be designed and constructed to withstand wind pressure as specified in Section 3.23.070 (b).

(b) **PROJECTED EXPOSED AREA** The exposed area subjected to wind pressure shall be the total area of all parts of the sign, including structural framing projected on a plane perpendicular to the direction of the wind. In determining the stress in any member, the wind shall be assumed to blow from that horizontal direction and from that inclination from the vertical (but not to exceed twenty degrees (20°) above or below the horizontal) which produces the maximum stress in that member. No shielding effect of one element by another shall be considered where the distance between them exceeds four (4) times the smaller projected dimension of the windward element.

(c) **EARTHQUAKES.** 1. Signs shall also be designed to withstand earthquake shock as set forth in Section 3.23.120.

2. Wind loads and earthquake loads need not be combined to determine the maximum horizontal loads acting on a sign. Only the larger of the two loads need be used for design.

(d) **ALLOWABLE STRESSES, MATERIALS, AND DETAIL OF DESIGN.** 1. In all signs the allowable stresses, materials, and details of design shall conform to the following:

a. For Steel: Chapter 3.27 except that:

(1) Members in ground signs may be less than one-fourth ($\frac{1}{4}$) inch thick if they conform to the provisions of Section 3.46.080 (d) 6, and

(2) Secondary members in contact with, or directly supporting, the facing may, in all types of signs, be formed of light gage steel, provided such members are designed in accordance with the Specifications for the Design of Light Gage Steel Structural Members of the American Iron and Steel Institute, and are galvanized to comply with the American Standard specifications for Zinc-Coated (Galvanized) Iron or Steel Sheets (ASTM A93-46; ASA G8.2-1947) or protected with other approved coating. Although no minimum thickness for the facing of a sign is specified, secondary facing members when formed integrally with the facing shall be not less than 24 gage in thickness (0.024 inch); when not formed integrally with the facing, the minimum thickness of secondary members shall be 12 gage (0.105 inch).

b. For Wood: Chapter 3.25.

2. The working stress of chains, wire ropes, and steel guy rods and their fastenings shall not exceed one-quarter ($\frac{1}{4}$) of their ultimate strength.

3. Applications for permits to erect signs in which plastic materials will be employed shall set forth either the manufacturer's trade-name for, or the common name, of the plastic material to be used; and shall certify

either that the plastic material is noncombustible or that the plastic material has been tested by a recognized testing laboratory and rated as an "approved plastic" as defined in Section 3.46.020 of this code. (Ord. 85500 § 4607, as amended by Ord. 91546; October 30, 1962).

3.46.080 Ground signs. (a) **MATERIALS.** Within the first fire zone, no ground sign with an area of two hundred (200) square feet or more shall be erected of combustible materials, unless the face is constructed of sheet metal or other approved facing materials. Letters and decorations may be of combustible materials. (See Section 3.16.020 b).

(b) **HEIGHT.** No ground sign shall be erected to a height exceeding one hundred (100) feet above the ground, except by permission of the Superintendent of Buildings. Lighting reflectors may project beyond the top or face of the sign.

(c) **PROJECTION.** No ground sign shall be required to be set back from the property line farther than the building line as established.

(d) **SUPPORTS AND ANCHORAGE.** 1. Ground signs shall be adequately supported to resist dead load and the wind load specified in Section 3.46.070, acting in any direction on the sign.

2. The members (or bases for rigidly attached members) supporting unbraced signs shall be so proportioned that the bearing loads imposed upon the soil in either a horizontal or vertical direction shall not exceed safe values. Braced signs shall be anchored to resist the specified wind load acting in any direction. Anchors and supports shall be designed for safe bearing loads on the soil and for an effective resistance to pullout amounting to a force twenty-five percent (25%) greater than the required resistance to overturning.

3. The soil used for back-fill for the dug-in type of anchor or cantilever support shall be carefully placed and thoroughly compacted. The anchors and supports shall penetrate to at least eighteen (18) inches below ground.

4. Portable signs supported by frames or posts rigidly attached to bases shall be so proportioned that the weight and size of the base is adequate to resist the wind pressure specified in Section 3.46.070. Such signs shall not exceed six (6) feet in height.

5. Whenever anchors or supports consist of wood embedded in the soil, the wood shall be treated under pressure with creosote or other approved preservative before erection.

Exception: Temporary signs are exempt from the above requirement.

6. The minimum thickness of hot-rolled, structural steel members furnishing structural support for signs shall be one-fourth ($\frac{1}{4}$) inch, provided that, if galvanized, such members may be not less than one-eighth ($\frac{1}{8}$) inch thick if the galvanizing complies with the American Standard Specifications for Zinc (Hot-Galvanized) Coatings on Structural Steel

Shapes, Plates and Bars, and their Products (ASTM A123-47; ASA G8.1-1947) or if not galvanized, provided that such members are protected by other approved protective coating.

Members formed of light gage steel may be used for support of ground signs, provided that they are designed in accordance with the Specifications for the Design of Light Gage Steel Structural Members of the American Iron and Steel Institute; and provided that the thickness, exclusive of the facing, shall be not less than 12 gage (0.105 inch) and they are galvanized to comply with American Standard Specifications for Zinc-Coated (Galvanized) Iron or Steel Sheets (ASTM A93-46; ASA G8.2-1947), or are protected by other approved coating. (Ord. 85500 § 4608, as amended by Ord. 91546; October 30, 1962).

3.46.090 Roof signs. (a) **MATERIALS.** Within the first fire zone, every roof sign shall be constructed of noncombustible materials, including the uprights, supports, and braces, except that facings (as set forth in Section 3.46.180), ornamental molding, battens, cappings, and nailing strips, platforms, and decorative trimmings may be constructed of combustible materials. Outside the first fire zone, roof signs constructed of combustible materials will be permitted, provided that the maximum height above grade shall not exceed the limits of height set forth in Table No. 5-D for buildings of Types I, II or IV construction in the particular zone in which the sign is located, and provided further that the height of such sign above the roof shall not exceed seventy-five (75) feet.

(b) **CLEARANCE.** Roof signs shall be so constructed as to leave a clear space, except for the structure supporting said sign, not less than five (5) feet between the roof and the lowest part of such sign.

(c) **SUPPORTS AND ANCHORAGE.** 1. Roof signs shall be adequately secured and anchored to the building over which they are constructed and erected. The dead and wind loads from the signs shall be distributed to the structural elements of the building in such a manner that no element shall be overstressed.

2. Uplift due to overturning of roof signs shall be adequately resisted by proper anchorage to the building walls or structure, or by sufficient counterweights to resist uplift. Proper anchorage to the building walls or structure shall include such alterations to the building as may be needed to integrate and adequately interconnect sufficient dead load to equal not less than ten percent (10%) in excess of the computed uplift applied to the building by the sign. Where uplift is resisted by counterweights, their weight shall exceed the amount of the uplift by ten percent (10%). (Ord. 85500 § 4609, as amended by Ord. 91546; October 30, 1962).

3.46.100 Wall signs. (a) **MATERIALS.** Within the first fire zone, no wall sign with an area of two hundred (200) square feet or more shall be erected of combustible materials, unless the face is constructed of sheet

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metal or other approved facing materials. Letters and decorations may be of combustible materials. (See Section 3.16.020 b).

(b) Wall signs attached to exterior walls of solid masonry or concrete shall be safely and securely attached to the same by means of metal anchors, bolts, expansion screws or other approved noncombustible device. No wooden blocks or anchorage with wood used in connection with screws or nails shall be considered proper anchorage. No wall sign shall be entirely supported by an unbraced parapet wall.

Exceptions: 1. Wall sign on buildings of Type V construction.

2. Temporary signs. (Ord. 85500 § 4610, as amended by Ord. 91546; October 30, 1962).

3.46.110 Projecting signs. (a) **MATERIALS.** All projecting signs with an area of twenty-five (25) square feet or more shall be faced with approved noncombustible materials except as specified in Section 3.46.180.

(b) **CLEARANCE.** Every projecting sign shall be at least seven (7) feet above the ground below such sign, and at least fourteen and one-half (14½) feet above any vehicular way below such sign.

(c) **SUPPORTS AND ATTACHMENT.** 1. Projecting signs shall be securely attached to a building or structure by metal bolts, anchors, supports, chains, wire ropes, or steel rods. No staples or nails shall be used to secure any projecting sign to any building or structure.

2. The dead load of projecting signs which are not parallel to the building or structure, and the load due to wind pressure shall be supported by structural shapes, chains, wire ropes, or steel guy rods.

3. Chains, wire ropes, or steel rods used to support the dead or wind load of projecting signs may be fastened to solid masonry walls with expansion bolts or other approved devices but no such support shall be attached to an unbraced parapet wall except with permission of the Superintendent of Buildings. Where the supports must be fastened to walls made of wood, the supporting device shall be fastened securely in an approved manner.

4. All chains, wire ropes, and their attachments shall be galvanized or of corrosive-resistant material. Other metal supports and braces shall be painted. (Ord. 85500 §4611, as amended by Ord. 91546; October 30, 1962).

3.46.120 Marquee signs. Marquee signs shall be independently supported unless the Superintendent of Buildings shall find that the structural strength of the marquee is such as to accommodate the additional weight of such signs. (Ord. 85500 § 4612, added by Ord. 91546; October 30, 1962).

3.46.130 Signs on canopies and awnings. Letters, figures or symbols may appear upon the skirt of a canopy or awning. (Ord. 85500 § 4613, added by Ord. 91546; October 30, 1962).

3.46.140 Temporary signs. No temporary sign shall exceed one hundred and fifty (150) square feet in area. Temporary signs of rigid material shall not exceed thirty-two (32) square feet in area, or six (6) feet in height. Cloth signs and panels shall be perforated over at least ten percent (10%) of their areas. (Ord. 85500 § 4614, added by Ord. 91546; October 30, 1962).

3.46.150 Electrical equipment. An electrical permit shall be obtained for all electrical signs, or signs or outdoor displays using electrical equipment, and all such shall be constructed and installed in accordance with the Electrical Code. (Ord. 85500 § 4615, added by Ord. 91546; October 30, 1962).

3.46.160 Conflict with traffic code. Signs and their appurtenances shall not conflict with the Traffic Code. (Ord. 85500 § 4616, added by Ord. 91546; October 30, 1962).

3.46.170 Obstruction of exits. No sign shall be erected, constructed, and maintained so as to obstruct any means of exit, or so as to prevent free passage from one part of a roof to any other part thereof. No sign shall be attached in any form, shape, or manner to a fire escape. (Ord. 85500 § 4617, added by Ord. 91546; October 30, 1962).

3.46.180 Limitation on use of approved plastics. The area of the display surface or facing which may be occupied or covered by letters and decorations made from, or faced with, approved plastics shall not exceed an approved total area as follows:

1. **FIRST FIRE ZONE.** For signs located in the first fire zone, the total plastic area of all faces shall not exceed two hundred (200) square feet.

2. **SECOND AND THIRD FIRE ZONES.** For signs in the second and fire zones, the total plastic area of all faces shall not exceed twelve hundred (1200) square feet. (Ord. 85500 § 4618, added by Ord. 91546; October 30, 1962).

Chapter 3.47

LATHING AND PLASTERING

Sections:

- 3.47.010 General.
- 3.47.020 Materials.
- 3.47.030 Interior plastering—Lathing.

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- 3.47.040 Interior plastering—Lath and plaster partitions.
- 3.47.050 Interior plastering—Suspended and furred ceilings.
- 3.47.060 Interior plastering—Thickness.
- 3.47.070 Interior plastering—Proportioning and mixing.
- 3.47.080 Interior plastering—Application of plaster.
- 3.47.090 Interior plastering—Staff.
- 3.47.100 Exterior plastering—Backing.
- 3.47.110 Exterior plastering—Application.
- 3.47.120 Pneumatically placed plaster.
- 3.47.130 Portland cement plaster.

3.47.010 General. Lathing and plastering shall be done in the manner and with the materials specified in this Chapter, and when required for fire protection shall also comply with the provisions of Chapter 3.43.

The Superintendent of Buildings may require that test holes be made in the wall for the purpose of determining the thickness and proportioning of the plaster, provided the permit holder has been notified 24 hours in advance of the time of making such test. (Ord. 85500 § 4701; Sept. 10, 1956).

3.47.020 Materials. Materials shall conform to the following standards:

Materials	U.B.C. Designation
Aggregate. (Only approved lightweight aggregates shall be used)	
Sand. Shall be washed and when used with portland cement for scratch coat plastering the amount of sand retained on a No. 8 sieve shall be not less than 10% or more than 30%.	47-1
Perlite, (when approved). All perlite containers shall be marked indicating that the perlite contained therein conforms to U.B.C. Standard No. 47-1.	47-1
Vermiculite, (when approved).	47-1
Gypsum Plaster.	47-2
In gypsum wood fiber plaster, wood fiber content shall not exceed 3.00 per cent by weight	
Lime. Special Finishing Hydrated Lime (autoclaved)	24-13
Quicklime for structural purposes (Lime putty shall be made from quicklime or hydrated lime and shall be prepared in an approved manner.)	24-12
Keene's Cement.	47-3
Portland Cement. Type I, II, or III, Type I-A, II-A, or III-A, air entraining portland cement.	26-1
Plastic or Waterproof Cement.	24-19
Fiber Insulation Lath.	22-1
Gypsum Lath.	47-5
Metal and Wire Lath, Metal Accessories and Channels	47-6

(Ord. 85500 § 4702; Sept. 10, 1956).

3.47.030 Interior plastering—Lathing. For gypsum and fiber insulation laths, supports, (either wood or metal) shall be spaced not more than 16 inches on centers. Nails shall be spaced not more than five inches on centers and shall penetrate at least $\frac{3}{4}$ inch.

Exceptions: 1. When $\frac{1}{2}$ inch plain gypsum lath is used, spacing of wood supports and of vertical only metal supports may be increased to 24 inches on centers, provided nail spacing is not more than 4 inches on centers.

2. Three-eighths inch long length plain gypsum lath may be used as wall furring attached to horizontal metal supports not over 36 inches on centers when plastered with not less than $\frac{3}{4}$ inch gypsum plaster.

For metal and wire lath, supports shall be as specified in Table No. 47-A. Nails shall be spaced not more than 6 inches on centers.

**TABLE No. 47-A—MAXIMUM SPACING OF SUPPORTS
FOR METAL AND WIRE LATH**

Weight (Lbs. per sq. yd.)	Type of Lath	Maximum Spacing of Supports	
		For Walls	For Ceilings
2.5	Flat Expanded metal lath	16"	0"
3.4	Flat Expanded metal lath	16"	16"
2.75	Flat Rib metal lath	16"	16"
3.4	Flat Rib metal lath	19"	19"
3.4	$\frac{3}{8}$ " Rib metal lath*	24"	24"
4.5	Sheet metal lath	24"	24"
2.48	Wire lath	16"	12"
**	Wire fabric	16"	16"

* Rod-stiffened or V-stiffened flat expanded metal lath of equal rigidity and weight is permissible on the same spacings as $\frac{3}{8}$ " rib metal lath.

** Paper-backed wire fabric, No. 16 gauge wire, 2" x 2" mesh, with stiffener.

(Ord. 85500 § 4703; Sept. 10, 1956).

3.47.040 Interior plastering—Lath and plaster partitions. Hollow partitions of lath and plaster shall have a shell thickness of not less than three-fourths inch ($\frac{3}{4}$ ").

The minimum thickness of solid partitions of lath and plaster shall be not less than two inches (2") nor one eighty-fourth of the distance between supports whichever is the greater. Studless solid partitions of metal lath and plaster or gypsum lath and plaster shall be not more than twelve feet (12') in height. (Ord. 85500 § 4704; Sept. 10, 1956).

3.47.050 Interior plastering—Suspended and furred ceilings. The main runners and cross furring shall be not less than the sizes set forth in Table No. 47-B except that other shapes of hot-rolled or cold-rolled members of equal strength may be substituted for those prescribed in this table.

Hangers for suspended ceilings shall be not less than as set forth in Table No. 47-B, fastened to or embedded in the structural framing, masonry or concrete.

Hangers shall be saddle tied or wrapped around main runners so as to develop to the full strength of the hangers. Lower ends of flat hangers shall be bolted with three-eighths inch ($\frac{3}{8}$ ") bolts to runner channels, or bent tightly around runners and bolted to the main part of the hanger.

Cross furring shall be securely attached to main runners by (1) saddle tying with double No. 16 U. S. Steel Wire gauge galvanized wire, (2) with approved special clips, or (3) approved equivalent attachments. (Ord. 85500 § 4705; Sept. 10, 1956).

3.47.060 Interior plastering—Thickness. Minimum thickness of plaster when used to provide required fire resistance shall be as specified in Tables No. 43-A and No. 43-B. (Ord. 85500 § 4706; Sept. 10, 1956).

3.47.070 Interior plastering—Proportioning and mixing. The proportioning of sand, vermiculite or perlite to 100 pounds of gypsum plaster shall not exceed the following:

	Pounds, Damp, Loose Sand	Cu. Ft. Vermiculite Or Perlite
1. Gypsum Or Hardwall Plaster		
Two Coat Work (Double-Up Method)		
	250	2½
(1) Over Gypsum Lath		
(2) Over Masonry (except over monolithic concrete)	300	3
Three Coat Work		
(1) First (scratch) coat over lath	200*	2*
(2) First (scratch) coat over masonry	300	3
(3) All second (brown) coats	300*	3*
2. Wood Fiber Gypsum Plaster		
On lath, mix with water only. On masonry, mix in proportions of 100 pounds of plaster to not more than 100 pounds of sand.		
3. Lime Plaster		
Three Coat work on metal and wire lath.		
(1) Scratch coat—ten cubic feet lime putty or 450 pounds of hydrated lime, 200 pounds Keene's cement and six pounds fiber to one cubic yard of sand.		
Two coat work on masonry and concrete.		
Base coat—same proportions as brown coat on metal and wire lath.		
4. Portland Cement Plaster		
The first two coats shall be as required for the first two coats of exterior work.		

*In lieu of the proportioning specified above, the proportions may be 100 pounds of gypsum neat plaster to not more than 250 pounds of damp, loose sand or 2½ cubic feet of vermiculite or perlite, provided this proportioning is used for both scratch and brown coats.

Lime or portland cement plaster shall not be applied directly to fiber insulation lath or gypsum lath. (Ord. 85500 § 4707; Sept. 10, 1956).

3.47.080 Interior plastering—Application of plaster. Gypsum plaster on monolithic concrete walls or ceilings shall be applied over an approved bonding base coat material.

Lime plaster applied to concrete walls shall be as specified in Section 3.47.070.

Portland cement plaster applied to interior concrete walls or ceilings shall conform to requirements for application to exterior concrete walls as specified in Section 3.47.110. (Ord. 85500 § 4708; Sept. 10, 1956).

3.47.090 Interior plastering—Staff. Staff shall be soaked before sticking. Lugs shall be of pure fiber and plaster of paris. Rust-resistive fastenings of sufficient strength to anchor the staff to the support shall be not less than No. 16 gauge galvanized wire, when wadded with fiber and plaster of paris. (Ord. 85500 § 4709; Sept. 10, 1956).

3.47.100 Exterior plastering—Backing. (a) **BACKING.** Studs shall be sheathed, or wire of not less than No. 18 U. S. Steel Wire gauge shall be stretched taut horizontally at intervals not exceeding six inches (6") on centers vertically and securely fastened in place. This shall not be required with metal lath or paper-backed wire fabric.

(b) **WEATHER PROTECTION.** Weather protection shall be as specified in Section 3.17.070.

(c) **METAL REINFORCEMENT.** Exterior plaster, except when applied to concrete or masonry, shall be reinforced with one of the materials having a galvanized coating or equivalent as set forth in Table No. 47-C.

Metal reinforcement shall be furred out from the backing at least one-quarter inch ($\frac{1}{4}$ ") by an approved furring method, and shall be nailed with galvanized nails or approved furring devices driven to at least three-quarters inch ($\frac{3}{4}$ ") penetration which shall be spaced not more than six inches (6") apart vertically and sixteen inches (16") apart horizontally. Metal reinforcement shall be lapped at least one full mesh at all joints. When no sheathing is used, all vertical joints shall be made at the studs, and horizontal joints where expanded metal or metal lath is used shall have at least one tie between studs, made with No. 18 U. S. Steel Wire gauge galvanized annealed tie wire. (Ord. 85500 § 4710; Sept. 10, 1956).

3.47.110 Exterior plastering—Application. Exterior plaster shall be portland cement plaster meeting the requirements of Table No. 47-D, except when applied over concrete or masonry.

The first coat shall be forced through all openings in the reinforcement so as solidly to fill all spaces. It shall then be scored horizontally only, with a scratcher having one-eighth inch ($\frac{1}{8}$ ") clipped teeth and grooves not more than one-half inch ($\frac{1}{2}$ ") deep. (Ord. 85500 § 4711; Sept. 10, 1956).

3.47.120 Pneumatically placed plaster. Pneumatically placed cement plaster shall be a mixture of portland cement and sand, mixed dry, conveyed by air through a pipe or flexible tube, hydrated at the nozzle at the end of the conveyor and deposited by air pressure in its final position.

Rebond materials may be screened and reused as sand in an amount not greater than 25 per cent of the total sand in any batch.

Pneumatically placed cement plaster shall consist of a mixture of one part cement to not more than five parts of sand. Except when applied to concrete or masonry, such plaster shall be applied in not less than two coats to a minimum total thickness of seven-eighths inch ($\frac{7}{8}$ "). The first coat shall be rodded and water floated, with no variation greater than one-fourth inch in any direction under a five-foot straightedge. (Ord. 85500 § 4712; Sept. 10, 1956).

3.47.130 Portland cement plaster. Portland cement plaster not less than one and one-half inch ($1\frac{1}{2}$ ") in thickness reinforced in two directions with not less than three-tenths per cent of steel may be considered to act with the studs to resist bending and shear under horizontal forces when said reinforcement is anchored to the stud in such a manner as to resist effectively the stresses developed. The unit stresses for such reinforced plaster shall not be more than 50 per cent of those allowed for concrete set forth in Table No. 26-B, based on a compressive strength of such plaster of 1500 pounds per square inch. (Ord. 85500 § 4713; Sept. 10, 1956).

TABLE No. 47-B—SUSPENDED AND FURRED CEILINGS

Minimum Sizes for Wire and Rigid Hangers
 Minimum Sizes and Maximum Spans for Main Runners
 Minimum Sizes and Maximum Spans for Cross Furring

	Maximum Area Supported	Size
Hangers for Suspended Ceilings	12.5 sq. ft.	9 gauge wire
	16 sq. ft.	8 gauge wire
	18 sq. ft.	3/16" diameter, mild steel rod
	20 sq. ft.	7/32" diameter, mild steel rod
	22.5 sq. ft.	1/4" diameter, mild steel rod
	25.0 sq. ft.	1" x 3/16", mild steel flats
For Supporting Runners	8 sq. ft.	12 gauge wire
	12 sq. ft.	10 gauge wire
	16 sq. ft.	8 gauge wire
Hangers for Attaching Runners and Furring Directly to Beams and Joists	8 sq. ft.	14 gauge wire
	12 sq. ft.	12 gauge wire
	16 sq. ft.	11 gauge wire
For Supporting Furring Without Runners ¹ (Wire Loops at Supports)	Type of Support:	
	Concrete	14 gauge wire
	Steel	16 gauge wire (two loops) ²
Wood	16 gauge wire (two loops) ²	
SPANS OF MAIN RUNNERS³		
Size and Type	Maximum Spacing of Hangers or Supports (Along Runners)	Maximum Spacing of Runners
3/4" — 3 lb. per ft., cold or hot rolled channel	2' 0"	3' 0"
1 1/2" — 475 lb. per ft., cold rolled channel	3' 0"	4' 0"
1 1/2" — 475 lb. per ft., cold rolled channel	3' 6"	3' 6"
1 1/2" — 475 lb. per ft., cold rolled channel	4' 0"	3' 0"
1 1/2" — 1.12 lb. per ft., hot rolled channel	4' 0"	5' 0"
2" — 1.26 lb. per ft., hot rolled channel	5' 0"	5' 0"
1 1/2" x 1 1/2" x 3/16" angle	5' 0"	5' 0"

Table No. 47-B (Continued)

SPANS OF CROSS FURRING ³		
Size and Type	Maximum Spacing of Runners Or Supports	Maximum Spacing of Cross Furring Members (Transverse)
1/4" diameter pencil rods	2' 0"	12"
	2' 0"	19"
	2' 6"	12"
3/8" diameter pencil rods	3' 0"	24"
	3' 6"	19"
	4' 0"	16"
3/4"---3 lb. per ft., cold or hot rolled channel	4' 0"	24"
	4' 6"	19"
	5' 0"	12"
1"---410 lb. per ft., hot rolled channel	4' 0"	24"
	4' 6"	19"
	5' 0"	12"

1 Insert, special clips or other devices of equal strength may be substituted for those specified.
 2 Two loops of No. 18 gauge wire may be substituted for each loop of No. 16 gauge wire for attaching steel furring to steel or wood joists.
 3 Other sections of hot or cold rolled members of equivalent beam strength may be substituted for those specified.

TABLE No. 47-C—EXTERIOR PLASTER REINFORCEMENT

Type of Reinforcement	Minimum Gauge	Minimum Weight (lbs. per sq. yd.)
Expanded Metal		1.8
Metal Lath		3.4
Woven Wire Netting	18	1.4
Welded Wire Fabric	16	1.0

TABLE No. 47-D—EXTERIOR PORTLAND CEMENT PLASTER

Coat	Maximum Volume Of Sand Per Volume Of Cement	Minimum Thickness
First or scratch	4	1/2"*
Second or brown	5	(1st and 2nd coats) 7/8"***
Third or finish	3***	1/8"

* Measured from backing to crest of scored plaster.

** If no third coat is applied, the thickness of the first and second coats shall be not less than one inch.

*** Approved prepared finish coats containing not less than 1/3 by weight of portland cement may be used.

Chapter 3.48

TRANSFORMER VAULTS

Sections:

- 3.48.010 Where required.
- 3.48.020 Location.
- 3.48.030 Construction.
- 3.48.040 Doorways.
- 3.48.050 Ventilation openings.
- 3.48.060 Drainage.
- 3.48.070 Water pipes and accessories.
- 3.48.080 Equipment to be accessible.

3.48.010 Where required. Where oil filled transformers are used for the service of one thousand amperes (1,000 amps.) or more, a transformer vault shall be required, unless otherwise approved by the utility providing the service. (Ord. 85500 § 4801, added by Ord. 88910; January 5, 1960).

3.48.020 Location. Vaults shall be located where they can be ventilated to the outside air. (Ord. 85500 § 4802, added by Ord. 88910; January 5, 1960).

3.48.030 Construction. Vaults shall be constructed so as to obtain a three-hour fire-resistive enclosure. (Ord. 85500 § 4803, added by Ord. 88910; January 5, 1960).

3.48.040 Doorways. (a) **DOORS.** Doors leading into the building shall be Class "A", others within ten feet (10') of an exterior opening shall be Class "D", and no door shall swing into the transformer room.

(b) **SILLS.** A doorsill or curb of sufficient height to confine within the vault the oil from the largest transformer shall be provided and in no case shall the height be less than four inches (4").

(c) **LOCKS.** Entrance doors shall be equipped with locks. Locks and latches shall be so arranged that the door may be readily and quickly opened from the inside. (Ord. 85500 § 4804, added by Ord. 88910; January 5, 1960).

3.48.050 Ventilation openings. Ventilation openings shall be provided to prevent excess temperature rise and shall be in accordance with the following:

1. **Location.** Ventilation openings shall be located a minimum of ten feet (10') from fire escapes, combustible materials and unprotected doors or windows.
2. **Vaults vented to an outdoor area** shall have a minimum net intake area and a minimum net exhaust area exclusive of area occupied by screens, grating or louvers of one and one-half square inches (1½ sq. in.) per kva of transformer capacity. In no case shall the intake or exhaust area be less than seventy-two square inches (72 sq. in.) net area.
3. **Vaults ventilated by natural circulation of air** shall have the intake near the floor and the exhaust in the roof or in the side wall near the roof. Other means of ventilation may be approved by the Superintendent of Buildings.
4. **Covering.** Ventilation openings shall be covered with durable gratings, screens or louvers.
5. **Dampers.** When the intake air is not from the outside, automatic dampers shall be required in the intake openings of vaults containing oil-insulated transformers. The actuating device on the automatic damper should be made to function at a temperature resulting from fire and not at a temperature which might prevail as a result of an over-heated transformer or bank of transformers.
6. **Ducts.** Ventilating ducts if used shall be constructed equivalent to Class "A" vents. (Ord. 85500 § 4805, added by Ord. 88910; January 5, 1960).

3.48.060 Drainage. (a) Drains shall be prohibited unless specifically approved by the Superintendent of Buildings.

PREFABRICATED CONSTRUCTION 3.48.070—3.49.020

(b) A storage sump shall be installed in the vault and the floor pitched to drain into it. A sump shall be a minimum of twelve inches (12") diameter and not less than twenty-four inches (24") deep, designed with a bottom to hold an accumulation of water or oil. (Ord. 85500 § 4806, added by Ord. 88910; January 5, 1960).

3.48.070 Water pipes and accessories. Any pipe or duct systems foreign to the electrical installation shall not enter or pass through a transformer vault. Piping or other facilities provided for water-cooled transformers are not deemed to be foreign to the electrical installation. (Ord. 85500 § 4807, added by Ord. 88910; January 5, 1960 and amended by Ord. 92306; September 4, 1963).

3.48.080 Equipment to be accessible. An accessible vault opening, which may be a door or suitable ventilation opening, adequate in size to permit the installation and/or removal of equipment to be located in the vault, shall be provided and kept free of obstruction at all times. (Ord. 85500 § 4808, added by Ord. 88910; January 5, 1960).

Chapter 3.49

PREFABRICATED CONSTRUCTION

Sections:

3.49.010 General.

3.49.020 Tests of assemblies.

3.49.010 General (a) **PURPOSE.** The purpose of this Chapter is to regulate construction of any building or structure which is wholly or in greater part fabricated off the site.

(b) **SCOPE.** All prefabricated construction and all materials used therein shall conform to all the requirements of this Code. (See Section 3.01.050.) (Ord. 85500 § 4901; Sept. 10, 1956).

3.49.020 Tests of assemblies. (a) **MATERIALS.** Sample materials and the assembly thereof shall be submitted to the Superintendent of Buildings for inspection to determine compliance with this Code. Every material shall be grade marked or labeled where required elsewhere in this Code.

(b) **CERTIFICATE.** A certificate shall be furnished by the manufacturer with every prefabricated building except where its prefabricated parts are readily accessible to inspection at the site. The certificate shall certify that the building in question meets all the requirements of this Code. When heating and electrical equipment is installed so that it cannot be inspected at the site, the certificate shall certify that such equipment complies with the laws applying thereto.

(c) **FIELD ERECTION.** Placement of prefabricated assemblies at the building site shall be inspected by the Superintendent of Buildings to

determine compliance with this Code. Plumbing equipment shall be so installed that it may be inspected at the site.

(d) **REJECTION OF CERTIFICATES.** Where field inspection of a prefabricated building discloses violation of regulations of this Code in prefabricated assemblies, which have been certified as complying with such regulations, the Superintendent of Buildings shall require immediate correction of such violation and may, at his discretion, refuse to accept future certificates from the manufacturer of such prefabricated building. (Ord. 85500 § 4902; Sept. 10, 1956).

Chapter 3.50

HEATING SYSTEMS—GENERAL REQUIREMENTS

Sections:

- 3.50.010 Scope.
- 3.50.020 Permit and approval of plans.
- 3.50.030 Inside air temperatures.
- 3.50.040 Construction and installation.
- 3.50.050 Air for combustion.

3.50.010 Scope. The provisions of this Chapter shall govern the installation, alteration and repair hereafter of all fixed systems and equipment used, or intended for use, in heating of rooms, spaces, or buildings. (Ord. 85500 § 5001; Sept. 10, 1956).

3.50.020 Permit and approval of plans. (a) **PERMIT REQUIRED.** It shall hereafter be unlawful for any person to construct or install any heating system or equipment in any building or to alter or make major repairs on any such existing plant or equipment without securing a permit therefor from the Superintendent of Buildings.

Exception: Permits for gas fitting work shall be secured from the Director of Public Health as set forth in Section 3.54.040.

(b) **APPLICATION FOR PERMIT.** Application for permits required in this Chapter shall be filed on forms supplied by the Superintendent of Buildings and shall be accompanied by all necessary plans and/or specifications, in duplicate, for such proposed construction, installation, alteration, or repair and with all proper and sufficient information relating thereto. Plans shall not be required for buildings of Groups I and J occupancy; or for buildings of other occupancy wherein the space to be heated does not exceed 100,000 cubic feet.

(c) **PERMIT FEES.** See Chapter 3.60. (Ord. 85500 § 5002; Sept. 10, 1956).

3.50.030 Inside air temperatures. Every heating plant or space heater hereafter installed in Group H and I occupancies shall be sized to offset the heat loss between inside air temperature of 70 degrees F. when outside temperature is 20 degrees F.

Exception: The Superintendent of Buildings may permit lower temperatures for design purposes in specific rooms or spaces where a need for such lower temperature can be clearly justified or where human occupancy of such rooms or spaces is intermittent.

The applicant for a permit shall certify on the application form that the proposed heating plant will meet the requirements of this Section. (Ord. 85500 § 5003; Sept. 10, 1956).

3.50.040 Construction and installation. (a) GENERAL. Construction and installation of heating systems and equipment shall conform to detailed requirements of this code as follows:

- 1. Warm air heating systems—See Chapter 3.51.
- 2. Forced warm air furnaces—See Chapter 3.51.
- 3. Gravity warm air furnaces—See Chapter 3.78.
- 4. Hot water heating systems—See Chapter 3.52.
- 5. Steam heating systems—See Chapter 3.52.
- 6. Hot water heating boilers—See Chapter 3.52.
- 7. Steam heating boilers—See Chapter 3.52.
- 8. Oil burner installations—See Chapter 3.53.
- 9. Gas burner installations—See Chapter 3.54

(b) CLEARANCE FOR BURNERS AND FANS. Burners and fans shall have minimum clearance from walls or partitions to facilitate maintenance as follows:

- 1. For Gas and Oil Burners..... 18 inches from burner or furnace casting extension, whichever is nearer the wall or partition.
- 2. For Fans 18 inches from furnace casing.

Exceptions: 1. Reductions in clearances may be permitted as set forth in Table No. 50-A.

2. Appliances listed by nationally recognized testing agencies for lesser clearances may be installed in accordance with their listings. (Ord. 85500 § 5004, as amended by Ord. 93462; December 28, 1964).

3.50.050 Air for combustion and ventilation. All fuel burning equipment shall be assured an adequate supply of air for proper combustion. No appliance shall be installed in such manner that operation of exhaust fans, ventilation systems or fireplaces creates conditions resulting in unsafe fuel burning equipment operation.

If the volume, in cubic feet, of the space in which fuel burning equipment is located is less than one-twentieth ($1/20$) of the maximum rate of input in B.T.U.'s per hour of all fuel burning equipment in such space, the following provisions shall apply.

1. For burner inputs of not more than 400,000 B.T.U.'s per hour, the provisions for air for combustion and ventilation shall conform to one of the following:

(a) For gas burning equipment, provisions for air for combustion and ventilation shall be in accordance with the American Standard ASA Z 21.30, Installation of Gas Appliances and Gas Piping, 1964 edition, approved by the American Standard Association, also designated as NFPA No. 54, 1964 edition, published by the National Fire Protection Association (C.F. 257207).

(b) For oil burning equipment, provisions for air for combustion and ventilation shall be in accordance with the American Standard ASA 295.1, Installation of Oil Burning Equipment, 1965 edition, approved by the American Standard Association, also designated as NFPA No. 31, 1965 edition, published by the National Fire Protection Association (C.F. 257208).

2. For burner inputs of more than 400,000 B.T.U.'s per hour, the provisions for air for combustion and ventilation shall conform to one of the following:

(a) There shall be provided a combustion air intake from outdoors which shall have a free area not less than the aggregate area of all flue connections it serves and placed as near the floor as practicable and there shall be provided an additional ventilating opening from outdoors of the same area as the combustion air intake located as near the ceiling as practicable.

(b) There shall be provided a single air intake from outdoors which shall have a free area of not less than three (3) times the aggregate area of all flue connections it serves, and located as near the ceiling as practicable. This requirement shall not be applicable where fuel burning equipment is installed in an enclosure where the equipment occupies more than fifty (50) percent of the floor area.

(c) There shall be provided two (2) air intakes from indoors, one as near the ceiling and the other as near the floor as practicable, each of which shall have a free area not less than the aggregate area of all flue connections it serves. These air intakes shall have permanent and unobstructed access to other space within the building; the combined volume of

the rooms so connected in cubic feet shall not be less than one-twentieth (1/20) of the maximum rate of input in B.T.U.'s per hour of all fuel burning equipment in the space.

(3) The size and location of air openings as required in 1 and 2 above shall not necessarily govern if adequate air for combustion and ventilation by mechanical means is assured with air flow interlocks in the plans and specifications proposed by a licensed professional engineer and submitted to the Superintendent of Buildings with the application for an installation permit as provided in Section 3.03.020(c). (Ord. 85500 § 5005, as amended by Ord. 93462 and Ord. 95566; February 23, 1967).

TABLE No. 50-A—CLEARANCE PERMITTED FROM PROTECTED COMBUSTIBLE MATERIALS
 (Applied to Appliances, Flues and Flue Connectors, Clearance in Inches, According to Type of Protection)
WHERE THE REQUIRED CLEARANCE WITH NO PROTECTION IS:

Type Of Protection Applied Over Combustible Material.*	36 Inches		18 Inches		12 Inches		9 Inches		6 Inches		3 Inches		
	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	
a. ¼ in. asbestos mill-board spaced out 1 in.**	30	18	30	15	9	12	9	6	6	3	2	3	2
b. 28 gage sheet metal on ¼ in. asbestos millboard	24	18	24	12	9	12	9	6	4	3	2	2	1
c. 28 gage sheet metal spaced out 1 in.**	18	12	18	9	6	9	6	4	4	2	2	2	2
d. 28 gage sheet metal on ½ in. asbestos millboard spaced out 1 in.**	18	12	18	9	6	9	6	4	4	2	2	2	2
e. 1½ in. asbestos cement covering on heating appliance	18	12	—	9	6	6	6	4	—	2	1	—	1
f. ¼ in. asbestos millboard on 1 in. rockwool bats reinforced with wire mesh or equivalent	18	—	—	6	—	—	4	4	4	2	2	2	2
g. 22 gage sheet metal on 1 in. rockwool bats reinforced with wire mesh or equivalent	18	—	12	4	—	3***	2	2	2	2	2	2	2
h. ¼ in. asbestos cement board or ¼ in. asbestos millboard	—	—	—	—	—	—	—	—	—	4	4	4	2

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Table No. 50-A (Continued)

Type Of Protection Applied Over Combustible Material.*	WHERE THE REQUIRED CLEARANCE WITH NO PROTECTION IS:												
	36 Inches		18 Inches		12 Inches		9 Inches		6 Inches		3 Inches		
	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	Sides And Rear Pipe (1) Above	Smoke Or Vent Pipe (1) Above	
i. 1/4 in. cellular asbestos	—	—	—	—	—	—	—	—	—	—	—	—	—
j. 1/2 in. gypsum wallboard	30	18	30	15	9	12	9	6	7	3	3	3	1
k. Metal lath and 3/4 in. gypsum plaster	24	18	24	12	9	12	9	6	5	2	2	2	—

* All clearances shall be measured from the outer surface of the appliance to the combustible material disregarding any intervening protection applied to the combustible material. A dash indicates no reduction in clearance permitted.
 ** Spacers shall be of noncombustible material.
 *** Permitted for vent pipes only.

(1) Above clearances for smoke or vent pipes permitted subject to the following limitations:

- a. Smoke pipes shall not be placed closer to combustible materials than 1 1/2 times their diameter.
- b. Smoke or vent pipes shall not be placed so close to combustible materials as to raise temperature of such material above 150° F.

(Table 51-A as amended by Ord. 93462; December 28, 1964).

Chapter 3.51**AIR DUCTS AND FORCED WARM AIR FURNACES****Sections:**

- 3.51.010 Scope.
- 3.51.020 Duct systems in all buildings except Groups I and J.
- 3.51.030 Special hazards.
- 3.51.040 Range hoods and vents.
- 3.51.050 Duct systems in buildings of Group I and J occupancy.
- 3.51.060 Forced warm air furnaces.

3.51.010 Scope. The detailed requirements of this Chapter shall apply to the design and installation of (1) air duct systems employing mechanical means for the movement of air and used for heating and ventilating systems; and (2) forced warm air furnaces. General requirements for heating shall be as set forth in Chapter 3.50. Gravity warm air furnaces are regulated by the Warm Air Furnace Ordinance, Chapter 3.78. (Ord. 85500 § 5101; Sept. 10, 1956).

3.51.020 Duct systems in all buildings except Groups I and J. (a) **GENERAL.** The requirements of this Section apply to duct systems used for heating, ventilating, air cooling, air conditioning, and exhaust in buildings of Groups A, B, C, D, E, F, G and H occupancies. They do not apply to systems for removal of flammable vapors and residues nor to systems for conveying dust, stock or refuse by means of air currents, which shall be subject to individual approval by the Superintendent of Buildings.

(b) **CONSTRUCTION OF DUCTS.** 1. Ducts shall be constructed entirely of noncombustible material, such as iron, steel, aluminum or other approved material, and may be of independent construction or a part of the building structure.

2. Rectangular ducts shall be constructed and braced as set forth in Table No. 51-A.

Flexible woven asbestos or other approved fire-resistive material, or sleeve joints with rope asbestos packing or other approved noncombustible material shall be provided for flexible connections.

Only noncombustible linings which are not subject to disintegration shall be used inside of ducts.

On ducts with entering air temperature exceeding 175 degrees F. combustible coverings shall not be used.

3. Round metal ducts shall be constructed of metal of the same gauge as specified for square ducts of the same cross sectional area.

4. Ducts shall be made reasonably tight throughout and shall have no openings other than those required for the proper operation and maintenance of the system.

5. Return ducts, other than vertical, shall be so constructed that the interior is accessible to facilitate the cleaning of possible accumulations of dust and combustible material in them except that accessibility shall not be required where all of the following conditions prevail:

- i. The occupancy is not productive of combustible material, such as lint, dust, greasy vapors, etc.
- ii. The return openings are at least 7 feet above the floor or are protected by corrosion-resistant metal screens of at least quarter inch mesh or equivalent installed back of the grilles.
- iii. The design velocity in the return is not less than 1,000 feet per minute.

Clean-out openings at approved intervals shall be provided where the ducts are smaller than 18 x 24 inches. Removal grilles of adequate size and accessibility may be accepted as clean-out openings. Where square elbows are provided with duct turns, access shall be provided for cleaning at the entering air side.

6. Supply ducts, other than vertical, shall conform to the above requirements for return ducts, unless all of the supply air passes through adequate cleansing devices.

(c) **FLEXIBLE DUCT CONNECTORS.** 1. Flexible duct connectors for use between ducts and air outlets or air outlet units need not conform to the requirements for ducts if they conform to the following provisions and are approved for this use.

- i. They shall be made from a base material of metal or mineral.
- ii. They shall not be subject to deterioration from mildew or moisture.
- iii. They shall not be more combustible than approved flameproofed* fabric.
- iv. They shall not exceed 12 feet in length.
- v. They shall not exceed 8 inches in diameter.
- vi. They shall not pass through any fire wall, fire partition or floor.
- vii. They shall be encased with not less than one-half inch of noncombustible insulating material or shall be located in an enclosure of noncombustible construction.

2. Vibration isolation connectors in duct systems, other than as covered by subsection (c) 3, shall be made of woven asbestos or approved flameproofed* fabric or shall consist of sleeve joints with packing of rope asbestos or other approved noncombustible material. Vibration isolation connectors of fabric shall not exceed 10 inches in length.

3. A vibration isolation connector at the joint between duct and fan where the inlets to the fan, if of exhaust type, or the outlets from the fan

*See Flame Retarded Fabrics in Fire Protection Equipment List published by Underwriters' Laboratories, Inc.

are in the same room or enclosure as the joint shall be exempt from subsection (c) 2 if not over 10 inches in length.

(d) **INSTALLATION OF DUCTS.** 1. Clearance from combustible materials of warm air ducts shall be as set forth in Section 3.50.040 (b).

2. Where fire stopping is required (see Section 3.25.120) the space around ducts passing through walls, floors or partitions shall be sealed with rope asbestos, mineral wool or other noncombustible materials.

3. Where ducts pass through concealed ceiling spaces of combustible construction or are located inside combustible partitions or walls, either the ducts or the interior surfaces of such concealed ceiling space, partition or walls shall be protected with $\frac{1}{4}$ -inch asbestos or other approved insulating material or a clearance of $\frac{1}{2}$ -inch as specified in subsection (d) 1 of this section shall be maintained between ducts and all combustible construction. The integrity of fire-stopping shall not be destroyed. The spaces between the ducts and the fire-stopping shall be filled solidly with brick, asbestos, mineral wool or other approved noncombustible material.

4. Ducts which pass through floors in which vertical openings are required to be protected, shall be encased in one hour fire-resistive construction, or shall be fire dampered at the floor. No duct shall penetrate a separation in which openings are not permitted.

Ducts which are located in one story and have duct openings extending through a floor to the story next above or below may, in lieu of such fire resistive enclosure, be provided with approved fire dampers at each such point where the floor is pierced. Two or more ducts serving separate floors shall not be encased in the same fire-resistive enclosure unless approved automatic fire dampers are installed where each branch is taken from such encased ducts; or unless such ducts are of at least 24 gauge steel covered with 1 inch noncombustible insulation.

5. No attic, basement or concealed spaces in a building shall be used as an integral part of a duct system unless it conforms to all the requirements for ducts. Such arrangements shall be subject to the approval of the Superintendent of Buildings. Plenum chambers which conform to all the requirements for ducts may be located in any such portion of the building; such chambers shall not be used for storage or occupational purposes.

Public exits in Group D occupancies shall not be used for recirculation of air.

6. Unprotected ducts shall not be built into or installed in a building in such a way as to impair the effectiveness of the fire-proofing around steel or iron structural members, such as placing ducts between the fire-proofing and the members protected.

7. Where ducts are located so that they will be subject to damage or rupture, they shall be adequately protected.

8. Ducts shall be substantially supported with noncombustible materials. Hanger connections shall not be stressed beyond 20% of their ultimate capacity as determined by tests. Hangers and other materials incident to hangers shall not be stressed beyond stresses for such materials as prescribed elsewhere in this Code.

(e) **AUTOMATIC FIRE DOORS AND DAMPERS.** 1. When ducts, or outlets or inlets to them, pass through occupancy or area separations they shall be provided with approved automatic fire doors or dampers. Fire doors or dampers shall be as specified in Section 3.43.060. On 3 hour fire resistive separations, fire doors shall be provided on both sides. On one and two hour fire-resistive separations a fire door or damper shall be provided on one side.

Fire dampers shall be mounted in a steel frame adequately stiffened and securely fastened to the wall. Where three or four hour fire-resistive separations are required and openings are permitted, steel sleeves shall pass through the wall. Such frames and sleeves shall be of the same gage as the damper.

Louver type fire dampers of 12 gage steel may be used in lieu of fire doors, provided the individual louvers are not over 8" on centers, not over 48" long, and are stiffened by formed edges and pivot line. More than one frame of louvers may be used to protect such an opening, provided each frame shall have a fusible link. Overlap or stops at top and bottom for such multi-louver dampers shall be at least $\frac{1}{2}$ " and interlock of blades shall be $\frac{3}{4}$ " and clearance between edges of blade and frame shall not exceed $\frac{3}{32}$ ".

On small openings not exceeding 400 square inches area, $\frac{1}{4}$ " steel plate may be used in lieu of fire doors, provided the radius of swing of the plate does not exceed 18". Overlap or stops for single blade plate dampers shall be 5% of the larger dimension, but not more than $1\frac{1}{2}$ " nor less than $\frac{1}{2}$ ".

2. Fire dampers installed in the system as required at other than occupancy or area separations shall be as follows:

SINGLE BLADE FIRE DAMPERS

Area Of Blade	Max. Depth And Radius Of Swing	Gage
400 sq. in. or less	16"	16
Over 400 sq. in. but not over 1,300 sq. in.	36"	12

Blades with area exceeding 1,300 sq. in. shall be subject to individual approval.

Overlap or stops for single blade dampers shall be 3% of the larger dimension, but not more than 1" nor less than $\frac{1}{4}$ ".

MULTI-LOUVER DAMPERS

Length Of Blade	Max. Blade Spacing Center To Center	Gage
36" or less	8"	16
Over 36" but not over 48"	10"	14
Over 48" but not over 60"	12"	12

Blades longer than 60" shall be subject to individual approval.

More than one frame of louvers may be used to protect an opening, provided each frame shall have a fusible link. Overlap or stops at top and bottom for multi-louver dampers shall be $\frac{1}{4}$ ". Interlock of blades shall be $\frac{3}{4}$ ". Clearances between edges of blades and frame shall not exceed $\frac{3}{32}$ ".

Dampers shall be mounted in a stiffened steel frame or sleeve of the same gage as the blades.

Maximum fusing temperature for any link inside a duct shall be 250° F.

Maximum fusing temperature for any link outside a duct shall be 160° F.

3. Fire doors and fire dampers shall be arranged to close automatically and remain tightly closed, upon the operation of a fusible link or other approved heat actuated device located where readily effected by an abnormal rise of temperature in the duct. Fusible links shall have a temperature rating approximately 50 degrees F. above the maximum temperature that would normally be encountered with the system in operation or shut down. Hinged dampers shall be equipped with spring catches, and pins of hinges shall be of corrosion resistant material.

4. Fresh air intakes shall be protected with approved automatic fire doors or dampers when within 20 feet of property lines in Fire Zone No. 1 and 10 feet in Fire Zones 2 and 3 except where the Superintendent of Buildings determines that no fire hazard is created by such omission. When deemed necessary by the Superintendent of Buildings, approved heat actuated devices shall be installed at intake openings to shut fans down in case of exposure fires.

5. Fire doors at openings through fire walls and fire dampers at fire partitions shall be so arranged that the disruption of the duct will not cause failure to protect the opening.

(f) **AIR INTAKES AND OUTLETS.** Air shall not be re-circulated from any space in which objectionable quantities of flammable vapors, flyings or dust are given off.

Exhaust air openings and recirculating air intakes shall be located at least 3 inches above the floor, except that protected floor inlets may be permitted, under seats, in theatres. When located less than 7 feet above

the floor, inlet and outlet openings shall be protected by a substantial grille or screen, through the openings in which a half inch sphere will not pass.

Fresh air intakes shall be protected by screens of corrosion-resistant material not larger than one-half-inch mesh.

(g) AIR FILTERS. Air filters shall be of approved types that will not burn freely or emit large volume 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 350 degrees F., as determined by tests made with a Cleveland open cup tester.

Where filters are flushed with liquid adhesives flowing through the air stream the system shall be arranged so that the filters cannot be flushed while the fan is in operation.

All air filters shall be kept free of excess dust and combustible material. A draft gauge shall be provided of a type which will operate a warning light or produce an audible or visible signal when excessive dust loads have accumulated.

(h) ENCLOSURE OF DUCTS. Vertical ducts passing through any story of a building shall be enclosed by partitions. Where vertical enclosed ducts are not firestopped with noncombustible material at each floor level, the duct enclosure shall be constructed and covered as required for vertical shafts and ducts shall be fire dampered at every opening into or out of the enclosure.

Horizontal runs of ducts leaving a furnace enclosure, shaft or vertical duct and then becoming vertical through any floor, shall be covered with one hour fire-resistive construction, except independent ducts serving only one floor each and which are fire dampered at each floor or shaft they penetrate.

Exception: In occupancies where construction of Types III-N, IV-N and V-N is permitted, ducts need not be enclosed.

Where horizontal runs of ducts are required to be covered with one hour fire-resistive construction, a suspended ceiling of one hour fire-resistive construction completely enclosing such ducts may be substituted for the individual cover.

(i) DAMPERS. Approved dampers shall be provided, in general, wherever a fire door would be required to close a normal opening and, specifically, as follows:

1. Where duct systems serve two or more floors, approved fire dampers shall be required either (1) at each direct outlet or inlet and in each branch duct at its junction with the main vertical duct, or (2) at each point where a floor is pierced.

Exception: Dampers are not required (1) at room openings in branch ducts; (2) in branch ducts having a cross-sectional area of less than 20 square inches which supply only air conditioning units discharging air at not over 4 feet above the floor; (3) in small buildings with unprotected floor openings subject to approval by the Superintendent of Buildings.

2. Dampers provided in ducts used solely for exhaust of air to the outside, shall be installed in such a way that they will not interfere with the flow of air in the main duct. No dampers are required in a system serving only one floor and used only for exhaust of air to the outside. Dampers shall be designed to close in the direction of air flow. Where direction of exhaust air flow is upward, sub-ducts at least 22 inches in length may be carried up inside the main duct from each inlet, in lieu of dampers.

Exception: Dampers may be omitted for story separation in buildings of Types III-N, IV-N, and V-N construction.

Ducts piercing required fire-resistive ceilings shall be fire dampered at every penetration of the ceiling, or each individual duct shall be of one-hour fire-resistive construction throughout its length within the area. When all ducts within the areas mentioned above are of at least four gauges heavier than otherwise required and are kept not less than three (3) inches clear of any unprotected wood, or structural steel member, the fire-resistive construction and the fire dampers may be omitted.

Every duct penetrating required furnace or boiler room separation shall be fire dampered at each penetration.

On downblow furnace installations in "slab on ground" buildings where heat distribution is by means of buried ducts under the floor slab, fire dampers in the concrete duct penetrating the furnace room floor may be waived under the following conditions:

Fusible electric cutoff switches which will stop all action of the burner and fans shall be installed, one at the ceiling over the burner and one at the base of the furnace in the lower plenum or in the entrance to the concrete duct, in such a location that it will fuse when the air entering the duct reaches 50 degrees above normal operating temperature or a maximum of 250°. The fuse link in the switch at the ceiling over the burner shall fuse at 165°. Access shall be provided to both fuse links.

Fire dampers on all other openings in the furnace room shall be installed in the conventional manner.

Vent openings through roofs serving one story only need not have fire dampers.

AIR DUCTS AND FORCED WARM AIR 3.51.030—3.51.040

Ducts passing through a garage need not have dampers if provided with the same fire resistance as the garage enclosure.

Ducts opening into a stair enclosure, elevator shaft, or dumbwaiter shaft shall be fire dampered at each opening. Ducts passing through a stair enclosure, elevator shaft or dumbwaiter shaft, shall be fire dampered or enclosed. (Ord. 85500 § 5102, as amended by Ord. 87090; April 22, 1958).

3.51.030 Special hazards. 1. The lowest duct inlet for air recirculated within a garage shall be not less than forty-eight inches (48") above the level of the garage floor.

2. No heating or ventilating fans, motors or other related equipment shall be installed in any stair enclosure, elevator shaft or dumbwaiter shaft. No furnace, boiler, compressor, motor or any equipment subject to possible explosion shall be installed under or adjacent to any stair providing exit from an upper floor or under or within six feet (6') of any balcony stair. No boiler, compressor or other equipment capable of possible explosion shall be placed under or adjacent to a required exit stairs or mezzanine stairs without a separation adequate to protect individuals using such stairs from the hazards of explosion as determined by the Superintendent of Buildings. In the story above or below a boiler or furnace room, no enclosure wall when projected vertically shall fall within a stair enclosure nor within two feet (2') horizontal distance of such stair enclosure.

Exception: Buildings of Groups I and J occupancy shall be exempt from the above requirement.

3. Ducts venting clothes dryers in all multi-story buildings except those of Group I occupancy shall be provided with removable lint strainers as close as practicable to each dryer so vented, unless the dryer itself is equipped with such a lint strainer. (Ord. 85500 § 5103 as amended by Ord. 86257; June 18, 1957).

3.51.040 Range hoods and vents. (a) **GENERAL.** Cooking devices in commercial kitchens which are used for frying or broiling or other grease producing cooking methods shall be provided with a metal exhaust hood of the canopy type extending over the entire surface used for cooking, or with a hood of the counter type using a high velocity ventilating slot extending the full length of the cooking surface.

Exception: Fraternity and Sorority Houses, private boarding places and similar uses or occupancies with a capacity of not more than fifty (50) persons and with kitchens and dining rooms designed to serve not more than 150 meals per day shall be exempt from the above requirement.

(b) **CONSTRUCTION AND PROJECTION.** Counter type hoods shall be provided with a shelf just above the high-velocity slot extending the full length of the cooking surface and extending over at least one-third ($\frac{1}{3}$) the width of such surface. A settling trough shall be provided for the collection and drainage of grease in the hood. A mechanical exhaust and approved noncombustible filters or other approved grease extracting device shall be provided for all counter type high velocity slot hoods of adequate capacity to remove the grease fumes. In no case shall less than 60 cfm/sq. ft. of hood area be exhausted for canopy hoods, nor less than 250 cfm/linear foot for slot type hoods. Duct velocity shall be at least 1,500 fpm.

Such hoods shall be constructed of sheet metal not lighter than No. 22 gage fastened to a rigid metal frame. All sides shall be enclosed to complete the required hood coverage. Hoods of the canopy type shall have the sides extended to within seven (7) feet of the floor. The shelves of the counter type shall not be more than thirty (30) inches above the cooking surface. All hoods shall be connected by a ventilating duct to a metal duct outside the building or to a Type A flue with a nonabsorbent interior surface. No such duct or flue shall be used for any other purpose than the range hood or hoods it serves.

The metal ventilating duct or ducts shall be constructed of (1) sheet steel four gauges heavier than those set forth in Table No. 51-A, (2) stainless steel of standard gauge requirements, or (3) approved equivalent and shall be of grease-tight construction. The interior of such ducts shall be completely unobstructed.

(c) **CLEARANCES.** All such range hoods and their ducts shall be installed to provide a clearance to combustible materials, whether plastered or unplastered, of not less than eighteen (18) inches. This required clearance may be reduced as set forth in Table No. 51-A for appliances under items (a) and (b) only.

Exceptions: 1. Zero clearances may be permitted at walls and partitions where combustible materials are covered with two (2) thicknesses of $\frac{1}{2}$ " plaster board or equal plus an approved one (1) inch thick metal pad filled with corrugated asbestos or the equivalent, and made of lock-jointed sheet metal tightly closed on all sides.

2. The same shall apply to combustible ceilings except that such metal pad shall be of two (2) inch thickness and shall extend 18" beyond the hood or duct.

No range hood duct shall pass through or up the outside of an exterior wall of combustible construction nor shall any such duct pass through any floor or ceiling or concealed space unless placed within a Type A chimney. Neither shall a range hood duct pass through any wall or partition separating tenants or occupancy groups. Where such ducts

pass through combustible partitions, clearances shall be provided as noted above in this subsection.

Exceptions: (1) A range hood duct may pass through a combustible roof construction provided it is enclosed within a two inch thick metal pad as described in this subsection and provided further that the joist depth does not exceed sixteen inches. Where joist depths exceed twelve inches the metal pad shall be increased to three inch thickness. Pads shall extend from eighteen inches below the underside of the roof to eighteen inches above the roof. Combustible surfaces shall first be covered with two layers of one-half inch gypsum wallboard or approved equivalent.

(2) Range hood ducts may pass through a suspended ceiling of non-combustible construction into a concealed space, provided that the floor or roof construction above such ceiling is also of noncombustible materials, and provided further that no steel requiring fire protection is exposed to such duct by penetration or that the aforementioned ceiling construction is required elsewhere in this Code as part of the fire-resistive value of the floor or roof construction so involved.

All such concealed horizontal ducts shall be provided with cleanouts at not more than ten feet intervals and at each angle. Access doors to cleanout openings shall be available from and exposed to the room space below. Approved means of detecting excessive grease accumulation shall be provided at these openings.

(3) Installations permitting range hood ducts to pass through one floor only may be made when the protection is equivalent to that provided by an approved Type A flue.

(d) **HEIGHT.** When supported on exterior walls, range hood ducts shall be securely fastened by approved means. All such ducts shall extend to a height to three feet above the roof of the building they serve and further shall extend to a height of three feet above the roof of any building within twelve feet of said duct; provided however, that this additional extension shall not be required where the occupancy or occupancies of such building areas nearer than twelve feet to the duct are so arranged that the duct fumes in no way become a nuisance. (Ord. 85500 § 5104; September 10, 1956).

3.51.050 Duct systems in buildings of group I and J occupancy. (a) **GENERAL.** The requirements of this section apply to air duct systems in Groups I and J occupancies.

(b) **CLASSIFICATION OF SYSTEMS.** (1) Low temperature systems are those using low pressure steam or hot water for air heating, and those using automatically fired warm air furnaces equipped with a fan to

circulate the air and with automatic temperature limit controls that cannot be set higher than two hundred and fifty degrees Fahrenheit.

(2) High temperature systems are any systems not conforming with the requirements for low temperature systems.

(c) WARM AIR SUPPLY DUCTS. (1) Such ducts shall be constructed entirely of noncombustible material equivalent in structural strength and durability to the following:

DUCTS NOT ENCLOSED IN PARTITIONS:

Diameter, Inches	ROUND DUCTS		
	Minimum Weight of Tin	Minimum Thickness Galv. Iron U.S. Gauge	Minimum Thickness Aluminum B&S Gauge
Less than 12	LC (107 lb.)	30	26
12 or more	IX (135 lb.)	28	26

RECTANGULAR DUCTS

Width Inches	Minimum Thickness Galv. Iron U.S. Gauge	Minimum Thickness Aluminum B&S Gauge
8 or less	30	28
More than 8, less than 14	28	26
14 or more	26	24

DUCTS ENCLOSED IN PARTITIONS:

Width Inches	Minimum Weight Tin	Minimum Thickness Galv. Iron U.S. Gauge	Minimum Thickness Aluminum B&S Gauge
14 or less	IC (107 lb.)	30	26
Over 14	IX (135 lb.)	28	26

NOTE: Tin shall not be used in areas subject to dampness.

(2) Linings used inside of ducts shall be fire-resistive. Joints and seams of such ducts shall be securely fastened and made substantially airtight. Slip joints in round ducts shall have a lap of at least one inch, and be securely fastened.

Such ducts shall be securely supported by metal hangers, straps, lugs, brackets, or other approved means. Means shall be provided for adjusting the volume of air supplied to each register.

(3) Portions of ducts which run in the open shall be separated from

combustible construction by one half inch gypsum wall board or equivalent within a distance from the near edge of the furnace or plenum of not less than ten feet. Such wall board or equivalent shall extend at least two inches beyond the edges of such ducts. Clearance of not less than two inches shall be considered the equivalent of one half inch gypsum wall board. Warm air plenums shall have a clearance from combustible construction of not less than six inches except that, when such combustible construction is protected by one half inch gypsum wall board or equivalent, such clearance may be reduced to four inches, and except that when such combustible construction is protected by a pad of one inch air cell asbestos covered with twenty-eight gauge galvanized steel or equivalent, such clearance may be reduced to one inch.

For the purpose of this section, a furnace plenum is any sheet metal chamber attached directly to a furnace air outlet or inlet and extending vertically within the perimeter of such outlet or inlet or, in the case of horizontal furnaces, sheet metal air chambers within three feet of such outlet or inlet.

(4) Where such ducts pass through closets they shall be covered with not less than one quarter inch air cell asbestos or its equivalent in approved fire resistive insulating covering, properly protected against injury.

Where the installation of such ducts in walls, floors or partitions requires the removal of any fire-stopping, the spaces around the duct at such points where fire-stopping was required shall be tightly filled with asbestos, mineral wool or other noncombustible insulating material.

(5) Where such ducts enter a floor, partition or enclosure of combustible construction within a horizontal distance of six feet from the furnace, they shall be separated from the combustible construction by at least five sixteenths inch for a distance of six feet from the primary heating surface of the furnace. This space at the point where it enters the floor or partition shall be tightly filled with asbestos cement or other noncombustible insulating material.

(6) Insulation shall be of noncombustible materials.

(d) WARM AIR HEATING PANELS. A warm air heating panel is a chamber through which heated air is circulated and of which one or more surfaces are exposed to the space or spaces to be heated.

Warm air heating panels shall be used with low temperature systems only.

Warm air heating panels shall be connected to supply ducts conforming to subsection (c) and to return air ducts conforming to subsection (f).

Where warm air supply is from a warm air furnace, warm air heating panels shall be enclosed with material which is wholly non-combustible or which possesses a flame spread classification of not over twenty, as determined by the "Tunnel" test. (See Chapter 3.42). This enclosing material

shall be securely attached to the building structure; joints and seams shall be substantially air-tight. Braces and hangers inside the chamber shall be noncombustible: Interior linings if used, shall be fire-resistive.

Where warm air supply is from low pressure steam or hot water heat exchangers, warm air heating panels shall either comply with the paragraph above or shall be enclosed with materials not more flammable than one-inch wood boards. This enclosing material shall be securely attached to the building structure; joints and seams shall be substantially air-tight. No single vertical warm air heating panel shall serve more than one story.

(e) COLD OR RETURN AIR DUCTS. Such ducts, except as required below, may be constructed of metal, of one inch (nominal) wood boards, or other suitable material, provided that no material more flammable than one inch wood boards shall be used.

Wood joists shall not be panned within two feet of furnace return plenums.

Where such ducts are installed in walls, floors or partitions their installation shall comply with the provisions of subsection (c) regarding fire-stopping.

Where spaces between studs in walls or partitions or spaces between joists in floors are used as ducts, the portions of such spaces so used shall be cut off from all remaining unused portions by tight fitting stops of sheet metal or of wood of not less than two inches nominal thickness.

The interior of combustible ducts shall be lined with noncombustible material at points where there might be danger from incandescent particles dropped through the register or heater, such as directly under floor registers and the bottom of vertical ducts or directly under heaters having a bottom return.

No vertical stack shall have openings to receive return air on more than one floor.

Except as provided in (1) and (2) below, return air shall be conducted to the heater through continuous ducts and air shall not be recirculated from any underfloor space or from any basement space not used for living quarters. Furnace rooms other than those which are used exclusively for heating equipment of the noncombustion type (such as electric, indirect hot water or steam, and heat pumps), shall not be a part of the return system.

(1) Underfloor spaces (other than basements) may be used as ducts for return air from rooms directly above provided such spaces are adequately drained, are not used for storage, are cleaned of all combustible material, and are tightly and substantially enclosed. Such underfloor spaces shall be covered with concrete not less than one and one half inches thick, or other approved materials.

(2) The system shall be arranged so that negative pressure from the circulating fan cannot affect the air supply for combustion or act to draw products of combustion from joints or openings in the furnace or flue.

(f) **BURIED DUCTS.** All buried ductwork shall be adequately protected from ground moisture. Ductwork of concrete, clay tile, or other approved materials of equivalent durability may be laid directly on the ground. Ductwork of metal or other approved equivalent shall be entirely surrounded by concrete to a thickness of not less than one inch.

Buried metal ductwork shall be of gauges not lighter than required for above ground ducts and of the same joint and seam construction as for above ground ducts.

Panels of metal ducts and plenums shall be stiffened and braced to prevent bowing or sagging.

Openings into slabs for duct connections or grilles shall be protected with plugs or caps in place during placing of concrete.

(g) **AIR FILTERS.** Air filters shall be of a type that will not burn freely or emit large volume of smoke or other objectionable products of combustion when attacked by flames. Where filters are exposed to direct radiation from heating surfaces, they shall be noncombustible.

Liquid adhesive coatings used on filters shall have a flashpoint of three hundred and fifty degrees Fahrenheit, Cleveland open cup tester, or higher.

(h) **ELECTRIC WIRING AND EQUIPMENT.** See Seattle Electrical Code. (Title 4). (Ord. 85500 § 5105 as amended by Ord. 101821 § 1; February 5, 1973).

3.51.060 Forced warm air furnaces. (a) **SCOPE.** The requirements of this section shall apply to furnaces using oil as a heat source. Gas furnaces are regulated under Chapter 3.54. Furnaces using solid fuels are regulated by the Warm Air Furnace Ordinance Chapter 3.78.

(b) **DEFINITIONS.** Terms used in this section shall be defined as follows:

1. **Warm-Air Furnace:** A device designed to supply heat with air as the heating medium, and in which the heat is communicated to the air by direct conduction from the fire through heat exchange surfaces. Such a furnace is equipped with a fan or blower to maintain a flow of air through the furnace and duct system.

2. **Heat Exchanger:** The combustion chamber and any auxiliary heat transfer surfaces surrounded by the casing.

3. **Combustion Chamber:** That enclosure in which fuel or gaseous derivatives of fuels are burned.

4. **Radiator:** An additional enclosure within the casing, connected between the combustion chamber and the flue to form auxiliary heat transfer surface.

5. **Fire Box Liner:** That metal or ceramic material installed near the bottom of the combustion chamber to protect it from the heat and chemical action of the primary combustion.

6. **Casing:** The envelope which encloses and forms a passage around the heat exchanger for the stream of air being heated and has openings to receive air from the return ducts or from the heated space and to deliver warmed air to the supply ducts connected to it.

7. **Bonnet:** That part of the casing which forms a plenum chamber from which the supply ducts receive warmed air.

8. **Air Delivery (CFM):** The quantity in cubic feet of air per minute corrected to standard conditions, which passes through the furnace unit and is delivered at the bonnet.

9. **Flue-Gas Temperature (T3):** The average temperature in degrees Fahrenheit of the flue gases measured at the flue outlet of the furnace and before any draft controlling device.

10. **Room Temperature (T4):** The average temperature of the air surrounding the furnace, taken with a shielded thermometer three and one half feet above the floor and not subject to drafts.

11. **Oil Input:** The rate at which oil is supplied to the furnace in gallons per hour.

12. **Heat Input:** The total gross heating value of the oil supplied to the furnace, expressed in Btu/hr.

13. **Bonnet Capacity:** The heat delivered at the bonnet of the furnace, expressed in Btu/hr.

14. **Gross Output:** The heat, expressed in Btu/hr., available for space heating, including the heat transfer through the casing, plenum chamber, and exposed stack. The gross output is equal to the heat input minus the flue gas losses, expressed in Btu/hr.

(c) **FURNACE DESIGN AND CONSTRUCTION.** 1. The general construction of a forced warm-air furnace shall be such that all parts are well fitted and that it will not show signs of becoming warped, bent, broken or otherwise damaged during the initial test or installation so as to prevent its compliance with any of these requirements; and whether specifically covered by the various provisions of these requirements or not, shall be in accordance with reasonable concepts of safety, substantiality and durability.

2. Every part of the furnace shall be secure against displacement and

must be constructed so as to maintain a fixed relationship between essential parts under normal and reasonable conditions of handling and usage to assure continued compliance with these requirements.

3. All furnaces shall be of such construction that no part of the products of combustion will become mixed with the warm air discharge by the appliance.

4. The outer casing, or jacket, shall be constructed of steel or other suitable material and of such design that it is not readily damaged or dented in shipment or use.

5. The heating surfaces shall be constructed of mild steel, cast iron, or other approved material. If of steel, the thickness shall be not less than 16-gage for the primary, nor 18-gage for secondary surfaces. Hearth, flame ring, fire box liner or other parts exposed to the burner flame shall be made of special materials capable of withstanding the temperature and chemical action encountered.

6. Doors or equivalent means shall be provided for permitting access to the combustion chamber, hearth or flame ring, the burner, and interior surfaces as required for cleaning and servicing.

7. The casing shall be protected as necessary by baffles, inner liner or insulated materials installed inside to shield it from the heat exchanger.

8. All electrical parts, including electric controls and motors, shall meet the requirements of the Electrical Code. (Title 4).

9. Means shall be provided for lubricating motor and blower or fan bearings, and where lubricant must be added, such means shall be readily accessible. The removal of screws in access panels shall be considered acceptable under this provision. Motor, blower or fan may employ permanently lubricated bearings of proven design.

10. Instructions for lubrication of motor and blower or fan bearing shall be permanently affixed to or imprinted upon the fan or blower housing or on surfaces adjacent to the means of access. Instructions shall designate the proper type and grade of lubricants to be used.

11. Bearings of motors, blowers or fans shall be of a type suitable for the temperature to which subjected in normal operation.

12. On belt driven blowers or fans, means for adjusting belt tension shall be provided and shall be readily accessible as defined in subsection (c) 9.

13. Filters shall be so located that the temperature of any portion of the filter does not exceed 90° F. above inlet air temperature under conditions of normal operation.

14. Furnaces shall be provided with an air temperature limit control of the automatic reset type having a fixed stop at a maximum setting not

to exceed 250° F. If an additional limit control is supplied, it may be of the manual reset type.

(d) PERFORMANCE. 1. The furnace shall be capable of delivering heat at the Btuh output claimed by the manufacturer and as determined by the Superintendent of Buildings, in accordance with the standards of nationally recognized agencies, such as Underwriters' Laboratories, Inc. and National Warm Air Heating and Air Conditioning Assn., or said Superintendent may require evidence that the furnace heating capacity is developed at an output of not more than 3,000 Btuh per square foot of furnace heating surface and a stack temperature not exceeding 700° Fahrenheit.

2. The temperature of the furnace heating surfaces shall not exceed 930° F. above inlet air temperature at full capacity except that this temperature may be exceeded when special materials are used for which higher operating temperatures can be justified.

(e) LABELING. Each furnace shall bear a conspicuous permanent rust-proof label on which shall appear the following:

1. The manufacturer's or distributor's name.
2. The bonnet capacity in BTU per hour.
3. Firing rate in gallons per hour.

(f) INSTALLATION REQUIREMENTS AND PERFORMANCE TESTS. The furnace shall be of adequate size for the connected heating load and both furnace and burner shall be installed according to manufacturer's instructions. (Ord. 85500 § 5106; Sept. 10, 1956).

TABLE No. 51-A—RECTANGULAR DUCT CONSTRUCTION

Aluminum B&S Gage	Steel, U. S. Standard Gage	Max. Side, Inches	Type Of Transverse Joint Construction	Bracing
24	26	Up thru 12	S & Drives on 9'-11" Centers	None
22	24	13 thru 24	S & Drives on 9'-11" Centers	None
22	24	25 thru 30	1" Standing seam panel construction 3'-7½" O.C. with 1" pocket slip on each end. If min. side is not over 18" wide, bar slip may be used on max. side with drives on min. side.	None If standing seams are not over 3'-7½" O.C.
20	22	31 thru 40	1" standing seam panel construction 3'-7½" O.C. with 1" pocket slip on each end. If min. side is not over 18" wide, bar slip may be used on max. side with drives on min. side.	None If standing seams are not over 3'-7½" O.C.
20	22	41 thru 60	1½" standing seams (panel construction) 1½ pocket slip each end.	None If standing seams are not over 3'-7½" O.C.
18	20	61 thru 90	1½" standing seams (panel construction) 3'-7½" O.C. 1½ pocket slips each end.	1½ x 1½ x ¼ angles 2'-0" from joint
16	18	91 and Up	1½" standing seams (panel construction) 3'-7½" O.C. 1½ pocket slips on each end.	1½ x 1½ x ¼ angles at joint and 2'-0" from joint

i. For normal pressures and velocities utilized in typical ventilating and air conditioning systems. Where special rigidity or stiffness is required, ducts shall be constructed of metal two gages heavier. All uninsulated ducts 12 in. and larger shall be cross-broken. Supply ducts shall be cross-broken outwardly, exhaust ducts, inwardly. Cross-breaking may be omitted on uninsulated ducts if metal of two gages heavier is used. Acoustically lined ducts need not be cross-broken.

ii. Other joint connections of equivalent mechanical strength and air tightness may be used.

iii. Duct sections of 3 ft. 9 in. may be used with bracing angles omitted, instead of 7 ft. 10 in. lengths with joints indicated.

Chapter 3.52**HOT WATER AND STEAM HEATING,
BOILERS AND PRESSURE VESSELS****Sections:**

- 3.52.100 Scope.
- 3.52.110 Definitions.
- 3.52.120 Permit required.
- 3.52.130 Detailed requirements.
- 3.52.140 Combustion regulators; safety valves.
- 3.52.150 Automatic boilers.
- 3.52.160 Inspections and tests.
- 3.52.170 Operating permit.
- 3.52.180 Maintenance inspection.
- 3.52.190 Operation and maintenance of boilers and pressure vessels.
- 3.52.200 Monitoring systems for automatic boilers.
- 3.52.210 Monitoring system functions.
- 3.52.220 Approval of monitoring systems.
- 3.52.230 Design and installation of monitoring.
- 3.52.240 Monitoring station building.
- 3.52.250 Monitoring station facilities.
- 3.52.260 Operations and tests.
- 3.52.270 Signals and reports.
- 3.52.280 Monitoring system permit.

3.52.100 Scope. The requirements of this chapter shall apply to the construction, installation, operation, repair and alteration of all boilers and pressure vessels.

Exceptions: 1. The operation only of low pressure steam heating boilers, low pressure hot water heating boilers, hot water supply boilers and pressure vessels in Group H occupancies of less than six (6) units and in Groups I and J occupancies.

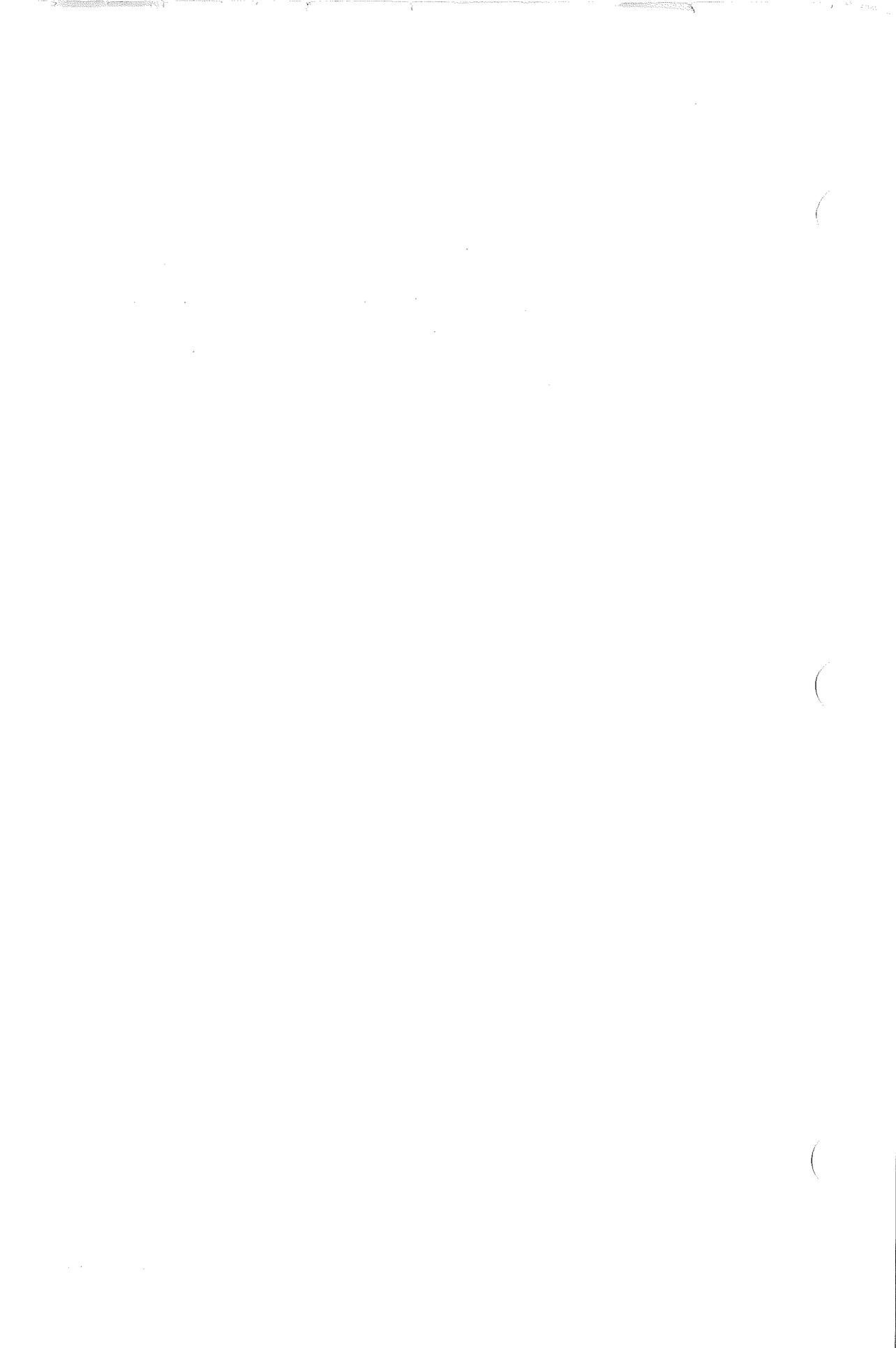
2. Pressure vessels (hot water tanks) with a nominal water containing capacity of one hundred twenty (120) gallons or less having a heat input of 200,000 B.T.U. per hour or less used for hot water supply at pressures of one hundred sixty (160) pounds per square inch or less and at temperatures of two hundred degrees Fahrenheit (200°F.) or less.

3. Pressure vessels used for unheated water supply, including those containing air which serves only as a cushion and is compressed by the introduction of water and tanks connected to sprinkler systems.

4. Portable unfired pressure vessels and I.C.C. containers.

5. Containers for liquefied petroleum gases, bulk oxygen and medical gas, which are regulated by the Fire Code.

6. Unfired pressure vessels in Groups E, F, G, H, I and J occupancies having a volume of five (5) cubic feet or less and operated at pressures not exceeding two hundred fifty (250) pounds per square inch.
7. Pressure vessels used in refrigeration systems which are regulated by the Refrigeration Code.
8. Pressure tanks used in conjunction with coaxial cables, telephone cables, power cables and other similar humidity control systems.



9. Any boiler or pressure vessel subject to regular inspection by Federal Inspectors or licensed by Federal authorities.
(Ord. 85500 § 5210, added by Ord. 93462; December 28, 1964).

3.52.110 Definitions. Certain words and terms used in this chapter, unless clearly inconsistent with their context, shall mean as follows:

AUTOMATIC BOILER: When applied to any class of boiler defined below, such boiler shall be equipped with certain controls and limit devices as specified in Section 3.52.150 (Table 52-A).

BOILER: A closed vessel used for heating water or liquid, or for generating steam or vapor by direct application of heat from combustible fuels or electricity.

CONTINUOUS PILOT: A pilot that burns without turn down throughout the entire period that the boiler is in service, whether or not the main burner is firing.

HOT WATER SUPPLY BOILER: A boiler having volume exceeding one hundred twenty (120) gallons, or a heat input exceeding 200,000 B.T.U. per hour or an operating temperature exceeding two hundred degrees Fahrenheit (200°F.), that provides hot water to be used externally to itself.

INTERLOCK: A device which senses a limit or off-limit condition or improper sequence of events and shuts down the offending or related piece of equipment or prevents proceeding in an improper sequence in order to prevent a hazardous condition developing.

INTERMITTENT PILOT: A pilot which burns during light-off and while the main burner is firing, and which is shut off with the main burner.

INTERRUPTED PILOT: A pilot which burns during light-off and which is shut off during normal operation of the main burner.

LOW PRESSURE HOT WATER HEATING BOILER: A boiler in which water is heated for the purpose of supplying heat at pressures not exceeding one hundred sixty (160) pounds per square inch and temperatures not exceeding two hundred fifty degrees Fahrenheit (250°F.).

LOW PRESSURE STEAM HEATING BOILER: A boiler operated at pressures not exceeding fifteen (15) pounds per square inch for steam.

MINIATURE BOILER: A boiler having an internal shell diameter of sixteen (16) inches or less and a gross volume of five (5) cubic feet or less for steam or vapor under pressures exceeding fifteen (15) pounds per square inch and not exceeding one hundred (100) pounds per square inch.

PACKAGE BOILER: May be any class of boiler defined herein and shall be a boiler equipped and shipped complete with fuel burning equipment, automatic controls and accessories, and mechanical draft equipment, if used.

PILOT: A burner smaller than the main burner, which is ignited by a spark or other independent and stable ignition source, and which provides ignition energy required to immediately light off the main burner.

POWER BOILER PLANT: One (1) or more power steam boilers or power hot water boilers and connecting piping and vessels within the same premises.

POWER HOT WATER BOILER (HIGH TEMPERATURE WATER BOILER): A boiler used for heating water or liquid to a pressure exceeding one hundred sixty (160) pounds per square inch or to a temperature exceeding two hundred fifty degrees Fahrenheit (250°F.).

POWER STEAM BOILER: A boiler in which steam or other vapor is generated at pressures exceeding fifteen (15) pounds per square inch.

PRESSURE VESSEL: A closed container, having a nominal internal diameter exceeding six (6) inches and a volume exceeding one and one-half (1½) cubic feet, for liquids, gases or vapors subjected to pressures exceeding fifteen (15) pounds per square inch or steam under any pressure.

PURGE: Acceptable method of scavenging the combustion chamber, boiler passes and breeching to remove all combustible gases.

SMALL POWER BOILER: A boiler with pressure exceeding fifteen (15) pounds per square inch but not exceeding one hundred (100) pounds per square inch and having less than 350,000 B.T.U. per hour heat output. (Ord. 85500 § 5211, added by Ord. 93462; December 29, 1964).

3.52.120 Permit required. (a) It shall be unlawful to install, alter or repair any boiler or pressure vessel without first obtaining a permit to do so from the Superintendent of Buildings.

Exception: Repairs not affecting the strength of a boiler or pressure vessel may be made without a permit.

(b) It shall be unlawful to convert an existing boiler to an automatic boiler, in accordance with Section 3.52.150, or to alter the control system on an automatic boiler without first obtaining a permit to do so from the Superintendent of Buildings.

(c) Each application for a permit shall be accompanied by two (2) sets of plans and specifications as determined necessary by the Superintendent of Buildings to describe adequately the proposed installation. (Ord. 85500 § 5212, added by Ord. 93462; December 28, 1964).

3.52.130 Detailed requirements. (a) **SAFETY REQUIREMENTS.** All boilers and pressure vessels, and the installation thereof, shall conform to minimum requirements for safety from structural and mechanical failure and excessive pressures, established by the Superintendent of Buildings in accordance with nationally recognized standards such as the A.S.M.E. Boiler and Pressure Vessel Code.

(b) **CONTROLS.** Required electrical, mechanical, safety and operating controls shall carry approval of an approved testing agency, such as Underwriters' Laboratories, Inc., Factory Mutual Laboratories, or American Gas Association. Electrical controls shall be of such design and construction as to be suitable for installation in the environment in which they are located.

(c) **GAUGES.** All steam boilers shall be provided with a pressure gauge and a water gauge glass. All water boilers shall be provided with a pressure gauge and a temperature indicator. (See Section 5215 for gauges on automatic boilers.)

(d) **STACK DAMPERS.** Stack dampers on boilers fired with oil or solid fuel shall not close off more than eighty per cent (80%) of the stack area when closed, except on automatic boilers with pre-purge, automatic draft control and interlock. Operative dampers shall not be placed within any stack, flue or vent of a gas-fired boiler, except on an automatic boiler with pre-purge, automatic draft control and interlock.

(e) **WELDING.** Welding and pressure vessels shall be done by approved welders in conformity with nationally recognized standards such as the A.S.M.E. Boiler and Pressure Vessel Code. All such welding shall be subject to the approval of the Superintendent of Buildings.

(f) **EXPANSION TANKS.** Every expansion tank shall be so located or protected that the water in the tank or connecting piping will not freeze in normal winter conditions and shall be adequately supported in such manner that no portion of the tank will be supported by the piping connected thereto.

1. (Open systems). Every open hot water heating system shall be provided with at least one (1) expansion tank placed at a sufficient elevation above the highest radiator to prevent boiling when the water in that radiator is at the highest temperature to which it is to be heated. Each such tank shall be connected to the system by a pipe of not less than three-quarter ($\frac{3}{4}$) inch internal diameter and shall be provided with an overflow pipe of at least the same diameter running into an open receptacle or other suitable drain within the building, and another overflow or vent line discharging to the atmosphere.

2. (Closed systems). Every closed hot water heating system shall be provided with an expansion tank of approved capacity and provision shall be made for draining such tank without emptying the system.

(f) **BOILER FOUNDATION.** Every boiler shall be supported on an approved foundation.

(g) **DRAINAGE.** The boiler room shall have an approved floor drain or equivalent means for disposing of accumulation of liquid wastes incident to cleaning or recharging.

(g) **SAFETY OR RELIEF VALVE DISCHARGE.** The discharge from relief valves shall be piped to within eighteen (18) inches of the floor or to an open receptacle, and when the operating temperature is in excess of two hundred twelve degrees Fahrenheit (212°F.), shall be equipped with a splash shield or centrifugal separator. When the discharge from safety valves would result in a hazardous discharge of steam inside the boiler room, such discharge shall be extended outside the boiler room.

(h) **CLEARANCE FOR ACCESS.** 1. When boilers are installed or replaced, clearance shall be provided to allow access for inspection, maintenance and repair, and passageways shall have an unobstructed width of eighteen (18) inches. Clearance for repair and cleaning may be provided through a door or access panel into another area, provided the opening is of sufficient size.

2. Power boilers having a steam generating capacity in excess of five thousand (5,000) pounds per hour or having a heating surface in excess of one thousand (1,000) square feet or input in excess of 5,000,000 B.T.U. per hour shall have a minimum clearance of seven (7) feet from the top of the boiler to the ceiling.

3. Low pressure heating boilers and hot water supply boilers which exceed any one of the following limits: 5,000,000 B.T.U. per hour input; 5,000 pounds steam per hour capacity or 1,000 square feet heating surface; and power boilers which do not exceed any of the following limits: 5,000,000 B.T.U. per hour input; 5,000 pounds steam per hour capacity or 1,000 square feet heating surface; and all boilers with manholes on top of the boiler, except those described in paragraphs 2 and 4 shall have a minimum clearance of three (3) feet from the top of the boiler to the ceiling.

4. Package boilers, miniature boilers, low pressure heating boilers and hot water supply boilers with no manhole on top of shell and not exceeding any of the above limits shall have a minimum clearance of two (2) feet from the ceiling.

(i) **AIR FOR COMBUSTION AND VENTILATION.** Air for combustion and ventilation shall be in accordance with Section 3.50.050.

(j) **SHUTOFF VALVES.** An approved manual shut off valve shall be installed upstream of all control devices on the main burner of a gas-fired boiler. The take-off point for the gas supply to the pilot shall be upstream of the gas shutoff valve of the main burner and shall be valved

separately. A union or other approved means of disconnect shall be provided immediately downstream of these shutoff valves.

(k) **GAS PRESSURE REGULATORS.** An approved gas pressure regulator shall be installed on gas-fired boilers where the gas supply pressure is higher than that at which the main burner is designed to operate. A separate approved gas pressure regulator shall be installed to regulate the gas pressure to the pilot or pilots. A separate regulator shall not be required for the pilot or pilots on manufacturer assembled boiler-burner units which have been approved by an approved testing agency as complying with the applicable standards of the American Standards Association and on gas-fired boilers in Group H occupancies of less than six (6) units and in Groups I and J occupancies.

(l) **LOW WATER CUTOFF.** Every hot water heating boiler, other than manually fired, shall be equipped with a low water cutoff or flow switch mounted so as to prevent damage to the boiler and to permit testing of the cutoff without draining the heating system, except that such boilers used in Group H occupancies of less than six (6) units and Groups I and J occupancies need not be equipped with the low water cutoff or flow switch. (Ord. 85500 § 5213, added by Ord. 93462 and amended by Ord. 95265; November 10, 1966).

3.52.140 Combustion regulators; safety valves. The following requirements shall be retroactive:

(a) Every hot water heating boiler, other than manually fired, shall be equipped with two (2) temperature combustion regulators in series. Every steam heating boiler, other than manually fired, shall be equipped with a pressure combustion regulator and a low water cutoff. (See Sections 3.52.150 and 3.53.130)

(b) Every boiler and pressure vessel shall be provided with a safety or relief valve to insure positive relief of any pressure over the pressure rating of the system. Each such valve shall be placed on the boiler side of all other valves and accessories and shall be mounted vertically on top of the boiler shell, where possible, and shall be of sufficient capacity to relieve the B.T.U. energy that can be supplied to the boiler, or as otherwise approved by the Superintendent of Buildings. Valves so employed shall be of such nature and so constructed and arranged as to permit their being tested manually to determine their operating condition. (Ord. 85500 § 5214, added by Ord. 93462; December 28, 1964).

3.52.150 Automatic boilers. (a) Automatic boilers shall be equipped with controls and limit devices as set forth in Table 52-A.

Automatic boilers shall also be equipped with the following gauges, as applicable: Oil temperature, oil suction pressure, high and low gas pressure, stack temperature and windbox pressure.

(b) Except as otherwise specified, gas-fired boilers exceeding four hundred thousand B.T.U. per hour input shall conform to American Standard Requirements for Installation of Gas Equipment in Large Boilers, Z21.33-1950 (C.F. No. 251967).

(c) Solid fuel-fired boilers are not normally considered to be automatic, however, if such an installation is proposed and can meet the safety requirements for an automatic gas or oil-fired boiler, the Superintendent of Buildings may approve such installation.

Table 52-A CONTROLS AND LIMIT DEVICES FOR AUTOMATIC BOILERS

BOILER GROUP	FUEL	FUEL INPUT RANGE (Inclusive)	IGNITION ¹ CYCLE	SAFETY CONTROL TIMING (Nominal Maximum Time in Seconds)				Assured ³ Fuel Supply Control	Assured ⁴ Air Supply Control	Low Fire ⁵ Start Up Control	Pre-Purging ⁶ Control	Hot Water ⁷ Temperature and Low Water Limit Controls	Steam Pressure ⁸ and Low Water Limit Controls	Approved ⁹ Fuel Shut Off	Control and Limit Device System Design ¹⁰
				TRIAL FOR PILOT	TRIAL FOR MAIN BURNER FLAME		Main Burner ² Flame Failure								
					Direct Electric Ignition	Pilot Flame									
A	Gas	0 - 400,000 BTU/Hr.	Any type pilot	None	None	90	90	None	Required	None	None	Required	Required	None	Required
B	Gas	400,001 - 2,500,000 BTU/Hr.	Interrupted or intermittent type pilot	60	None	30	2 - 4	None	Required	None	None	Required	Required	None	Required
C	Gas	2,500,001 - 5,000,000 BTU/Hr.	Interrupted or intermittent type pilot	60	None	30	2 - 4	Required	Required	Required	Required	Required	Required	Required	Required
D	Gas	Over 5,000,000 BTU/Hr.	Interrupted or intermittent type pilot	60	None	15	2 - 4	Required	Required	Required	Required	Required	Required	Required	Required
E	Oil (All Grades)	0 - 400,000 BTU/Hr.	Any type pilot	None	90	90	90	None	Required	None	None	Required	Required	None	Required
F	Oil (All Grades)	400,001 - 2,500,000 BTU/Hr.	Interrupted or intermittent type pilot	60	10	60	2 - 4	Required	Required	None	None	Required	Required	None	Required
G	Oil PS-100-PS-200 (Grades 1 & 2)	2,500,001 - 5,000,000 BTU/Hr.	Interrupted or intermittent type pilot	60	10	60	2 - 4	None	Required	Required	Required	Required	Required	Required	Required
H	Oil PS-300-400-Bunker (Grades 4, 5 & 6)	2,500,001 - 5,000,000 BTU/Hr.	Interrupted or intermittent type pilot	60	None	60	2 - 4	Required	Required	Required	Required	Required	Required	Required	Required
J	Oil (All Grades)	Over 5,000,000 BTU/Hr.	Interrupted or intermittent type pilot	60	10	60	2 - 4	Required	Required	Required	Required	Required	Required	Required	Required
K	Electric	All	None	None	None	None	None	None	None	None	None	Required	Required	None	Required

Notes to Table 52-A

- Automatic boilers shall have one flame failure device on each burner which, except for burners with direct electric ignition using fuel oil types PS-100 and PS-200, Grades 1 and 2, shall prove the presence of a suitable ignition source at a point where it will reliably ignite the main burner flame. With intermittent pilot the combustion safeguard control system shall monitor only the main flame after the prescribed limited trial and ignition period.
- In groups B, C and D a ninety second main burner flame failure limit may apply if continuous pilots are provided on manufacturer assembled boiler-burner units which have been approved by an approved testing agency as complying with the applicable standards of the American Standards Association.
- Automatic boilers exceeding two million five hundred thousand B.T.U. per hour input shall have controls interlocked to accomplish a non-recycling shut off of the fuel supply in the event of high or low gas pressure or low oil temperature if preheated oil system is used and/or in the vent of low atomizing steam or air pressure if steam or air atomizing burners are used.
- Automatic boilers shall have controls interlocked to shut off the fuel supply in the event of draft failure if forced or induced draft fans are used or in the event of low combustion air flow if a gas power burner is used. Where a single motor directly driving both the fan and the oil pump is used, a separate control is not required.
- Automatic boilers fired with gas or fuel oil types PS-100 and PS-200, Grades 1 and 2, exceeding two million five hundred thousand B.T.U. per hour input or PS-300 and PS-400, Grades 4, 5, 6 and bunker, exceeding five million B.T.U. per hour input shall be

provided with low fire start of its main burner system to permit smooth light off. This will normally be at a rate of approximately thirty-three and one-third percent of its maximum firing rate.

- Automatic boilers fired with gas or fuel oil types PS-100 and PS-200, Grades 1 and 2, exceeding two million five hundred thousand B.T.U. per hour input or PS-300 and PS-400, Grades 4, 5, 6 and bunker, exceeding five million B.T.U. per hour input shall not permit pilot or main burner trial for ignition operation before a purging operation of sufficient duration to permit a minimum of four complete air changes through the furnace, including combustion chamber and the boiler passes. Where this is not readily determinable, five complete air changes of the furnace, including combustion chamber up to the first pass, will be considered equivalent. An atmospheric gas burner with no mechanical means of creating air movement or an oil burner which obtains two-thirds or more of the air required for combustion without mechanical means of creating air movement shall not require purge by means of four air changes so long as its secondary air openings are not provided with means of closing. If such burners have means of closing secondary air openings, a time delay must be provided which puts these closures in a normally open position for four minutes before an attempt for ignition. An installation with a trapped combustion chamber shall in every case be provided with a mechanical means of creating air movement for purging.
- Every automatic hot water supply boiler, low pressure hot water heating boiler, and power hot water boiler shall be equipped with two high temperature limit controls with a manual reset on the control with the higher setting interlocked to shut off the main fuel supply except that manual reset on the high temperature limit

control shall not be required on any automatic package boiler not exceeding four hundred thousand B.T.U. per hour input and which has been approved by an approved testing agency. Every automatic hot water heating and power boiler shall be equipped with one low water level limit control with a manual reset interlocked to shut off the fuel supply so installed as to prevent damage to the boiler and to permit testing of the control without draining the heating system except on boilers used in Group H occupancies of less than six units and in Groups I and J occupancies. However, a low water flow limit control installed in the circulating water line may be used instead of the low water level limit control for the same purpose on coil type boilers.

- Every automatic low pressure steam heating boiler, small power boiler and power steam boiler shall be equipped with two high steam pressure limit controls interlocked to shut off the fuel supply to the main burner with manual reset on the control with the higher setting, and two low water level limit controls one of which shall be provided with a manual reset device and independent of the feed water controller. Coil type flash steam boilers may use two high temperature limit controls, one of which shall be manually reset, in the hot water coil section of the boiler instead of the low water level limit control.
- Automatic boilers fired with gas or fuel oil types PS-100 and PS-200, Grades 1 and 2, exceeding two million five hundred thousand B.T.U. per hour input or PS-300 and PS-400, Grades 4, 5, 6 and bunker, exceeding five million B.T.U. per hour input shall use an approved automatic reset safety shutoff valve for the main burner fuel shutoff which shall be interlocked to the programming control devices required. On oil burners, where the safety shutoff

valve will be subjected to pressures in excess of ten psi when the burner is not operating, a second safety shutoff valve shall be provided in series with the first. Gas-fired boilers exceeding two million five hundred thousand B.T.U. per hour input using gas in excess of one pound per square inch pressure or having a trapped combustion chamber or employing horizontal fire tubes shall be equipped with two approved safety shutoff valves, one of which shall be an automatic reset type, one of which may be used as an operating control, and both of which shall be interlocked to the limit control devices required. Gas-fired boilers exceeding two million five hundred thousand B.T.U. per hour input using gas in excess of one pound per square inch pressure shall be provided with a permanent and ready means for making periodic tightness checks of the main fuel safety shutoff valves.

10. Control and limit device system voltage shall not exceed one hundred fifty volts to ground and one side of the system shall be grounded. Control and limit devices shall interrupt the ungrounded side of the circuit. A readily accessible means of manually disconnecting the control circuit shall be provided with controls so arranged that when they are de-energized the burner shall be inoperative.
11. Fuel input shall be determined by one of the following:
 - (a) The maximum burner input as shown on the burner nameplate or as otherwise identified by the manufacturer.
 - (b) The nominal boiler rating, as determined by ASME rules, plus twenty-five per cent.
 - (c) A permanently affixed meter to indicate fuel consumption, timed to determine the rate of fuel input.

(Ord. 85500 § 5215 added by Ord. 93462 and amended by Ord. 95265 and Ord. 96247; November 16, 1967).

3.52.160 Inspections and tests. Any installation for which a permit is required shall not be put into service until it has been inspected and approved by the superintendent of buildings.

It shall be the duty of the owner or his authorized representative to notify the superintendent of buildings that the installation is ready for inspection and test. It shall also be the duty of the owner or his authorized representative to post in a conspicuous position on the installation a notice in substantially the following form: "Warning! This installation has not been inspected and approved by the superintendent of buildings and shall not be covered or concealed until so inspected and approved", and it shall be unlawful for anyone other than the superintendent of buildings to remove such notice. The superintendent of buildings shall require such tests as he deems necessary to determine that the installation complies with the provisions of this code. Such tests shall be made by the owner or his authorized representative in the presence of the superintendent of buildings.

Exception: On installations designed and supervised by a registered professional engineer, the superintendent of buildings may permit inspection and testing by such engineer in lieu of the above requirements.

When the owner or his authorized representative requests inspection of a boiler prior to its installation, the superintendent of buildings shall make such inspection. (Ord. 85500 § 5216, added by Ord. 93462; December 28, 1964).

3.52.170 Operating permit. It is unlawful to operate any boiler or pressure vessel (See Section 3.52.100) without first obtaining a valid operating permit to do so from the superintendent of buildings. Such permit shall be displayed in a conspicuous place adjacent to boiler or vessel. The operating permit shall not be issued until the equipment has been inspected and approved by the superintendent of buildings.

A copy of the approved wiring diagram for an automatic boiler installation shall also be permanently and prominently displayed, under protective covering, in the boiler room. Such diagram shall include the coding of the actual wiring by color or by number to permit a ready check of the system. (Ord. 85500 § 5217 added by Ord. 93462 and amended by Ord. 96247; November 16, 1967).

3.52.180 Maintenance inspection. The superintendent of buildings shall inspect all boilers and pressure vessels operated under permit at such intervals as he deems necessary but in no event less frequently than noted below:

1. Power boilers and miniature boilers shall be inspected externally annually. Where construction and operating conditions permit, they shall in addition be subject to inspection internally annually.

2. Low pressure heating boilers and hot water supply boilers shall be inspected externally annually. Where construction and operating conditions permit, they shall in addition be subject to inspection internally annually.

3. Automatic low pressure heating boilers shall be inspected externally biennially. Where construction and operating conditions permit, they shall in addition be subject to inspection internally biennially.

4. Unfired pressure vessels shall be inspected externally biennially. Where subject to corrosion and construction permits, they shall in addition be subject to inspection internally biennially.

Inspection of boilers and pressure vessels covered by insurance may be made by employees of the insuring company holding commissions from the National Board of Boiler and Pressure Vessel Inspectors, subject to approval of the Superintendent of Buildings. Approved insuring company inspectors shall make reports on prescribed forms on any inspections authorized by the superintendent of buildings, and such report shall be filed in his office. Company inspectors shall also notify the superintendent of buildings of any suspension of insurance because of dangerous conditions, new insurance in effect, and discontinuance of any insurance. (Ord. 85500 § 5218, added by Ord. 93462; December 28, 1964).

3.52.190 Operation and maintenance of boilers and pressure vessels.

Boilers and pressure vessels shall be operated and maintained in conformity with requirements for adequate protection of the public established by the superintendent of buildings in accordance with nationally recognized standards such as the A.S.M.E. Boiler and Pressure Vessel Code.

The superintendent of buildings shall notify the owner or his authorized representative of any defects or deficiencies which shall be promptly and properly corrected. If such corrections are not made, or if the operation of the boiler or pressure vessel is deemed unsafe by the superintendent of buildings, he may revoke the permit to operate. If the operation of a boiler or pressure vessel is deemed by the superintendent of buildings to constitute an immediate danger, he may relieve the pressure on such boiler or pressure vessel at the owner's cost, and they shall not thereafter be operated without approval of the superintendent of buildings. (Ord. 85500 § 5219, added by Ord. 93462; December 28, 1964).

3.52.200 Monitoring systems for automatic boilers. Sections 3.52.200 through 3.52.270 regulate the installation, maintenance and use of monitoring systems for automatic boilers as provided for in Section 10.36.150 of this code, as amended or hereafter amended.

For purposes of these sections, a "monitoring system" shall mean an

approved protective signaling system used for surveillance of controls and limit devices required on certain automatic boilers.

Other words and phrases used herein shall mean as follows:

ALARM SERVICE. The service required following the transmission of an alarm signal.

ALARM SIGNAL. A signal indicating an emergency requiring immediate action.

CENTRAL STATION SYSTEM. A system, or group of systems, the operations of which are signaled to, recorded in, maintained and supervised from an approved central station, in which there are competent and experienced observers and operators in attendance at all times whose duty it shall be, upon receipt of a signal, to take such action as required. Such systems shall be independently owned, controlled, and operated by a person, firm, or corporation whose principal business is the furnishing and maintaining of supervised protective signaling service and who have no interest in the protected properties.

FUEL SHUT DOWN SYSTEM. A system to shut off the fuel supply to the burner and operated by the same alarm signal as that relayed to the monitoring system. The fuel shut down system shall be manually reset before burner operation can be resumed.

MAINTENANCE. Repair service, including periodically recurrent inspections and tests, required to keep the protective signaling system and its component parts in an operative condition at all times, together with replacement of the system or of its components, when for any reason they become undependable or inoperative.

MONITORING STATION. The central station of a central station system or the central supervisory station of a proprietary system.

PROPRIETARY SYSTEM. A system with supervision by competent and experienced personnel in a central supervising station at the property protected. The system is to include equipment and other facilities required to permit the operators to test and operate the system and, upon receipt of a signal to take such action as required.

PROTECTIVE SIGNALING SYSTEMS. Electrically operated circuits, instruments, and devices, together with the necessary electrical energy, designed to transmit alarms and trouble signals, necessary for monitoring boilers.

TROUBLE SIGNAL. A signal indicating trouble of any nature, such as a circuit break or ground, occurring in the devices or wiring associated with a protective signaling system. (Ord. 85500 § 5220 added by Ord. 95265 and amended by Ord. 96247; November 16, 1967).

3.52.210 Monitoring system functions. An approved monitoring system shall sense low water level and an indication of flame failure on all boiler, steam pressure at the upper limit setting on steam boilers or water

temperature at the upper limit setting on hot water boilers. Upon sensing any of the above conditions, a manually reset relay device shall shut off the fuel supply to the boiler and shall also relay an alarm signal to the monitoring system. The monitoring system shall sense existing limit controls and flame failure device or a duplicate of each control device. (Ord. 85500 § 5221 added by Ord. 95265 and amended by Ord. 96247; November 16, 1967).

3.52.220 Approval of monitoring systems. An annually renewable permit issued by the superintendent of buildings shall be required for a monitoring system as provided under Section 3.52.280 of this code. Before such permit may be issued, the following conditions for approval shall be met:

a. Information: Complete information regarding the system including specifications, wiring diagrams, and floor plans shall be submitted to the superintendent of buildings.

b. Equipment: All devices, combinations of devices, and equipment constructed and installed in conformity with the provisions of Sections 3.52.220 through 3.52.270 shall be approved for the purposes for which they are intended. All devices shall carry approval of Underwriters' Laboratories, Inc., or other comparable agency.

c. Acceptance tests: Upon completion of a system, a satisfactory test of the entire installation shall be made in the presence of the superintendent of buildings.

d. Maintenance: All systems shall be under the supervision of qualified persons. These persons shall cause proper tests and inspection to be made at prescribed intervals and shall have general charge of all alterations and additions to the system under their supervision, or a satisfactory agreement on the maintenance, operation, and efficiency of the system shall be provided. (Ord. 85500 § 5222 added by Ord. 95265 and amended by Ord. 95819; May 25, 1967).

3.52.230 Design and installation of monitoring systems. The design and installation of all electrical wiring, equipment and devices of a monitoring system, service requirements therefor, and electrical supervision thereof, shall be in conformity with the Electrical Code, Title 4 as amended and applicable provisions of NFPA Standards No. 71, Central Station Protective Signaling Systems, and No. 72D, Proprietary Protective Signaling Systems, as published by the National Fire Protection Association, copies of which are filed with the city comptroller (C.F. 256705).

Central station systems and facilities which have been approved by a recognized agency as conforming to NFPA Standards No. 71 shall be deemed to be in compliance with the provisions of this section and Sections

3.52.240, 3.52.250 and 3.52.260 following. (Ord. 85500 § 5223 added by Ord. 95265 and amended by Ord. 96247; November 16, 1967).

3.52.240 Monitoring station building. (a) The monitoring station building and its fire protection shall be satisfactory to the superintendent of buildings.

(b) Access to operating rooms of monitoring stations shall be restricted to only authorized persons. A central station operating room shall be locked at all times.

(c) Emergency lighting facilities shall be provided in the operating room and in other areas of the monitoring station considered necessary by the superintendent of buildings. The emergency lighting system shall illuminate the area automatically upon failure of the normal lighting system power supply. (Ord. 85500 § 5224 added by Ord. 95265; November 10, 1966).

3.52.250 Monitoring station facilities. (a) The monitoring station shall be equipped with the necessary instruments of an approved pattern for automatically receiving and recording all signals. The time of receipt of signals shall also be recorded manually, or preferably by an automatic device.

(b) The devices and circuits shall be designed and installed so as to meet successfully the most severe conditions liable to be met in practice, and no change or alteration shall be made in same without approval.

(c) Circuits between the protected premises and the monitoring station, and within the protected premises, except as hereinafter excluded, where essential to the actuation or operation of signaling devices shall be so arranged that the occurrence of a single break or single ground fault will not prevent the transmission of an alarm signal. This requirement shall not apply to circuits wholly within the monitoring station nor to the carrier transmission portion of circuits.

(d) The occurrence of a single break or a single ground fault on any circuit shall not of itself cause a false signal which may be interpreted as an alarm signal. Where such single fault prevents the normal functioning of any circuit its occurrence shall be indicated automatically at the monitoring station by a trouble signal compelling attention and readily distinguishable from signals other than those indicative of an abnormal condition of supervised parts of a boiler monitoring system.

(e) Circuit adjusting means for emergency operation may either be automatic or be provided through manual operation upon receipt of a trouble signal.

(f) The circuits and devices shall be arranged to receive and record a signal readily identifiable as to location of origin.

(g) The carrier transmission portion of circuits between the pro-

tected premises and the monitoring station shall meet all of the following requirements:

1. Carrier channels shall be designed to transmit a constant tone of one frequency, which tone shall shift to a second frequency for transmission of signals.

2. Two carrier channels shall be provided for each circuit, with all signals transmitted simultaneously over both channels; or one carrier channel shall be provided plus means for immediate transfer of the circuit to a standby carrier channel, a maximum of eight circuits being associated with each standby channel.

3. The two channels (or one channel with standby arrangement) for each circuit shall be routed between the carrier transmitter and the carrier receiver as follows:

- (i) Over separate routes between terminating equipments.
- (ii) Over separate cables on the same route.
- (iii) Over separate pairs of wires in the same cable.
- (iv) Over one pair of wires provided service is limited to one plant.

4. Failure of a carrier channel, including any standby channels provided, shall be indicated instantly and automatically in the monitoring station.

NOTE: The term "carrier transmission" as used herein does not preclude the use of microwave links in the carrier circuit.

(Ord. 85500 § 5225 added by Ord. 95265; November 10, 1966).

3.52.260 Operations and tests. (a) The monitoring station shall have sufficient personnel (a minimum of two persons) constantly on duty to assure immediate attention to all signals received. In the monitoring station of a proprietary system, the superintendent of buildings may permit a minimum of one person to be on constant duty, provided there are approved means, such as a watchman's service, to maintain a check at intervals of not less than two hours to assure that the operator is on duty. The minimum age of all operators shall be eighteen years. Operation and supervision shall be the primary functions of the operators and no other interest or activity shall take precedence over the protective service.

(b) Manual tests of all circuits extending from the monitoring station and of monitoring station devices shall be made at intervals of approximately twelve hours.

(c) Facilities shall be provided at the monitoring station on all circuits extending from the monitoring station and on all local current sources at the monitoring station for making the following tests:

1. Current strength on each circuit; this current to be adjusted to normal before making other tests.
2. Voltage across terminals of each circuit at the inside terminals of protective devices.
3. Voltage between ground and each side of each circuit.

(d) Complete and satisfactory test shall be made monthly of all actuating and transmitting devices. (Ord. 85500 § 5226 added by Ord. 95265; November 10, 1966).

3.52.270 Signals and reports. (a) Reports of all signals received shall be made available upon request to the authority having jurisdiction.

(b) Disposition of signals.

1. Upon receipt of trouble signals or other signals pertaining solely to matters of equipment maintenance of the signaling systems, the operating company shall immediately investigate and, if possible, assure that the trouble is remedied at once.

In all cases where service of the signaling system is interrupted and is not immediately corrected, the property owner shall be notified immediately and this shall be confirmed by written notice with a copy to the Superintendent of Buildings.

2. Upon receipt of an alarm signal, the monitoring station shall notify the property owner, or his designated representative, by telephone or by the quickest method available and this shall be confirmed by written notice.

3. Definite instructions for the handling of alarms shall be posted for the guidance of operators.

4. The operating company shall have a man available within two-hour travel who is competent to inspect, maintain, and repair the system. (Ord. 85500 § 5227 added by Ord. 95265 and amended by Ord. 96247; November 16, 1967).

3.52.280 Monitoring system permit. The owner, or his authorized representative, of a boiler plant served by a monitoring system shall obtain an annually renewable permit therefor issued by the superintendent of buildings. The annual fee for such permit shall be twenty-five dollars. Application for such permit and renewal thereof shall be made in writing to the superintendent of buildings on forms provided therefor. The permit for operation of automatic boilers under supervision by a monitoring system shall be required in addition to the operating permit required under Section 5217.

A monitoring system permit shall not be issued or renewed until the system and appurtenances thereto have been inspected and approved by the superintendent of buildings.

It shall be the obligation of the applicant to demonstrate in the presence of the superintendent of buildings by testing of the apparatus, or such other means as may be appropriate, the operation and reliability of the subject monitoring system. The superintendent of buildings may require such additional tests as he deems necessary for the safe operation and proper maintenance of the monitoring system and the boiler plant served by such system. (Ord. 85500 § 5228 added by Ord. 95819; May 25, 1967).

Chapter 3.53

OIL BURNER INSTALLATIONS

Sections:

- 3.53.010 General.
- 3.53.020 Oil burners and oil burner equipment defined.
- 3.53.030 Approval of oil burners.
- 3.53.050 Use of non-automatic burners.
- 3.53.060 Gravity feed to burners.
- 3.53.070 Pressure tank feed.
- 3.53.080 Oil pumps.
- 3.53.090 Piping.
- 3.53.100 Valves.
- 3.53.110 Preheating of oil.
- 3.53.120 Tests.
- 3.53.130 Oil burner controls.
- 3.53.140 Installation of the burner.
- 3.53.150 Inspections.
- 3.53.170 Uses other than heating.

3.53.010 General. The construction and manner of installation of all oil burners and oil burner equipment hereafter installed for use, and the alteration and repair hereafter of all oil burners and oil burner equipment shall conform to the requirements of this Chapter. Electric wiring for motors, equipment and controls shall conform to the requirements of the Electrical Code (Title 4). Liquefied petroleum gas igniters or burners used in conjunction with oil burner installations shall conform to the requirements of the Fire and Explosion Hazard Ordinance. (Title 8) Oil storage tanks shall conform to the requirements of Section 3.11.100. (Ord. 85500 § 5301; Sept. 10, 1956).

3.53.020 Oil burners and oil burner equipment defined. For the purpose of this Chapter, the term "oil burner" shall mean any device, for use in connection with a heating system or other approved use designed to burn fuel oil having a flash point of 100 degrees Fahrenheit, or higher, as determined by the Tag. Closed Tester in accordance with the method of test adopted by the American Society for Testing Materials (A.S.T.M. Designation D56-21), and having a fuel tank or container with a capacity of more than one gallon connected thereto. The term "oil burner equipment" shall include oil burners, as above defined, and all tanks, piping, pumps, control devices and accessories, connected to the burners.

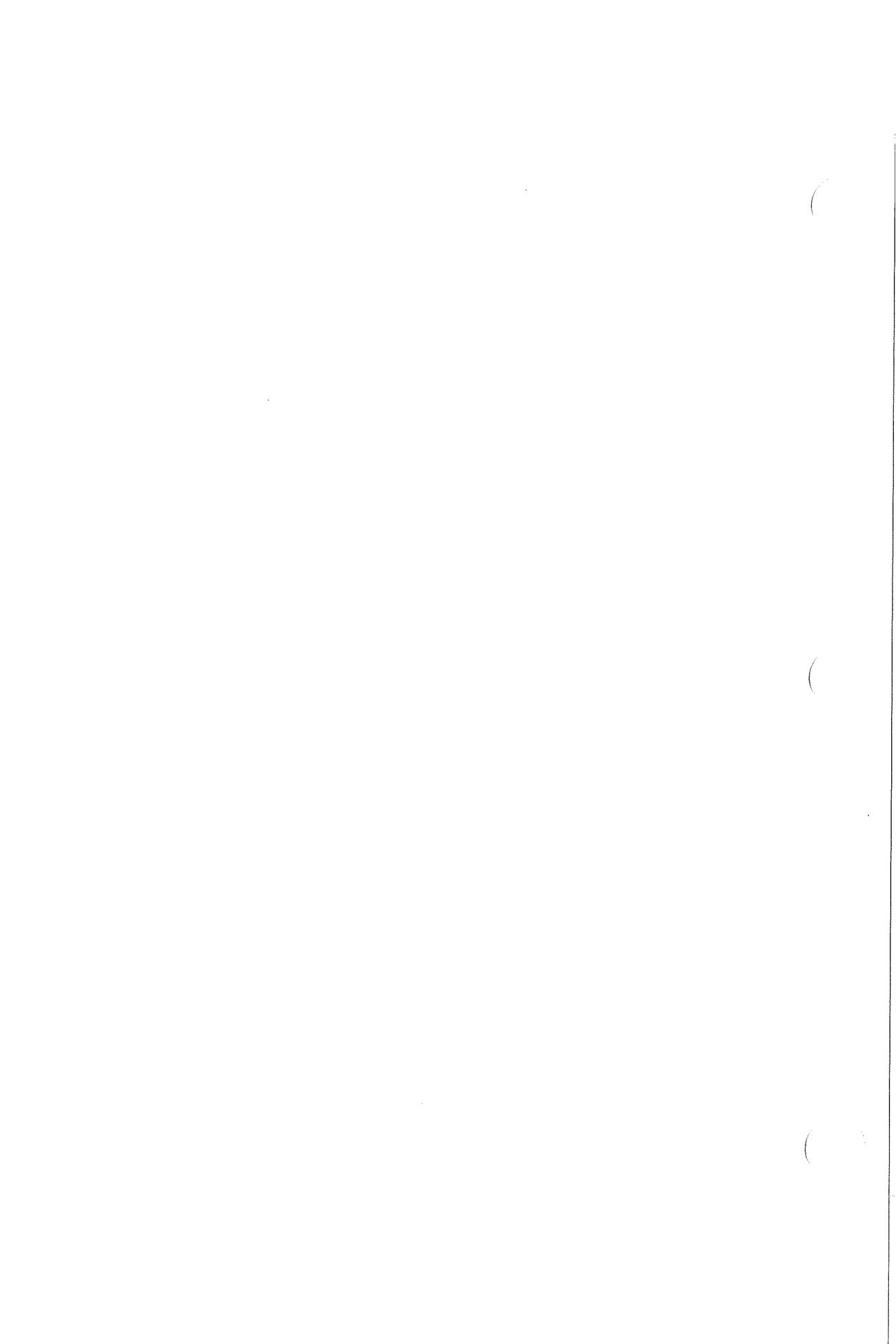
The following terms used in this chapter shall have meaning as follows:

"DOMESTIC" shall define any installation not exceeding a heat output of 200,000 B.t.u./hr.

"COMMERCIAL" shall define any installation exceeding 200,000 B.t.u. but not exceeding a heat output of 500,000 B.t.u./hr.

"INDUSTRIAL" shall define any installation exceeding a heat output of 500,000 B.t.u./hr.

No stove or heater with supply tank of larger than one gallon capacity and designed to burn flammable liquids with flash point less than 100 degrees Fahrenheit shall be permitted.



The requirements of this Chapter shall not apply to portable burners not requiring connection to a flue. (Ord. 85500 § 5302; Sept. 10, 1956).

3.53.030 Approval of oil burners. (a) APPROVAL OF OIL BURNERS. It shall be unlawful to install any oil burner until an application for approval of such make or type of burner, on a form such as set forth immediately hereafter, shall have been filed with the Superintendent of Buildings and a "Certificate of Approval" of such burner issued by said Superintendent in accordance with the standards of nationally recognized testing agencies such as Underwriters' Laboratories, Inc.

"Application For Certificate Of Approval"

The undersigned hereby requests that a Certificate of Approval be issued for the oil burner described below:

1. Name of Burner.
2. Name of Manufacturer.
3. Address of Manufacturer.
4. Kind of Fuel recommended for Burner.
5. List approvals by recognized laboratories.

Name	Date
6. Attach blueprint of assembly drawing showing construction of device, indicating moving parts, oil passages and air passages, or other evidence satisfactory to the Superintendent of Buildings.	

Application filed by.....
this.....day of....., 19....."

Should a Certificate of Approval be denied, the Superintendent of Buildings shall issue, to the applicant, a statement as to the reason therefor.

(b) PERMITS. It shall be unlawful hereafter to install any oil burner without a permit to make such installation issued by the Superintendent of Buildings. Each application for an installation permit shall be accompanied by plans and/or specifications adequately describing the proposed work.

When the Superintendent of Buildings is satisfied that such plans and/or specifications conform to the requirements of this Code, he shall issue a permit to install, provided fees as specified in the Permit Fee Ordinance (See Chapter 3.60) have been paid. (Ord. 85500 § 5303 as amended by Ord. 86257; June 18, 1957).

3.53.050 Use of non-automatic burners limited. Oil burners which are not equipped with automatic means for preventing abnormal discharge of oil at the burner, shall not be installed or operated in any location where a competent attendant will not be constantly on duty on the premises where the burner is located while the burner is in operation. (Ord. 85500 § 5305; Sept. 10, 1956).

3.53.060 Gravity feed to burners. Gravity feed shall be used only with burners arranged to prevent abnormal discharge of oil at the burner by automatic means, specifically approved for the burner with which it is used.

In buildings of Group A, B, C, D and H occupancy and waterfront structures as specified in Chapter 3.56, gravity feed supply tanks shall not exceed sixty gallons (60 gals.) individual capacity. In buildings of other occupancy, gravity supply tanks shall not exceed two hundred seventy-five gallons (275 gals.) individual capacity. Where more than one (1) gravity supply tank is used, such tanks shall be connected to the feed pipe leading to the burner through a manually operated, approved three-way valve in such a way that only one (1) tank can discharge its contents at a time. Gravity supply tanks of ten gallon (10 gal.) or more capacity shall be installed only in the lowest story of a building. The top of the gravity supply tank shall be not more than ten feet (10') above the burner constant level valve to which it is attached, and at least ten feet (10') removed from the burner.

Where oil is supplied to the burner by gravity and a constant level device is not incorporated in the burner assembly or in an auxiliary tank used in connection with an automatic pump, an approved constant level device shall be installed in the oil feed line at the gravity tank or as close thereto as practicable. The constant level device shall be provided with an approved anti-flooding device. Vent pipes or tubing of constant level devices shall not be connected to tanks or tank vents. (Ord. 85500 § 5306 as amended by Ord. 88324; June 24, 1959).

3.53.070 Pressure tank feed. Pressure tank feed shall be used only with burners arranged to prevent abnormal discharge of oil at the burner by automatic means, specifically approved for the burner with which it is used.

Pressure tanks shall be constructed in accordance with approved standards, shall not exceed a capacity of 60 gallons, and shall not be operated at pressures exceeding 50 pounds per square inch. They shall be equipped with a reliable pressure gauge, and with an automatic relief valve piped to discharge outside of buildings. (Ord. 85500 § 5307; Sept. 10, 1956).

3.53.080 Oil pumps. Oil pumps shall be of approved type, secure against leaks, and shall be rigidly fastened in place.

Pumps, not an integral part of the burner, shall be arranged to stop

automatically in case of breakage of the supply line to the burner. (Ord. 85500 § 5308; Sept. 10, 1956).

3.53.090 Piping. All piping shall be standard full weight wrought iron, steel or brass pipe with standard fittings or approved brass or copper tubing with approved fittings, except that approved flexible metal hose may be used for reducing the effects of jarring and vibration or where rigid connections are impracticable.

Pipe used in the installation of burners shall not be smaller than ¼-inch iron pipe size or ¼-inch outside diameter copper tubing.

Oil piping shall be so installed as to provide protection against mechanical injury.

Unions requiring gaskets or packing, and right and left couplings shall not be used in oil lines.

Pipe lines, other than tubing, connected to underground tanks, except vertical fill lines and test walls, shall be provided with double swing joints graded to tank and arranged to permit the tank to settle without impairing the efficiency of the pipe connections. (Ord. 85500 § 5309; Sept. 10, 1956).

3.53.100 Valves. Readily accessible shut-off valves of approved type shall be installed in oil supply lines close to gravity and pressure supply tanks. Where a shut-off valve is installed in the discharge line of an oil pump, an approved pressure relief valve shall be connected into the discharge line between the pump and the shut-off valve and arranged to return surplus oil to the storage tank or to by-pass it around the pump. (Ord. 85500 § 5310; Sept. 10, 1956).

3.53.110 Preheating of oil. Preheating of oil, where necessary, shall be done by steam or hot water indirect heaters or approved electric heaters. Heaters shall be by-passed or provided with suitable means to prevent abnormal pressure. (Ord. 85500 § 5311; Sept. 10, 1956).

3.53.120 Tests. Before painting, tanks to be covered or installed underground shall be tested and proved tight against leaks at a pressure not less than 5 pounds per square inch, nor more than 10 pounds per square inch. (Ord. 85500 § 5312; Sept. 10, 1956).

3.53.130 Oil burner controls. Oil burner equipment shall be provided with some means for manually stopping the flow of oil to the burner, from a conveniently located point at a safe distance from the burner.

Automatically operated oil burners used in connection with vapor, hot water, steam or warm air heating systems shall be equipped with approved automatic devices to shut down the burner in the event of undue pressure in a steam boiler or overheating within a hot water boiler or warm air furnace.

In systems where steam or air is used for atomizing the oil, the

equipment shall be so arranged that in case of interruption of the atomizing supply, the oil supply will be immediately shut off.

On all installations where operation of burner is controlled by an aquastat, pressurestat or furnacestat, a second control, either aquastat, pressurestat, or furnacestat, shall be installed in the electric service supply line as a high limit or safety control. On steam, hot water, or vapor systems, such second control shall either be installed on a boiler tapping and pipe of at least $\frac{1}{2}$ inch size, or else the second control shall be installed on a separate boiler tapping.

Each automatic oil burner shall be equipped with a primary safety control which provides proper sequence of ignition, supervises the flame while burning and provides shutoff in event of flame failure, as shown in table No. 53-A.

An automatic or remotely lighted burner and one intended for use where a competent attendant will not be on duty continually in the room where the burner is located while it is in operation, shall be equipped with an approved primary safety control.

A manually lighted burner intended for use where a competent attendant will be on duty continually in the room where the burner is located while it is in operation, is not required to be equipped with a primary safety control, but such control, if provided, shall be of an approved type.

A manually lighted burner intended for use where a competent attendant will not be on duty continually in the room where the burner is located while it is in operation shall be equipped with an approved safety control which will shut off the burner in the event of flame failure as provided in Table No. 53-A.

All non-automatic burners shall be equipped with an approved device which shall shut off the oil supply in the event of current failure and will not re-establish oil supply until manually reset.

Any oil burner with $\frac{1}{2}$ h.p. motor or larger shall require an additional relay which is specified to handle the inductive load of the motor. (Ord. 85500 § 5313; Sept. 10, 1956).

3.53.140 Installation of the burner. Where oil burners are installed in furnaces originally designed for solid fuel, the ash door of the furnace shall be removed or bottom ventilation otherwise provided to prevent the accumulation of vapors in the ash pit, unless the burner is of a type which mechanically purges the ash pit.

Boilers and furnaces in which oil burners are installed shall be connected to flues having sufficient draft at all times to assure safe operation of the burners; a suitable draft regulating device shall be installed where necessary to prevent excessive draft. Manual dampers when used shall be installed so that they cannot close off more than eighty (80) per cent of the internal cross section area of the smoke pipe. Automatically operated dampers shall be of approved type designed to maintain a safe damper

opening at all times and arranged to prevent starting of the burner unless the damper is opened at least 20 per cent of the internal cross section area of the smoke pipe.

Instructions for the care and operation of the oil burner equipment shall be conspicuously posted near the oil burner and shall be maintained in readable condition by user.

Exception: Equipment in buildings of I and J occupancy.

Contractors installing industrial oil burner systems shall furnish two diagrams showing the main oil lines and controlling valves, one of which diagrams shall be posted near the oil burner equipment and the other at some point which will be accessible in case of fire at the burner. (Ord. 85500 § 5314; Sept. 10, 1956).

3.53.150 Inspections. Immediately upon the installation of underground tanks or tanks placed in vaults and concealed piping of an oil burner installation, the installer thereof shall notify the Superintendent of Buildings that said tanks and piping are ready for inspection, and it shall be unlawful for any person to cover up any such tanks or piping until the same have been inspected and approved by the Superintendent of Buildings.

The Superintendent of Buildings shall inspect all work within 3 days after having been notified that such work is ready for inspection. Notification of any required corrections shall be sent to the owner and installer of the work. (Ord. 85500 § 5315; Sept. 10, 1956).

3.53.170 Uses other than heating. Oil burner installations intended for uses other than heating shall be subject to special approval by the Superintendent of Buildings. (Ord. 85500 § 5317; Sept. 10, 1956).

TABLE No. 53-A—SAFETY CONTROL TIMING

Maximum Main Flame Hourly Input, Kind Of Ignition	Normal Timing (Seconds) Trial For Ignition Period (See Notes (b) and (c))	Pilot-Flame Establishing Period (See Note (d))	(See Note (a)) Flame Failure Shut-Off (See Note (d))
1,000,000 Btu (Approx. 7 gals.) Unproven ignitor or pilot	90 Max.	—	90 Max.
2,500,000 Btu (Approx. 16 gals.) Unproven ignitor or pilot	30 Max.	—	30 Max.
5,000,000 Btu (Approx. 33 gals.) Unproven ignitor or pilot	15 Max.	—	15 Max.
Over 5,000,000 Btu Proven pilot required	60 Max.	5 Min.	4 Max.

NOTES TO TABLE No. 53-A:

- (a) The nominal safety timing is the designed duration of the period (plus or minus factory tolerance) determined at rated voltage of the control in a room temperature of 70° F.
- (b) The maximum input for determining the trial-for-ignition period for a burner not equipped as indicated in "c" below is to be the maximum rated input of the burner.
- (c) The maximum input for determining the trial-for-ignition period for a burner equipped for starting on low fire only is to be the input to the largest fire allowed to be ignited provided the input to that fire cannot be increased until ignition of that low fire is established.
- (d) The flame failure shut-off timing is to be based on the burner's maximum rated input. The flame failure shut-off time is that period required by the control to actuate or deenergize the fuel shut-off device after flame extinguishment, except for burner having an hourly input of 1,000,000 Btu's or less, the timing may be interval measured from the time the combustion thermostat indicates the flame failure.

GAS PIPING AND APPLIANCES

Chapter 3.54

GAS PIPING AND APPLIANCES

Sections:

- 3.54.010 Scope.
- 3.54.020 Definitions A-B.
- 3.54.030 Definitions C-E.
- 3.54.040 Definitions F-K.
- 3.54.050 Definitions L-R.
- 3.54.060 Definitions S-Z.
- 3.54.070 Gas piping installation for unmeasured gas.
- 3.54.080 Piping from multiple meter installations.
- 3.54.090 Size of piping.
- 3.54.100 Acceptable piping materials.
- 3.54.110 Pipe threads.
- 3.54.120 Concealed piping.
- 3.54.130 Underground piping.
- 3.54.140 Piping supports.
- 3.54.150 Outlets.
- 3.54.160 Manual shut-off valves.
- 3.54.170 Special provisions.
- 3.54.180 Gas piping in mobile home and travel trailer parks.
- 3.54.190 Appliance connections to building piping.
- 3.54.200 Test of piping for tightness.
- 3.54.210 Checking for leakage with meter.
- 3.54.220 Permit required.
- 3.54.230 Posting of permits.
- 3.54.240 Permit for additional work.
- 3.54.250 Suspension of work.
- 3.54.260 Revocation of permit.
- 3.54.270 Notice for inspection required.
- 3.54.280 Certification of final inspection.
- 3.54.290 Special conditions.
- 3.54.300 Right of entry.
- 3.54.310 Gas appliance—Approval.
- 3.54.320 Tentative approval of new devices.
- 3.54.330 Appliance installation—General requirements.
- 3.54.340 Permissible temperature on combustible materials.
- 3.54.350 Air for combustion and ventilation.
- 3.54.360 Installation requirements for specific appliances.
- 3.54.370 Domestic ranges.
- 3.54.380 Water heaters.
- 3.54.390 Room heaters.
- 3.54.400 Central heating boilers and furnaces.
- 3.54.410 Vented wall furnaces.

- 3.54.420 Floor furnaces.
- 3.54.430 Attic furnaces.
- 3.54.440 Duct furnaces.
- 3.54.450 Conversion burners.
- 3.54.460 Unit heaters.
- 3.54.470 Infrared radiant heaters.
- 3.54.480 Clothes dryers.
- 3.54.490 Hot plates and laundry stoves.
- 3.54.500 Hotel and restaurant ranges, deep fat fryers and unit broilers.
- 3.54.510 Gas counter appliances.
- 3.54.520 Other appliances.
- 3.54.530 Venting of appliances.
- 3.54.540 Draft hoods.
- 3.54.550 Venting systems—General requirements.
- 3.54.560 Vent connectors.
- 3.54.570 Venting through walls, floors, roofs, ceilings and partitions.
- 3.54.580 Outside vents.
- 3.54.590 Special venting arrangements.

3.54.010 Scope. This chapter regulates the installation, tests and operation of residential and commercial gas appliances and of gas piping systems in and connecting buildings, or connecting to buildings, extending from the gas meter outlet or service regulator or the liquefied gas tank outlet to the inlet connections of appliances. Such regulations apply to systems for fuel gases such as natural gas, manufactured gas, liquefied petroleum gas, or mixtures thereof. Appliances utilizing liquefied petroleum gas which is piped into buildings shall comply with provisions of this chapter; regulations for the storage and handling of liquefied petroleum gas and installation of equipment pertinent to systems for such uses not covered herein are set forth in Chapter 8.19 of the Fire Code (Ordinance 87870). Enforcement of requirements of Sections 3.54.070 to 3.54.300 inclusive and Section 3.54.380 of this chapter shall be the responsibility of the Director of Public Health. Other requirements of this chapter shall be enforced by the Superintendent of Buildings. (Ord. 85500 § 5401 added by Ord. 95566; February 23, 1967).

3.54.020 Definitions A-B.

APPLIANCE. Any device which utilizes gas to produce light, heat, power, refrigeration or air conditioning.

APPLIANCE, AUTOMATICALLY CONTROLLED. Appliances equipped with an automatic pilot and other automatic devices which:

1. Accomplished complete turn-on and shut-off of the gas to the main burner or burners, or
2. Graduate the gas supply to the burner or burners but do not effect complete shut-off of the gas.

APPLIANCE CONNECTOR. An assembly of listed semi-rigid or flexible metal tubing and listed fittings designed to connect certain gas appliances to gas piping systems.

APPLIANCE FLUE. The flue passages within the appliance.

APPLIANCE SHUT-OFF VALVE. A manually operated valve or cock not an integral part of the appliance installed in the gas piping at or near the appliance.

APPROVED. In respect to Sections 3.54.070 through 3.54.300, "approved" shall mean approved by the Director of Public Health. In respect to other sections, it shall mean approved by the Superintendent of Buildings.

AUTOMATIC GAS SHUT-OFF DEVICE. A device constructed so that upon the attainment of a water temperature in a hot water supply system in excess of some predetermined limit acts in such a way as to cause the gas to the system to be shut off.

AUTOMATIC GAS SHUT-OFF VALVE. A valve used in conjunction with an automatic gas shut-off device to shut off the gas supply to a gas-fired water heating system. It may be constructed integrally with the gas shut-off device, or be a separate assembly.

AUTOMATIC PILOT. An automatic pilot device and pilot burner securely assembled in fixed functional relationship.

AUTOMATIC PILOT DEVICE. A device employed with gas-burning equipment which will either automatically shut off the gas supply to the burner(s) being served or automatically actuate electrically or otherwise a gas shut-off device when the pilot flame is extinguished. The pilot burner may or may not be constructed integrally with the device.

AUTOMATIC PILOT DEVICE—COMPLETE SHUT-OFF TYPE. An automatic pilot device for shutting off automatically the gas supply to the main burner and pilot in event of pilot or gas failure.

AUTOMATIC VALVE FOR GAS APPLIANCES. An automatic or semi-automatic device consisting essentially of a valve and operator that controls the gas supply to the burner(s) during operation of an appliance. The operator may be actuated by application of gas pressure on a flexible diaphragm, by electrical means, by mechanical means, or by other approved means.

BUNGALOW RANGE (See COMBINATION RANGE). A range similar to a combination range supplied with gas oven and top burner sections and a supplementary fuel section used primarily for space heating or for heating a solid top section and not for oven heating.

BURNER. A device for the final conveyance of the gas, or a mixture of gas and air, to the combustion zone. (Ord. 85500 § 5402 added by Ord. 95566; February 23, 1967).

3.54.030 Definitions C-E.

CENTRAL HEATING GAS APPLIANCE. A gas appliance normally

used as the primary means of heating premises. Ordinarily this includes gas boilers, warm air furnaces, floor furnaces and wall furnaces but does not include unit heaters, room heaters, nor industrial gas boilers or furnaces.

CLOTHES DRYER. A device used to dry wet laundry by means of heat derived from the combustion of fuel gases. Dryer classifications are as follows:

(a) Type 1. Factory-built package, multiple produced. Primarily used in family living environment. May or may not be coin operated for public use. Usually the smallest unit physically and in function output.

(b) Type 2. Factory-built package, multiple produced. Used in business with direct intercourse of the function with the public. May or may not be operated by public or hired attendant. May or may not be coin operated. Not designed for use in individual family living environment. May be small, medium, or large in relative size.

COMBINATION RANGE (See BUNGALOW RANGE). A range which may be operated on both gas and supplementary fuel and consisting of a top burner and oven section which may be heated by either gas or supplementary fuel or both.

COMBUSTION. Combustion, as used herein, refers to the rapid oxidation of fuel gases.

CONCEALED GAS PIPING. Gas piping which, when in place in the finished building, would require removal of permanent construction to gain access to the piping.

CONDENSATE (CONDENSATION). The liquid which separates from a gas (including flue gas) due to reduction in temperature.

CONTROL. A device designated to regulate the gas, air, water and electrical supply to a gas appliance. It may be manual or automatic.

CONTROL COCK. A cock used in piping to control the gas supply to any section of a system of piping or to an appliance.

CONVERSION BURNER. A burner designed to supply gaseous fuel to an appliance originally designed to utilize another fuel.

CUBIC FOOT (CU. FT.) OF GAS. The amount of gas which would occupy one (1) cubic foot when at a temperature of sixty degrees Fahrenheit (60°F.) saturated with water vapor and under a pressure equivalent to that of thirty (30) inches of mercury.

DILUTION AIR. Air which enters a draft hood or draft regulator and mixes with the flue gases.

DIRECTOR. The Director of Public Health of the City of Seattle, or his duly authorized representative, including any plumbing or gas inspector.

DIVERSITY FACTOR. Ratio of the maximum probable demand to the maximum possible demand.

DRAFT HOOD. A device built into an appliance, or made a part of the vent connector from an appliance, which is designed to (1) assure the ready escape of the flue gases in the event of no draft, back draft, or stoppage beyond the draft hood; (2) prevent a back draft from entering the appliance; and (3) neutralize the effect of stack action of the chimney or gas vent upon the operation of the appliance.

DRAFT REGULATOR. A device which functions to maintain a desired draft in the appliance by automatically reducing the draft to the desired value.

DUCT FURNACE. A furnace normally installed in distribution ducts of air conditioning systems to supply warm air for heating. This definition shall apply only to an appliance which depends for air circulation on a blower not furnished as part of the furnace. (Ord. 85500 § 5403 added by Ord. 95566; February 23, 1967).

3.54.040 Definitions F-K.

FLOOR FURNACE. A completely self-contained unit furnace suspended from the floor of the space being heated, taking air for combustion from outside this space, and with means for observing flames and lighting the appliance from such space.

FLUE EXHAUSTER. A device installed in and made a part of the vent, which device will provide a positive induced draft.

FLUE GASES. Products of combustion plus excess air in appliance flues or heat exchangers (before the draft hood or draft regulator).

GAS COMPANY. The gas utility company operating under franchise with the City or liquefied petroleum gas distributors.

GAS FITTER (OR INSTALLER). An individual who is engaged in gas fitting or in the installation of gas appliances.

GAS FITTING. The installation, replacement or repair of gas piping on the outlet side of the gas meter or service regulator.

GAS HOSE. A gas conduit which depends for tightness on joint packing, or on any wall structure other than that formed by a continuous one-piece metal tubing member.

GAS PIPING. Any run of piping or fitting used to convey fuel gas, installed on any premises or in any building, but shall not include any portion of the service piping.

GAS PIPING SYSTEM. Any arrangement of gas piping supplied by one (1) meter and each arrangement of gas piping serving a building, structure or premises whether individually metered or not.

GAS VENTS. Listed factory made vent piping and vent fittings for conveying flue gases to the outside atmosphere.

(a) **Type B Gas Vents.** Factory made gas vents listed by a nationally recognized testing agency for venting listed or approved appliances equipped to burn only gas.

(b) Type BW Gas Vents. Factory made gas vents listed by a nationally recognized testing agency for venting listed or approved gas-fired vented wall furnaces.

HEATING VALUE (TOTAL). The number of British Thermal Units produced by the combustion at constant pressure, of one (1) cubic foot of gas when the products of combustion are cooled to the initial temperature of the gas and air, when the water vapor formed during combustion is condensed, and when all the necessary corrections have been applied.

INSTALLING AGENCY. Any person who is engaged in the installation of gas appliances or the installation, replacement or repair of gas piping on the outlet side of the gas meter or service regulator or of the gas piping from any liquefied petroleum gas tank or tanks. (Ord. 85500 § 5404 added by Ord. 95566; February 23, 1967).

3.54.050 Definitions L-R.

LIQUEFIED PETROLEUM GAS. Any material which is composed predominantly of any of the following hydrocarbons or mixtures thereof: Propane, Propylene, Butane (Norman and Iso-Butane and Butylenes.

LISTED. Equipment or materials included in a list published by a nationally recognized testing laboratory which maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

MAIN BURNER. A device or group of devices essentially forming an integral unit for the final conveyance of gas or a mixture of gas and air to the combustion zone, and on which combustion takes place to accomplish the function for which the appliance is designed.

MAKE-UP AIR HEATER. A heating appliance used to temper air in which all the heat and the products of combustion generated by the device are released into the air stream being heated.

MANUAL MAIN SHUT-OFF VALVE. A manually operated valve or cock in the gas line or manifold for the purpose of completely turning on or shutting off the gas supply to the main burners except to pilot or pilots which are provided with independent shut-off valves.

MINOR REPAIRS. Adjustment of appliances, replacement of parts, repairing leaks and similar work.

PILOT. A small flame which is utilized to ignite the gas at the main burner or burners.

RELIEF OPENING. The opening provided in a draft hood to permit the ready escape to the atmosphere of the flue products from the draft hood in the event of no draft, back draft, or stoppage beyond the draft

hood, and to permit inspiration of air into the draft hood in the event of a strong updraft.

ROOM HEATER. A self-contained, vented, free standing, gas-burning, air heating appliance installed in and for heating rooms. This shall not include heating appliances covered by other A.S.A. or listed requirements. (Ord. 85500 § 5405 added by Ord. 95566; February 23, 1967).

3.54.060. Definitions S-Z.

SEALED COMBUSTION SYSTEM APPLIANCES. Appliances which are constructed and installed so that all air for combustion is derived from the outside atmosphere and all flue gases are discharged to the outside atmosphere.

SERVICE PIPE. The pipe which brings the gas from the gas main to the meter or service regulator, whichever is farthest from the main.

SHUT-OFF. (See CONTROL COCK).

UNIT HEATER. (a) Low Static Pressure Type: A self-contained, automatically controlled, vented, gas-burning appliance, limited to the heating of nonresidential space in which it is installed. Such appliances shall have integral means for circulation of air, normally by a propeller fan or fans, and may be equipped with louvers or face extensions made in accordance with the manufacturer's approved specification.

(b) High Static Pressure Type: A self-contained, automatically controlled vented, gas-burning appliance, limited to the heating of non-residential space. These appliances have integral means for circulation of air against two-tenths (0.2) inch or greater static pressure and are designed for installation in the space to be heated unless they are equipped with provisions for attaching both inlet and outlet air ducts.

UNMEASURED GAS. Gas which has not passed through and the volume of which has not been registered by a meter.

VENT. A conduit or passageway, vertical or nearly so, for conveying products of combustion to the outside atmosphere.

VENT CONNECTOR. That portion of the venting system which connects the gas appliance to the gas vent, chimney or single-wall metal pipe.

VENTED WALL FURNACE. A self-contained, vented appliance complete with grilles or equivalent, designed for incorporation in or as a permanent attachment to the structure of a building, and furnishing heated air circulated directly into the space to be heated through openings in the casing. Such appliances, if so listed, may be provided with duct extensions beyond the vertical and horizontal limits of the casing proper. Where duct extensions are provided, they shall be supplied by the manufacturer as an integral part of the appliance and tested as such. This definition shall ex-

clude floor furnaces, unit heaters and central furnaces as defined herein.

VENTING SYSTEM. The gas vent, chimney or single-wall metal pipe, and vent connector if used, assembled to form a continuous open passageway from the gas appliance to the outside atmosphere for the purpose of removing vent gases. (Ord. 85500 § 5406 added by Ord. 95566; February 23, 1967).

3.54.070 Gas piping installation for unmeasured gas. No person, unless in the employ of the gas company or having permission from such company, shall (a) open or make connections with a gas main, (b) repair, alter, open or make connection to the service pipe, or do any other work on the parts of the gas supply system up to and including the meter, or (c) disconnect the inlet of the gas meter, or move the meter; provided a gas fitter or plumber may disconnect the outlet of a meter from the gas piping only when necessary.

In case any work done by a gas fitter discloses the need for repairs or alterations by the gas company on any part of the supply system containing unmeasured gas, such company shall be notified promptly of the fact by the gas fitter.

If gas is leaking from any part of the gas supply system containing unmeasured gas, a gas fitter not in the employ of such company may make necessary temporary repairs and shall promptly notify such company to make permanent repairs. (Ord. 85500 § 5407 added by Ord. 95566; February 23, 1967).

3.54.080 Piping from multiple meter installations. Gas piping at multiple meter installations shall be plainly marked by a metal tag or other permanent means attached by the installing agency, designating the building or the part of the building being supplied.

When two or more meters, or two or more service regulators where meters are not provided, are installed on the same premises and supply separate consumers, the gas piping systems shall not be interconnected on the outlet side of the meters or service regulators. (Ord. 85500 § 5408 added by Ord. 95566; February 23, 1967).

3.54.090 Size of piping. Piping for pressures not in excess of one-half pound per square inch ($\frac{1}{2}$ p.s.i.) shall be of a size and so installed as to provide a supply of gas sufficient to meet the maximum demand with a pressure loss not greater than five-tenths (0.5) inch water column between the meter, service regulator, or liquefied petroleum gas regulator and the appliance, except that in a single-family or duplex dwelling, the minimum size fuel line from the meter to the location of a heating plant with input of 100,000 B.T.U. per hour or larger shall be one (1) inch standard pipe or equivalent size in tubing if the length of piping from meter to location of equipment exceeds twenty-five (25) feet.

Piping for pressures in excess of one-half pound per square inch ($\frac{1}{2}$ p.s.i.) shall be of such size and so installed as to provide a supply of gas sufficient to meet the requirements of demand at the point of use. Approved gas flow computers or approved pipe sizing tables may be used to determine size of pipe required. Pressure loss from the meter to any gas utilization equipment under maximum probable flow conditions shall not exceed ten (10) percent of the initial gauge pressure, unless otherwise designed for a greater pressure loss and approved by the serving utility.

The volume of gas to be provided for (in cubic feet per hour) shall be determined directly from the manufacturer's B.T.U. ratings of the appliances to be installed and the heating value of the gas to be used.

The amount of cubic feet per hour of gas required shall be determined by dividing the total B.T.U. input of all appliances by the average B.T.U. heating value per cubic foot of gas. The average B.T.U. per cubic foot of the gas in the area of the installation shall be obtained from the franchised gas utility or the liquified petroleum gas distributor. (Ord. 85500 § 5409 added by Ord. 95566; February 23, 1967).

3.54.100 Acceptable piping materials. (a) PIPE. For pressures not in excess of one-half pound per square inch ($\frac{1}{2}$ p.s.i.), gas pipe shall be wrought iron or steel pipe complying with the specifications of the American Standard for Wrought Iron and Wrought Steel Pipe, A.S.A. B36.10-1959 (C.F. 257209). Threaded copper or brass in iron pipe sizes may be used with gases not corrosive to such material.

For pressures in excess of one-half pound per square inch ($\frac{1}{2}$ p.s.i.), standard weight or A.S.A Schedule 40 Steel Pipe is acceptable and generally used for gas pressures up to one hundred twenty-five pounds per square inch (125 p.s.i.). Threaded copper or brass pipe in iron pipe sizes, steel tubing, and Type K or L copper tubing may be used in accordance with manufacturer's recommendations if approved by the Director. For gas pressures in excess of one hundred twenty-five pounds per square inch (125 p.s.i.), piping shall be selected in accordance with Section 2, A.S.A. B31.1-1955 and 1963 Addendum thereto (C.F. 257210).

(b) TUBING. Seamless copper or steel tubing may be used. Copper tubing shall be of standard Type K or L, or equivalent, complying with specification ASTM B88-62 (C.F. 248051) and having a minimum wall thickness for each tubing size in compliance with ASTM specifications. Steel tubing shall comply with specification ASTM A539-65 (C.F. 257211).

(c) PIPING JOINTS AND FITTINGS. Pipe joints may be screwed, flanged or welded, and nonferrous pipe may also be soldered or brazed with material having a melting point in excess of 1000°F. Tubing joints shall either be made with approved flared or compression type gas tubing fittings, or be soldered or brazed with a material having a melting point in excess of 1000°F.

Fittings (except stopcocks or valves) shall be malleable iron or steel when used with steel or wrought iron pipe, and shall be approved copper or brass when used with copper or brass or tubing. Cast iron fittings in sizes six (6) inches and larger, or special fittings, may be used to connect steel and wrought iron pipe when approved by the Director.

(d) OTHER MATERIALS. When piping is in contact with material exerting a corrosive action, piping and fittings coated with a corrosion resisting material shall be used.

Existing piping may be rerun, and existing pipe, fittings and appliance connectors may be re-used on the same premises if clear and in good condition.

Joint compounds (pipe dope) shall be applied only to the male threads of the joints. Such compounds shall be resistant to the action of liquefied petroleum gas-air mixtures. (Ord. 85500 § 5410 added by Ord. 95566; February 23, 1967).

3.54.110 Pipe threads. Pipe and fitting threads shall comply with the specifications of American Standard for Pipe Threads, A.S.A. B2.1-1960 (C.F. 248022).

Pipe with threads which are stipped, chipped, corroded, or otherwise damaged shall not be used. If a weld opens during the operation of cutting or threading, that portion of the pipe shall not be used.

Pipe shall be threaded in accordance with the following:

Iron Pipe Size (Inches)	Approx. Length of Threaded Portion (Inches)	Approx. No. of Threads to be Cut
$\frac{1}{2}$	$\frac{3}{4}$	10
$\frac{3}{4}$	$\frac{3}{4}$	10
1	$\frac{7}{8}$	10
$1\frac{1}{4}$	1	11
$1\frac{1}{2}$	1	11
2	1	11
$2\frac{1}{2}$	$1\frac{1}{2}$	12
3	$1\frac{1}{2}$	12
4	$1\frac{5}{8}$	13

(Ord. 85500 § 5411 added by Ord. 95566; February 23, 1967).

3.54.120 Concealed piping. Piping in solid floors or walls such as concrete shall be laid in channels suitably covered to permit access to the piping with a minimum of damage to the building. Piping shall not be laid in cinders. When approved by the Director and acceptable to the serving gas supplier, gas piping may be embedded in concrete floor slabs constructed with portland cement. Piping shall be surrounded with a minimum of one and one half ($1\frac{1}{2}$) inches of concrete and shall not be in physical con-

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tact with other metallic structures such as reinforcing rods or electrical neutral conductors. When piping may be subject to corrosion at point of entry into a concrete slab, it shall be suitably protected from corrosion. Piping shall not be embedded in concrete slabs containing quickset additives or cinder aggregate.

All threaded or flanged joints shall be made permanently tight. The use of bushings, unions, gland or compression type joints, flared fittings, running threads, right and left couplings, and swing joints, including those made by combinations of fittings, is prohibited in concealed locations. When necessary to insert fittings in existing pipe which has been installed in a concealed location, the pipe may be reconnected by the use of a ground joint union with the nut "center punched" to prevent loosening by vibration.

Where copper tubing is used in concealed spaces, such tubing shall be protected at all nailing surfaces with one-sixteenth (1/16) inch plate straps. Reconnection of such tubing may be made only with brazed or welded fittings. (Ord. 85500 § 5412 added by Ord. 95566; February 23, 1967).

3.54.130 Underground piping. Underground piping shall comply with all requirements of Section 3.54.100 and be installed at a minimum depth of twelve (12) inches, except for gas lights.

Underground piping for any gas appliance shall be wrapped iron or steel pipe or tubing or Type K or L copper tubing. Underground connections from the fuel line to the lamp tubing may be made with approved fittings. When dissimilar metals are joined underground, an insulated coupling shall be used. Piping shall not be laid in contact with cinders. (Ord. 85500 § 5413 added by Ord. 95566; February 23, 1967).

3.54.140 Piping supports. Gas piping shall not be supported by other piping, but shall be supported with pipe hooks, metal pipe straps, bands or hangers suitable for the size of the pipe, and of proper strength and quality.

Spacing of supports in piping installations shall not be greater than shown in the following table:

SUPPORT OF PIPING

Size of Pipe (Inches)	(Feet)	Size of Tubing (Inch O.D.)	(Feet)
1/2	6	1/2	4
3/4 or 1	8	5/8 or 3/4	6
1 1/4 or larger (horizontal)	10	7/8 or 1	8
(vertical)	Every floor level		

(Ord. 85500 § 5414 added by Ord. 95566; February 23, 1967).

3.54.150 Outlets. Each outlet, including a valve or cock outlet, shall be closed gas-tight with a threaded iron plug or cap immediately after installation and shall be left closed until an appliance is connected thereto, and shall be closed in the same manner when an appliance is removed from an outlet and the outlet is not to be used again immediately.

The outlet fitting or the pipe shall be securely fastened. Outlets shall not be placed behind doors. Outlets shall be far enough from floors, walls and ceilings to permit the use of a pipe wrench of suitable size without straining or bending the pipe. (Ord. 85500 § 5415 added by Ord. 95566; February 23, 1967).

3.54.160 Manual shut-off valves. Gas shut-off valves controlling several piping systems shall be placed such distance from each other that they will be easily accessible for operation and shall be installed so as to be protected from physical damage. Such valves shall be plainly marked with a suitable tag by the installer.

In multiple tenant buildings supplied through a master meter or one service regulator when a meter is not provided, or where meters or service regulators are not readily accessible from the appliance location, an individual shut-off valve for each apartment, or for each separate house line, shall be provided at a convenient point of general accessibility.

In a common system serving a number of individual buildings, shut-off valves shall be installed at each building.

An approved gas shut-off valve shall be installed upstream of the union connection on every gas appliance and within six (6) feet of the appliance served. (Ord. 85500 § 5416 added by Ord. 95566; February 23, 1967).

3.54.170 Special provisions. Gas pipe shall not be bent. Fittings shall be used when making turns in gas pipe.

Gas pipe or tubing and fittings shall be clear and free from cutting burrs and defects in structure or threading and shall be thoroughly brushed and scale blown.

Defects in pipe, fittings or threads shall not be repaired. When defective pipe or fittings are located in a system the defective pipe or fitting shall be replaced.

Gas piping shall not be run in or through an air duct, chimney or gas vent, ventilating duct, clothes chute, dumbwaiter, or elevator shaft.

No device shall be placed inside the gas piping or fittings that will reduce the cross-sectional area or otherwise obstruct the free flow of gas. (Ord. 85500 § 5417 added by Ord. 95566; February 23, 1967).

3.54.180 Gas piping in mobile home and travel trailer parks. Gas piping systems in mobile home and travel trailer parks extending from the outlet of a meter set assembly or the outlet of a service regulator when a

meter is not provided to the terminal of the gas riser at each trailer site shall comply with the following specific provisions and with all other applicable provisions of this chapter.

Piping shall be buried to provide a cover of not less than twelve (12) inches to protect the piping system from physical damage.

Piping shall not be installed under trailer sites and patio slabs adjacent to trailers when an enclosing foundation is used under the trailer.

The gas riser to each trailer site shall be placed in the rear one-third section of the site and not less than eighteen (18) inches from the road-side wall of the trailer. It shall be located and protected or supported so as to minimize the likelihood of damage by moving vehicles. The minimum size of the gas piping outlet at a trailer site shall be three-quarters ($\frac{3}{4}$) inch for other than undiluted liquefied petroleum gases.

Outlets for the individual trailers and gas piping to any building supplied by the system shall be provided with a readily accessible approved valve which cannot be locked in the open position.

A readily accessible valve shall be provided near the point of gas delivery for shutting off the entire trailer park system. The valve provided by the serving gas supplier may be considered acceptable for this purpose provided it is readily accessible.

Trailers shall be connected to the gas piping system with listed connectors or semi-rigid tubing. Connectors having aluminum exterior surfaces shall not be used.

Demand Factors: (a) The hourly volume of gas required for any trailer site gas outlet or any section of a trailer park gas piping system may be computed from the following table.

(b) Other gas equipment or appliances, other than trailer site outlets, shall be computed at the manufacturer's maximum cubic foot per hour input rating and shall be added to the figures given in the following table.

**DEMAND FACTORS FOR USE IN CALCULATING
GAS PIPING SYSTEMS IN TRAILER PARKS**

No. of Trailer Sites	B.T.U. Per Hour Per Trailer Site
1	125,000
2	117,000
3	104,000
4	96,000
5	92,000
6	87,000
7	83,000
8	81,000

9	79,000
10	77,000
11 - 20	66,000
21 - 30	62,000
31 - 40	58,000
41 - 60	55,000
Over 60	50,000

(Ord. 85500 § 5418 added by Ord. 95566; February 23, 1967).

3.54.190 Appliance connections to building piping. Non-portable appliances such as central heating, room heaters, and similar equipment shall be connected with rigid piping, except when semi-rigid tubing is used in accordance with Section 3.54.100 the tubing may be connected directly to the appliance.

Domestic gas ranges, hot plates, refrigerators, dryers, water heaters, or appliances of similar nature shall be connected with rigid pipe, semi-rigid tubing or appliance connectors of flexible metal tubing and fittings which meet the specifications of the American Standards Association, A.S.A. Z21.24-1963 (C.F. 257212) and Addenda Z21.24a-1965 (C.F. 257213). When a semi-rigid tubing connector or a connector of a flexible metal tubing and fittings is used, it shall connect to an outlet in the same room as the appliance. The length of the connector shall not exceed six (6) feet. The connector or tubing shall be installed so as to be protected against physical damage.

Aluminum alloy connectors may be used only in interior locations where they shall not be in contact with masonry, plaster, or insulation nor be subject to repeated corrosive wettings.

The connection of an appliance with any type of gas hose is prohibited, except when used with laboratory or shop equipment that requires mobility during operation. Such connections shall have the shut-off or stopcock installed at the connection to the building piping. When gas hose is used, it shall be of the minimum practical length, but not to exceed six (6) feet, except for hand torches and special mobile equipment, and shall not extend from one room to another nor pass through any walls, partitions, ceilings or floors. Under no circumstances shall gas hose be concealed from view or used in a concealed location. Only listed gas hose shall be used and only in accordance with its listing. Gas hose shall not be used where it is likely to be subject to excessive temperature (above 125°F.) nor shall it be used as a substitute for a standard appliance connector.

Outdoor portable appliances may be connected with an approved outdoor hose connector not to exceed fifteen (15) feet in length provided it connects outdoors to approved gas piping including an approved valve at the inlet of the hose connector.

Approved log lighters may be installed in fireplaces providing the control valve is an approved type for such use and installed within four (4) feet of the lighter and outside of the fireplace opening. Gas piping between the control valve and the lighter shall be wrought iron or steel and fittings shall be of malleable iron or steel. The fireplace throat opening to the chimney shall have an unrestricted opening equal to one (1) square inch for each 6,000 B.T.U. per hour input to the lighter. A chimney serving a fireplace where a lighter is installed shall not be interconnected with vents serving other appliances.

Where liquefied petroleum gas is supplied from I.C.C. cylinders not over seven and seventy-five hundredths (7.75) cubic feet per cylinder, seamless copper tubing of standard grades of K or L, or equivalent, may be used for connection between the cylinders and the appliance. (Ord. 85500 § 5419 added by Ord. 95566; February 23, 1967).

3.54.200 Test of piping for tightness. Before the piping is approved and equipment on gas supply is connected, a test for tightness shall be made by the installer in the presence of the Director. If the Director is not available, an alternate procedure as approved by him may be followed. The installer shall provide all equipment necessary to apply the test.

To test for tightness, systems operating at pressures of one-half pound per square inch ($\frac{1}{2}$ p.s.i.) or less shall be tested with a minimum pressure of six (6) inches of mercury or not less than three (3) pounds gauge for a minimum period of ten (10) minutes, except an alternate method approved by the Director may be used to test outlet connections and minor fuel line extensions. Systems with pressures in excess of one-half pound per square inch ($\frac{1}{2}$ p.s.i.) shall be subjected to a pressure of at least one and one-half ($1\frac{1}{2}$) times the proposed maximum operating pressure, but not less than thirty pounds per square inch (30 p.s.i.), and the system shall hold the required pressure for not less than one (1) hour without showing any drop in pressure after the test gas in the pipe has been given time to arrive at an ambient temperature. Pipe systems of two hundred (200) feet or more of four (4) inch pipe size or larger shall be tested for a longer period as determined by the Director.

For test purposes, air or an inert gas such as carbon dioxide or nitrogen as approved by the Director shall be used as the pressuring medium, or piping may be tested by some other method similarly approved.

The gas appliance shut-off valve shall be included in a fuel line test.

Leaks in gas piping shall be located by applying soapy water to the exterior of the piping, or by other approved methods. (Ord. 85500 § 5420 added by Ord. 95566; February 23, 1967).

3.54.210 Checking for leakage with meter. Immediately after turning

gas into piping, the system shall be checked to ascertain that no gas is escaping by observation of the test dial.

If observation reveals no movement, the pipe shall be purged and a small gas burner lighted and the test dial again observed. If the dial hand now moves, the system is operating properly. If the dial hand does not move, the meter test is not valid. (Ord. 85500 § 5421 added by Ord. 95566; February 23, 1967).

3.54.220 Permit required. It shall be unlawful to install, extend, alter, replace or repair any gas piping without first obtaining a permit as required by the Director; except that no permit shall be required for minor repairs such as adjustment of appliances, replacement of parts, repairing leaks, and similar work.

Application for a gas piping permit shall be made to the Director on a form provided by him. Such permit shall state the kind of work to be done thereunder and shall be signed by the owner of the premises upon which the work is to be done or by his authorized representative.

Permits as required for the installation of appliances, gas burners, and other gas-fired equipment or accessories shall be obtained from the Superintendent of Buildings. (Ord. 85500 § 5422 added by Ord. 95566; February 23, 1967).

3.54.230 Posting of permits. Permits shall be posted in a conspicuous place on the building or premises wherein the work is being done and shall remain posted until the completion of the work. Permits shall expire one (1) year after date of issue. (Ord. 85500 § 5423 added by Ord. 95566; February 23, 1967).

3.54.240 Permit for additional work. When a permit has been issued, no work not authorized by the permit shall be done without a new permit covering such additional work. (Ord. 85500 § 5424 added by Ord. 95566; February 23, 1967).

3.54.250 Suspension of work. The Director may order the immediate suspension of all or any portion of gas fitting work by attaching notice to that effect on the premises whenever it is found by him that such work is being performed without a lawful permit or that such work or material used is not in accordance with the provisions of this chapter. Whenever suspension has been so ordered, it shall be unlawful for any person to proceed with further work without authorization by the Director. (Ord. 85500 § 5425 added by Ord. 95566; February 23, 1967).

3.54.260 Revocation of permit. The Director may revoke any permit issued hereunder if it is found by him that the work permitted is being performed in violation of the terms of the permit or the provisions of this

chapter. Whenever a permit is revoked, the Director shall give notice of the reason for such revocation. (Ord. 85500 § 5426 added by Ord. 95566; February 23, 1967).

3.54.270 Notice for inspection required. When work is ready for inspection, the Director shall be notified, and the installer shall keep all work open until it is inspected and approved. The Director shall inspect all work within one (1) working day after having been so notified and the installer shall apply the test herein required in the Director's presence.

If, upon inspection, the Director finds the work or material used is not in accordance with the provisions of this chapter, he shall post a written notice upon the premises or mail or deliver such notice to the installer, stating the corrections required. Refusal or failure to comply with any such notice within ten (10) days of posting or receipt thereof, shall constitute a violation of this code.

In addition to inspection of all gas piping under permit, the Director shall inspect the installation of water heaters and room heaters for proper clearances, air for combustion and ventilation, and venting to an existing chimney or vent. He may cause to be disconnected and discontinue service to any gas piping or appliance which, upon inspection, shall be found to be defective or in such condition as to endanger life or property. Whenever such a disconnection is made, notice shall be affixed thereto, stating the reasons for such disconnection, and it shall be unlawful for any person to reconnect said gas piping or appliance without authorization by the Director. (Ord. 85550 § 5427 added by Ord. 95566; February 23, 1967).

3.54.280 Certification of final inspection. After final inspection and upon approval of work for which a specific permit has been issued, the Director shall attest such approval on said permit. (Ord. 85500 § 5428 added by Ord. 95566; February 23, 1967).

3.54.290 Special conditions. Where conditions arise that a deviation from the provisions of this chapter becomes necessary, the Director may permit such deviation as, in his judgment, the conditions require. (Ord. 85500 § 5429 added by Ord. 95566; February 23, 1967).

3.54.300 Right of entry. The Director shall have access to all buildings and all gas piping therein at reasonable times to perform any duty imposed upon him by this chapter. (Ord. 85500 § 5430 added by Ord. 95566; February 23, 1967).

3.54.310 Gas appliance—Approval. Each appliance and accessory shall comply with applicable standards of the American Standards Association

as determined by an approved testing agency. Where no such standards exist, approval of the Superintendent of Buildings shall be obtained before the appliance or accessory is installed.

All automatically controlled water heating equipment, space heating equipment, air conditioning equipment, refrigerators, direct air heaters, boilers and clothes dryers, when not approved by an approved testing agency as complying with applicable standards of the American Standards Association, and all conversion burners installed in such equipment shall be subject to the following requirements:

Each appliance with an input over 400,000 B.T.U. per hour or each separate unit of an appliance supervised by an individual pilot and having an input over 400,000 B.T.U. per hour shall be equipped so as to turn off the main burner supply within two (2) to four (4) seconds after the supervised flame is extinguished.

Where liquefied petroleum gas is utilized as a fuel, the automatic pilot shall turn off the pilot flame as well as the main burner flame within the time period allowed in the foregoing requirement. (Ord. 85500 § 5431 added by Ord. 95566; February 23, 1967).

3.54.320 Tentative approval of new devices. If it is impractical to conduct adequate tests prior to installation, the authority having jurisdiction may grant tentative permission to make the installation as proposed, but final approval shall not be given until tests conducted after installation show that the material, device, fixture, method of assemblage, installation, appurtenance, or appliance meets the requirements of this chapter. (Ord. 85500 § 5432 added by Ord. 95566; February 23, 1967).

3.54.330 Appliance installation—General requirements. The installation of gas appliances shall conform to the conditions of approval. Every appliance shall be located so that it will be readily accessible for servicing.

Gas appliances shall be located or reasonably protected, so that they are not subject to physical damage.

Gas appliances shall be adequately supported and so connected to the piping as not to exert undue strain on the connections.

Where air or oxygen under pressure is used in connection with the gas supply, effective means shall be provided to prevent air or oxygen from passing into the gas piping. (Ord. 85500 § 5433 added by Ord. 95566; February 23, 1967).

3.54.340 Permissible temperature on combustible materials. All gas appliances and their vent connectors shall be installed so that operations will not raise the temperature of unprotected combustible walls, partitions, floors or ceilings more than ninety degrees Fahrenheit (90°F) above normal room temperature when measured with mercury thermometers or conventional bead type thermocouples.

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Minimum clearances between combustible materials and appliances and their vent connectors may be reduced in accordance with Table 50-A. (Ord. 85500 § 5434 added by Ord. 95566; February 23, 1967).

3.54.350 Air for combustion and ventilation. Air for combustion and ventilation shall be as required in Section 3.50.050 (Ord. 85500 § 5435 added by Ord. 95566; February 23, 1967).

3.54.360 Installation requirements for specific appliances. Nothing in the following sections (Sections 3.54.370 to 3.54.520, inclusive) shall be construed as superseding or nullifying any provision of any section of this chapter.

The provisions of these sections set forth requirements for the installation of specific appliances in addition to the requirements of other sections. (Ord. 85500 § 5436 added by Ord. 95566; February 23, 1967).

3.54.070 Domestic ranges. Listed domestic ranges (except bungalow and dual oven type combination ranges) when installed on combustible floors shall be set on their own bases or legs and shall be installed with clearances of not less than shown on the marking plate and the manufacturer's instructions. In the absence of clearance information on the marking plate, the range shall be installed with clearances of not less than that shown in Table No. 54-B. The clearance shall not interfere with requirements for combustion air and accessibility.

**TABLE NO. 54-B
MINIMUM CLEARANCES FOR LISTED DOMESTIC RANGES,
UNLESS OTHERWISE MARKED**

Type of Range	Spacing of Center Line of Top Burners From Side of Range	Distance from Combustible Material — Inches			
		Sides		Rear	
		Wall Not Extending Above Cooking Top	Wall Extending Above Cooking Top	Body of Range	Projecting Flue Box
Insulated	Less than 10 in.	½	4½	1	1
Insulated	10 in. or more	½	½	1	1
Flush to Wall	Less than 10 in.	Flush	4½	Flush	—
Flush to Wall	10 in. or more	Flush	Flush	Flush	—

Bungalow type domestic ranges or dual oven type combination ranges shall be spaced from combustible construction and otherwise installed in accordance with the standards applying to the supplementary fuel section of the range. Where gas is used as the fuel for the supplementary section of a bungalow range, the minimum clearance between the back of the unit and combustible construction shall be in accordance with minimum clearances for listed gas-fired room heaters.

Domestic ranges shall have a vertical clearance above the cooking top of not less than thirty (30) inches to combustible construction. When the underside of such combustible construction is protected with asbestos mill board at least one-quarter ($\frac{1}{4}$) inch thick covered with sheet metal of not less than No. 28 U.S. Standard gauge, the clearance shall be not less than twenty-four (24) inches. The protection shall extend nine (9) inches horizontally beyond the sides of the range. (Ord. 85500 § 5437 added by Ord. 95566; February 23, 1967).

3.54.380 Water heaters. Water heaters, with the exception of those having sealed combustion systems, shall not be installed in bathrooms or bedrooms, or in other enclosed occupied spaces unless such other spaces are provided with adequate combustion air and ventilation as required.

Listed water heaters shall be installed in accordance with their listing and the manufacturer's instructions. In no case shall the clearance be such as to interfere with the requirements for combustion air, draft hood clearance and relief, and accessibility for servicing. (See Table No. 54-C).

TABLE NO. 54-C

MINIMUM CLEARANCES FOR LISTED WATER HEATERS

Type of Heater	Distance from Combustible Material (Inches)	
	Nearest Part of Jacket	Flat Side
Type A	6	-----
Type B	2	-----
Type C	-----	Flush
Counter Type Unit.	In accordance with manufacturer's instructions	

Type A—Miscellaneous (including circulating tank, instantaneous, un-insulated, underfired)

Type B—Underfired, insulated automatic storage heaters.

Type C—Type B units with one or more flat sides and tested for installation flush to wall.

Counter Type—Type E units specifically designed for installation in or beneath a counter.

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Water heaters shall be connected in a manner to permit observation, maintenance, and servicing.

An automatic storage type water heater or a hot water heater storage vessel shall be installed with an automatic gas shut-off system, or a temperature relief valve, or a combination temperature and pressure relief valve.

A listed pressure relief valve shall be installed on every water heater which is to be used in a commercial establishment. Pressure relief valves shall be installed in the cold water supply and temperature and pressure relief valves on the hot water supply at the first fitting from the tank.

No valve shall be installed between a pressure relief valve and the tank which it protects. Each pressure relief valve discharge shall be piped to within six (6) inches of the floor or grade. Temperature or temperature and pressure relief valves shall be piped to a proper drain or by an air gap drain to the outside, or the drain may be piped to within six (6) inches of the floor adjacent to the heater, providing the heater is installed in an uninhabited room on the bottom floor of the building and if the water discharged on the floor would not cause any material damage.

An automatic water heater installed in series with other water heating units shall be the last water heater in the series. (Ord. 85500 § 5438 added by Ord. 95566; February 23, 1967).

3.54.390 Room heaters. A room heater shall be placed so as not to cause either a hazard to walls, floors, curtains, furniture and doors or an obstruction to the free movements of persons within the room. Appliances designed and marked "For use in noncombustible fire resistive fireplace only," shall not be installed elsewhere. Listed room heaters shall be installed at least six (6) inches from combustible construction, provided that at least two (2) inch clearance shall be maintained between the flue box or draft hood and combustible construction (subject to reduction in accordance with Table No. 54-A). Appliances listed for installation at lesser clearance may be installed in accordance with their listings. In no case shall the clearances be such as to interfere with the requirements of combustion air and accessibility. Room heaters installed in sleeping quarters, including those in hotels and motels, shall be of the vented type and shall be connected to an effective chimney or gas vent and equipped with an automatic pilot. (Ord. 85500 § 5439 added by Ord. 95566; February 23, 1967).

3.54.400 Central heating boilers and furnaces. Listed central heating boilers and furnaces shall be installed with clearances not less than specified in Sections 3.54.040 and 3.52.130. Central heating boilers and furnaces listed for installation at clearances other than specified in said sections may be installed in accordance with their listing and the manufacturer's instructions.

A central heating boiler or furnace shall be erected in an approved manner and shall be installed on a firm, level, fireproof foundation unless listed for installation on a combustible floor, or the floor is protected in an approved manner.

The installation of central heating boilers and furnaces shall be such as to make them accessible for inspection by the Superintendent of Buildings. No forced air or gravity central heating furnaces shall be located in any room used or designed to be used for sleeping purposes, bathroom, clothes closet, or in any confined space with access only to the above locations. No warm air furnace shall be located in or serve any surgical operating room or other location where circulation of contaminated air could create hazard. (Ord. 85500 § 5440 added by Ord. 95566; February 23, 1967).

3.54.410 Vented wall furnaces. Listed wall furnaces shall be installed in accordance with their listing and the manufacturer's instructions. Listed wall furnaces may be installed in or attached to combustible material.

Wall furnaces shall be located so as not to cause a fire hazard. Wall furnaces installed between bathroom and adjoining rooms shall not circulate air from bathrooms to other parts of the building.

The installation of wall furnaces shall be such as to make them accessible for inspection by the Superintendent of Buildings. Panels, grilles and access doors which must be removed for normal servicing operations shall not be attached to the building construction. (Ord. 85500 § 5441 added by Ord. 95566; February 23, 1967).

3.54.420 Floor furnaces. Listed floor furnaces may be installed on combustible floors, but shall be installed only on the first floor of any building.

Fixed ventilation by means of a duct or grille arranged to supply air from a permanently ventilated attic or underfloor space shall be provided to any confined space which encloses the floor furnace. The duct or grille shall be screened and have a free area of at least one (1) square inch per thousand (1,000) B.T.U. per hour of input, and shall be installed in such a manner as to insure adequate combustion.

No floor furnace shall be installed in the floor of any aisle or passageway of any place of assembly, or in any exit way from any such room or space.

The grille of a floor furnace with a horizontal warm air outlet shall not be placed closer than six (6) inches to the nearest wall. A distance of at least fifteen (15) inches from two adjoining sides of the floor grille to walls shall be provided to eliminate the necessity of occupants walking over the warm air discharge from grilles. Wall-register models shall not be placed closer than six (6) inches to a corner.

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The furnace shall be so placed that a door, drapery, or similar object cannot be nearer than twelve (12) inches to any portion of the register of the furnace.

The floor around the furnace shall be braced and headed with a framework of material not lighter than the joists or girders.

Floor furnaces shall be supported independently of the grills.

The lowest portion of the floor furnace shall have at least eighteen (18) inches clearance from the general ground level. A twelve (12) inch clearance shall be provided on all sides except the control side, which shall have an eighteen (18) inch clearance.

The space in which any floor furnace is installed shall be accessible by an opening in the foundation not less than twenty-four (24) inches by twenty-four (24) inches in any cross-section thereof, and an unobstructed passageway not less than twenty-four (24) inches wide by thirty-six (36) inches high in any cross section thereof. The passageway shall be continuous from the opening to the furnace controls and valves, and the opening to the passageway shall be located not more than twenty (20) feet from the furnace. (Ord. 85500 § 5442 added by Ord. 95566; February 23, 1967).

3.54.430 Attic furnaces. Only furnaces listed for attic installation shall be installed in attics. Any furnace installed in an attic shall be accessible by an opening and passageway as large as the largest piece of furnace, but not less than thirty (30) inches by thirty (30) inches which passageway shall be continuous from the opening to the furnace control and valves. The opening to the passageway shall be located not more than twenty (20) feet from the furnace. An electric light shall be provided at or near the furnace location, controlled by a switch located ahead of the passage opening. Every passageway shall have solid continuous flooring not less than twenty-four (24) inches wide from the entrance opening to the furnace. A ladder permanently fastened to the building or equal access shall be provided leading to the attic opening. (Ord. 85500 § 5443 added by Ord. 95566; February 23, 1967).

3.54.440 Duct furnaces. Listed gas-fired duct furnaces shall be installed with clearances in accordance with Section 3.50.040.

A duct furnace shall be erected and firmly supported in an approved manner.

The installation of duct furnaces shall be such as to make them accessible for inspection by the Superintendent of Buildings.

The ducts connected to or enclosing duct furnaces shall have removable access panels on both upstream and downstream sides of the furnace.

The controls and draft hoods for duct furnaces shall be located outside the ducts. The draft hood shall be located in the same enclosure from which the combustion air is taken.

Circulating air shall not be taken from the same enclosure in which the furnace is located.

Duct furnaces when used in conjunction with a refrigeration system shall not be located downstream from the evaporator coil. (Ord. 85500 § 5444 added by Ord. 95566; February 23, 1967).

3.54.450 Conversion burners. Installation of conversion burners shall conform to American Standard Requirements for Installation of Domestic Gas Conversion Burners, Z 21.8-1965 (C.F. 257214). (Ord. 85500 § 5445 added by Ord. 95566; February 23, 1967).

3.54.460 Unit heaters. Suspended type unit heating appliances shall be safely and adequately supported with due consideration given to their weight and vibration characteristics. Hangers and brackets shall be of non-combustible material. The location of any unit heater or the duct work attached thereto shall be such that a negative pressure will not be created in the room in which the unit heater is located.

Listed floor mounted type unit heaters shall be installed with clearance from combustible material at the back and one side only of not less than six (6) inches. When the flue gases are vented horizontally, the six (6) inch clearance shall be measured from the draft hood or vent instead of the rear wall of the unit heater.

Floor mounted type unit heaters listed for reduced clearances may be installed at the clearances marked on the unit from the back, two side walls and ceiling. Walls and ceiling shall have at least six (6) inches clearance from the draft hood relief openings and the nearest point of the draft hood exterior to the unit.

Listed suspended type unit heaters shall be installed with clearance from combustible material of not less than eighteen (18) inches at the sides, twelve (12) inches at the bottom and six (6) inches above the top when the unit heater has an internal draft hood or one (1) inch above the top of the sloping side of a vertical draft hood.

Suspended type unit heaters listed for reduced clearances may be installed in accordance with the clearance marked on the unit which will require not less than six (6) inches from the draft hood relief opening and six (6) inches above an elbow attached directly to the draft hood outlet.

A unit heater shall not be attached to a warm air duct system unless listed and marked for such installation.

A face extension of the same cross-sectional dimensions as the warm air outlet of the unit heater and not exceeding five (5) feet in length is not considered to be a warm air duct system.

Unit heaters installed in garages for more than three (3) motor vehicles or in airplane hangars shall be of a type listed for such use and shall be installed so that the bottom of the heater is at least eight (8) feet above the floor. (Ord. 85500 § 5446 added by Ord. 95566; February 23, 1967).

3.54.470 Infrared radiant heaters. Suspended type infrared radiant heaters shall be safely and adequately fixed in position independent of gas and electric supply lines. Hangers and brackets shall be of noncombustible material.

Listed heaters shall be installed with clearances from combustible material of not less than shown on the marking plate and in the manufacturer's instructions. (Ord. 85500 § 5447 added by Ord. 95566; February 23, 1967).

3.54.480 Clothes dryers. (a) **CLEARANCE.** Listed Type 1 clothes dryers shall be installed with minimum clearance of six (6) inches from adjacent combustible material except that clothes dryers listed for installation at lesser clearances may be installed in accordance with their listing.

Listed Type 2 clothes dryers shall be installed with clearance of not less than shown on the marking plate and in the manufacturer's instructions. Type 2 clothes dryers designed and marked "For use only in fire-resistive locations" shall not be installed elsewhere.

Unlisted clothes dryers shall be installed with clearances to combustible material of not less than eighteen (18) inches. Combustible floors under unlisted clothes dryers shall be protected in an approved manner.

(b) **EXHAUSTING TO OUTSIDE AIR.** Type 1 clothes dryers shall not be installed in bathrooms or bedrooms unless exhausted to the outside air.

Type 2 clothes dryers shall be exhausted to the outside air.

When a Type 1 clothes dryer is exhausted to the outside, consideration shall be given to provision for make-up air.

Provision for make-up air shall be provided for Type 2 clothes dryers, with a minimum free area of one (1) square inch for each 1,000 B.T.U. per hour total input rating of the dryer(s) installed.

(c) **EXHAUST DUCTS.** A clothes dryer exhaust duct shall not be connected into any vent connector, gas vent or chimney.

Ducts for exhausting clothes dryers shall not be put together with sheet metal screws or other fastening means which extend into the duct and which would catch lint and reduce the efficiency of the exhaust system.

Exhaust ducts for Type 2 clothes dryers shall be constructed of sheet metal or other noncombustible material. Such ducts shall be of adequate strength to meet the conditions of service with minimum thicknesses equivalent to No. 22 galvanized sheet gauge.

Exhaust ducts for Type 2 clothes dryers shall have a minimum clearance of six (6) inches to combustible material except that they may be installed with reduced clearance provided the combustible material is protected as described in Table 50-A.

When ducts pass through walls, floors or partitions, the space around the duct shall be sealed with noncombustible material.

Multiple installations of Type 2 clothes dryers shall be made in a manner to prevent adverse operation due to back pressures that might be created in the exhaust systems.

(d) MULTIPLE FAMILY OR PUBLIC USE. Clothes dryers installed for multiple family or public use shall be equipped with approved automatic pilots. (Ord. 85500 § 5448 added by Ord. 95566; February 23, 1967).

3.54.490 Hot plates and laundry stoves. Listed domestic hot plates and laundry stoves when installed on combustible surfaces shall be set on their own legs or bases. They shall be installed with minimum horizontal clearances of six (6) inches from combustible material.

The vertical distance between tops of all domestic hot plates and laundry stoves and combustible material shall be at least thirty (30) inches. (Ord. 85500 § 5449 added by Ord. 95566; February 23, 1967).

3.54.500 Hotel and restaurant ranges, deep fat fryers and unit broilers. Listed hotel and restaurant ranges, deep fat fryers and unit broilers, when set on their own bases or legs, may be installed on unprotected floors unless marked "For use only in fireproof location."

Hotel and restaurant ranges, deep fat fryers, and unit broilers which are not listed for mounting on a combustible floor shall be mounted on fireproof floors or be mounted in accordance with one of the following paragraphs, or in some manner substantially equivalent thereto that is acceptable to the Superintendent of Buildings.

(a) Where the appliance is set on legs which provide not less than eighteen (18) inches open space under the base of the appliance, or where it has no burners and no portion of any oven or broiler within eighteen (18) inches of the floor, it may be mounted on a combustible floor without special floor protection, provided there is at least one (1) sheet metal baffle between the burner and the floor.

(b) Where the appliance is set on legs which provide less than eighteen (18) inches but not less than eight (8) inches open space under the base of the appliance, it may be mounted on combustible floors, provided

the floor under the appliance is protected with not less than three-eighths ($\frac{3}{8}$) inch asbestos mill board covered with sheet metal of not less than six (6) inches beyond the appliance on all sides.

(c) Where the appliance is set on legs which provide less than eight (8) inches but not less than four (4) inches under the base of the appliance, it may be mounted on combustible floors, provided the floor under the appliance is protected with hollow masonry not less than four (4) inches in thickness covered with sheet metal of not less than No. 24 U.S. Standard gauge. Such masonry courses shall be laid with ends unsealed and joints matched in such a way as to provide for free horizontal circulation of air through the masonry. The hollow masonry shall be kept in place by a holding strip fastened to the floor on all four sides. The ends of hollow masonry shall be not less than three (3) inches from any wall or obstruction.

(d) Where the appliance does not have legs at least four (4) inches high, it may be mounted on combustible floors, provided the floor under the appliance is protected by two (2) courses of four (4) inch hollow masonry with courses laid at right angles and with ends unsealed and joints matched in such a way as to provide for free horizontal circulation of air through such masonry courses and covered with steel plate not less than three-sixteenths ($\frac{3}{16}$) inch in thickness. The masonry shall be kept in place by a holding strip fastened to the floor on all four sides. The ends of the masonry shall be not less than three (3) inches from any wall or obstruction.

Listed hotel and restaurant ranges, deep fat fryers and unit broilers shall be installed at least six (6) inches (subject to reduction in accordance with Table 50-A) from combustible material except that at least two (2) inch clearance shall be maintained between the flue box or draft hood and combustible material. Appliances designed and marked "For use only in fireproof locations" shall not be installed elsewhere.

Unlisted specially designed hotel and restaurant appliances shall be placed not closer than eighteen (18) inches to any combustible material, unless such combustible material is protected as specified in Table No. 50-A. Vertical distance from cooking top at front of appliance shall not be less than forty-eight (48) inches from combustible materials.

Any portion of combustible material adjacent to a cooking top section of a hotel or restaurant range, even though certified for close-to-wall installation, which is not shielded from the wall by a high shelf, warming closet, etc., shall be protected for a distance of at least two (2) feet above the surface of the cooking top.

Adequate means shall be provided to properly ventilate the space in which hotel and restaurant equipment is installed to permit proper combustion of the gas. When exhaust fans are used for ventilation, means

shall be provided to avoid interference with the operation of the equipment. (Ord. 85500 § added by Ord. 95566; February 23, 1967).

3.54.510 Gas counter appliances. A vertical distance of not less than forty-eight (48) inches shall be provided between the top of all commercial hot plates and griddles and combustible material.

Listed gas counter appliances such as commercial hot plates and griddles, food and dish warmers, coffee brewers and urns, waffle bakers and hot water immersion sterilizers, when installed on combustible surfaces shall be set on their own bases or legs, and shall be installed with a minimum horizontal clearance of six (6) inches from combustible material, except that at least a 2-inch clearance shall be maintained between the flue box or draft hood and combustible material, unless such combustible material is protected as specified in Table No. 50-A.

Unlisted specially designed commercial hot plates and griddles shall be installed with a horizontal clearance (subject to reduction in accordance with Table No. 50-A) from combustible material of not less than eighteen (18) inches. Unlisted specially designed counter appliances such as coffee brewers and urns, waffle bakers, and hot water immersion sterilizers shall be installed with a horizontal clearance from combustible material of not less than twelve (12) inches. Gas counter appliances may be installed with lesser clearance than specified above where the combustible material is protected in an approved manner. Unlisted specially designed food and dish warmers shall be installed with a horizontal clearance from combustible material of not less than six (6) inches. (Ord. 85500 § 5451 added by Ord. 95566; February 23, 1967).

3.54.520 Other appliances. Gas appliances and equipment not specifically referred to in this chapter shall be constructed and installed so as to conform to applicable provisions of this chapter and nationally recognized standards of safety, such as those of the National Fire Protection Association. (Ord. 85500 § 5452 added by Ord. 95566; February 23, 1967).

3.54.530 Venting of appliances. Every appliance shall be effectively vented to the out of doors. See also Chapter 3.37.

EXCEPTIONS:

1. Listed ranges.
2. Built-in domestic cooking units listed and marked as unvented units.
3. Listed hot plates and listed laundry stoves, provided that those installed in sleeping rooms shall be equipped with a pilot flame for each burner and an automatic device to shut off the gas supply when the pilot flame is extinguished.

4. Listed Type 1 clothes dryers.

5. Approved make-up air heaters, provided that such heaters are installed only in Groups F and G occupancies where highly flammable or combustible materials are not handled.

*6. A single listed booster type (automatic instantaneous) water heater when designed and used solely for the sanitizing rinse requirements of a National Sanitation Foundation Class 1, 2 or 3 dishwashing machine, provided that the input is limited to 50,000 B.T.U. per hour, the storage capacity is limited to 12.5 gallons, and the heater is installed in a commercial kitchen having an approved mechanical exhaust system.

*7. Listed refrigerators, provided that gas refrigerators shall not be installed in bedrooms.

*8. Counter appliances.

*9. Other appliances, except room heaters, listed for unvented use and not provided with flue collars.

*10. Specialized equipment of limited input such as laboratory burners or gas lights.

When any or all of the appliances starred above (*) are installed so that the aggregate input rating exceeds 30 B.T.U. per hour per cubic foot of room or space in which they are installed, one or more of them shall be provided with a venting system or other approved means for removing the vent gases to the outside atmosphere so that the aggregate input rating of the remaining unvented appliances does not exceed the 30 B.T.U. per hour per cubic foot figure. When the room or space in which they are installed is directly connected to another room or space by a doorway, archway, or other opening of comparable size, which cannot be closed, the volume of such adjacent room or space may be included in the calculations. (Ord. 85500 § 5453 added by Ord. 95566; February 23, 1967).

3.54.540 Draft hoods. Every vented appliance, except incinerators, dual type combination ranges, sealed combustion system appliances and units designed for power burners or for forced venting, shall be installed with a draft hood. The draft hood supplied with or forming a part of listed vented appliances shall be installed without alteration, exactly as furnished and specified by the appliance manufacturer. If a draft hood is not supplied by the appliance manufacturer when one is required, it shall be supplied by the installing agency and be of a listed or approved type, and in the absence of other instructions shall be the same size as the appliance flue collar. When a draft hood is required with a conversion burner, it shall be of a listed or approved type supplied by the installing agency or as recommended by the manufacturer.

When the installer determines that a draft hood of special design or a barometric damper is needed or preferable for a particular installation, advice of the manufacturer, the serving gas supplier or authority having

jurisdiction shall be secured. When barometric dampers are used, they shall be an approved two-way type and installed in accordance with manufacturer's instructions. (Ord. 85500 § 5454 added by Ord. 95566; February 23, 1967).

3.54.550 Venting systems—General requirements. Every appliance designed to be vented shall be connected to a venting system as specified in this chapter and Chapter 37. Listed venting systems shall be installed in accordance with their listing and the manufacturer's instructions.

Venting systems shall be so designed and constructed as to develop a positive flow adequate to convey all combustion products to the outside atmosphere.

Venting systems may be designed in accordance with accepted engineering methods when such design method has been approved by the Superintendent of Buildings.

A venting system which is an integral part of the vented appliance shall be installed in accordance with the terms of its listing, manufacturer's installation requirements, and applicable requirements of this code.

Where Type B venting systems are installed within interior walls, partitions, joist spaces or other concealed spaces, all provisions of this section and other applicable sections of this chapter and Chapter 3.37 shall apply.

Positive means shall be provided to secure the venting system in such a position that the minimum required listed clearances or those specified in this chapter and Chapter 3.37 may be permanently maintained. (Ord. 85500 § 5455 added by Ord. 95566; February 23, 1967).

3.54.560 Vent connectors. See also Chapter 37.

(a) **MATERIALS.** Vent connectors used for conversion burners without draft hoods, incinerators and unlisted appliances without draft hoods shall be constructed of materials having a resistance to corrosion and heat not less than that of No. 24 galvanized sheet gauge.

Vent connectors used for gas appliances having draft hoods and for listed conversion burners having draft hoods shall be constructed of materials having a resistance to corrosion and heat not less than that of No. 28 galvanized sheet gauge, except that Type B vent material may be used as the connector between the draft hood and the chimney.

(b) **SIZE OF VENT CONNECTOR.** The effective area of the vent connector, when connected to an appliance having a single draft hood, shall be not less than the area of the draft hood outlet or shall be in accordance with approved engineering methods. Reference shall be made to Tables 1, 2 and 3 in Appendix D of A.S.A. Standard Z21.30, 1964 Edition (C.F. 257207).

For single appliances having more than one draft hood outlet, the instructions of the appliance manufacturer shall be followed. If there are none, the effective area of the vent connector shall equal the combined areas of the draft hood outlets for which it acts as a common connector to the venting system.

When two or more appliances are connected to a common vent or chimney, the effective area of each vent connector shall be not less than the area of the appliance draft hood outlet or shall be in accordance with approved engineering methods. Reference shall be made to Tables 4, 5 and 6 in Appendix D of A.S.A. Z21.30.

Each vent connector of a multiple venting system shall have the greatest possible vertical rise consistent with the headroom available between the draft hood outlet and the point of interconnect on to a manifold, to a common vent, or to a chimney, or the vertical rise shall be in accordance with approved engineering methods. Reference shall be made to Tables 4, 5 and 6 in Appendix D of A.S.A. Z21.30.

When the size of a connector is increased to overcome installation limitations and obtain connector capacity equal to the appliance input, the size increase shall be made at the appliance draft hood outlet.

(c) DAMPERS. No operative damper, unless interlocked to shut off the main burner under insufficient draft conditions, or heat extraction device shall be placed in any vent connector.

(d) CHIMNEY CONNECTIONS. A connector shall not be connected to a chimney having a fireplace opening.

An automatically controlled gas appliance connected to a chimney which also serves equipment for the combustion of solid or liquid fuel shall be equipped with an automatic pilot. A gas appliance vent connector and a chimney connector from an appliance burning another fuel may be connected through a single opening if joined by a suitable fitting located as close as practicable to the chimney. If two or more openings are provided into one chimney they shall be at different levels except that two openings may be at the same level if at right angles to each other.

In entering a chimney the connection shall be at least six (6) inches above the bottom to avoid stoppage. Masonry chimneys shall be provided with a cleanout which may be provided through a capped tee installed next to the chimney.

Existing chimneys which have been used with solid or liquid fuels shall not be used with gas exclusively until they have been thoroughly cleaned. (Ord. 85500 § 5456 added by Ord. 95566; February 23, 1967).

3.54.570 Venting through walls, floors, roofs, ceilings, and partitions. No venting system shall enter or pass through any required stairway, corridor or other required exit. Otherwise, venting shall be as set forth in this section.

(a) GENERAL REGULATIONS FOR TYPE B VENTING SYSTEMS:

1. Such venting systems shall not enter or pass through a clothes closet or other confined space containing combustible storage without encasement.

2. Such venting systems passing through combustible walls, roofs or partitions shall be guarded at the point of passage by a thimble consisting of a single concentric metal casing at least two (2) inches larger in diameter than the outside diameter of the vent pipe.

EXCEPTION: In passing through combustible walls, roofs or partitions not exceeding two (2) inches in thickness, a sheet metal plate cut to receive the vent pipe and fastened securely over the opening to provide required clearance may be substituted for the thimble.

3. Required enclosures for vents shall have no openings other than those required for entrance of the vent connector(s) and those permitted in the following subsection (a)4.

4. Any shaft or enclosure used for gas venting systems and another use shall have noncombustible fire resistive values of two (2) hours in all types of construction. Openings other than for gas venting systems shall be closed by self closing Class B fire doors. Ducts entering such shafts shall have fire dampers of value equal to fire doors.

5. Openings in floors, ceilings, or shafts for passage of venting systems shall be sealed tightly with noncombustible materials of fire resistive value equal to that required for such floor, ceiling, or shaft.

(b) OCCUPANCY REGULATIONS FOR TYPE B VENTING SYSTEMS:

1. In buildings of E-1 or E-2 occupancy see Fire Code.

2. Such venting systems penetrating Group H occupancy separations shall have not less than one (1) hour protection.

3. Enclosure shall in no case be less than occupancy separation penetrated.

(c) CONSTRUCTION REGULATIONS FOR TYPE B VENTING SYSTEMS: In those occupancy conditions of use where Type B vents are permitted, they may be used in buildings of the various construction types, as follows:

1. In buildings of Types III-N, IV-N and V-N construction when they are visible for inspection throughout their entire length.

2. In buildings with wood stud walls, to vent wall furnaces under the following conditions:

Studs shall not be less than 2 x 6 inches nominal and wood of stud spaces shall be lined with one-half inch gypsum wall-board or approved equivalent and shall be fire stopped at each floor level.

Wall furnace vents shall have a net clearance in accordance with con-

ditions of listing or where no such conditions are given of not less than one (1) inch from combustible construction.

A wall furnace so vented shall not exceed 65,000 B.T.U. per hour input rating and shall have a separate individual vent.

Not more than one vent shall be enclosed in a single stud space.

3. To pass through attics under the following conditions:

In buildings of Types I, II, and IV construction, where the attic is enclosed entirely by noncombustible construction and contains no ventilating ducts and provided that the vent in penetrating space between steel and its required protection or between a floor and its required ceiling below is enclosed in noncombustible construction of not less than one (1) hour fire resistance.

In buildings of Types III-H.T. or III-1 hr. construction, such vents shall be enclosed in noncombustible construction of not less than one (1) hour fire resistance or in galvanized metal pipe not lighter than 14 gauge, which pipe shall have not less than one (1) inch clearance to combustible material.

In buildings of Types III-N or V construction, such vents shall provide access for inspection through their full length in the attic whose enclosure integrity shall not be destroyed.

4. In buildings of Types I, II, III-1 hr. or H.T., IV-1 hr., and V-1 hr. construction where such vents serve one story only, they may pass through stories above that served when completely enclosed in one (1) hour fire resistive construction or galvanized metal pipe of not less than 14 gauge, which pipe shall have not less than one (1) inch clearance to combustible material.

5. In buildings of Types I, II, III-1 hr. or H.T., IV-1 hr., and V-1 hr. construction where such vents serve more than one story, they shall be enclosed in a noncombustible shaft with a fire resistive value of two (2) hours for Types I, II and III-1 hr. or H.T., and of one (1) hour for Types IV and V-1 hr.

(d) REQUIREMENTS FOR TYPE BW VENTS. Such vents listed only for single-story use shall be installed only in a single-story building or on the top story of a multi-story building. Such vents listed for multi-story use may be installed in either single-story or multi-story buildings. All such vents shall be installed in accordance with their listings and the manufacturer's instructions.

(e) REQUIREMENTS FOR SINGLE WALL VENTING SYSTEMS. Such venting systems shall be installed only within the room or space in which the vented appliance is located or through a noncombustible roof to the outer air. Such venting systems shall not be installed within walls, partitions, joist spaces, or in any concealed location nor shall pass through

combustible walls, floors, ceilings, roofs or partitions, or joists spaces.

An approved roof jack shall be provided where the vent passes through a roof. Clearances specified in Chapter 3.37 shall be maintained. (Ord. 85500 § 5457 added by Ord. 95566; February 23, 1967).

3.54.580 Outside vents. Outside vents shall be of Type B or approved chimneys. The vent top shall be located above the roof eaves or wall parapet. (Ord. 85500 § 5458 added by Ord. 95566; February 23, 1967).

3.54.590 Special venting arrangements. The provisions of Section 3.54.350 and Sections 3.54.530 to 3.54.570 inclusive do not apply to listed appliances having sealed combustion chambers and which are so constructed and installed that all air for combustion is derived from outside the space being heated and all flue gases are discharged to the outside atmosphere. Such appliances shall be installed in accordance with their listings, and shall be so located that any vent termination located at a building wall shall be at least six (6) feet from any air intake of a mechanical ventilating system.

Flue exhausters may be used with appliances in lieu of natural draft vents except on incinerators. With appliances requiring venting, provisions shall be made to prevent the flow of gas to the main burners in the event of failure of the exhaust system.

Flue exhausters shall be so installed that any vent termination located at a building wall shall be at least six (6) feet from any air intake of a mechanical ventilating system. Flue exhausters shall not discharge into any natural draft vent serving other appliances.

EXCEPTION: The provisions of Section 3.54.560, Vent connectors, do not apply to the installation of flue exhausters. (Ord. 85500 § 5459 added by Ord. 95566; February 23, 1967).

Chapter 3.55

VENTILATION

Sections:

- 3.55.010 Definition.
- 3.55.020 General.
- 3.55.030 Methods of producing ventilation.
- 3.55.040 Ventilating openings defined.
- 3.55.050 Area of ventilating openings.
- 3.55.060 Ventilation requirements.
- 3.55.070 Source of air supply.
- 3.55.080 Air inlets and outlets.
- 3.55.090 Point of exhaust discharge.
- 3.55.100 Toilet room systems.
- 3.55.110 Heating for mechanical systems.
- 3.55.120 Interpretation of requirements.
- 3.55.130 Ventilating openings kept closed.
- 3.55.140 Rooms for more than one purpose.
- 3.55.150 Partial story height partitions.
- 3.55.160 Method of determining compliance.
- 3.55.170 Instruments for taking readings.

3.55.010 Definition. For the purpose of this Chapter, ventilation is hereby defined as the providing and maintaining in rooms or spaces, by natural or mechanical means, minimum air conditions to protect the health of occupants thereof. (The comfort of such occupants may require more ventilation than the minimum health standards set forth in this Chapter.) (Ord. 85500 § 5501; Sept. 10, 1956).

3.55.020 General. Installation of all ventilating systems provided for in this Code shall conform to the provisions of this Chapter, (except where State laws or the Fire and Explosion Hazard Ordinance (Title 8) apply). Requirements, as herein stated, shall apply to every room hereafter erected, altered, or converted for the purposes enumerated or those purposes not enumerated but similar to those enumerated.

Openings required to remove heat or gasses for fire prevention, and for any other cause except health of the human occupants of the rooms shall be provided as required by other chapters of this Code. (Ord. 85500 § 5502; Sept. 10, 1956).

3.55.030 Methods of producing ventilation. Ventilation may be produced by:

(a) A natural ventilating system which depends on atmospheric conditions and the operation of exterior windows, transoms and other openings, together with the provisions of courts as specified in Section 3.05.100.

(b) A mechanical ventilating supply system which forces air into a room or space by artificial means combined with the removal of air through windows, skylights, doors, transoms, grilles, shafts, ducts or other openings.

(c) A mechanical ventilating exhaust system which removes air from a room or space by artificial means combined with a supply of air through windows, skylights, transoms, doors, grilles, ducts, or other openings. (Ord. 85500 § 5503; Sept. 10, 1956).

3.55.040 Ventilating openings defined. Ventilating openings in any room or space are hereby defined as apertures opening upon a public street or alley, court, public park, public waterway, or onto a roof of a building or structure in which the room or space is situated. They shall be doors, windows, skylights, transoms, or auxiliary openings which are provided for ventilating purposes and which are equipped with adjustable louvres, dampers, or other devices to deflect or diffuse the air currents. (Ord. 85500 § 5504; Sept. 10, 1956).

3.55.050 Area of ventilating openings. The area of ventilating openings shall be computed as follows:

WINDOWS: The maximum area that can be opened.

SKYLIGHTS: The minimum area of opening to the outer air through which air can flow.

TRANSOMS: The free area through the sashed opening.

AUXILIARY OPENINGS: The free area when louvres, dampers, or other devices are in position to deflect or diffuse the air currents. (Ord. 85500 § 5505; Sept. 10, 1956).

3.55.060 Ventilation requirements. Ventilation requirements shall be based on the purposes for which rooms are used, regardless of type or occupancy of building in which they are located, and shall be as set forth in Table No. 55-A.

The ventilating requirements for rooms not specified in Table No. 55-A but used for purposes similar to those enumerated shall be the same as those for room purposes of similar character.

Where conditions of occupancy can be clearly demonstrated to require less ventilation than specified in Table No. 55-A, the Superintendent of Buildings may permit such lesser ventilation.

The method of producing ventilation and the quantities of air to be supplied and exhausted by mechanical ventilation systems stated in Table No. 55-A are minimums required to safeguard health. Where it is stated that natural ventilation is required, this may be supplemented, but not replaced, by a mechanical ventilating supply system or a mechanical ventilating exhaust system, or both. (Ord. 85500 § 5506 as amended by Ord. 88324; June 24, 1959).

TABLE No. 55-A—MINIMUM VENTILATING REQUIREMENTS

CONDITIONS			REQUIREMENTS
ROOM PURPOSE	Areas of Ventilating Openings in Percentage of Floor Area		Cubic feet of air per minute supplied or exhausted per sq. foot of floor area of rooms. Except as otherwise noted S indicates mechanical supply. E indicates mechanical exhaust.
	Less Than	Not Less Than	
Anaesthetizing room			S 1.2 and E 1.2.
Apartment units			Natural ventilating openings at least 3% of gross floor area.
Assembly rooms (except those used for worship only) and Exhibition rooms (except picture galleries and rooms for permanent Exhibits)		Capacity 601 or more persons	S 15. and E 10. per person.
	5	Capacity 600 or less persons	S 15. per person. (E through shafts or other openings for natural exhaust having a total ventilating opening of not less than .5 of 1% of the floor area as uniformly distributed as practicable and open when the room is in use without causing objectionable drafts.)
Assembly rooms and Sunday Schools used for worship only	3		S 10/person.
Autopsy rooms	5		S 1.0 or E 1.0.
Bakeries		Stories below that nearest to grade	S 1.2 and E 1.2.
	5	Other stories	E .6.
Ballrooms	4		S 2.0 and E 1.0.
Banking rooms (public and teller spaces) and Safe Depositories		Stories below that nearest to grade	S 1.2 and either mechanical or gravity exhaust.
	5	Other stories	S 1.0 or E 1.0.
Bank Vaults			S 1.5 or E 1.5.
Bathrooms	5		E 1.0 or gravity exhaust of 1 sq. in. per sq. ft. of floor area.
Barber and Beauty Shops	5		S 1.2 and either mechanical or gravity exhaust.
Game and Amusement rooms	5	Having more than four tables or amusement devices	S 1.5 and E 1.5.
	5	Having four or less tables or amusement devices	S 1.5 or E 1.5.

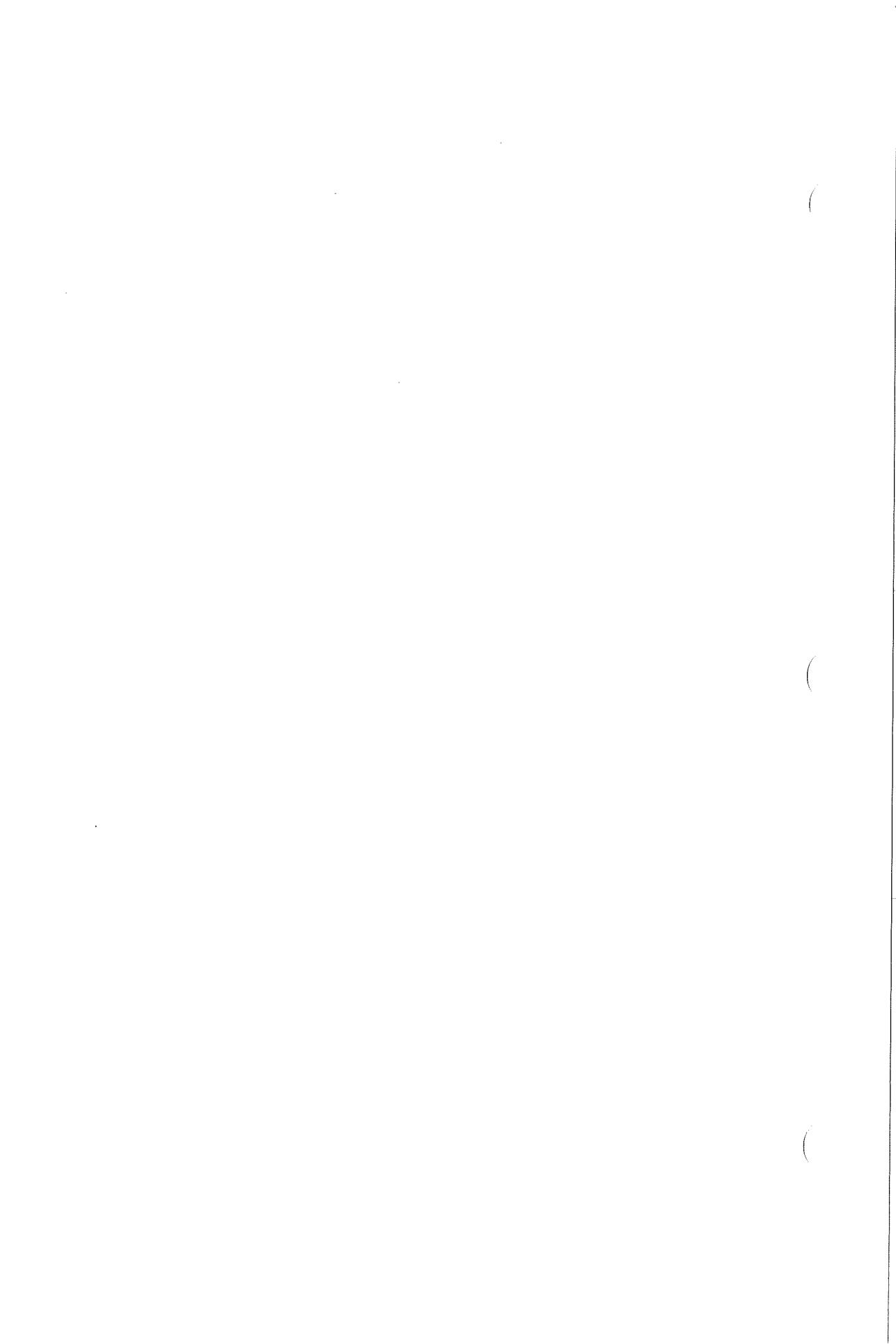


Table No. 55-A (Continued)

CONDITIONS			REQUIREMENTS
ROOM PURPOSE	Areas of Ventilating Openings in Percentage of Floor Area		Other Conditions
	Less Than	Not Less Than	
Boiler rooms			See Chapter 50.
Bowling alleys	5	3	Disregard floor area from foul line to pit.
			Cubic feet of air per minute supplied or exhausted per sq. foot of floor area of rooms.
			Except as otherwise noted S indicates mechanical supply. E indicates mechanical exhaust.
			See Chapter 50.
			S 2.0 in open spaces having no fixed seats plus S 20. for each fixed seat,
			or
			E 2.0 in open spaces having no fixed seats plus E 20. for each fixed seat.
	3		S 2.0 and E 2.0 in open spaces having no fixed seats plus S 20 and E 20. for each fixed seat.
Cabarets	4		S 1.5 and E 1.0.
Chapels	3		S 10/person
Classrooms, Day Nurseries	5		S 25/person
Coat rooms	5		E .75.
Community and Fraternal halls			Floor area more than 1500 sq. ft.
		5	Floor area not more than 1500 sq. ft.
	5		S 1.5.
			S 1.5 and E .75.
Dance halls, roller skating rinks	4		S 2.0 and E 1.0.
Dining rooms, private in other than dwellings			Natural ventilating openings at least 3% of gross floor area.
Dining rooms public	5	1	E 2.0.
	1		S 1.5 and E 1.5.
Dressing rooms	5		S 1.2 or E 1.2, or gravity exhaust.
Dwellings			Natural ventilating openings at least 3% of gross floor area.
Electric Transformer vaults			See Electrical Code.
Factories	5		S .5 or E .5. See Note 2 end of table.
Food baking rooms			Stories below that nearest to grade.
	5		Other stories
			E 1.2 and E 1.2.
			E .6.
Parking Garage (enclosed) spaces for automobiles operated under own power, single floor or elevator type, capacity 5 or more cars.	10		Entrance story
			E 3.0 in main entrance drive plus E .5 in car storage space.
			Any story except entrance story
			E .5 in car storage space.

Table No. 55-A (Continued)

C O N D I T I O N S			R E Q U I R E M E N T S
ROOM PURPOSE	Areas of Ventilating Openings in Percentage of Floor Area		Other Conditions
	Less Than	Not Less Than	
Parking Garage (enclosed) spaces for automobiles operated under own power, ramp type, capacity 5 or more cars.	10		Any story below entrance story
			Entrance story
			Any story above entrance story
Passages (enclosed) for vehicles using internal combus- tion engines			E 2.0 in ramps and drives be- tween ramps in first story below entrance story, which may be re- duced .2 for each story below (minimum E .5) plus E .5 in car storage space. E 3.0 in main entrance drive to ramp plus E .5 in car storage space. E 2.0 in ramps and drives be- tween ramps in second story, which may be reduced .2 for each story above (Minimum E .5) plus E .5 in car storage space. E 3.0. See note No. 1 at end of table.
Gymnasiums	5		S .8 or 10/person where seats are provided, whichever is greater.
Kitchens, commercial		3	Exhaust, see Section 3.51.040
	3		S 1.2 and Exhaust, see Section 3.51.040.
Kitchens, domestic	3		E. 2.0, or gravity exhaust 1 sq. in. per sq. ft. floor area but not small- er than 30 sq. in.
Laboratories, Chemical	5		E .6.
Laundries con- taining equip- ment which can be used by not more than one family at one time.	2½	Minimum area of ventilating openings 1½% of floor area	E 1.0, or gravity exhaust.
Laundries con- taining equip- ment which can be used by more than one family at one time.	5	Minimum area of ventilating openings 1½% of floor area	E 1.0, or gravity exhaust.
Laundries, commercial	8		S 1.5 or E 1.5.
Living rooms, in other than dwellings			Natural ventilating openings at least 3% of gross floor area.

Table No. 55-A (Continued)

CONDITIONS			REQUIREMENTS
ROOM PURPOSE	Areas of Ventilating Openings in Percentage of Floor Area		Cubic feet of air per minute supplied or exhausted per sq. foot of floor area of rooms. Except as otherwise noted S indicates mechanical supply. E indicates mechanical exhaust.
	Less Than	Not Less Than	
Loading spaces and appurtenant driveway areas in manufacturing and storage units, for vehicles using internal combustion engines.			E 5. (See note No. 3 at end of table).
Locker rooms	5		E 1.2.
Lunch counters and Rooms	5		E 2.0.
Motion picture, television and radio studios			S 1.5 and E 1.5.
Museums	5		S .6 or E .6.
Offices, laboratories (other than chemical), treatment rooms, X-ray operators' rooms, medicine rooms, rest rooms (Except Inside Rooms)	4	2½	Any offices with openings less than 2½% are to be considered as inside rooms. S .6 or E .6.
Offices, laboratories (other than chemical), treatment rooms, X-ray operators' rooms, rest rooms. Inside Rooms			If ventilating openings having 5% of floor area of intermediate room are located in the partitions separating said room from another room having ventilating openings not less than 5% of the floor area of both rooms and if ventilating openings having 2½% of floor area of intermediate rooms are located in wall of corridor. No requirements.

Table No. 55-A (Continued)

CONDITIONS			REQUIREMENTS
ROOM PURPOSE	Areas of Ventilating Openings in Percentage of Floor Area		Cubic feet of air per minute supplied or exhausted per sq. foot of floor area of rooms. Except as otherwise noted S indicates mechanical supply. E indicates mechanical exhaust.
	Less Than	Not Less Than	
		If ventilating openings of less area than noted above are located in either wall above mentioned or if no ventilating openings in either wall above mentioned.	S 1.0 and E .8. Exhaust may be by natural draft.
Operating and delivery rooms			S 1.2 and E 1.2.
Packing, shipping, and receiving rooms	5		S .6 or E .6.
Paint shops and mixing rooms	5		S .5 or E .5. See Note 2 at end of table.
Pressing rooms	5		S .5 or E .5. See Note 2 at end of table.
Printing shops	5		S .5 or E .5. See Note 2 at end of table.
Reading, music, craft and art rooms	5		S 1.0 or E 1.0.
Repair shops and hangars, combustion engines	5	CO exhaust system required for repair shops handling 6 or more engines.	S .5 or E .5. See Note 2 at end of table.
Sales rooms, retail	3	Basements	S 1.5 or E 1.5.
	1	Main floor	S 1.0 or E 1.0. (Door may be considered as ventilating opening.)
	3	Other stories	S .6 or E .6.
Sleeping rooms			Natural ventilating openings at least 3% of gross floor area.
Smoking rooms	5		E 1.5.
Storage battery rooms			E 1.0.
Storage rooms, active storage	2		E 4.
Study rooms	5		S 25 or E 25/person.

Table No. 55-A (Continued)

C O N D I T I O N S			R E Q U I R E M E N T S
R O O M P U R P O S E	Areas of Ventilating Openings in Percentage of Floor Area		Cubic feet of air per minute supplied or exhausted per sq. foot of floor area of rooms. Except as otherwise noted S indicates mechanical supply. E indicates mechanical exhaust.
	Less Than	Not Less Than	
Toilet rooms	5		E 2.0, or gravity exhaust 1 sq. in. per sq. ft. floor area but not smaller than 30 sq. in.
Waiting rooms in railway stations and similar occupancies	5		S .6.
Work shops	5		S .5 or E .5. See Note 2 at end of table.

Note No. 1. Passages (enclosed) for vehicles using internal combustion engines.

If openings, each having an area not less than twenty-five per cent (25%) of the cross-sectional area of the passage, are provided to atmosphere in both end walls of the passage—Natural ventilation.

If openings having a combined area not less than fifty per cent (50%) of the area of a side wall of the passage, uniformly distributed, are provided to atmosphere—Natural ventilation.

Note No. 2. Work shops and factories.

When the work in the room is of such a character that dangerous or noxious dust or fumes are given off, the requirements, as stated, shall be supplemented by local or unit exhaust sufficient to remove such dust or fumes.

Note No. 3. Loading spaces and appurtenant driveways.

Loading spaces and appurtenant driveways in manufacturing and storage units having apertures opening directly to atmosphere, said apertures having an area of not less than twenty per cent (20%) of the floor area of the loading spaces and appurtenant driveways—Natural ventilation.

If the apertures having an area of less than twenty per cent (20%) of the floor area of the loading spaces and appurtenant driveways—E .5.

3.55.070 Source of air supply. The air supply for all buildings except those of Group I occupancies shall be taken directly from out-of-doors, except that

(a) When air is supplied by a mechanical ventilating supply system, a portion not to exceed two-thirds ($\frac{2}{3}$) of the required air supply may be recirculated, provided the system is equipped with such devices for the control of temperature and dust content that the physical properties of the air so supplied are substantially the same as though all of the supply were taken from out-of-doors. The quantity so re-circulated may be considered as exhaust from the rooms from which it is withdrawn.

(b) When air is supplied by a mechanical ventilating supply system which is not equipped with devices prescribed in paragraph (a), a portion not to exceed two-thirds ($\frac{2}{3}$) of the air supplied may be re-circulated during the time that the rooms are not occupied. The intake and all equipment and ducts shall be so arranged that all of the air supplied by the system can be taken from out-of-doors, and that the air permitted to be re-circulated as herein described, can be discharged to the atmosphere when the rooms are occupied.

(c) The intake drawing air from out-of-doors shall be at such a point that the air supply will be uncontaminated and that the openings will be unobstructed at all times. The intake opening shall be at least fifteen feet (15') from the discharge outlet of an exhaust fan, and, unless adequate means is provided for the removal of dust from the air, the bottom of the opening shall be at least five feet (5') above the surface of any abutting public way, gangway, driveway, grade, or abutting roof. No intake opening shall be placed in a horizontal position in any sidewalk, or in the pavement of any street, alley, or driveway, or level with any other surrounding grade nor so as to take air from the lower level of any two level street or similar construction.

(d) No air exhausted from bath, toilet, urinal, lavatory, kitchen, boiler room, or other room in which such air might be contaminated shall be re-circulated at any time.

(e) Air may be re-circulated from any room or space where the ventilating system is provided with approved filters for the removal of odors and fumes.

(f) In air conditioning systems providing summer cooling, outside air requirements shall be not less than one-third ($\frac{1}{3}$) of supply quantities scheduled in Table No. 55-A where air quantity requirements are set on an area basis. Outside air intakes may be sized accordingly. (Ord. 85500 § 5507 as amended by Ord. 88324; June 24, 1959).

3.55.080 Air inlets and outlets. The air inlets and outlets in every system of ventilation shall be so located and constructed as to insure circulation of air throughout each room.

If a mechanical ventilating supply system only is installed for a room, or if a greater quantity of air is supplied by a mechanical ventilating supply system than is removed by a mechanical ventilating exhaust system for a room, adequate means shall be provided for the natural exit of the excess air supplied. If a mechanical ventilating exhaust system only is installed for a room or if a greater quantity of air is removed by a mechanical ventilating system for a room than it supplies, adequate means shall be provided for the natural supply of the deficiency in the air supplied. (Ord. 85500 § 5508 as amended by Ord. 86257; June 18, 1957).

3.55.090 Point of exhaust discharge. The air removed by every exhaust system shall be discharged out-of-doors at a point where it will not cause a public nuisance, and from which it cannot again be readily drawn in by a ventilating system, excepting that:

Air which is to be used for re-circulation may be discharged to a supply system;

Air which will not cause a nuisance may be discharged into a boiler room in such quantity as is required to supply the needs of combustion. (Ord. 85500 § 5509; Sept. 10, 1956).

3.55.100 Toilet room systems. Mechanical ventilating exhaust system for bath, toilet, urinal, and similar rooms shall be independent from those for rooms of other character, except that:

Exhaust ducts from janitors' closets containing slop sinks or similar fixtures may be connected to and made a part of toilet room systems;

Exhaust ducts from private bath, toilet, and urinal rooms containing not more than five fixtures and from isolated public rooms of the same nature may be connected to and made a part of the exhaust system for rooms of other character or exhaust ducts from rooms other than bath, toilet, and urinal rooms may be connected to and made part of the exhaust system for toilet rooms, provided:

(a) That the exhaust fan for the system is installed for operation all of the time that the building is occupied;

(b) That the branch duct from each bath, toilet, or urinal room or group of rooms, shall be run parallel and adjacent to the duct from other rooms for a distance of not less than five feet, within which distance there are no exhaust openings in either duct and the connection between the ducts made with an easy curve having its outlet toward the exhaust fan, and

(c) That the total quantity of air exhausted from private bath, toilet, and urinal rooms and from isolated public rooms of same nature shall not exceed ten per cent of the capacity of the fan. (Ord. 85500 § 5510; Sept. 10, 1956).

3.55.110 Heating for mechanical systems. If an installation is a mechanical ventilating exhaust system without a mechanical ventilating supply system, or if it is a mechanical ventilating supply system, either with or without a mechanical ventilating exhaust system, equipment shall be installed so that the supply shall be heated to such a temperature as will provide minimum health conditions for the proposed use of the room (see Chapter 3.50).

The heating elements and all equipment and connections required therefor shall be based on maintaining the required conditions when the out-of-doors temperature is fifteen degrees above zero Fahrenheit. (Ord. 85500 § 5511; Sept. 10, 1956).

3.55.120 Interpretation of requirements. In rooms which are required to be provided with mechanical ventilating exhaust systems, the fresh air to replace the air exhausted from each room shall be obtained from ventilating openings in that room, or from a mechanical ventilating supply system installed for that room or

It may be obtained from ventilating openings in uncontaminated rooms adjacent to the designated rooms through unobstructed openings at a velocity not to exceed 200 f.p.m. provided that the quantity of air supplied to the adjacent room is not less than that required for both the designated room and the adjacent room.

If an adjacent room requires a preponderance of mechanical exhaust when the ventilating openings are not adequate for natural ventilation, such rooms shall not be used as a source of supply to the designated room.

In picture projection rooms, it may be obtained from openings to uncontaminated rooms adjacent to the picture projection room, which have ventilating openings or which are provided with a mechanical ventilating supply system of the capacity required for such adjacent room. (Ord. 85500 § 5512; Sept. 10, 1956).

3.55.130 Ventilating openings kept closed. If, for any reason, it is impracticable to open the ventilating openings, the ventilation requirements shall be the same as though no such openings were provided. (Ord. 85500 § 5513; Sept. 10, 1956).

3.55.140 Rooms for more than one purpose. If a room is used for two or more room purposes, having different ventilating requirements, and it is possible to determine the space which will be used for each purpose, each such space may be considered as a separate room and ventilated in accordance with the table of ventilating requirements; if it is not possible to determine the space which will be used for each purpose the entire room shall be ventilated as required for most severe room purpose in the room. (Ord. 85500 § 5514; Sept. 10, 1956).

3.55.150 Partial story height partitions. A partition which is not more than three-quarters the story height of a room shall not be considered a partition forming an independent room, but the space on both sides of the partition shall be considered as one room. Grilles having openings of not less than seventy-five per cent free area may be placed in the openings. (Ord. 85500 § 5515; Sept. 10, 1956).

3.55.160 Method of determining compliance. The air inlets of every mechanical ventilating supply system and the air outlets of every mechanical ventilating exhaust system shall be adjusted to supply or exhaust the quantities of air prescribed with approximately uniform distribution over the entire area of such inlet or outlet. (Ord. 85500 § 5516; Sept. 10, 1956).

3.55.170 Instruments for taking readings. Compliance with mechanical ventilating requirements shall be determined by readings indicating the velocity of the air in feet per minute; they shall be taken with a calibrated anemometer unless the conditions surrounding the installation are not within the range of accuracy of this instrument, in which case other devices approved by the Superintendent of Buildings may be used. (Ord. 85500 § 5517; Sept. 10, 1956).

Chapter 3.56

WATERFRONT STRUCTURES—PIERS, WHARVES
AND BUILDINGS

Sections:

- 3.56.010 Scope.
- 3.56.020 Definitions.
- 3.56.030 Area and height allowable for waterfront structures.
- 3.56.040 Location on property.
- 3.56.050 Substructure.
- 3.56.060 Superstructure.

3.56.010 Scope. Waterfront structures shall be subject to all the requirements of this Code relating to other structures except as limited, added to, or otherwise specified in this Chapter.

For occupancy separations see Table No. 5-B.

Exception: Fire-resistive walls as specified in Section 3.56.060 (f) may be used as "One-Hour Fire-Resistive Occupancy Separations" and as separation between E-4 and B occupancies, including the specified protection to openings, in buildings of Type III H.T., IV N and V N.

For occupant load see Section 3.33.030. (Ord. 85500 § 5601, as amended by Ord. 87090; April 22, 1958).

3.56.020 Definitions. (a) **WATERFRONT STRUCTURES.** For the purpose of this Section, waterfront structures shall include all structures which have twenty per cent (20%) or more of their area over water, or a structure which has 8,000 square feet over water.

(b) **DOCK.** A dock is a natural open or artificial closed basin in which vessels may remain afloat when berthed at a wharf or pier.

(c) **PIER.** A pier is a structure, usually of greater length than width, of timber, stone, concrete or other material, having a deck, and projecting from the shore into navigable waters so that vessels may be moored alongside for loading and unloading or for storage or repairs.

(d) **SUBSTRUCTURE.** The substructure is that portion of the construction below and including the deck.

(e) **SUPERSTRUCTURE.** The superstructure is that portion of the construction above the deck.

(f) **WHARF OR QUAY.** A wharf or quay is a structure of timber, stone, concrete or other material having a platform built along and parallel to navigable waters so that vessels may be moored alongside for loading and unloading, or for storage or repair. (Ord. 85500 § 5602, as amended by Ord. 87090; April 22, 1958).

3.56.030 Area and height allowable for waterfront structures. Height and areas shall comply with requirements of Tables 5-C and 5-D, except that the increase allowed in Section 3.05.060 is not applicable to waterfront structures.

Exceptions: 1. Type III H. T. or one (1) hour construction of one (1) or two (2) stories and F or G occupancy may be unlimited in area.

(2). In covered boat moorages where water covers more than fifty per cent (50%) of the floor area of the structure, the areas in Table 5-C may be increased not to exceed four hundred per cent (400%) when completely sprinklered.

3. Each covered area of a boat moorage may be considered as a separate building, subject to the following conditions:

(a) Maximum individual areas shall be eight thousand (8000) square feet.

(b) Walkways, finger piers and other decked areas shall not exceed thirty per cent (30%) of the area of the roof that extends over water.

(c) When a distance of exit travel exceeds three hundred (300) feet, an approved four (4) inch dry standpipe with two and one-half ($2\frac{1}{2}$) inch outlets at a maximum of one hundred (100) feet on center shall be provided. There shall be a Siamese connection at the shore end and direct access for Fire Department pumping apparatus shall be provided.

(d) Covered areas shall be separated a minimum of sixteen (16) feet.

(e) Maximum width of connecting walkways shall be ten (10) feet.

(f) Each covered area shall be provided with the following:

1. Vents or monitors of not less than five per cent (5%) of the roof area.

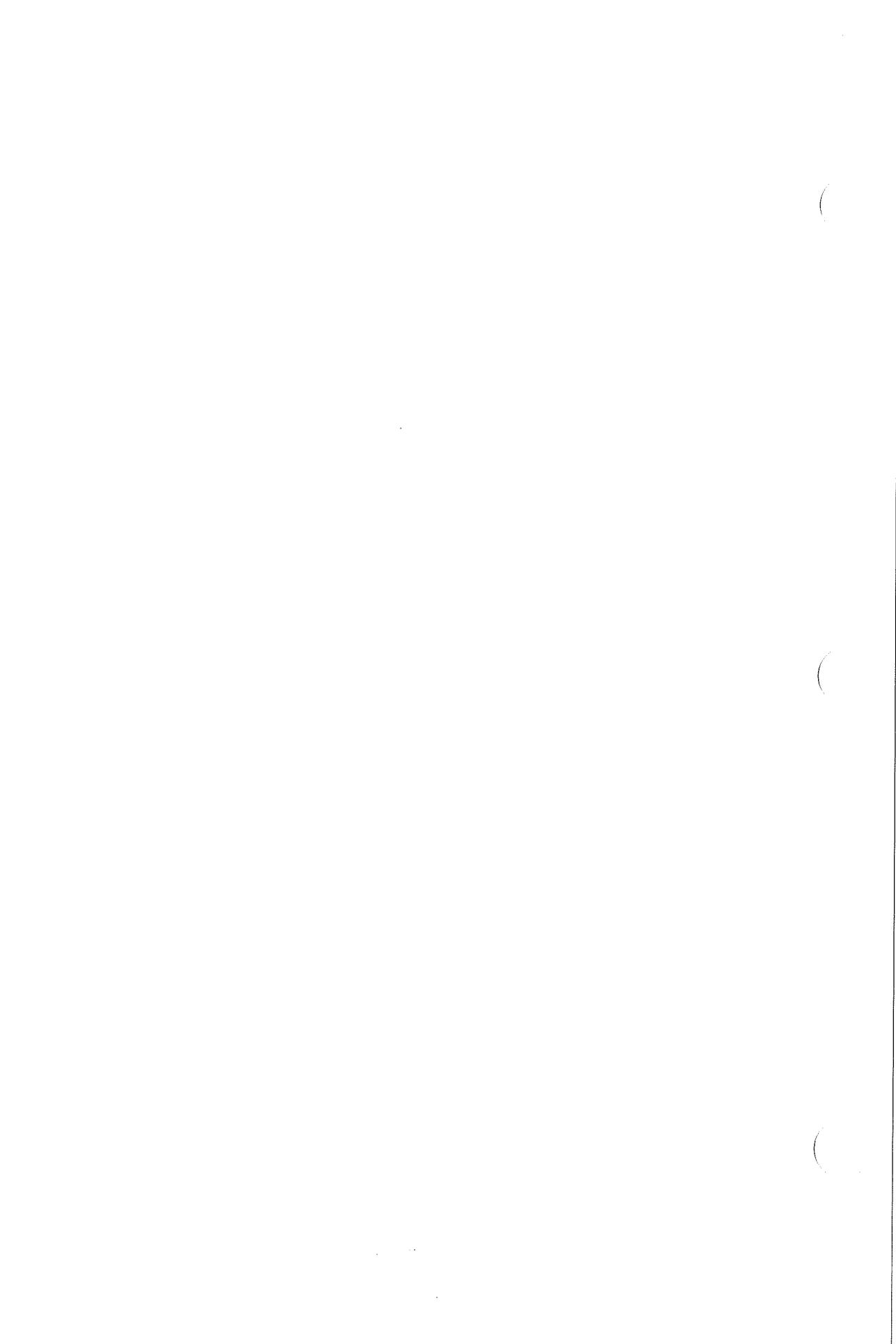
2. An approved draft stop across the end of each roof area when such end is within thirty (30) feet of an adjacent building. The draft stop shall extend to a line of the lower edge of the roof. A draft stop constructed in accordance with Section 3.56.050 shall be provided in the walkway between individual roofed areas.

(g) There shall be no storage on the piers or walkways within the covered areas. Uses accessory to the principal occupancy shall be permitted, provided they are conducted in an area separated from the moorage area by a minimum of sixteen (16) feet, and that the exposed side of the moorage area is protected by a

one (1) hour fire separation extending two and one-half (2½) feet above the roof line and below the deck to city datum if over salt water, or to low water if over fresh water, or to a depth of six (6) feet. One (1) story superstructures shall be permitted for accessory uses, but shall not exceed one thousand (1,000) square feet in area nor twenty (20) feet in height. (Ord. 85500 § 5603, as amended by Ord. 89827; December 12, 1960).

3.56.040 Location on property. Except when waterfront structures are separated by a deck on the same property and of a width of not less than that required in Section 3.56.040 from an unprotected opening to a property line, exterior walls and openings shall have a fire-resistive protection as determined by location on property.

Exception: In covered boat moorages, exterior walls which are entirely built over water may be 2 x 6 T. & G. noncombustible both sides regardless of proximity to property lines. Where such walls, (even though part of such covered boat moorage) are built on land, this exception shall not apply. (Ord. 85500 § 5604; Sept. 10, 1956).



3.56.050 Substructure. (a) **CONSTRUCTION.** Substructures may be of any type construction permitted in this Code subject to the area limitation of Section 3.56.030 except that when of wood, exclusive of piling, the members shall be not less in least dimension than the following:

Member	Nominal Size Unlimited Use	Piers for Boat Mooring Only. Not Exceeding 10 Ft. In Width
Caps and Girders	8"	6"
Joists, Beams and Other Members	4"	3"
Flooring or Deck	3" T & G or splined or 4" square edged	2"
Bracing	3"	2"

If under roof there shall be applied over the flooring or deck a tight fitting wearing floor, of soft wood not less than two inches (2") thick and not more than six inches (6") wide; or of 1" thick hardwood; or of other material with equivalent fire resistance.

Exception: Covered piers for moorage only need not have a wearing floor.

(b) **DRAFT STOPS.** Draft stops shall be installed in all substructures constructed of combustible materials, exclusive of piling and pile bracing. They shall be placed not over one hundred feet (100') apart measured along the main axis of the pier or wharf. They shall fit tightly around all joists, beams, etc. and extend from the underside of the deck to City Datum if over salt water and to low water if over fresh water with a maximum required depth of 6 feet. See Section 3.56.060 (f) for draft stops under fire-resistive walls in superstructure.

Substructure draft stops shall be constructed of not less than two (2) thicknesses of two inch (2") nominal thickness lumber laid with broken joints or materials of equal fire resistance.

(c) **AUTOMATIC SPRINKLERS.** Automatic sprinklers shall be installed under the substructure of every future waterfront structure in accordance with the requirements of Chapter 3.38.

Exceptions: Automatic sprinklers are not required under the following categories of substructure:

- i. Combustible substructures having no superstructures.
- ii. Combustible substructures with superstructures where no sprinklers are required for said superstructure under Section 3.56.060.
- iii. Noncombustible substructures with or without superstructures.

- iv. Substructures, over other than tidal water, where sprinkler heads cannot be installed with a minimum clearance of 4 feet above mean high water.
- v. Substructures resulting from walkways or finger piers when width does not exceed 10 feet. (Ord. 85500 § 5605; Sept. 10, 1956).

3.56.060 Superstructure. (a) **CONSTRUCTION.** Superstructures shall be of Type I, II, III H.T., IV N or V N construction, subject to the height and area limitations of Section 3.56.030 and the following requirements or modifications.

(b) **FLOORS.** See Section 3.56.050.

(c) **EXTERIOR WALLS.** Exterior walls of Type III H.T., IV N or V N buildings, when not subject to the requirements of Section 3.56.040 because of their proximity to property lines, may be constructed of matched or lapped lumber not less than two inches (2") thick and not more than six inches (6") wide, or the exterior walls may be constructed of matched or lapped lumber not less than one inch (1") thick with a weather covering applied directly to the wood of noncombustible material. Fire stops shall be required in stud walls to cut off all concealed draft opening both vertical and horizontal as specified in Chapter 3.25. Openings in exterior walls shall be of the construction required for the fire-resistive construction of the walls.

(d) **ROOF COVERING.** Roof covering shall be "fire-retardant" roofing as specified in Section 3.32.040. See Section 3.01.040 (g) for repairs.

(e) **ROOF CONSTRUCTION.** In Type III H.T. the roof may be constructed of corrugated galvanized steel or approved equivalent attached directly to steel or wood purlins in lieu of the lumber covering specified in Section 3.20.060.

(f) **FIRE-RESISTIVE WALLS.** In Type III H.T., IV N and V N buildings, there shall be at least one fire-resistive wall from the deck to at least three feet (3') above the roof for each five hundred feet (500 ft.) of length. Areas greater than 100,000 sq. ft. shall be divided with such fire-resistive walls. There shall be a draft stop constructed in accordance with Section 3.56.050 (b), installed in the substructure immediately below every required fire-resistive wall when the deck is of combustible materials.

"Fire-resistive" walls shall be constructed of not less than two thicknesses of two inch (2") T & G or splined lumber not over six inches (6") in width placed vertically with broken joints and galvanized metal between or equally fire-resistive construction.

Openings in fire-resistive walls shall be protected with Class "C" fire doors without glass and shall be automatic closing.

(g) **DRAFT STOPS.** Draft stops shall be installed in accordance with the requirements of Section 3.32.060 except that they shall be in-

stalled not over one hundred feet (100') apart, measured along the main axis of the building.

(h) STAIRS AND EXITS. Stairs and exits shall be provided as specified in Chapter 3.33.

Exceptions: 1. An exterior exit shall be considered to be the point of termination of stairs at the deck or they may terminate at the side other than street front of a waterfront structure if an open deck at least ten feet (10') in width extends from the exit to a public way, except in B occupancies. Exterior stairs shall not be permitted in B occupancies.

2. In B occupancies exterior exits other than the main exits as required by Section 3.33.160 may terminate at the side other than street front of a waterfront structure if an open deck at least ten feet (10') in width extends from the exit to a public way.

3. The distance of travel permitted in Section 3.33.020 (d) shall be reduced by twenty-five per cent (25%) in B occupancies.

4. Boat moorages which have no sales, service, or repair facilities may have a single exit not less than 3 feet wide and shall be exempt from the maximum distance of travel limitations of Section 3.33.020 (d).

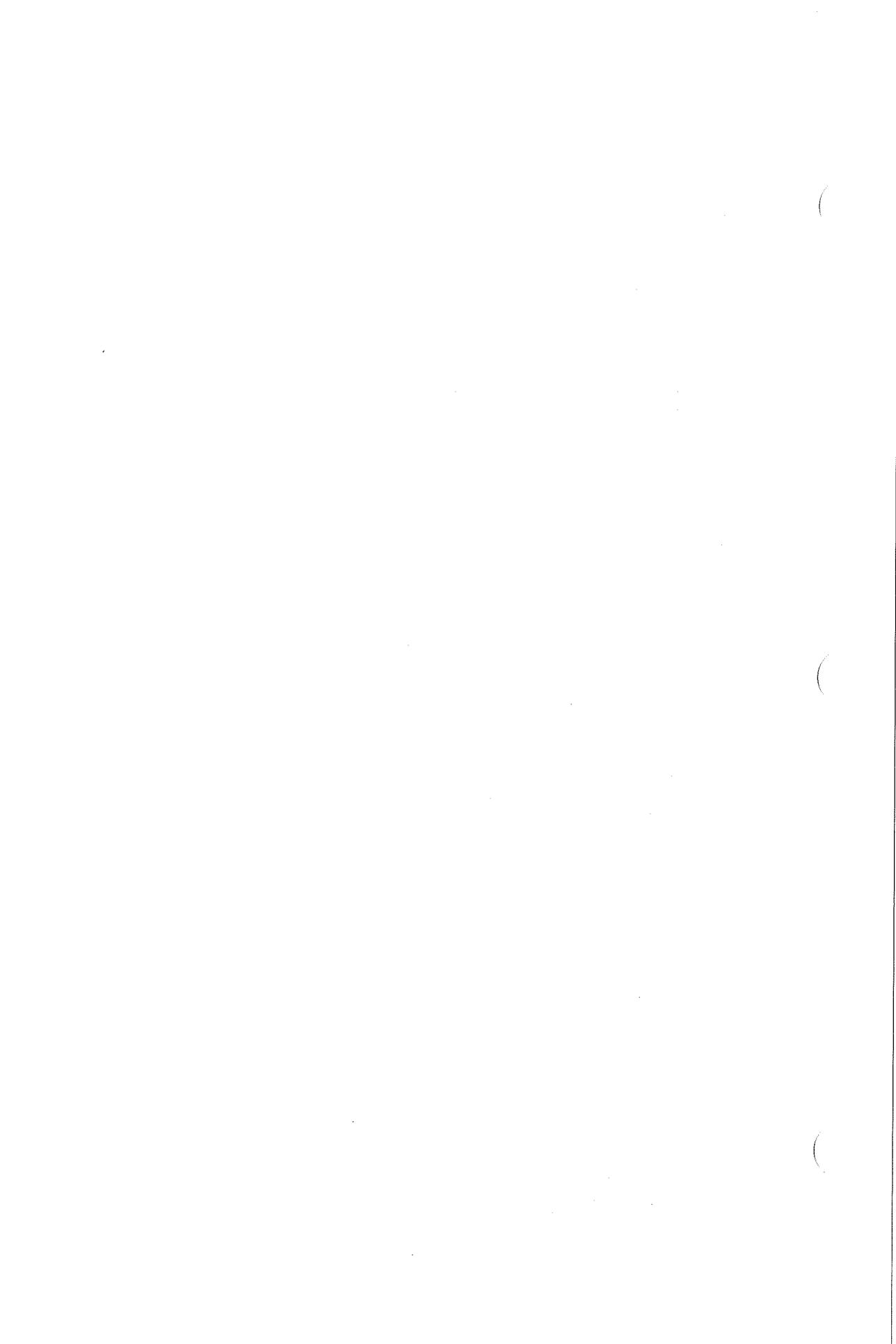
(i) LIGHT AND VENTILATION. All portions of waterfront buildings customarily used by human beings shall be provided with light and ventilation by means of windows or skylights with an area not less than 10% of the total floor area or shall be provided with artificial light and a mechanically operated ventilating system. (See Chapter 3.05 for court requirements.)

Exception: Superstructures whose primary use is warehousing and where normal population density does not exceed one person per 1,000 square feet of area are exempt from the requirements of this subsection.

(j) AUTOMATIC SPRINKLERS. The following requirement shall be retroactive. Automatic sprinklers shall be installed in the superstructure of every waterfront building in accordance with the requirements of Chapter 3.38. Such installations shall be made and completed in existing buildings within six (6) months from the effective date of this ordinance.

Exceptions: 1. Automatic sprinklers shall not be required in the superstructure of waterfront buildings which are less than eight thousand square feet (8,000 sq. ft.) in area in Fire Zone No. 3.

2. Automatic sprinklers shall not be required in one story superstructures which do not exceed 1,000 square feet in area nor twenty feet in height.



3. Sprinklers not required in buildings of Group G or H occupancy of Type I construction where no one assembly room exceeds one thousand (1,000) square feet in area, provided the entire substructure shall be of Type I construction.

4. Sprinklers not required in buildings of Type II, III, IV and V construction of Group H occupancy and Group G occupancies, such as office buildings, lodge halls, exposition halls, club rooms, specialty schools, and social halls, the occupant load of which is less than 100, cold storage and commercial greenhouses, provided: (1) the area shall not exceed that allowed in Table 5-C, (2) the substructure shall be noncombustible with two-hour fire-resistive slab under the entire structure, and (3) no one room shall exceed one thousand square feet in area. (Ord. 85500 § 5606, as amended by Ord. 92306; September 4, 1963).

Chapter 3.57

PLASTICS

Sections:

- 3.57.010 Scope—Definitions—Classifications.
- 3.57.020 Interior finish and trim.
- 3.57.030 Exterior wall panels.
- 3.57.040 Glazing unprotected openings.
- 3.57.050 Roof panels.
- 3.57.060 Skylights.
- 3.57.070 Panels in monitors and sawtooth roofs.
- 3.57.080 Light diffusing systems in ceilings.
- 3.57.085 Plastic areas of lighting fixtures.
- 3.57.090 Partitions.
- 3.57.100 Exterior veneer.
- 3.57.110 Greenhouses.

3.57.010 Scope — Definitions — Classifications. (a) SCOPE. Plastic materials may be of any class as defined in this section. Before any plastic material is approved for use, the manufacturer of such plastic material shall file with the Superintendent of Buildings such technical data as may be considered relevant to the proposed use of the plastic material. These data may include: physical properties of material, chemical composition and properties, weather resistance, electrical properties, fire resistance, burning characteristics, products of combustion, and coefficient of expansion.

Upon review of data furnished, the Superintendent of Buildings shall determine the adequacy of the material offered and if it is found that the material is satisfactory for the use intended, he may approve the ma-

terial subject to the limitations specified in this Chapter and for interior finish and trim subject to the provisions of Chapter 3.42.

Each sheet or roll of plastic material shall be identified and marked by a number, trade name designation, or other means of identification satisfactory to the Superintendent of Buildings.

Plans and specifications submitted to the Superintendent of Buildings specifying the use of a plastic material shall identify by the accepted designation the plastic material specified.

(b) DEFINITIONS. 1. "Plastic Materials" are those made wholly or principally from standardized plastics listed and described in U.B.C. Standard No. 52-1.

(2) "Approved Plastic" material is one which the Superintendent of Buildings has found to be suitable functionally for the purpose for which it is offered, which burns no faster than two and one-half inches (2½") per minute in sheets sixty-thousandths of an inch (0.060") in thickness when tested in accordance with Standard Specifications for "Standard Method of Flammability of Plastics over Fifty-thousandths of an Inch (0.050") in thickness" (U.B.C. Standard No. 52-2), or which is not consumed in less than two minutes when tested in accordance with Standard Specifications for "Standard Method of Test for Flammability of Plastics Fifty-thousandths of an Inch (0.050") and Under in Thickness" (U.B.C. Standard No. 52-3—1958 Edition), the thickness of the plastic material to be determined by U.B.C. Standard No. 52-4, the products of combustion

of which are no more toxic in point of concentration than those of wood or paper burned under similar conditions.

(c) **CLASSIFICATION.** 1. Class A plastic materials shall be those reinforced or unreinforced approved plastic materials which are self-extinguishing when tested in accordance with the test procedures described in Section 3.57.010 (b) 2 above.

2. Class B plastic materials shall be those approved plastic materials which are reinforced with glass fiber or other incombustible material amounting to not less than 1.5 ounces per square foot and not less than 20 per cent by weight of the plastic panel or sheet.

3. Class C plastic materials shall be those approved plastic materials which are reinforced with glass fiber or other incombustible material amounting to not less than 10 per cent by weight of the plastic panel or sheet.

4. Class D plastic materials shall be those approved plastic materials other than Class A, B, or C which meet the requirements of Section 3.57.010 (b) 2. (Ord. 85500 § 5701, added by Ord. 86804; Jan. 7, 1958).

3.57.020 Interior finish and trim. Plastic for interior finish and trim shall comply with the provisions of Chapter 3.42. (Ord. 85500 § 5702, added by Ord. 86804; Jan. 7, 1958).

3.57.030 Exterior wall panels. (a) **DEFINED.** Exterior wall panels shall mean plastic sheets used as a light-transmitting medium in exterior walls.

(b) **CLASS A AND B PLASTICS.** Class A and B plastic sheets may be used in wall panels in Types III, IV and V one-hour buildings except in occupancy Groups A, B, D and E, provided:

1. The wall in which such panels are installed is so located that openings are not required to be fire-protected.

2. The total area of plastic panels in the plane of any one exterior wall in any story shall not exceed 30 per cent of the total area of that wall.

3. No section of plastic panels shall exceed one hundred feet (100') in length, twelve feet (12') in height.

4. In Types III and IV buildings sections up to forty feet (40') in length shall be separated longitudinally by a section of the required exterior wall construction equal in width to 20 per cent of the length of the section or four feet (4'), whichever is greater. Sections shall be separated by a section of the required exterior wall construction at least four feet (4') in width. Equivalent perpendicular separation may be substituted.

(c) **CLASS C AND D PLASTICS.** Class C and D plastics may be used as exterior wall panels in locations and subject to the conditions specified for Class A and B plastics, provided the area of such panels

does not exceed 20 per cent of the wall area in any one story of the structure and no section of such panel is over fifty feet (50') in length or eight feet (8') in height. (Ord. 85500 § 5703, added 462 by Ord. 86804; Jan. 7, 1958).

3.57.040 Glazing unprotected openings. Doors, sash, and framed openings in exterior walls may be glazed or equipped with plastics subject to the requirements of Section 3.57.030. (Ord. 85500 § 5704, added by Ord. 86804; Jan. 7, 1958).

3.57.050 Roof panels. (a) **WHEN PERMITTED.** In buildings of Types III, IV and V one-hour, regardless of the requirements for fire-retardant roofing materials, plastic panels may be used in roofs, except that in roofs of Types I and II buildings and Groups A, B-1, D and E occupancies in one-hour buildings (Types III, IV and V one-hour) shall be limited to three per cent (3%) of the floor area sheltered by the roof and the maximum area for any one panel shall be thirty square feet (30 sq. ft.).

Plastic skylights of an approved fire-venting type may be used where venting is required in one-story buildings.

(b) **INSTALLATION REQUIREMENTS.** 1. There shall be a distance of not less than five feet (5') between skylight units, and such units shall not be located within the distance from the lot line within which openings in walls are required to be fire protected.

2. All plastic roof panels shall be attached directly to the roof framework or shall be mounted individually in steel or other approved metal frames.

3. Exposed edges of plastic panels shall not project over the side wall of the structure.

(c) **AREA, SIZE AND PITCH LIMITATIONS.** Sections of glazed skylights and sash shall not exceed four feet (4') in length along the pitch slope of the roof.

TABLE NO. 57-A—INSTALLATION OF SKYLIGHTS

Type Plastic	Maximum Area	Glazed Skylights and Sash	Total Area In Terms of Per Cent of Floor Area Sheltered by Roof
A & B	150 sq. ft.	300 sq. ft.	25%
C & D	75 sq. ft.	100 sq. ft.	12%

(d) **AREA AND PITCH LIMITATIONS OF DOMES.** The maximum area of plastic domes shall be seventy-five square feet (75 sq. ft.). The plastic, if dome shaped, shall rise above the mounting flange a minimum distance equal to ten per cent (10%) of its maximum span or five inches (5"), whichever is the greater.

(e) **FIRE PROTECTION.** Plastics with a fusion temperature below three hundred degrees Fahrenheit shall not be installed over sprinkler heads. (Ord. 85500 § 5705, as amended by Ord. 88324; June 24, 1959).

3.57.060 Skylights. (Repealed by Ord. 88324; June 24, 1959).

3.57.070 Panels in monitors and sawtooth roofs. (a) **GENERAL.** Plastics may be used in monitors and sawtooth roofs. The lower edge of the plastic material shall be at least six inches above the surface of the adjoining roof surface. Such plastic panels shall be separated from each other by a section of incombustible material or by a section of the roofing material of the structure, said section to be equal in length to one-tenth of the length of the plastic section, or four feet, whichever is greater.

(b) **CLASS A AND B PLASTICS.** Class A and B Plastics may be used provided that the maximum length of a section of plastic panels shall not exceed one hundred feet, and the distance between the upper and lower edges shall not exceed ten feet.

(c) **CLASS C AND D PLASTICS.** Class C and D plastics may be used provided that the maximum length of a section of plastic panels shall not exceed fifty feet and the distance between the upper and lower edges shall not exceed eight feet.

(d) **LIMITATION OF AGGREGATE AREA.** The total area of plastics used in monitors and sawtooth glazing shall not exceed the following percentages of the floor area of the occupancy sheltered: thirty per cent for Class A and Class B plastics, and twenty per cent for Class C and Class D plastics. (Ord. 85500 § 5707, added by Ord. 86804; January 7, 1958).

3.57.080 Light diffusing systems in ceilings. (a) **GENERAL.** Plastic light diffusing systems in ceilings shall mean installation of plastic panels suspended below lighting fixtures for the purpose of diffusing light.

(b) **INSTALLATION REQUIREMENTS.** Plastic light diffusing systems in ceilings in required fire exits, corridors, and occupancies A, B, D and E shall be made of Class A plastics only approved for such installations by the Superintendent of Buildings. In other rooms or spaces, panels of approved plastics may be installed as light diffusing systems in accordance with the following provisions:

1. Plastic diffusers of approved plastics may be installed in light diffusing systems provided the aggregate plastic area does not exceed ten per cent of the ceiling area.

2. Plastic diffusers installed in light diffusing systems in which the aggregate plastic area exceeds ten per cent of the ceiling area shall be deemed to be an interior finish and as such shall conform to the requirements of Chapter 3.42, except that a plastic light diffusing system, the plastic of which has a heat distortion temperature of two hundred and twenty-five degrees Fahrenheit or less (ASTM Method D648-45T) and the panels of which have been shown in appropriate tests by a recognized testing laboratory to fall from their mountings at an ambient temperature at least two hundred degrees Fahrenheit below the ignition temperature of the material, shall be exempt from this provision, provided that the maximum length of plastic panels weighing over eight ounces, but not more than sixteen ounces per square foot shall be five feet, and the maximum length of plastic panels weighing over two ounces but not more than eight ounces per square foot shall not exceed ten feet, and the maximum length of plastic panels weighing two ounces or less per square foot shall not exceed twenty-five feet, and provided that the weight of the plastic material shall not exceed sixteen ounces per square foot in any case.
3. Plastics subject to heat distortion when used over exits and exitways shall be fastened so as to avoid fallout.
4. Plastic diffusers installed in surface mounted or recessed fixtures shall not be subject to the requirements of this section unless the aggregate area of the diffusers exceeds ten per cent of the area of the ceiling.
5. No plastic light diffusing system shall be installed in areas required to be equipped with automatic sprinklers unless appropriate tests by a recognized laboratory have shown that such system does not prevent effective operation of the sprinklers or unless sprinklers are located both above and below the light diffusing system to give effective sprinkler protection.
6. In Types I, II, III and IV buildings all hanging supports and fastenings shall be of noncombustible material. Hangers shall be at least No. 12 U.S. Standard gauge galvanized wire or equivalent. (Ord. 85500 § 5708, as amended by Ord. 90485, and Ord. 95265; November 10, 1966).

3.57.085 Plastic areas of lighting fixtures. Plastic lenses which are installed as integral components of lighting fixtures shall be subject to the following requirements:

(a) The total plastic lens area of an integrated lighting unit consisting of an assembly of individual lighting fixtures shall not exceed ten per cent of the ceiling area or two hundred square feet, whichever is lesser, provided that such units are installed with at least twenty-four inches of noncombustible ceiling material intervening between units.

(b) Aggregate plastic lens area shall not exceed twenty-five percent of the ceiling area unless the plastic material conforms to the fire resistive standards for ceiling finish as set forth in Chapter 3.42. Ord. 85500 § 5708-B added by Ord. 95265; November 10, 1966).

3.57.090 Partitions. (a) CONSTRUCTION. Where partitions are not required to be of incombustible or fire-resistive construction, plastics may be used for the construction of the entire partition.

(b) LIGHT-TRANSMITTING PANELS OF PLASTIC IN PARTITIONS. Approved plastics may be used to provide the light-transmitting medium in partitions where plain glass is permitted, provided the area of



plastic so installed does not exceed in the aggregate one-third of the area of the partition in which installed.

Approved plastics may also be installed in openings in movable partitions made of metal or other incombustible material, provided the area of plastic so installed does not exceed in the aggregate one-half of the area of the partition in which installed. (Ord. 85500 § 5709, added by Ord. 86804; January 7, 1958).

3.57.100 Exterior veneer. Approved plastics may be attached to a backing of masonry, concrete, or cement plaster.

(a) No plastic veneer shall be attached to any exterior wall to a height greater than thirty-five feet above grade, and shall be permitted only on the first story of buildings located in Fire Zones 1 and 2.

(b) No section of Class A plastic panels shall exceed one hundred and fifty square feet in area, and no section of Class B, C, or D plastic panels shall exceed fifty square feet in area, with no dimension of any type panel in excess of fifteen feet.

Exception: Outside Fire Zones 1 and 2 the maximum area of sections may be increased by fifty per cent.

(c) Each panel of plastic shall be separated three feet laterally and six feet vertically from every other panel by sections of the required exterior wall construction. (Ord. 85500 § 5710, added by Ord. 86804; January 7, 1958).

3.57.110 Greenhouses. Approved plastics may be used in lieu of plain glass in greenhouses in Fire Zone 3. (Ord. 85500 § 5711, added by Ord. 86804; Jan. 7, 1958).

Chapter 3.58

INCINERATORS

Sections:

- 3.59.010 Definitions.
- 3.58.020 Permits.
- 3.58.030 Commercial incinerators.
- 3.58.040 Expansion and construction.
- 3.58.050 Framework.
- 3.58.060 Exterior casings.
- 3.58.070 Linings.
- 3.58.080 Insulation.
- 3.58.090 Auxiliary burners.
- 3.58.100 Automatic alarm.
- 3.58.110 Grate and hearth.
- 3.58.120 Chimneys.

- 3.58.130 Dampers.
- 3.58.140 Spark arrester.
- 3.58.150 Collection or draft equipment.
- 3.58.160 Test opening.
- 3.58.170 Combustion air.
- 3.58.180 Location—Outdoors.
- 3.58.190 Location in buildings.

3.58.010 Definitions. Except where it is clear from the context that a different meaning is intended, the following words and terms when used in Sections 3.58.010 through 3.58.190 shall mean as follows:

INCINERATOR. A furnace for the destruction of waste.

GRATE AREA. The area in a horizontal plane above the grate and hearth of an incinerator.

COMMERCIAL INCINERATOR. An incinerator the grate area of which is two (2) square feet or more.

MULTIPLE CHAMBER INCINERATOR. An incinerator in which combustion gases flow from a primary to a secondary combustion chamber through a mixing chamber.

RETORT INCINERATOR. A multiple chamber incinerator in which bridge and curtain walls are so arranged as to cause combustion gases to flow through two (2) one hundred and eighty degree (180°) turns, one in a lateral, and one in a vertical, direction.

IN-LINE INCINERATOR. A multiple chamber incinerator in which bridge and curtain walls are so arranged as to cause combustion gases to flow through two (2) one hundred and eighty degree (180°) turns, both in a vertical direction.

MIXING CHAMBER. The space in a multiple chamber incinerator bounded by exterior walls and the planes created by the bridge wall of the primary combustion chamber and the curtain wall of the secondary combustion chamber. (Ord. 85500 § 5801, added by Ord. 91587; November 14, 1962).

3.58.020 Permits. It shall be unlawful to construct or install any commercial incinerator or, if the cost thereof exceeds twenty-five percent (25%) of its replacement value to make alterations or repairs to any such incinerator without first having applied for and secured from the Superintendent of Buildings an "Incinerator Permit", the fee for which permit shall be Ten Dollars (\$10.00) for any incinerator having a grate area of less than twenty (20) square feet and Twenty-five Dollars (\$25.00) for an incinerator having a larger grate area. Application for such permit shall be on forms prepared by the Superintendent of Buildings and accompanied by two (2) sets of plans and specifications and such other information as said Superintendent shall require. Such permit shall be valid for one (1) year from date of issue and within thirty (30) days of the date

of expiration upon application may be renewed for an additional year and for a second additional year if the work permitted has been started and is progressing at a rate satisfactory to the Superintendent of Buildings. (Ord. 85500 § 5802, added by Ord. 91587; November 14, 1962).

3.58.030 Commercial incinerators. Table 58-A, and Figures 58-B, 58-C, 58-D and 58-E are hereby adopted and made a part hereof. Every commercial incinerator shall be a multiple chamber retort incinerator or a multiple chamber in-line incinerator. Every commercial incinerator the grate area of which is less than twenty (20) square feet shall be a retort incinerator. Every commercial incinerator the grate area of which is forty (40) square feet or more shall be an in-line incinerator. Every such incinerator shall be as set forth in this chapter. In addition it shall be designed and constructed in accordance with Figure 58-D or Figure 58-E, using the design factors set forth in Table 58-A, as supplemented by Figures 58-B and 58-C; or, it shall be tested by an approved testing laboratory and certified by said laboratory to be such as to meet the tests set forth in Techniques of Testing for Air Contaminants from Combustion Sources by C. Kanter, R. Lunche and A. Fudurich, published by the Air Pollution Control Association in proceedings of its 49th Annual Meeting in the year 1956, copy of which is filed with the City Comptroller (C. F. 246676). (Ord. 85500 § 5803, added by Ord. 91587; November 14, 1962).

3.58.040 Expansion and contraction. The body of every commercial incinerator shall be designed and constructed to withstand expansion and contraction thrusts generated by such internal temperature change as may be encountered. (Ord. 85500 § 5804, added by Ord. 91587; November 14, 1962).

3.58.050 Framework. Every commercial incinerator shall have a free-standing structural steel framework, or shall be steel reinforced, so as to withstand interior thrusts from all arches, and support all appurtenances. (Ord. 85500 § 5805, added by Ord. 91587; November 14, 1962).

3.58.060 Exterior casings. The exterior casings of commercial incinerators shall be sheet steel not lighter than No. 12 U. S. Gauge, or a solid masonry wall not less than eight (8) inches in thickness. (Ord. 85500 § 5806, added by Ord. 91587; November 14, 1962).

3.58.070 Linings. Every commercial incinerator shall be fully lined with high duty type refractory brick, as set forth in Standard C-106, edition of 1951, or castable refractory lining as set forth in Standard C-213, edition of 1961; each published by the American Society for Testing Materials, and copies of each of which are filed with the City Comptroller (C. F. 246677, 246678). Brick linings shall be set in high temperature air setting bonding mortar. (Ord. 85500 § 5807, added by Ord. 91587; November 14, 1962).

3.58.080 Insulation. Commercial incinerators shall have two (2) inches of high temperature insulation between the exterior casing and the refractory lining. (Ord. 85500 § 5808, added by Ord. 91587; November 14, 1962).

3.58.090 Auxiliary burners. Commercial incinerators designed or used for the destruction of waste the moisture content of which is more than twenty percent (20%), by weight, shall be equipped with an auxiliary burner in both the primary combustion chamber and the mixing chamber. Each auxiliary burner shall be capable of supplying a minimum of twenty-five thousand (25,000) B. T. U. per hour per square foot of grate area. Burners shall have flame failure protection equipment. (Ord. 85500 § 5809, added by Ord. 91587; November 14, 1962).

3.58.100 Automatic alarm. Commercial incinerators designed or used for the destruction of waste the moisture content of which is more than twenty percent (20%), by weight, and the grate area of which is twenty (20) square feet or more shall be equipped with a smoke detecting device with an automatic mechanical alarm incapable of being manually reset. (Ord. 85500 § 5810, added by Ord. 91587; November 14, 1962).

3.58.110 Grate and hearth. Commercial incinerator grates shall be of heavy duty cast iron. Commercial incinerator hearths shall be high duty type refractory brick as set forth in Standard C-106, edition of 1951, or castable refractory lining as set forth in Standard C-213, edition of 1961; each published by the American Society for Testing Materials, and copies of each of which are filed with the City Comptroller (C. F. 246677, 246678). Brick hearths shall be set in high temperature air setting bonding mortar. (Ord. 85500 § 5811, added by Ord. 91587; November 14, 1962).

3.58.120 Chimneys. Chimneys and breechings serving commercial incinerators shall be as specified in this code for Type A Flues for High Heat Appliances. (Ord. 85500 § 5812, added by Ord. 91587; November 14, 1962).

3.58.130 Dampers. Every chimney serving a commercial incinerator, or the breeching to such chimney, shall be equipped with a fully adjustable barometric damper, the cross sectional area of which shall be not less than eighty percent (80%) of the cross sectional area of the chimney or breeching in which it is installed. The Superintendent of Buildings may also require that such chimney, or breeching, be also equipped with a fully adjustable mechanical damper. Every damper shall be such as may be completely closed for cleaning purposes. (Ord. 85500 § 5813, added by Ord. 91587; November 14, 1962).

3.58.140 Spark arrester. Every chimney serving a commercial incinerator shall be equipped with a wire mesh spark arrester of No. 12 U. S. Gauge steel wire not larger than No. 2 mesh, and the open cross sectional area of such spark arrester shall be not less than the cross

sectional area of the chimney. (Ord. 85500 § 5814, added by Ord. 91587; November 14, 1962).

3.58.150 Collection or draft equipment. The Superintendent of Buildings may require that a chimney serving a commercial incinerator be equipped with approved flue gas washers or other approved collection or draft equipment. (Ord. 85500 § 5815, added by Ord. 91587; November 14, 1962).

3.58.160 Test opening. Every chimney serving a commercial incinerator shall have an accessible test opening approximately one-half ($\frac{1}{2}$) inch in diameter within the first two (2) feet of the chimney above the incinerator or within two (2) feet of the breeching outlet. (Ord. 85500 § 5816, added by Ord. 91587; November 14, 1962).

3.58.170 Combustion air. There shall be an approved supply of combustion air to every incinerator. (Ord. 85500 § 5817, added by Ord. 91587; November 14, 1962).

3.58.180 Location—Outdoors. Outdoor incinerators shall be located not less than fifteen (15) feet from any building or property line, or as otherwise approved. (Ord. 85500 § 5818, added by Ord. 91587; November 14, 1962).

3.58.190 Location in buildings. An incinerator in a building shall be located in a room separated from any other part of such building by two-hour fire resistive walls, floors, and ceilings, with all openings equipped with self-closing Class "B" fire doors. There shall be a clearance of not less than five (5) feet on the front side, and of not less than two (2) feet on at least two (2) of the other three (3) sides, of every incinerator. (Ord. 85500 § 5819, added by Ord. 91587; November 14, 1962).

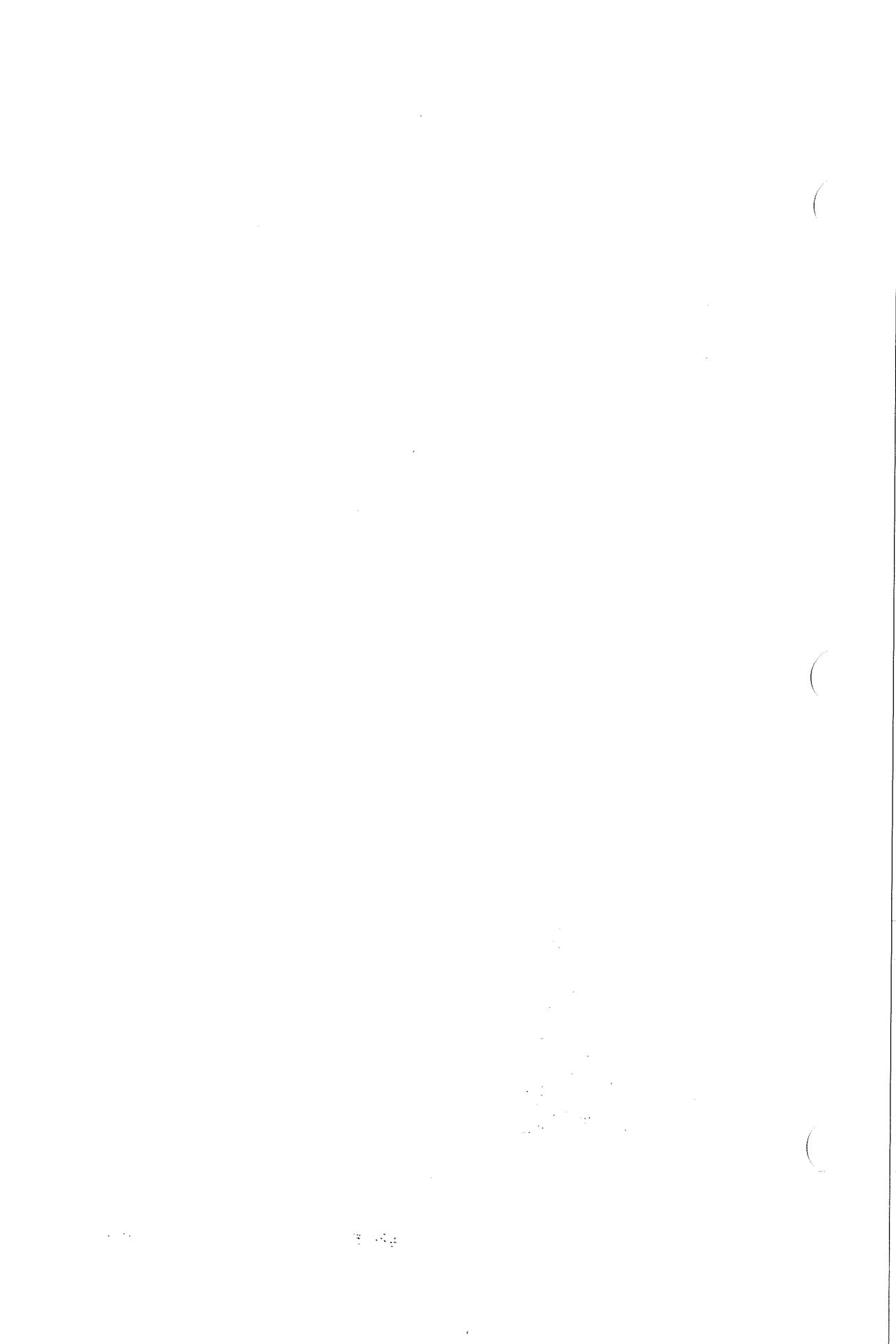
BUILDINGS

TABLE NO. 58-A — INCINERATOR DESIGN STANDARDS

ITEM AND SYMBOL	RECOMMENDED VALUE	ALLOWABLE DEVIATIONS
<p>A. Primary Combustion Zone:</p> <ol style="list-style-type: none"> 1. Grate loading, L/G 2. Grate area, A/G 3. Average arch height, H/A 4. Length to width ratio (approx.): <ol style="list-style-type: none"> a. Refort b. In-line 	<p>10 Log R/c; lbs/hr-ft² where R/c equals the refuse combustion rate in lbs/hr (See Fig. 58-B) $R/c \div L/G; ft^2$ 4/3 (AG)4/11; ft (See Fig. 58-C)</p> <p>Up to 500 lbs/hr, 2:1; over 500 lbs/hr, 1.75:1 Diminishing from about 1.6:1 for 750 lbs/hr to about 1:1 for 4,000 lbs/hr capacity. Over-square acceptable in units of more than 11 ft ignition chamber length.</p>	<p>+ or — 10% + or — 10% — — —</p>
<p>B. Secondary Combustion Zone:</p> <ol style="list-style-type: none"> 1. Gas velocities: <ol style="list-style-type: none"> a. Flame port @ 1000°F, V/FP b. Mixing chamber @ 1000°F, V/MC c. Curtain wall port @ 950°F, V/CWP d. Combustion chamber @ 900°F, V/CC 2. Mixing chamber downpass length, L/MC, from top of ignition chamber arch to top of curtain wall port 3. Length to width ratios of flow cross-sections: <ol style="list-style-type: none"> a. Retort, mixing chamber & combustion chamber b. In-line 	<p>55 ft/sec 25 ft/sec About 0.7 of mixing chamber velocity 5 to 6 ft/sec; always less than 10 ft/sec</p> <p>Average arch height, ft Range - 1.3:1 to 1.5:1 Fixed by gas velocities due to constant incinerator width</p>	<p>+ or — 20% + or — 20% — — — + or — 20°F — —</p>
<p>C. Combustion Air:</p> <ol style="list-style-type: none"> 1. Air requirement batch charging operation 2. Combustion air distribution: <ol style="list-style-type: none"> a. Overfire air ports b. Underfire air ports c. Mixing chamber air ports 3. Port sizing, nominal inlet velocity pressure 4. Air inlet ports oversize factors: <ol style="list-style-type: none"> a. Primary air inlet b. Underfire air inlet c. Secondary air inlet 	<p>Basis: 300% excess air. 50% air requirement admitted through adjustable ports; 50% air requirement set by open charge door and leakage.</p> <p>70% of total air required 10% of total air required 20% of total air required 0.1 inch water gage</p> <p>1.2 1.5 for over 500 lbs/hr to 2.5 for 50 lbs/hr 2.0 for over 500 lbs/hr to 5.0 for 50 lbs/hr</p>	<p>— — — — — — — —</p>

INCINERATORS

ITEM AND SYMBOL	RECOMMENDED VALUE	ALLOWABLE DEVIATIONS
D. Furnace Temperature: Average temperature, combustion products	1000°F	+ or - 20%
E. Draft Requirements: <ol style="list-style-type: none"> 1. Theoretical stack draft, D/T 2. Available primary air induction draft, D/A. (Assume equivalent to inlet velocity pressure) 3. Natural stack velocity, V/S 	0.2-0.35 inch water gage 0.1-0.2 inch water gage Less than 30 ft/sec @ 900°F	_____ _____ _____



INCINERATORS

FIGURE 58-B. RELATIONSHIP OF GRATE LOADING TO COMBUSTION RATE FOR MULTIPLE-CHAMBER INCINERATORS

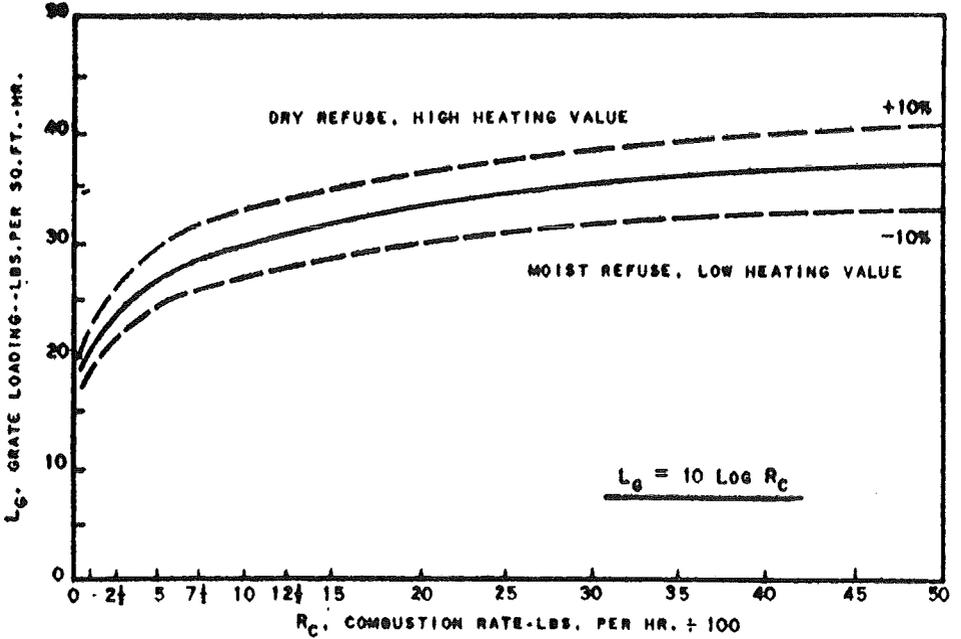


FIGURE 58-C. RELATIONSHIP OF ARCH HEIGHT TO GRATE AREA FOR MULTIPLE-CHAMBER INCINERATORS

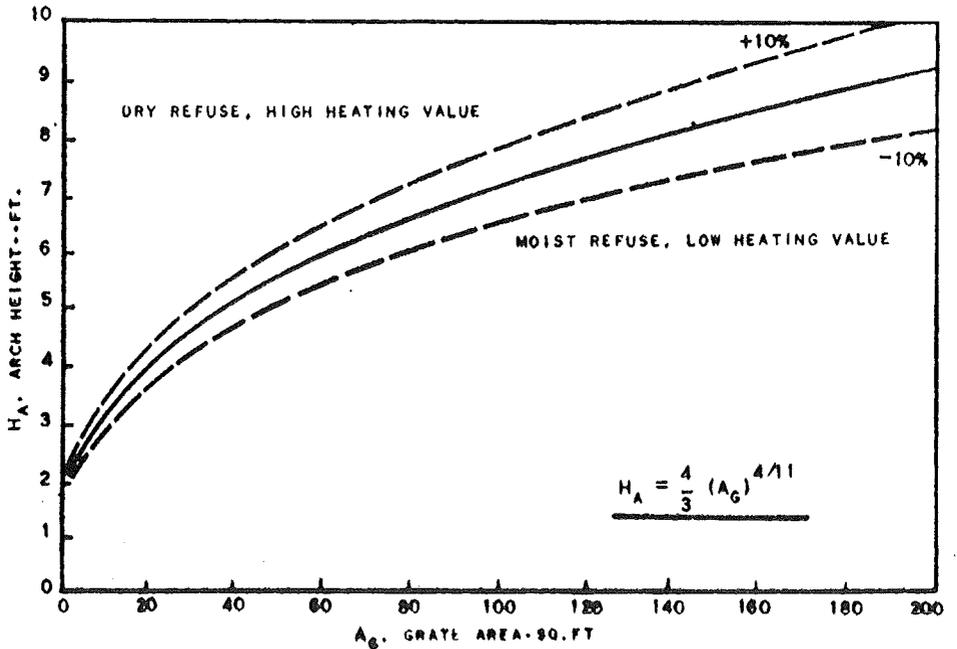
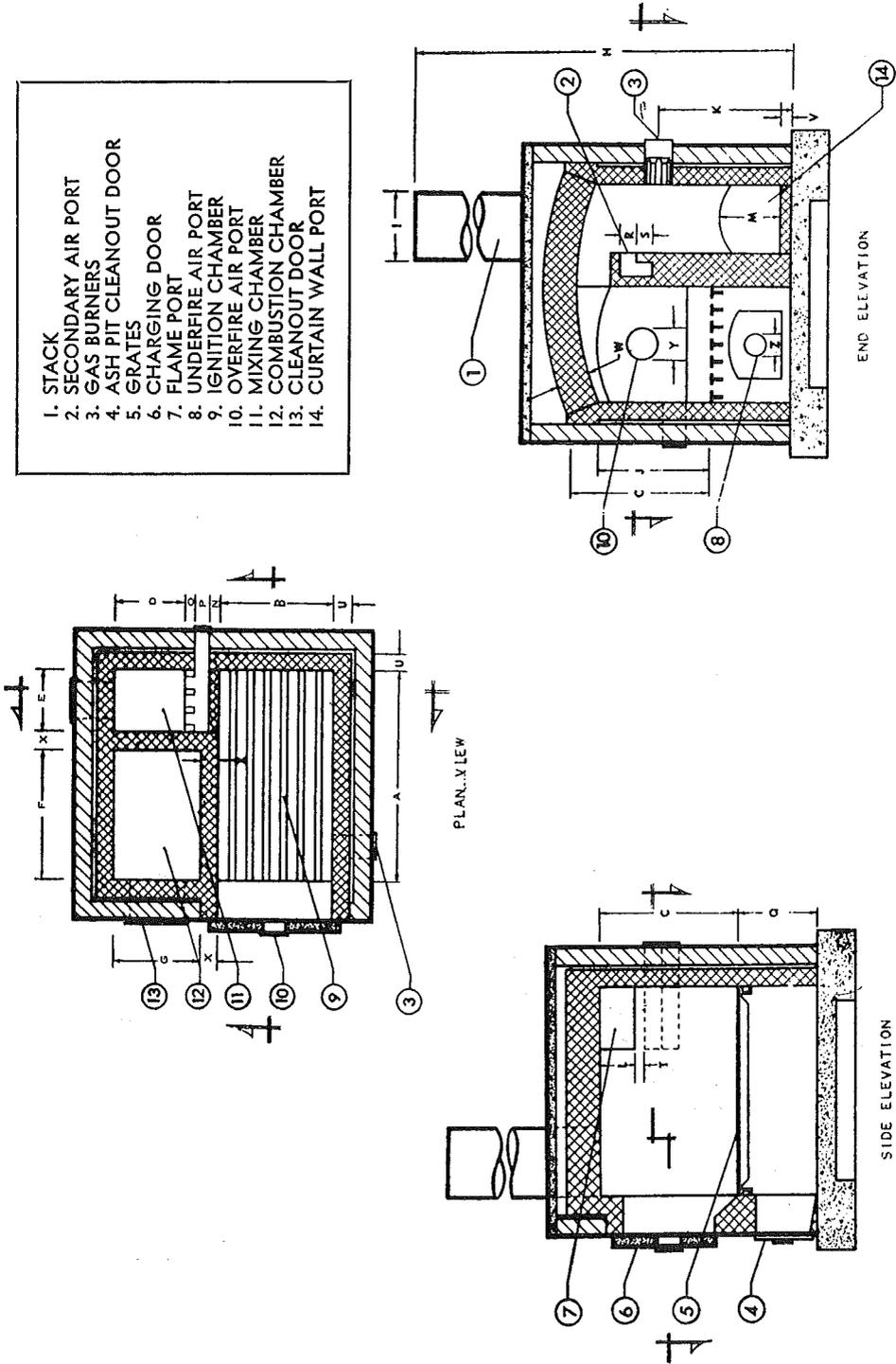


FIGURE 58-D—DESIGN STANDARDS FOR MULTIPLE-CHAMBER RETORT INCINERATORS



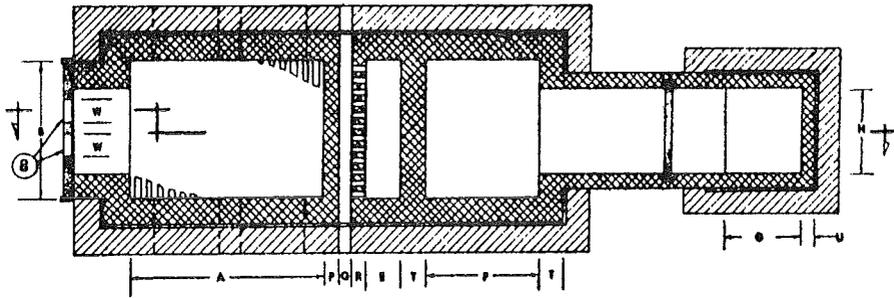
INCINERATORS

SIZE OF INCINERATOR POUNDS PER HOUR		LENGTH IN INCHES																									
A	B	C	D	E	F	G	H*	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z		
50	31½	18½	22½	9	6¾	20¼	13½	18	8	18½	20	3¾	10	4½	2¼	2¼	9	2½	2½	4½	2½	4½	4½	4½	4½	6	4
100	40½	18	28½	18½	9	27	18	19	12	23	28	5	15	2½	2½	4	14½	5	0	2½	4½	2½	4½	4½	8	5	
150	45	22½	33½	15½	11½	29	22½	20	14	27	35½	5	16½	4½	2½	4½	18	5	2½	2½	4½	2½	4½	4½	9	6	
250	54	27	37½	18	13½	36	27	22	18	30	40	7½	18	4½	4½	4½	20	5	2½	2½	4½	2½	4½	4½	12	6	
500	76½	36	47½	27	18	49½	36	28	24	36½	48½	12½	23	9	4½	4½	26	5	5	2½	9	4½	9	9	16	8	
750	85½	49½	54	36	22½	54	45	32	30	40	51½	15	28	9	4½	4½	25	5	10	2½	9	4½	9	9	18	8	
1000	94½	54	59½	36	27	58½	45	35	34	45	54½	17½	30	9	4½	4½	27½	7½	12½	2½	9	4½	9	9	22	10	

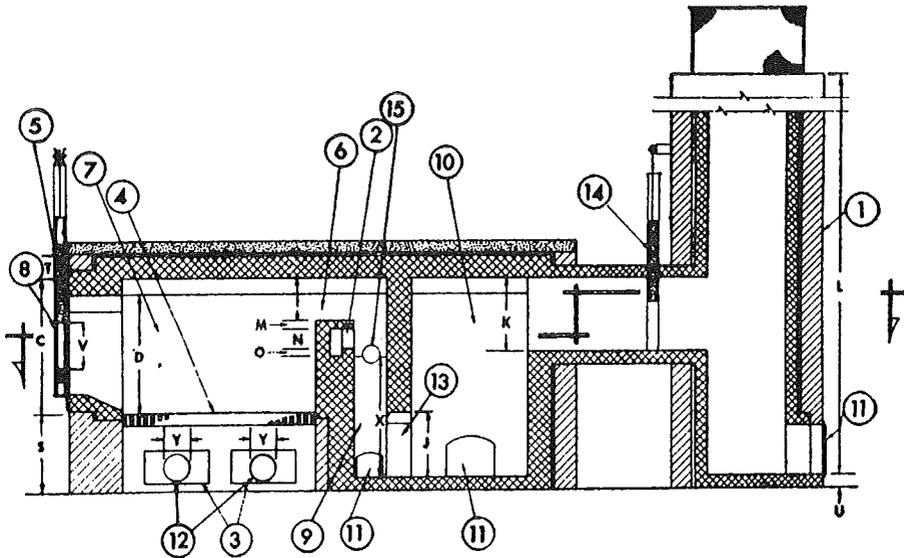
*Dimension "H" given in feet.

BUILDINGS

FIGURE 58-E—DESIGN STANDARDS FOR MULTIPLE-CHAMBER
IN-LINE INCINERATORS



PLAN VIEW



SIDE ELEVATION

1. STACK	6. FLAME PORT	11. CLEANOUT DOORS
2. SECONDARY AIR PORTS	7. IGNITION CHAMBER	12. UNDERFIRE AIR PORTS
3. ASH PIT CLEANOUT DOORS	8. OVERFIRE AIR PORTS	13. CURTAIN WALL PORT
4. GRATES	9. MIXING CHAMBER	14. DAMPER
5. CHARGING DOOR	10. COMBUSTION CHAMBER	15. GAS BURNERS

INCINERATORS

SIZE OF INCINERATOR		LENGTH IN INCHES																							
POUNDS PER HOUR	A	B	C	D	E	F	G	H	I	J	K	L*	M	N	O	P	Q	R	S	T	U	V	W	X	Y
750	85½	49½	51½	45	15¾	54	27	27	9½	24	18	32	4½	5	7½	9	2½	2½	30	9	4½	5	11	51	7
1000	94½	54	47½	18	63	31½	31½	11	29	22½	35	4½	5	10	9	2½	2½	30	9	4½	7	12	52	8	
1500	99	76½	65	55	18	72	36	36	12½	32	27	38	4½	5	7½	9	4½	4½	30	9	4½	8	14	61½	9
2000	108	90	69½	57½	22½	79½	40½	40½	15	36	31½	40	4½	5	10	9	4½	4½	30	9	4½	9	15	63½	10

*Dimension "L" given in feet

Chapter 3.60

PERMIT FEES

Sections:

- 3.60.010 Title—Enforcement.
- 3.60.020 Purpose.
- 3.60.030 Payment of fees.
- 3.60.040 Building permit fees—Gross area.
- 3.60.050 Building permit fees—Value of construction.
- 3.60.060 Permit renewal fee.
- 3.60.070 Minimum fee.
- 3.60.080 Other building permit fees.
- 3.60.090 Plan examination fees.
- 3.60.100 Plan vault fees.
- 3.60.110 Special fees.
- 3.60.120 Permit fees for signs.
- 3.60.130 Permit fees for heating installations, burners and tanks.
- 3.60.140 Permit fees for boilers and pressure vessels.
- 3.60.150 Permit fees for gas piping.
- 3.60.160 Work may be stopped.
- 3.60.170 Refund of fees.
- 3.60.180 Penalty for violations.

3.60.010 Title—Enforcement. This chapter shall be known as the permit fee ordinance and shall be enforced by the superintendent of buildings except that Section 3.60.150 shall be enforced by the director of public health. (Ord. 97179 § 1; October 30, 1968).

3.60.020 Purpose. The purpose of this chapter is to prescribe fees for permits which are required by the Building Code (Chapters 3.01 through 3.57), as follows:

- (a) Buildings, as required in Chapter 3.03 of the code.
- (b) Signs, as required in Chapter 3.46 of the code.
- (c) Heating installations, as required in Chapter 3.50 of the code.
- (d) Boilers and pressure vessels, as required in Chapter 3.52 of the code.
- (e) Oil burners, as required in Chapter 3.53 of the code.
- (f) Gas piping and appliances, as required in Chapter 3.54 of the code.

An additional purpose of this chapter is to prescribe special fees for testing, examination, inspection, or the furnishing of certain services or material not otherwise included under the required permits as above. (Ord. 97179 § 2; October 30, 1968).

3.60.030 Payment of fees. No permit required by the Building Code shall be issued, nor shall any drawing relating thereto be examined, until the permit fee hereinafter prescribed shall have been paid. (Ord. 97179 § 3; October 30, 1968).

3.60.040 Building permit fees—Gross area. Building permit fees for new construction or additions of floor area to existing structures shall be charged as set forth in Table No. 1 in accordance with the types of construction and occupancy groups defined in the Building Code (Chapters 3.01 through 3.57).

“Gross area,” as used herein, means the total area of all floors, measured from the exterior face or outside dimension of a building, including basements, cellars, balconies, stages and platforms, but not including unexcavated areas.

Where walls are omitted in the construction of a building, such as an open shed or marquee, the exterior wall on the open side or sides shall be assumed to be two feet inside the edge of the roof. In any building where the roof or other overhang projects more than two feet beyond an exterior wall, the outside dimension of the building shall also be assumed to be two feet inside the edge of the overhang.

Where a proposed structure housing a single occupancy generally conforms to a type of construction higher than that type which meets the minimum requirements based on occupancy or location in fire zone, the fee for such design shall be based on the higher type of construction to which the building generally conforms.

Where a building includes more than one type of construction or occupancy, the fee for each type of construction or occupancy shall be computed separately, if practicable; otherwise, the fee shall be computed upon that type of construction or occupancy which constitutes the greater percentage of the gross area of the entire building.

TABLE NO. 1—BUILDING PERMIT FEES
Based on Gross Area

TYPE OF CONSTRUCTION	OCCUPANCY GROUP	RATE PER 100 SQ. FT. OR FRACTION THEREOF OF GROSS AREA		
		10,000 Sq. Ft. or less	Next 40,000 Sq. Ft.	All Over 50,000 Sq. Ft.
I and II	A, B, D, H	\$8.00	\$6.00	\$3.00
	C, E, F, G	6.75	4.50	2.75
	I, J	5.50	3.75	2.00
III and IV	B, D, H	6.50	4.00	2.75
	C, E, F, G	5.50	3.50	1.50
	I, J	4.50	2.50	1.50
V	B, D, H	4.75	3.00	2.00
	C, E, F, G	4.00	2.50	1.50
	I, J	2.75	2.00	1.25

Provided, that the fees listed in Table No. 1 shall be subject to the following exceptions:

(1) The fee for detached buildings of Type V construction in J-1 occupancy shall be one-half the amount as computed on a gross area basis.

(2) The fee for uncovered piers, platforms, roof parking areas and similar uncovered usable structures shall be one-half the amount as computed on a gross area basis.

(3) The fee for swimming pools shall be fifteen dollars for a swimming pool based upon a standard plan which has been filed with the superintendent of buildings and which is accessory to Group I occupancy, and thirty dollars for other swimming pools.

(4) Fees for open parking lots shall be fifteen dollars for lots of four thousand square feet or less of gross lot area, and thirty dollars for lots larger than four thousand square feet of gross lot area, provided, that the fees for structures incidental to open parking lots, such as retaining walls and rockeries, shall be charged separately in accordance with the fee schedule contained in Section 3.60.050, and that the fees for grading, excavation and filling incidental to such open parking lots, shall be charged separately as specified in Chapter 3.70. (Ord. 97179 § 4 as amended by Ord. 99790 § 1; March 31, 1971).

3.60.050 Building permit fees—Value of construction. Building permit fees for alterations and repairs where there is no increase in floor area and other construction such as towers, silos, retaining walls, foundations, and automatic sprinkler systems which manifestly cannot be computed on a gross area basis shall be charged on a valuation basis as set forth in Table No. 2. The determination of the value of construction shall be made by the superintendent of buildings, or his authorized representative.

TABLE NO. 2—BUILDING PERMIT FEES
Based on Value of Construction

Total Valuation	Fee
\$1.00 to \$500.00	\$7.50
Over \$500 to \$2,000	\$7.50 for the first \$500.00 plus \$1.00 for each additional \$100.00 or fraction thereof, to and including \$2,000.
Over \$2,000 to \$25,000	\$22.50 for the first \$2,000 plus \$5.00 for each additional thousand or fraction thereof, to and including \$25,000.
Over \$25,000 to \$50,000	\$137.50 for the first \$25,000 plus \$3.50 for each additional thousand or fraction thereof, to and including \$50,000.
Over \$50,000 to \$100,000	\$225.00 for the first \$50,000 plus \$2.00 for each additional thousand or fraction thereof, to and including \$100,000.
Over \$100,000	\$325.00 for the first \$100,000 plus \$1.50 for each additional thousand or fraction thereof.

(Ord. 97179 §5 as amended by Ord. 99790 § 2; March 31, 1971).

3.60.060 Permit renewal fee. The fee for the renewal of a building permit shall be one-half of the original permit fee, provided that the maximum fee for renewal of a permit for a Group I or J occupancy shall be ten dollars and for all other occupancies, the maximum fee shall be twenty-five dollars. Such renewal fees shall be applicable only where no changes have been made or will be made in the original plans or specifications. (Ord. 97179 § 6; October 30, 1968).

3.60.070 Minimum fee. The minimum fee for any building permit or permit renewal, where a fee is required, shall be seven dollars and fifty cents. (Ord. 97179 § 7 as amended by Ord. 99790 § 3; March 31, 1971).

3.60.080 Other building permit fees. (a) There shall be a charge of seven dollars and fifty cents for a certificate of occupancy required as the result of a permitted change of occupancy not involving any construction work. There shall be no fee charged for a certificate of occupancy for buildings constructed or altered when such certificate is issued during the life of the building permit.

(b) There shall be a charge of seven dollars and fifty cents for a permit to demolish a building having a gross area in excess of one thousand square feet. There shall be no fee charged for the required permit to demolish a building of Group I or J occupancy or any building with a gross floor area not exceeding one thousand square feet. (Ord. 97179 § 8 as amended by Ord. 99790 § 4; March 31, 1971).

3.60.090 Plan examination fees. (a) The fee for examination of plans and specifications for proposed construction to determine the extent of their compliance with the Building Code and Zoning Ordinance shall be one-half of the fee prescribed for a building permit for such construction. The plan examination fee shall be paid at the time the plans are filed and shall apply on the total permit fee where the permit is issued within six months of the date of filing. If the permit is not issued within said six months, or if the proposed construction is abandoned, the plan examination fee shall be forfeited as compensation of such examination.

(b) Where a redesign of a building is submitted after one design has been examined, the plan examination fee for the first design shall be forfeited and a new plan examination fee shall be charged in accordance with foregoing subsection (a). The examination of any further redesign shall be similarly charged. The plan examination fee for any partial redesign shall be determined by the superintendent of buildings, or his authorized representative, which fee shall be consistent with the reasonable estimated cost to the city of such examination.

(c) Where a duplicate set of approved plans are submitted for examination and approval at any time after a permit had been issued on the original approved plans, there shall be charged a fee of one-half the original plan examination fee, provided the maximum fee for this service shall be twenty-five dollars. (Ord. 97179 § 9; October 30, 1968).

3.60.100 Plan vault fees. The superintendent of buildings is authorized to permit the checking out and examination of building plans on file in the plan vault of the building department, subject to rules established by him, and to collect a fee for checking out plans as follows:

For plans not taken out of the department.....\$2.00 each

For plans taken out of the department

For one week or less 5.00 each

Second and subsequent weeks 3.00 each per week

Provided that all such plans shall be returned to the building department files within thirty days. (Ord. 97179 § 10; October 30, 1968).

3.60.110 Special fees. The superintendent of buildings is authorized to charge such fees as he may deem necessary for the furnishing of special services or materials as requested by the public which are not ordinarily provided under permit. Such services and materials to be furnished may include but are not limited to the following:

Examination, testing, or inspection of particular plans, construction, or equipment which may be related to, but not directly covered by, a specific building permit.

Reproduction of records and documents or the furnishing of reports, data, or other material.

The superintendent of buildings or his authorized representative shall have full authority to specify the terms and conditions upon which such services and materials shall be made available and such fees as determined by him shall be consistent with the reasonable estimated cost to the city for the furnishing of such services or materials. (Ord. 97179 § 11; October 30, 1968).

3.60.120 Permit fees for signs. Permit fees for signs shall be charged as follows:

Electric signs having less than twenty-five square feet of total display area\$ 7.50

Non-electric signs having less than two hundred square feet of total display area 7.50

All other signs 15.00

Temporary signs (in addition to above fee, a deposit reimbursable on removal of sign) 25.00

NOTE: "Total display area" shall mean both sides of a double-faced sign, all three sides of a three-faced sign, etc.

Every sign permit shall be subject to an additional charge of fifty cents to reimburse the city for its expense incidental to procuring liability insurance as required by Section 3.46.060 of this code, which additional charge shall be adjusted from time to time by the superintendent of buildings as may be required to fully reimburse the city for its expense in this connection. (Ord. 97179 § 12 as amended by Ord. 99790 § 5; March 31, 1971).

3.60.130 Permit fees for heating installations, burners and tanks. In addition to other required fees, permit fees for warm air heating installations, major alterations thereto or replacements thereof and the installation of oil or gas burners and accessories shall be charged as follows:

Basic fee for issuing permit	\$5.50	
Heating systems:		
With output of 100,000 BTU/hr. or less....	4.00	
With output exceeding 100,000 BTU/hr.....	4.00	plus \$1.00 for each 100,000 BTU/hr. or fraction thereof in excess of 100,000 BTU/hr.
Oil and gas burners (not an integral part of a package heating unit):		
With installed heat output of 100,000 BTU/hr. or less	\$2.00	
With installed heat output exceeding 100,000 BTU/hr. but not more than 400,000 BTU/hr.	4.00	
With installed heat output exceeding 400,000 BTU/hr.	6.00	
Oil storage tanks, domestic	2.00	

(Ord. 97179 § 13 as amended by Ord. 100329 § 1; October 4, 1971).

3.60.140 Permit fees for boilers and pressure vessels. (a) INSTALLATIONS. In addition to other required fees, permit fees for boilers and pressure vessel installations, alterations, or repairs affecting the strength of a boiler or pressure vessel shall be charged as follows:

1. Boilers (directly heated by combustion, combustion products or electricity)		
Power boiler	\$.035	per sq. ft. of heating surface, or .05 per KW input rating
Minimum fee per power boiler	7.50	per boiler
Maximum fee per power boiler	35.00	
Small power boiler	7.50	per boiler
Miniature boiler	7.50	per boiler
Low pressure boiler .....	.025	per sq. ft. of heating surface, or .05 per KW input rating
Minimum fee per low pressure boiler..	7.50	
Maximum fee per low pressure boiler..	25.00	

There shall be charged an additional fee for the installation of controls

and limit devices for automatic boilers in accordance with Section 3.52.150 of this code as follows:

Automatic power boiler	\$25.00
Automatic small power boiler	15.00
Automatic small power package boiler	5.00
Automatic low pressure boiler	25.00

Fees for low pressure hot water supply boilers consisting of tanks whose contents are heated by electric elements shall be charged at the same rates that apply to unfired pressure vessels of the same size.

2. Unfired pressure vessels.

Rating size (sq. ft.)	Fee
Up thru 9	\$ 2.50
10 - 24	5.00
25 - 39	10.00
40 - 54	15.00
55 - 69	20.00
70 and over	25.00
Minimum fee for one premises	7.50

NOTE: Rating size shall be the product of the two greatest dimensions of the vessel: diameter x overall length for cylindrical vessels; maximum width x maximum length for rectangular vessels.

(b) CERTIFICATE OF INSPECTION—OPERATING PERMIT. The fee for a certificate of inspection for a boiler or pressure vessel (which certificate shall constitute an operating permit for such boiler or pressure vessel) shall be charged as follows:

1. Boilers (directly heated by combustion, combustion products or electricity)

Power boiler	\$.035 per sq. ft. of heating surface, or .05 per KW input rating
Minimum fee per power boiler	7.50 per boiler
Maximum fee per power boiler	35.00
Small power boiler	7.50 per boiler
Miniature boiler	7.50 per boiler
Low pressure boiler .....	.025 per sq. ft. of heating surface, or .05 per KW input rating
Minimum fee per low pressure boiler..	7.50
Maximum fee per low pressure boiler..	25.00

There shall be an additional charge for automatic boilers as follows:

Automatic power boiler	\$10.00
Automatic small power boiler	5.00
Automatic low pressure boiler	10.00
Monitoring system for an automatic boiler plant	25.00

2. Unfired pressure vessels.

Rating Size (sq. ft.)	Fee
Up thru 9	\$ 2.50
10 - 24	5.00
25 - 39	10.00
40 - 54	15.00
55 - 69	20.00
70 and over	25.00
Minimum fee for one premises	7.50

Where more than one miniature boiler is installed on one premises, the minimum charge for a certificate of inspection shall be seven dollars and fifty cents for one boiler and two dollars and fifty cents for each additional boiler.

The certificate fees for boiler and pressure vessels which are inspected by approved insurance company employees shall be fifty percent of those set forth in this subsection provided that such fifty percent rate shall not apply to the automatic boiler charges specified in the foregoing and further provided that no fee shall be less than the minimum.

All certificates of inspection shall be subject to renewal annually except those for automatic low pressure boilers and unfired pressure vessels which shall be renewable biennially.

(c) **BOILER AND PRESSURE VESSEL PLAN APPROVAL.** The fee for the examination and approval of boiler and pressure vessel plans shall be charged at the same rate as the installation fee provided that the minimum fee shall be ten dollars.

Exception: Plan approval will not be required for ASME boiler and pressure vessel plans previously accepted by an approved inspection agency or for previously approved plans which are altered only by changing the length of cylindrical shells.

(d) **SHOP AND FIELD ASSEMBLY INSPECTIONS.** The superintendent of buildings may, upon written request of any manufacturer or assembler licensed to do business in the city of Seattle who is in possession of an appropriate American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Symbol and holds a valid Certificate of Authorization from the ASME, make shop and field assembly inspections of boilers, boiler piping and unfired pressure vessels and provide for certification of manufacturer's data reports of such inspections as may be required by the ASME Boiler and Pressure Vessel Code rules. This service shall be provided only when the applicant is unable to obtain inspections from private inspection agencies or other governmental authorities.

Fees for shop inspections of boilers and pressure vessels shall be charged at the same rates as the installation fees, provided that the minimum fee for each visit to any one premises shall be ten dollars. (Ord. 97179 § 14 as amended by Ord. 99790 § 6; March 31, 1971).

3.60.150 Permit fees for gas piping. Permit fees for gas piping shall be charged as follows:

Basic fee for the issuance of each permit\$3.00

For the installation of gas piping:

(a) One through four outlets 5.50

(b) Each additional outlet 1.50

(Ord. 97179 § 15 as amended by Ord. 100803 § 1; March 27, 1972).

3.60.160 Work may be stopped. It is unlawful to proceed with any work for which a permit is required under the Building Code until the fee herein prescribed for such permit has been paid; or to proceed with any portion of any construction, installation, alteration or repair when the permit fee herein required has not been paid.

Should the superintendent of buildings have reason to believe that any work is proceeding for which the required permit fee has not been paid, he shall make an inspection thereof. Should he find that a permit fee is due the city in connection with such work he shall immediately order the suspension of such construction, installation, alteration or repair by posting a notice to that effect on the building or premises or by notifying the owner, lessee or person in charge, or by both such methods. It shall thereafter be unlawful for any person to remove, mutilate, conceal or destroy such posted notice or to proceed with such work until all of the fees pertaining to a permit therefor shall be paid. (Ord. 97179 § 16 as amended by Ord. 99790 § 7; March 31, 1971).

3.60.170 Refund of fees. Should any construction, installation, alteration or repairs for which a permit has been paid, not be carried on, the superintendent of buildings, or his authorized representative, upon proper application for refund and surrender of the permit for cancellation, and upon being satisfied after a survey of the premises, that such work will not be performed, shall by verified statement, so notify the city comptroller, advising him also of the amount or portion of the fee to be refunded. Upon receipt of such notice, the city comptroller shall draw, and the city treasurer shall honor and pay, a warrant upon the building department operating fund in the amount of the refund so stated by the superintendent of buildings to be due. In such cases, the superintendent of buildings shall cancel the permit. In determining such refunds, the superintendent of buildings shall deduct an amount equal to the plan examination fee for such permit as required in Section 3.60.090 herein, or where no plan examination was required, an amount equal to five percent of the total fee paid but not less than fifteen dollars to cover the cost of administration of the permit. (Ord. 97179 § 17 as amended by Ord. 99790 § 8; March 31, 1971).

3.60.180 Penalty for violations. Violation of, or failure to comply with, any of the provisions of this chapter, or of any lawful order or requirement

of the superintendent of buildings or his authorized representative made in accordance with the provisions hereof, shall subject the offender, upon conviction thereof, to a fine in any sum not exceeding three hundred dollars, or to imprisonment in the city jail for a term not exceeding ninety days, or to both such fine and imprisonment, and each day of such violation or failure to comply with any of the provisions of this chapter or of such order or requirement, shall constitute a separate offense.

Anyone concerned in the violation of this chapter, whether he directly commits the act or effects the commission constituting the offense, or aids or abets the same, or whether he directly or indirectly counsels, encourages, hires, commands, induces or otherwise procures another to commit such misdemeanor, is and shall be a principal under the terms of this chapter and shall be proceeded against and prosecuted as such. (Ord. 97179 § 19; October 30, 1968).

Chapter 3.64

NUMBERING BUILDINGS AND PREMISES

Sections:

- 3.64.010 Numbering buildings south of Lake Union, Salmon Bay and Lake Washington Canal.
- 3.64.020 Numbering buildings on Olive Way eastward from Melrose Avenue.
- 3.64.030 Numbering buildings on Second Avenue from Jackson Street to Yesler Way.
- 3.64.040 Numbering buildings north of Lake Washington, Lake Union, Salmon Bay and Lake Washington Canal.
- 3.64.050 Superintendent of Buildings to enforce chapter, fix house numbers, prescribe rules.
- 3.64.060 Penalty for violations—Aiding or abetting.

3.64.010 Numbering buildings south of Lake Union, Salmon Bay and Lake Washington Canal. The numerical designation of all doorways, and entrances to buildings, lots, yards and grounds fronting upon the several ways, avenues, streets, drives, places and squares of the City of Seattle be and the same are hereby established in accordance with the following system:

Except where otherwise specified, one hundred (100) numbers are allotted to each block; one whole number is allotted to each twenty feet frontage in each block and where there shall be more than one doorway or entrance within such twenty feet, half numbers shall be used; even numbers shall be used on the northerly side of streets or ways extending in an easterly and westerly direction and on the easterly side of avenues

and streets extending in a northerly and southerly direction; odd numbers shall be used on the southerly side of streets and ways extending in an easterly and westerly direction and on the westerly side of avenues or streets extending in a northerly and southerly direction.

Between Yesler Way and Denny Way all frontages upon avenues west of Broadway, East Union Street, Minor Avenue and Melrose Avenue shall be numbered as follows:

Yesler Way to Fir Street number 100 and upwards, Fir Street to Spruce Street number 150 and upwards, Spruce Street to Alder Street number 200 and upwards, continuing by consecutive hundreds to Pine Street; Pine Street to Olive Street number 1600 and upwards, Olive Street to Howell Street number 1700 and upwards, Howell Street to Stewart Street number 1800 and upwards, Stewart Street to Virginia Street number 1900 and upwards continuing by consecutive hundreds to Denny Way.

Between Yesler Way and East Denny Way all frontages upon avenues east of Broadway, East Union Street, Minor Avenue and Melrose Avenue shall be numbered as follows:

Yesler Way to East Fir Street number 100 and upwards, East Fir Street to East Spruce Street number 150 and upwards, East Spruce Street to East Alder Street number 200 and upwards, continuing by consecutive hundreds to East Marion Street; East Marion to East Spring Street number 900 and upwards, East Spring Street to East Union Street number 1100 and upwards, East Union Street to East Pike Street number 1400 and upwards continuing by consecutive hundreds to East Denny Way.

Between Yesler Way and Denny Way all frontages upon ways and streets west of Broadway, East Union Street, Minor Avenue and Melrose Avenue shall be numbered as follows:

Westward from Elliott Avenue number 51 and downward, Elliott Avenue to Western Avenue number 52 and upwards, Western Avenue to First Avenue number 76 and upwards, First Avenue to Second Avenue number 100 and upwards continuing eastward to Broadway, East Union Street or Melrose Avenue by consecutive hundreds.

Between Yesler Way and East Denny Way all frontages upon ways and streets east of Broadway, East Union Street, Minor Avenue and Melrose Avenue shall be numbered as follows:

Westward from Elliott Avenue number 51 and downward, Elliott Avenue to Western Avenue number 52 and upwards, Western Avenue to First Avenue number 76 and upwards, First Avenue to Second Avenue number 100 and upwards continuing eastward to Broadway, East Union Street or Melrose Avenue by consecutive hundreds.

Between Yesler Way and East Denny Way all frontages upon ways and streets east of Broadway, East Union Street, Minor Avenue and Melrose Avenues shall be numbered as follows:

Melrose Avenue to Bellevue Avenue number 300 and upwards, Bellevue Avenue to Summit Avenue number 400 and upwards continuing by consecutive hundreds to Broadway.

Broadway to Tenth Avenue number 900 and upwards, Tenth Avenue to Eleventh Avenue number 1000 and upwards continuing by consecutive hundreds corresponding with the numbered series of avenues eastward to Lake Washington.

South of Yesler Way the frontages upon the avenues shall be numbered as follows:

Yesler Way to Washington Street number 100 and upwards continuing by consecutive hundreds to the South City Limits, the blocks and streets on the east side of Ninth Avenue South being taken as a controlling series for numbering purposes.

South of Yesler Way the frontages upon ways and streets shall be numbered as follows:

Westward from First Avenue South to the Harbor Line or East Waterway number 99 and downward, First Avenue South to Occidental Avenue number 100 and upwards, Occidental Avenue to Second Avenue South number 150 and upwards, Second Avenue South to Third Avenue South number 200 and upwards continuing by consecutive hundreds to Sixth Avenue South; Sixth Avenue South to Maynard Avenue number 600 and upwards, Maynard Avenue to Seventh Avenue South number 650 and upwards, Seventh Avenue South to Eighth Avenue South number 700 and upwards, continuing eastward by consecutive hundreds corresponding with the numbered series of avenues to Lake Washington.

North of Denny Way (and East Denny Way) the frontages upon the avenues shall be numbered as follows:

Denny Way (and East Denny Way) to John Street (and East John Street) number 100 and upwards, continuing by consecutive hundreds to Galer Street (and East Galer Street) the blocks and streets on the east side of Queen Anne Avenue being taken as a controlling series for numbering purposes.

Galer Street (and East Galer Street) to Garfield Street (and East Garfield Street) number 1600 and upward continuing by consecutive hundreds to Smith Street (and Louisa Street), the blocks and streets along the east side of First Avenue North being taken as a controlling series for numbering purposes; Smith Street (and Louisa Street) to Ray Street (and Roanoke Street) number 2500 and upwards continuing by consecutive hundreds to Barrett Street, the blocks and streets along Queen Anne Avenue being taken as a controlling series for numbering purposes.

Roanoke Street to Edgar Street number 2500 and upwards continuing by consecutive hundreds north to Lake Union.

Barrett Street to Grand Boulevard number 3000 and upwards, Grand Boulevard to Orchard Street number 3200 and upwards, Orchard Street

to Grover Street number 3400 and upwards continuing by consecutive hundreds to Emerson Street; Emerson Street to Thurman Street number 3800 and upwards continuing by consecutive hundreds based on the shortest series of blocks northward to Salmon Bay and Admiralty Inlet.

Between Queen Anne Avenue and Eastlake Avenue and Lake Union the frontage on the ways and streets shall be numbered as follows:

Queen Anne Avenue to First Avenue North number 1 and upwards, First Avenue North to Warren Avenue number 100 and upwards, Warren Avenue to Second Avenue North number 150 and upwards, Second Avenue North to Third Avenue North number 200 and upwards, continuing by consecutive hundreds corresponding to the numbered series of avenues with half hundreds in case of Nob Hill, Taylor and Dexter Avenues, to Ninth Avenue North; Ninth Avenue North to Westlake Avenue number 900 and upwards, Westlake Avenue to Terry Avenue North number 950 and upwards, Terry Avenue North to Boren Avenue North number 1000 and upwards, Boren Avenue North to Fairview Avenue number 1100 and upwards, Fairview Avenue to Minor Avenue North number 1150 and upwards, Minor Avenue North to Pontius Avenue number 1200 and upwards, Pontius Avenue to Howard Avenue North number 1250 and upwards, Howard Avenue North to Eastlake Avenue Number 1300 and upwards.

East of Eastlake Avenue and Lake Union and north of East Denny Way the frontages upon the ways and streets shall be numbered as follows:

Eastlake Avenue to Melrose Avenue North number 200 and upwards continuing by consecutive hundreds eastward to North Broadway; North Broadway to Tenth Avenue North number 900 and upwards, Tenth Avenue North to Federal Avenue number 1000 and upwards, Federal Avenue to Eleventh Avenue North number 1050 and upwards, Eleventh Avenue North to Twelfth Avenue North number 1100 and upwards continuing eastward to Lake Washington by consecutive hundreds corresponding with the numbered series of avenues with half hundreds where an additional avenue intervenes between two consecutively numbered avenues.

West of Queen Anne Avenue the frontags upon ways and streets shall be numbered westward from Queen Anne Avenue, all numbers being prefixed by the letter W, as follows:

Queen Anne Avenue to First Avenue West number W1 and upwards, First Avenue West to Second Avenue West number W 100 and upwards continuing westward by consecutive hundreds corresponding with the numbered avenues with half hundreds where an additional avenue intervenes between two consecutively numbered avenues.

In the case of irregular drives, places, streets, ways or avenues, the frontage shall be numbered as near as may be according to the uniform series of block numbers with which they most nearly correspond. (Ord. 4635 § 1; October 19, 1897).

3.64.020 Numbering buildings on Olive Way eastward from Melrose Avenue. On Olive Way the street numbers shall run upwards consecutively eastward from the existing street numbers west of the Melrose Avenue intersection. (Ord. 4635 § 1-a, added by Ord. 68550; Sept. 6, 1938).

3.64.030 Numbering buildings on Second Avenue from Jackson Street to Yesler Way. On Second Avenue from Jackson Street to Yesler Way all frontages shall be numbered as follows:

From Jackson Street to Main Street number 200 and upwards, Main Street to Washington Street number 300 and upwards, Washington Street to Yesler Way number 400 and upwards. (Ord. 4635 § 2-b, added by Ord. 68550; Sept. 6, 1938).

3.64.040 Numbering buildings north of Lake Washington, Lake Union, Salmon Bay and Lake Washington Canal. The plan for the numbering of frontages upon the various avenues, streets and other public places in that portion of the City of Seattle lying north of Lake Washington, Lake Union, Salmon Bay and Lake Washington Canal, be, and the same is hereby, defined and established as follows, to-wit:

(1) One number to be allowed to every twenty (20) feet of street frontage; even numbers to apply on the north and east margins, and odd numbers on the south and west margins of the various streets, avenues and other public places.

(2) The frontages upon the avenues and places which run in a general northerly and southerly direction, shall be numbered in accordance with the designations of the intersecting numbered streets, viz:—north from North Twenty-ninth Street, from 2900 upwards; from North Thirtieth Street, from 3000 upwards; from North Fiftieth Street (or East Fiftieth Street, or West Fiftieth Street) from 5000 upwards; one hundred numbers being allowed for each block, except in cases where a named "place" intervenes between two consecutively numbered streets, and in such case fifty (50) numbers shall be allowed for each block. Frontages on avenues and places shall number from 3400 upwards in the block commencing from Ewing Street and running north; from 3500 upwards in the block north from Blewett Street and from 3600 upwards in the block north of Killbourne Street.

(3) The frontages upon the streets and places which run in a general easterly and westerly direction, shall be numbered as follows:

(a) West from First Avenue North West, commencing with 100, and continuing west in correspondence with the numbers of the avenues; one hundred numbers being allowed for each block, except where an avenue or place intervenes between two consecutively numbered avenues, and in such case fifty (50) numbers shall be allowed for each block.

(b) East from First Avenue North West, commencing with 100 and continuing as follows: East from Palatine Avenue, 200 and upwards; from

Greenwood Avenue, 300 and upwards; from Phinney Avenue, 400 and upwards; from Sunset Place, 450 and upwards; from Dayton Avenue, 500 and upwards; from Evanston Avenue, 600 and upwards; from Fremont Avenue, 700 and upwards; from Linden Avenue, 800 and upwards; from Aurora Avenue, 900 and upwards; from Winslow Place, 950 and upwards; from Whitman Avenue, 1000 and upwards; from Albion Place, 1050 and upwards; from Woodland Park Avenue, 1100 and upwards; from Midvale Avenue, 1200 and upwards; from Stone Avenue, 1300 and upwards; from Interlake Avenue, 1400 and upwards; from Ashworth Avenue, 1500 and upwards; from Carr Place, 1550 and upwards; from Woodlawn Avenue, 1600 and upwards; from Densmore Avenue, 1700 and upwards; from Wallingford Avenue, 1800 and upwards; from Burke Avenue, 1900 and upwards; from Stroud Avenue, 2000 and upwards; from Meridian Avenue, 2100 and upwards; from Bagley Avenue, 2200 and upwards; from Corliss Avenue, 2300 and upwards; from Sunnyside Avenue, 2400 and upwards; and from Eastern Avenue, 2500 and upwards;

(c) East from First Avenue North East, commencing with 100 and continuing east in correspondence with the numbered avenues; one hundred numbers being allowed for each block, except where an avenue or place intervenes between two consecutively numbered avenues, and in such case fifty numbers shall be allowed for each block. (Ord. 4635 § 1-c, added by Ord. 68550; Sept. 6, 1938).

3.64.050 Superintendent of Buildings to enforce chapter, fix house numbers, prescribe rules. The Superintendent of Buildings is hereby charged with the enforcement of this chapter. He shall, upon application of the owner of any property, ascertain the correct number thereof in accordance with the numbering system elsewhere herein set forth.

Whenever the irregularity of plats, the changing direction of streets, avenues, or other highways, the interruption of the continuity of highways or any other condition causes doubt or difference of opinion as to the correct number of any piece of property or any building thereon, the number shall be determined by the Superintendent of Buildings. He shall be guided by the specific provisions of this chapter so far as they are applicable and, when not applicable, by such rules as he may establish to carry out the intent of this chapter.

The owner of any building or other structure shall maintain the street number thereof, as provided herein, in a conspicuous place over or near the principal street entrance or entrances or in such other conspicuous places as it is necessary for the easy finding of such address, provided that this shall not be construed to require number on either appurtenant building or other buildings or structures should the Superintendent of Buildings find that the numbering thereof is not essential.

Numbers shall be easily legible figures not less than two inches high contrasting with the color of the building or other structures upon which they are placed.

Should the Superintendent of Buildings find that any building, structure or premises is not provided with numbers as herein required, or is not correctly numbered, he shall notify the owner, agent or tenant of the correct street number and shall require that the same shall be properly placed, in accordance with the provisions of this chapter, within a reasonable length of time. It shall be unlawful for any person to fail to comply with such notice. (Ord. 4635 § 2 as amended by Ord. 62978; August 22, 1932)

3.64.060 Penalty for violations—Aiding or abetting. Any person who shall violate or fail to comply with any of the provisions of this chapter or of any lawful order or requirement of the Superintendent of Buildings made in accordance with the provisions hereof, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be punished by a fine in any sum not exceeding three hundred dollars, or by imprisonment in the city jail for a term not exceeding ninety days, or by both such fine and imprisonment, and each day that any person shall continue to violate or fail to comply with any of the provisions of this chapter or of such order or requirement shall be considered a separate offense.

Every person concerned in the commission of a misdemeanor in violation of this chapter, whether he directly commits the act or effects the commission constituting the offense, or aids or abets the same and whether present or absent; and every person who directly or indirectly counsels, encourages, hires, commands, induces, or otherwise procures another to commit such misdemeanor, is and shall be a principal under the terms of this chapter and shall be proceeded against and prosecuted as such. (Ord. 4635 § 3 as amended by Ord. 62978; August 22, 1932).

Chapter 3.68

FILLS AND EXCAVATIONS

Sections:

3.68.010 Protection of adjoining property.

3.68.020 Penalty for violations—Aiding or abetting.

3.68.010 Protection of adjoining property. When the owner of any lot shall raise or lower the level of such lot by a fill or excavation, he shall at his own expense protect all adjoining property from encroachment by such fill or from danger of collapse due to such excavation either by the erection of a retaining wall or by sloping the sides of such fill or excavation entirely within the confines of said lot in a manner found safe by the Superintendent of Buildings. (Ord. 72585 § 1; May 12, 1943).

3.68.020 Penalty for violations—Aiding or abetting. The violation or failure to comply with any of the provisions of this chapter or any lawful order or requirement of the Superintendent of Buildings made in accordance with the provisions hereof is unlawful, and upon conviction thereof, the violator shall be punished by a fine in any sum not exceeding three hundred dollars, or by imprisonment in the city jail for a term not exceeding ninety days, or by both such fine and imprisonment, and each day that any person shall continue to violate or fail to comply with any of the provisions of this chapter or of such order or requirement shall be considered a separate offense.

Every person concerned in the violation of or the failure to comply with this chapter, whether he directly commits the act or effects the commission constituting the offense, or aids or abets the same, and whether present or absent; and every person who directly or indirectly counsels, encourages, hires, commands, induces, or otherwise procures another to commit such offense, is and shall be a principal under the terms of this chapter and shall be proceeded against and prosecuted as such. (Ord. 72585 § 2; May 12, 1943).

Chapter 3.70

GRADING AND FILLING LAND

Sections:

- 3.70.010 Purpose and police power.
- 3.70.020 Definitions.
- 3.70.030 Scope and exceptions.
- 3.70.035 Shorelands.
- 3.70.040 Retaining walls—When required.
- 3.70.050 Drainage.
- 3.70.060 Application for permits.
- 3.70.070 Referral of applications.
- 3.70.080 Granting of permits.
- 3.70.090 Fees.
- 3.70.100 Enforcement.
- 3.70.110 Penalty for violations.

3.70.010 Purpose and police power. This ordinance is intended to regulate grading on private property, including excavation and filling, so that adjacent property will not be endangered and that hazards to life, limb or property will be eliminated or minimized; and so that grading projects will not be inconsistent with the Zoning Ordinance or with the comprehensive plan of the city; and is declared to be an exercise of the police power of the State of Washington and of the City of Seattle to promote the public health, safety and welfare, and its provisions shall be liberally construed for the accomplishment of that purpose. (Ord. 83843 § 1; February 15, 1955).

3.70.020 Definitions. Words and phrases used herein, unless the same be contrary to or inconsistent with the context, shall mean as follows:

“BUILDING PERMIT” means a permit required by the Building Code of the City of Seattle.

“EXCAVATION” means any act by which earth, sand, gravel, rock or similar material is cut into, dug, quarried, uncovered, removed, displaced, relocated or bulldozed.

“FILL” means any act by which earth, sand, gravel, rock or similar material is deposited, placed, pushed, pulled, or transported to a place other than the place from which it was excavated.

“GRADING” means excavation or fill or any combination thereof.

“GRADING PERMIT” means a permit required by this chapter.

“NON-RESIDENTIAL ZONE” means any property designated on the Use Map of the Seattle Zoning Ordinance as Business District, Commercial District, First Manufacturing District, Second Manufacturing District, or Industrial District.

“RESIDENTIAL ZONE” means any property designated on the Use Map of the Seattle Zoning Ordinance as First Residence District, Two-Family Residence District, or Second Residence District.

“SITE” means one lot or a group of lots which are contiguous except that a public street or way may intervene. (Ord. 83843 § 2; February 15, 1955).

3.70.030 Scope and exceptions. It shall be unlawful to perform any grading in one or more operations of more than five hundred (500) cubic yards of earth or similar material on a single site that includes any excavation exceeding five (5) feet in vertical depth, or any fill exceeding three (3) feet in vertical depth unless authorized by a grading permit issued in accordance with this chapter, with the following exceptions:

- (a) Any excavation incident to a building or other structure authorized by a building permit.
- (b) The depositing or covering of any garbage, rubbish, or other material at any dump operated by The City of Seattle.
- (c) The excavation of natural deposits from a pit or quarry when in accordance with the provisions of the Zoning Ordinance of the City of Seattle or other applicable ordinance.
- (d) Any grading within a public right-of-way, or work incidental thereto, when authorized by ordinance or permit of the Board of Public Works;

Provided, a grading permit must be secured in accordance with this chapter for any fill in whole or in part on any tidelands or shorelands. (Ord. 83843 § 3, as amended by Ord. 91585; November 14, 1962).

3.70.035 Shorelands. Any fill constructed upon shorelands shall be contained within private property by bulkheads constructed thereon so as to prevent adverse effects upon other lands beneath the water and the design and construction of such bulkheads shall be subject to approval by the Superintendent of Buildings; provided, the Superintendent may waive the above bulkhead requirement upon a showing, supported by adequate engineering data, that such bulkheads are not necessary to such containment. No grading permit shall be issued to fill upon shorelands unless the applicant shall have filed with the Superintendent of Buildings a bond in an amount determined by said Superintendent to be sufficient to provide for the correction of any adverse effects upon public or private property from such filling which may occur within three years from the date of such filling. No grading permit shall be issued for or authorize any filling beyond the shorelands. (Ord. 83843 § 3-A, as amended by Ord. 91585; November 14, 1962).

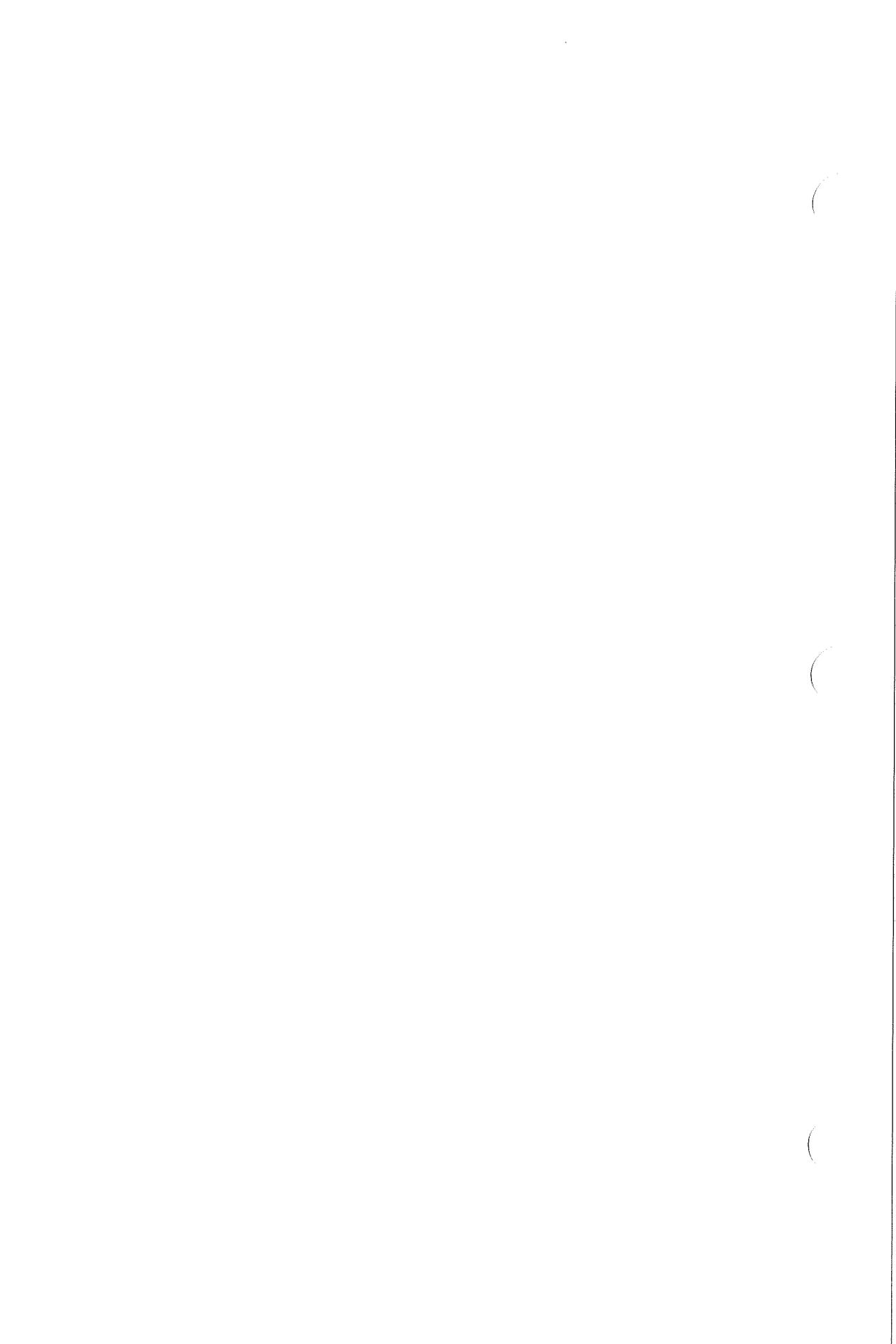
3.70.040 Retaining walls—When required. Retaining walls or cribbing shall be used wherever the forces tending to cause failure along any potential slide surface in the earth mass behind the face of an excavation or of an earth fill, amount to more than two-thirds of the total of forces for resistance to sliding, in order to protect all adjoining property from encroachment by a fill or from danger of collapse due to an excavation. (Ord. 83843 § 4; February 15, 1955).

3.70.050 Drainage. Adequate provisions shall be made to prevent any surface water or seepage from damaging the cut face of any excavation or the sloping face of a fill. Provisions shall be made to carry to the nearest practicable street, or sewer, or natural water-course approved by the City Engineer, any surface waters that are or might be concentrated as a result of a fill or excavation. (Ord. 83843 § 5; February 15, 1955).

3.70.060 Application for permits. Application for a grading permit required by Section 3.70.030 shall be made in writing to the Superintendent of Buildings on form provided therefor. Each application shall be signed by the owner, lessee, or his authorized agent. There shall also be filed with such application two (2) sets of drawings fully describing the intent and nature of the work for which the permit is desired. They shall also show the locations of necessary retaining walls, drainage structures, cribbing, and surface protection. Drawings shall be prepared by or under the direction of a civil engineer or land surveyor licensed to practice in the State of Washington, provided, however that any owner who is capable of making drawings which will illustrate the proposed work adequately may prepare the required drawings. A topographic map showing the present contours of the land and the proposed contours after completion of the proposed grading shall be filed with any application that requires referral by Section 3.70.070 and may be required with any application if the Superinten-

dent of Buildings deems it necessary to fully describe the nature and extent of the work. (Ord. 83843 § 6, as amended by Ord. 86102; April 30, 1957).

3.70.070 Referral of applications. All applications for grading permits on property located in a Residential Zone which property abuts upon or is located directly across an alley from property in a Non-Residential Zone shall be referred by the Superintendent of Buildings to the City Planning Commission. Applications for grading permits that include the movement of more than twenty-five hundred (2500) cubic yards of earth or similar material on property in a Residential Zone shall be referred to the City Planning Commission and to the City Engineer. The City Planning Commission shall determine if the proposed grading will adversely affect the character of the site for present lawful uses or with the future development of the site and adjacent properties for building or other purposes as indicated by the Comprehensive Plan and the Zoning Ordinance. The City Engineer shall determine the effect of the intended grading upon public



GRADING AND FILLING LAND 3.70.080—3.70.110

and private property. The city planning commission and the city engineer shall report their findings to the superintendent of buildings. (Ord. 83843 § 7; February 15, 1955).

3.70.080 Granting of permits. After an application has been filed and the city planning commission and the city engineer have submitted their reports where necessary, the superintendent of buildings shall ascertain whether such grading work complies with the other provisions of this chapter. If the application and plans so comply, or if they are corrected or amended so as to comply, the superintendent of buildings shall issue to said applicant a grading permit including a permit placard. The permit placard shall be posted on the site of the work in a conspicuous place protected from the weather. A grading permit shall be valid for the number of days stated in the permit but in no case shall the period be more than one year. The city planning commission and the city engineer shall be notified of action on application referred under the provisions of Section 3.70.070.

Upon approval of the application and issuance of the grading permit no work shall be done that is not provided for in the permit. The superintendent of buildings is authorized to inspect the premises at any time to determine if the work is in accordance with the permit application and plans. (Ord. 83843 § 8; February 15, 1955).

3.70.090 Fees. A fee shall be collected to cover the cost of granting the permit and of investigating, inspecting, and exercising proper police regulations, based upon the following schedule:

- (a) 500 to 2,500 cubic yards\$10.00
- (b) More than 2,500 cubic yards 10.00
plus \$3.00 for each additional 1,000 cubic
yards or major portion thereof, provided,
such fee shall in no event exceed \$500.00.

(Ord. 83843 § 9, as amended by Ord. 91748; January 8, 1963).

3.70.100 Enforcement. It shall be the duty of the superintendent of buildings to enforce the provisions of this chapter. (Ord. 83843 § 10; February 15, 1955).

3.70.110 Penalty for violations. Any violation of or failure to comply with the provisions of this chapter shall subject the offender upon conviction thereof to a fine of not exceeding three hundred dollars or to imprisonment for not exceeding ninety days, or both, and each day that such violation or failure to comply exists shall constitute a separate offense. (Ord. 83843 § 11; February 15, 1955).

Chapter 3.74
HOUSEBOATS

Sections:

- 3.74.010 Definitions.
- 3.74.020 Moorage location.
- 3.74.030 Zoning requirements.
- 3.74.040 Land access.
- 3.74.050 Moorage walkways.
- 3.74.060 Moorage lighting.
- 3.74.070 Fire protection.
- 3.74.080 Water service connections.
- 3.74.090 Public sewer connections.
- 3.74.100 Local side sewer system.
- 3.74.110 Connection to local side sewer system.
- 3.74.120 Sewer installation fees.
- 3.74.130 Plumbing systems.
- 3.74.140 Garbage disposal.
- 3.74.150 Electrical service and wiring.
- 3.74.160 New construction.
- 3.74.170 Housing standards for existing floating homes.
- 3.74.180 Approval of moorage site plan required.
- 3.74.190 Moorage register of ownerships.
- 3.74.200 Enforcement.
- 3.74.210 Penalty for violations.

3.74.010 Definitions. Certain words and terms used in this chapter unless clearly inconsistent with their context, shall mean as follows:

“Floating home” means a building constructed on a float used in whole or in part for human habitation as a single-family dwelling, which is moored, anchored or otherwise secured in waters within the city limits.

“Floating home site” means a part of a floating home moorage, located over water, and designed to accommodate one floating home.

“Floating home moorage” means a waterfront facility for the moorage of one or more floating homes, and the land and water premises on which such facility is located.

“Garbage” means all discarded putrescible waste matter, including small dead animals weighing not over fifteen pounds, but not including sewage or human or animal excrement.

“Sewage” means all water-carried waste discharged from the sanitary facilities of buildings occupied or used by people. (Ord. 96821 § 1.010; June 26, 1968).

3.74.020 Moorage location. Every floating home moorage shall be located on privately owned or privately controlled premises. No floating

home shall be located in any waterway or fairway, or in the public waters of any street or street end, provided that until January 1, 1974 this section shall not apply to those occupied floating homes and floating home moorages which were located in the public waters of any street or street end on July 26, 1968, have continuously remained in such locations, comply with all other provisions of Ordinance 96821 and are authorized by a use and occupation permit approved by the board of public works, provided further that, subsequent to January 1, 1973, this section shall not apply to floating homes and floating home moorages located in Portage Bay in a submerged street segment lying generally parallel to the shoreline that terminates on the north and on the south in a submerged street area when the same person owns or leases the property abutting on both sides thereof. (Ord. 96821 § 1.020 as amended by Ord. 100108, Ord. 101461 and Ord. 101819 § 1; February 5, 1973).

3.74.030 Zoning requirements. All floating homes and floating home moorages shall be subject to the limitations of the comprehensive zoning ordinance of Seattle (Title 26 of this code). (Ord. 96821 § 1.030; June 26, 1968).

3.74.040 Land access. Every floating home moorage shall have not less than twenty feet of land frontage abutting a public street sufficiently improved for automobile travel. (Ord. 96821 § 1.040; June 26, 1968).

3.74.050 Moorage walkways. Every floating home moorage shall have firm and substantial walkways with a net width of not less than four feet and extending from land to every floating home site in such moorage. (Ord. 96821 § 1.050; June 26, 1968).

3.74.060 Moorage lighting. Every floating home moorage, and the walkways to every floating home site, shall be illuminated by lights designed, constructed and maintained to provide a minimum average illumination on the walkways of five foot-candles of light intensity. The lowest foot-candle value at any point on the walkways shall not be less than one-half the average value. (Ord. 96821 § 1.060; June 26, 1968).

3.74.070 Fire protection. Floating home moorages shall be provided with fire extinguishing equipment as follows:

A. **PORTABLE FIRE EXTINGUISHERS:** Every floating home moorage shall be provided with two two and one-half gallon water-filled or equivalent type fire extinguishers along the route of exit travel, in sufficient quantity so that the maximum travel distance from any point within the moorage to an extinguisher does not exceed seventy-five feet.

B. **STANDPIPES:** Floating home moorages hereafter constructed where the length of the moorage pier from the shore side or inboard end to the water side or outboard end exceeds three hundred feet, shall be equipped with an approved standpipe system of either of the following types:

3.74.070 HOUSEBOATS

1. Wet Standpipe System. (a) Supply shall be a minimum of two inches in diameter, capable of providing a minimum flow of one hundred gallons per minute, and shall be properly insulated or otherwise protected against freezing.

(b) Outlets shall be provided at intervals along the pier or float so that every point of the moorage is within a distance of one hundred

twenty-five feet of an outlet. Each outlet shall be equipped with a valved male coupling with one and one-half inch national standard fire-hose coupling screw threads.

(c) Each outlet shall be provided with one hundred feet of approved fire hose with controlling nozzle attached. A suitable home cabinet shall be provided for storage and protection of the hose, and may be used for the storage of a required portable fire extinguisher. Hose shall be racked in such manner as to be readily extended.

(d) All standpipe connections and piping shall conform to the applicable portions of National Fire Code Standard, N.F.P.A. No. 14 for Standpipes and Hose Systems.

2. Dry Standpipe System. (a) Pipe shall be a minimum of four inches in diameter, capable of providing a minimum flow of five hundred gallons per minute.

(b) A fire department two-way siamese connection shall be provided at the shore end, and so arranged that hose lines can be readily and conveniently attached to the inlets without interference.

(c) Valved outlets shall be provided at intervals along the pier or float, so that every point of the moorage is within a distance of one hundred twenty-five feet of an outlet.

(d) All couplings shall be two and one-half inch national standard fire-hose coupling screw threads.

(e) All standpipe connections and piping shall conform to the applicable portions of National Fire Code Standard N.F.P.A. No. 14 for Standpipes and Hose Systems. (Ord. 96821 § 1.070 as amended by Ord. 101067 § 1; June 9, 1972).

3.74.080 Water service connections. Every floating home moorage shall have a lawfully installed water service connection; and shall provide water service piping, securely fastened and stabilized above water, from such water service connection to an outlet connection at each floating home site at such floating home moorage. The water piping in every floating home in a floating home moorage shall be connected to the water service outlet serving such floating home and such connection shall be securely fastened and stabilized above high water line. Water service connections and water service piping shall be constructed, installed and maintained in accordance with Chapter 23.04 of this code. (Ord. 96821 § 1.080; June 26, 1968).

3.74.090 Public sewer connections. Every floating home moorage any part of which is within three hundred feet of a public sewer and every floating home moorage on Shilshole Bay, Salmon Bay, Lake Washington Ship Canal, Lake Union, Portage Bay, Union Bay and that portion of Lake Washington lying within the city limits of Seattle shall have a lawfully installed connection to such sewer. (Ord. 96821 § 1.090; June 26, 1968).

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3.74.100 Local side sewer system. Every floating home moorage within the limits specified in Section 3.74.090 shall provide a local side sewer system for the collection of sewage from every floating home in such moorage. Such local side sewer system shall be connected to the public sewer, shall have an inlet connection at each floating home site, and shall be constructed, installed and maintained in accordance with this and all other applicable ordinances regulating the construction, alteration, repair and connection of side sewers. (Ord. 96821 § 1.100; June 26, 1968).

3.74.110 Connection to local side sewer system. Every floating home in a floating home moorage which is required under Section 3.74.090 to have a lawfully installed connection to a public sewer shall be connected to the local side sewer system and no owner or operator of such a floating home moorage shall permit to be moored at such moorage under his control any floating home which is not lawfully connected to the local side sewer system. It shall be unlawful for any person to use, occupy or let any floating home for human habitation within the limit specified in Section 3.74.090 unless the same is lawfully connected to the sewer system.

A reconnection permit shall be required for any floating home which is relocated from its original site of connection to a local side sewer system and such reconnection shall be subject to the approval of the city engineer as to compliance with this chapter. (Ord. 96821 § 1.110; June 26, 1968).

3.74.120 Sewer installation fees. The fee for the installation of any side sewer serving a floating home moorage shall be the fee provided by law for the connection, to the public sewer, of side sewers serving mobile home parks. (Ord. 96821 § 1.120; June 26, 1968).

3.74.130 Plumbing systems. All plumbing and plumbing systems in every floating home shall meet the requirements of the plumbing code (Title 5 of the code) except as otherwise approved by the director of public health in accordance with the plumbing code. (Ord. 96821 § 1.130; June 26, 1968).

3.74.140 Garbage disposal. Every floating home moorage shall be provided with adequate garbage storage and collection facilities which shall be located in an accessible place on the moorage site, and no garbage or refuse therefrom shall be thrown or dumped into the waters. (Ord. 96821 § 1.140; June 26, 1968).

3.74.150 Electrical service and wiring. Electrical service to floating home and floating home moorages shall be provided as approved by the

lighting utility. Electrical wiring and equipment in every floating home shall conform to requirements of the electrical code (Title 4 of this code) as set forth for residential occupancies and no floating home shall be permitted to connect or reconnect to the utility's distribution system unless approved for such connection by the superintendent of buildings in accordance with the electrical code. (Ord. 96821 § 1.150; June 26, 1968).

3.74.160 New construction. All new construction of floating homes or major alterations thereto and all floating homes moved into city waters, excluding the structural members used for flotation, shall conform to the requirements for dwellings as set forth in the building code (Title 3 of this code) and all other applicable codes and ordinances regulating the design, construction, use and occupancy of such buildings and the required installations therein. (Ord. 96821 § 1.160; June 26, 1968).

3.74.170 Housing standards for existing floating homes. Every floating home shall comply with the minimum housing standards as set forth in the housing code as now or hereafter amended (Title 27 of this code) except as otherwise approved by the superintendent of buildings in accordance with said housing code. (Ord. 96821 § 1.170 as amended by Ord. 100108 § 2; July 20, 1971).

3.74.180 Approval of moorage site plan required. Every floating home moorage shall continuously conform to a moorage site plan which has been approved by the superintendent of buildings. Such approval, shall be obtained as follows: Three copies of the site plan, drawn to scale and completely dimensioned, and setting forth the address and legal description of the property on which the moorage is located, and the name and address of the owner or operator of the moorage, shall be filed with the superintendent of buildings.

The moorage site plan shall show:

- (1) The dimensions of the floating home moorage site.
- (2) The location of abutting public waterways.
- (3) The location and dimensions of private waterways and land access to the moorage.
- (4) The location and identification of individual floating home sites.
- (5) The location and dimensions of off-street parking spaces.
- (6) The location and dimensions of walkways and any accessory structures or facilities.
- (7) The water service system.
- (8) The local side sewer system.
- (9) The electrical service and lighting system.

Such site plan shall be examined by the superintendent of buildings, the fire chief, the director of public health, the superintendent of water, and by the city engineer, to each of whom the superintendent of buildings shall refer such plan. Upon approval of a floating home moorage site plan

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by the fire chief, the director of public health, the superintendent of water, and the city engineer as to compliance with laws and ordinances under their respective jurisdictions, and upon being himself satisfied that the plan conforms to the requirements of this ordinance and other applicable ordinances and is otherwise lawful, the superintendent of buildings shall approve such plan. One copy of the approved site plan shall be retained in the office of the superintendent of buildings, one copy in the office of the director of public health, and one copy, which shall be maintained on the premises of the floating home moorage, shall be returned to the owner or operator. (Ord. 96821 § 1.180; June 26, 1968).

3.74.190 Moorage register of ownerships. Every owner or operator of a floating home moorage shall maintain a current register of every floating home moored on the premises under his control, such register to record the name and address of the legal owner of each floating home and the registration number assigned to it by the King county assessor. A copy of said register shall be made available upon request to any city department head referred to in this chapter or to his representatives. (Ord. 96821 § 1.190; June 26, 1968).

3.74.200 Enforcement. Except as otherwise specifically provided herein, the superintendent of buildings shall enforce this ordinance and may adopt rules and regulations consistent therewith. Upon presentation of proper credentials the superintendent of buildings or other authorized officer of the city may with the consent of the occupant or with the consent of the owner of unoccupied premises or pursuant to a lawfully issued warrant enter any building or premises at any reasonable time to perform any duty imposed on him by this chapter. (Ord. 96821 § 1.200; June 26, 1968).

3.74.210 Penalty for violations. Anyone violating or failing to comply with any of the provisions of this chapter shall, upon conviction thereof, be punished by a fine in a sum not exceeding three hundred dollars, or by imprisonment in the city jail for a term not exceeding ninety days, or by both such fine and imprisonment, and each day that anyone shall continue so to violate or fail to comply shall be considered a separate offense. (Ord. 96821 § 1.210; June 26, 1968).

Chapter 3.76

ELEVATORS, ESCALATORS AND DUMBWAITERS

Sections:

- 3.76.010 Definitions.
- 3.76.020 Permits—Certificates of inspection.
- 3.76.030 Requirements for new installations and major alterations.
- 3.76.040 Requirements for existing installations.
- 3.76.045 Emergency service elevators.
- 3.76.050 Requirements for operation and maintenance.
- 3.76.060 Permit and inspection fees.
- 3.76.070 Penalty for violations—Aiding or abetting.

3.76.010 Definitions.

“Approved” means approval by the superintendent of buildings or his duly authorized representatives.

“ANSI Code” means the American National Standard Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks, and Appendices A, B, C and D thereof (Eighth Edition, published by the American Society of Mechanical Engineers, designated ANSI A17.1-1971), three copies of which are on file with the city clerk in C.F. 273776.

“Automobile parking elevator” means an elevator located in either a stationary or horizontally moving hoistway and used exclusively for parking automobiles where, during the parking process, each automobile is moved either under its own power or by means of a power-driven transfer device onto and off the elevator directly into parking spaces or cubicles in line with the elevator and where no persons are normally stationed on any level except the receiving level.

“Conveyance” means an elevator, escalator, dumbwaiter, manlift, automobile parking elevator or moving walk, all as defined herein.

“Dumbwaiter” means a hoisting and lowering mechanism with a car of limited capacity and size which moves in guides in a substantially vertical direction, and is used exclusively for carrying materials.

“Elevator” means a hoisting and lowering mechanism equipped with a car or platform which moves in guides in a substantially vertical direction, and which serves two or more floors of a building or structure.

“Enforcing authority” as used in the “ANSI Code” means the superintendent of buildings and includes his authorized representatives.

“Escalator” means a power-driven, inclined, continuous stairway used for raising or lowering passengers.

“Manlift” means a device consisting of a power-driven endless belt moving in one direction only, provided with steps or platforms and handholds attached to it for the transportation of personnel from floor to floor.

“Moving walk” means a type of passenger-carrying device on which passengers stand or walk, and in which the passenger-carrying surface re-

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mains parallel to its direction of motion and is uninterrupted.

“Owner” means any person having title to, or (as guardian, trustee, lessee, or otherwise) control of a conveyance.

Other definitions shall be as set forth in the ANSI Code. (Ord. 84905 § 1 as amended by Ord. 97178 and Ord. 101601 § 1; November 16, 1972).

3.76.020 Permits—Certificates of inspection. It shall be unlawful to hereafter install any new elevator, escalator, dumbwaiter, manlift, automobile parking elevator, or moving walk or to make major alterations to any existing elevator, escalator, dumbwaiter, manlift, automobile parking elevator or moving walk without a permit for such installation or alteration issued by the superintendent of buildings as provided in Section 3.76.060.

No permit shall be required for ordinary repairs and replacement normally necessary for maintenance and made with parts of equivalent materials, strength and design.

It is unlawful to operate any elevator, escalator, dumbwaiter, manlift, automobile parking elevator or moving walk without a certificate of inspection issued by the superintendent of buildings. Such certificate shall be issued annually upon payment of prescribed fees and the exhibit of a valid inspection report issued by the superintendent of buildings which indicates that inspection has been made and such conveyance found to be in a safe operating condition. (Ord. 84905 § 2 as amended by Ord. 97178 and Ord. 99502 § 1; December 9, 1970).

3.76.030 Requirements for new installations and major alterations. All new elevators, escalators, moving walks, and dumbwaiters and major alterations to existing elevators, escalators, moving walks, and dumbwaiters, and the installation thereof shall conform to the requirements of the ANSI Code, which is hereby made a part of this chapter, and three copies of which are filed in the office of the city clerk in C.F. 273776.

All new manlifts and major alterations to existing manlifts and the installation thereof shall conform to the requirements of the American National Standard Safety Code for Manlifts, published by the American Society of Mechanical Engineers, designated ANSI A90.1-1969, three copies of which are filed in the office of the city clerk in C.F. 274104.

Exception: For the purposes of this chapter, all references in the ANSI Code to the National Electrical Code shall not apply and are hereby deleted. All electrical work shall be done in accordance with the requirements of the Electrical Code of the city of Seattle. (Ord. 84905 § 3 as amended by Ord. 97178 and Ord. 101601 § 2; November 16, 1972).

3.76.040 Requirements for existing installations. All existing elevators shall comply with the requirements of this section. Alterations and addi-

tions required under this section shall not be construed as major alterations as specified in the ANSI Code.

(a) **HOISTWAY ENTRANCES.** Every existing passenger elevator entrance shall be equipped with hoistway doors, and hoistway door interlocks.

Every existing freight elevator shall be provided with hoistway protection at every elevator landing, which shall be not less than the following minimum requirements.

(1) A hoistway gate with approved electric contacts and locks or interlocks which shall be not less than sixty-six inches in height above the threshold and shall be full bodied, coming to within two inches of the floor at all points. Gates made of grill, lattice or other open work shall reject a ball two inches in diameter.

(2) Gates shall be of metal or wood and shall be strong enough to withstand a lateral pressure of two hundred fifty pounds applied at any point of the gate.

(3) An access opening five inches wide and thirty-six inches high with the bottom of the opening approximately thirty inches from the floor shall be provided for access to the hand rope for hand rope controlled elevators. Where a two section gate is used, the access slot need not be over twenty-six inches high.

(b) **ENCLOSURES, CAR AND HOISTWAY.**

Car Enclosures. (1) Passenger cars shall be enclosed with a solid panel or open work with openings not more than one-half inch square to the height of the car top.

(2) Freight elevators shall be enclosed to a height of at least six feet on all unused sides, with a design that will reject a ball two inches in diameter; and opposite the counterweight runway and for six inches each side of the counterweight runway, this enclosure shall extend to the car top, or to the car cross head level, where no car top is provided.

Hoistway Enclosures. (1) All sides of elevator hoistways shall be permanently enclosed to a height of not less than six feet above each floor.

(2) Where moving parts within the hoistway, including sliding doors, are closer than four inches from the outside face of the enclosure, the openings in the grill work or between vertical boards or bars shall reject a ball over one-half inch in diameter.

(c) **HAND ROPE CONTROLLED ELEVATORS.** All hand rope controlled elevators shall conform to the following requirements:

(1) Elevators (except hydraulic elevators), shall have automatic brakes electrically released and applied by springs.

(2) Elevators shall have the rope arranged so that, to go "up," the rope must be pulled "down"; and, to go "down," the rope must be pulled "up." Any operating rope or portion of the operating rope, which operates reverse to this normal direction, shall be inaccessible from the car or from

the hoistway landing.

(d) **RELAYS.** Every 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 starting the motor, if:

- (1) The phase rotation is in the wrong direction; or
- (2) There is a failure in any phase.

Every elevator operated by hand rope or other non-self-centering device, shall be provided with a device preventing the operation of the car after the interruption of the current, either main line or any interlock or contact circuit, until the operative device has been first returned to the inoperative position.

(e) **AUTOMATIC ELEVATORS.** On elevators having clearance greater than two and one-half inches between the inside face of a swinging hoistway door and the hoistway edge of the threshold, the hoistway door shall be equipped with an extension panel on the lower portion of the door extending up at least thirty-six inches above the bottom of the door and having the inside face of this panel within two inches of the line of the threshold when the door is closed and the top surface of this panel shall be beveled at not less than sixty degrees from the horizontal.

Every elevator shall have electric contacts and locks; or interlocks on hoistway gates or doors, and electrically contacted car gates or car doors.

(f) **SHEAR GUARDS.** Where an elevator does not have a car door, projections within four inches of the car threshold and extending inward more than one-half inch from the general surface of the hoistway enclosure, and which are opposite the car entrance (except door-operating devices, interlocks, indicator and signal devices), shall be beveled on the underside or shall be guarded with metal plates of not less than No. 11 U.S. Gauge. The angle of such bevels or guard plates shall be no less than sixty degrees from the horizontal, and they shall be smoothly, firmly and permanently fastened to the hoistway enclosure.

Concrete or metal plates (not less than No. 16 U.S. Gauge backed with at least two inch thickness of wood), will be permitted in lieu of No. 11 U.S. Gauge metal.

(g) **RESHACKLING OF CABLES.** The hoisting ropes of power elevators having drum-type driving machines with one to one roping shall be reshackled at the car ends at intervals not longer than:

- (1) Twelve months for machines located over the hoistway;
- (2) Twenty-four months for machines located below or at the side of the hoistway.

(h) **SIDEWALK ELEVATORS.** Every sidewalk elevator shall be provided with a safety bar and a protective screen that will open and close with the car when the sidewalk doors are in the open position. (Ord. 84905 § 4 as amended by Ord. 97178 and Ord. 101601 § 3; November 16, 1972).

3.76.045 Emergency service elevators. In all new buildings in excess of six stories or sixty-five feet and existing buildings in excess of eight stories or eighty-five feet in height above the highest street level providing practical access to fire fighting equipment and wherein all elevators have automatic operation, every elevator shall be designed and equipped to operate as an emergency service elevator as follows:

A manually operated "ON-OFF" switch shall be provided inside the car, on the same wall as, or adjacent to, the operating panel. Such switch shall be enclosed in a fixture with a "break-glass" cover, shall be located not less than six feet nor more than six feet, six inches above the floor, and shall be clearly labeled, "FIRE EMERGENCY SERVICE." The switch, when operated and placed in the "ON" position, shall remove the car from normal service and place it on emergency service whereby the car shall then be only manually operable from the car station buttons until the emergency service switch is returned to the "OFF" position.

In elevators equipped with a photoelectric cell device which controls the closing of automatic power-operated elevator doors, the emergency service switch, when actuated, shall also render the photoelectric device inoperative.

The superintendent of buildings may waive the above requirements for any elevator designed for limited or restricted use, serving only specific floors or a special function.

For existing buildings, the superintendent of buildings may vary the requirements of this section, provided he finds that alternate provisions can be made to accomplish the purposes of this section with substantially equivalent effectiveness and safety. In existing buildings, compliance with requirements for emergency service elevators and emergency equipment in automatic elevators shall be effected on or before July 1, 1973. (Ord. 84905 § 4A added by Ord. 97178 and amended by Ord 101601 § 4; November 16, 1972).

3.76.050 Requirements for operation and maintenance. The owner shall be responsible for the safe operation and maintenance of each elevator, dumbwaiter, escalator, manlift, automobile parking elevator or moving walk installation. Sidewalk elevators on public places are also subject to the requirements of Ordinance 90047 as amended.

(a) Periodic Inspection and Tests. The superintendent of buildings shall make periodic inspections of every conveyance at intervals of twelve months or as soon thereafter as is practical.

(b) Maintenance Inspection and Tests. The owner shall cause maintenance inspection and tests to be made of any elevator by a person qualified to perform such service in accordance with Section 1001 of the ANSI Code.

Five year safety tests: Tests of the elevator car and counterweight safeties and governors shall be made in accordance with Rule 1001.4 of the ANSI Code.

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Five year buffer tests: Tests of the car and counterweight oil buffers shall be made in accordance with Rule 1001.5 of the ANSI Code.

All costs of such inspections and tests shall be paid by the owner.

(c) Inspection Report by Superintendent. After each inspection of a conveyance the superintendent of buildings shall deliver a copy of his inspection report to the owner of the conveyance inspected. If inspection shows a conveyance to be in an unsafe condition, the superintendent of buildings shall further issue a notice in writing requiring the repairs or alterations to be made to the conveyance which are necessary to render it safe, and may order the operation thereof discontinued until the repairs or alterations are made or the unsafe conditions are removed. The superintendent of buildings may post any conveyance found to be in an unsafe conditions with a notice stating that such conveyance is unsafe. Such notice shall be removed only by the superintendent of buildings after correction of such unsafe condition. (Ord. 84905 § 5 as amended by Ord. 97178, Ord. 99502 and Ord. 101601 § 5; November 16, 1972).

3.76.060 Permit and inspection fees. (a) Application for a permit to install or alter any conveyance shall be made on forms provided by the superintendent of buildings and the permit shall be issued to an owner upon payment of the permit fees listed below.

(b) Application for a certificate of inspection as permit to operate any conveyance shall be made by the owner of the conveyance. No certificate shall be issued to operate any conveyance found to be unsafe or failing to comply with a notice or correction issued by the superintendent of buildings. Certificates shall be issued on payment of the fees listed below.

A fee for each permit or certificate of inspection shall be paid to the superintendent of buildings as follows:

New Installations:

Passenger or freight elevator, automobile parking elevator, escalator, manlift:

Up to and including \$40,000 of estimated cost\$55.00
 Over \$40,000 of estimated cost 55.00
 plus \$1.00 for each \$1,000 or
 fraction thereof over \$40,000

Dumbwaiter or private residence elevator:

Up to and including \$10,000 of estimated cost\$15.00
 Over \$10,000 of estimated cost 15.00
 plus \$1.00 for each \$1,000 or fraction thereof over \$10,000

(Installation fees include charges for electrical equipment installed in connection with any conveyance and such equipment shall not be subject to a separate electrical permit and fee.)

Major Alterations:

\$1.00 for each \$1,000 (or fraction thereof) of estimated cost, provided that there shall be a minimum charge of \$10.00 per unit.

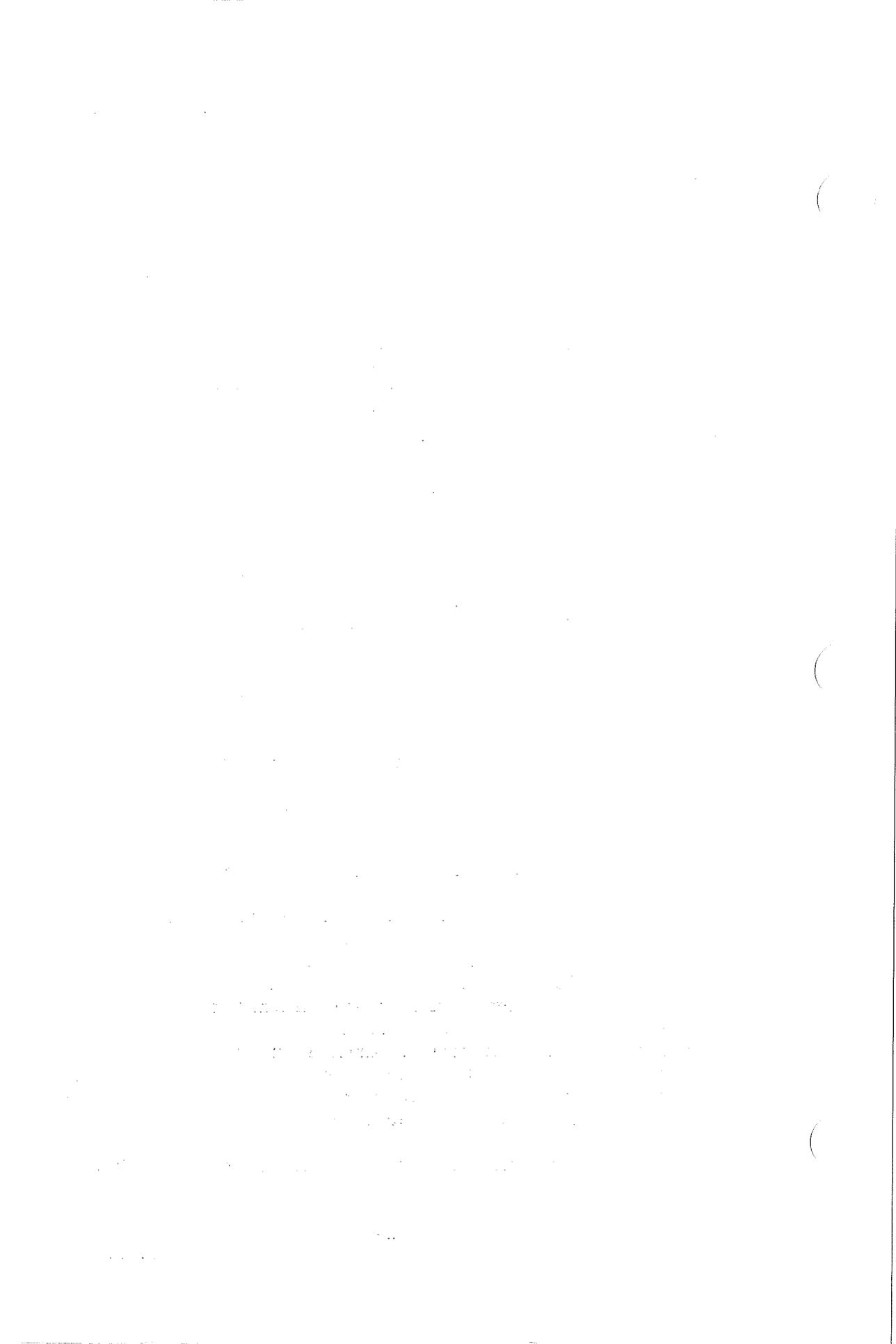
Annual Certificate of Inspection:

Each power operated passenger or freight elevator\$25.00
 Each hand power elevator 10.00
 Each manlift 25.00
 Each dumbwaiter 10.00
 Each escalator* 20.00
 Each moving walk* 20.00
 Each sidewalk elevator 10.00
 Each automobile parking elevator 25.00

(* Each separately powered unit shall be considered a separate conveyance)

(Ord. 84905 § 6 as amended by Ord. 97178 and Ord. 99502 § 3; December 9, 1970).

3.76.070 Penalty for violations—Aiding or abetting. Any violation of or failure to comply with the provisions of this chapter shall subject the offender upon conviction thereof to a fine in any sum not exceeding three hundred dollars, or to imprisonment in the city jail for a term not exceeding ninety days, or both such fine and imprisonment; and each day that violation or failure to comply with this chapter shall continue, shall be considered a separate offense. Anyone concerned in the violation or failure to comply with the provisions of this chapter, whether directly committing the act or effecting the omission constituting the offense or aids or abets the same and whether present or absent; and anyone who directly or indirectly counsels, encourages, hires, commands, induces or otherwise procures another to violate or fail to comply with the provisions of this chapter, is and shall be an offender under the terms of this chapter and shall be proceeded against and prosecuted as such. (Ord. 84905 § 7; Feb. 20, 1956).



Chapter 3.78

WARM AIR GRAVITY FURNACES

Sections:

- 3.78.010 Application and permit.
- 3.78.020 Protection of health, welfare and safety.
- 3.78.030 Definitions.
- 3.78.040 Connections with chimney.
- 3.78.050 Requirements for joists and studding.
- 3.78.060 Sizes of heating plants in dwellings.
- 3.78.070 Heating capacity and equipment in dwellings.
- 3.78.080 Capacity in occupancies other than dwellings.
- 3.78.090 Furnace number and rating required for permit.
- 3.78.100 Transition from warm air leader pipes to stacks.
- 3.78.110 Registers—Free area.
- 3.78.120 Registers—Location and specifications.
- 3.78.130 Warm air leader pipes.
- 3.78.140 Wall stacks or wall pipes.
- 3.78.150 Baseboard, wall and floor registers.
- 3.78.160 Cold air return.
- 3.78.170 Duplex grating, casing, joists, heating capacity.
- 3.78.180 Penalty for violations.

3.78.010 Application and permit. It shall hereafter be unlawful for any person, firm or corporation to construct or install any warm air heating furnace or plant, without first making written application for and securing a permit from the Department of Buildings therefor, or to fail or neglect to comply with the provisions of this chapter and of the permit so issued thereunder; and any person, firm or corporation applying for any such permit shall, upon demand of said Department of Buildings, furnish said Department with all proper and sufficient information relating thereto, and shall, upon completion of the work authorized by such permit, immediately notify the Department of Buildings that said work has been completed and apply for an inspection of same, giving the permit number and location of the job. (Ord. 52113 § 1; Dec. 2, 1926).

3.78.020 Protection of health, welfare and safety. The provisions of this chapter shall be held to the minimum requirements adopted for the protection of the health, welfare and safety of the community. (Ord. 52113 § 2; Dec. 2, 1926).

3.78.030 Definitions. The following definitions shall govern the meanings of the respective words, terms and expressions wherever used in this chapter, and in their use by the Department of Buildings:

A Warm Air Heating Plant as referred to by this chapter, shall consist of a warm air heating furnace dependent upon gravity for circula-

tion of air, enclosed within casings, and with all proper and necessary equipment connected therewith, intended for heating the building in which the same is installed.

A Dwelling shall be taken to mean and include any house or building or portion thereof, which is or is to be occupied in whole or in part as a home, residence or sleeping place of one of more human beings, either permanently or transiently.

In cases where a building is occupied in part as a "dwelling" the part so occupied shall be considered a dwelling for the purpose of this chapter.

The Heating Surface is hereby defined as all surfaces of the furnace body inside the casing, above the grate level, in contact with fire, flame or hot gases, on one side, and circulating air on the other side, and the surface area of the air side of such portion of the furnace body shall, for the purpose of this chapter, be considered the heating area of the furnace. (Ord. 52113 § 3; Dec. 2, 1926).

3.78.040 Connections with chimney. (a) It shall hereafter be unlawful to connect any warm air heating furnace to any chimney or stack having a net flue area less than eighty (80) square inches, if such flue be rectangular, or less than seventy-eight and one-half (78.5) square inches if such flue be round where the total leader pipe area (or heating capacity) of such furnace does not exceed one thousand (1,000) square inches or to a proportionately greater area of chimney flue where such total leader pipe area, or heating capacity, of such furnace exceeds one thousand (1,000) square inches. Such chimney flue shall have no other vent pipe or smoke pipe connection thereto unless its area is greater than the minimum allowed in this section, and then only upon the approval of the Department of Buildings.

(b) Provided, however, that in any dwelling which, together with its chimney, were both constructed prior to the passage of this ordinance, a warm air furnace the leader pipe area capacity of which does not exceed one thousand (1,000) square inches, may be installed and connected to said chimney if the area of the flue of said chimney be not less than fifty (50) square inches, if round, or fifty-two (52) square inches, if square, and a proportionately greater area of chimney flue shall be required when the leader pipe area capacity of the furnace to be connected to such chimney exceeds one thousand (1,000) square inches, all subject to the approval of the Department of Buildings, and said Department of Buildings is hereby authorized and empowered to require such increase in the height of any such chimney flue, or such other changes as it may be deemed necessary to help compensate for lack of flue area and insure safety. Such chimney flues shall have not more than one other smoke pipe connection, the same not to exceed six (6) inches in diameter.

(c) For each and every warm air furnace hereafter installed in the City of Seattle, under the provisions of this chapter, the area of the

breeching or smoke pipe shall not be less than the area of the smoke collar of the furnace to which it is connected, and each such breeching or smoke pipe shall be made of sheet iron of not less than No. 24 U. S. standard gauge. Provided that dampers may be installed in the smoke pipe between the burner and chimney of oil burning furnaces provided they do not close off more than eighty (80) per cent of the internal cross-section area of the smoke pipe. Each such breeching or smoke pipe shall be provided with a proper check draft conveniently located; shall be securely wired in place; shall have all joints riveted or fastened with sheet metal screws to make them rigid; shall have proper thimble for making tight connections to chimney flue. (Ord. 52113 § 4, as amended by Ord. 82690; Jan. 26, 1954).

3.78.050 Requirements for joists and studding. (a) Whenever it is necessary in installing or altering any warm air heating plant, to cut joists or supporting members, proper headers shall be put in and additional support shall be provided when necessary to prevent weakening of the structure in a manner subject to the approval of the Department of Buildings.

(b) Where warm air risers enter the wall in any building under construction, the studdings shall be set directly over and under the adjacent joists, leaving a net space of not less than fourteen (14) inches between studs and between joists. (Ord. 52113 § 5; Dec. 2, 1926).

3.78.060 Sizes of heating plants in dwellings. In connection with any warm air heating plant in any dwelling, no warm air leader pipes, wall stacks, furnace or fittings shall hereafter be installed of sizes less than those determined in the following manner:

The glass area of any room shall include the full frame size of all outside window openings and of all outside door openings.

The outside wall exposure of a room shall be computed by multiplying the height of the outside wall of such room by its length, and deducting therefrom the glass area of said room.

(a) To determine the area in square inches of a basement leader pipe or pipes to serve any first floor room:

Divide the "glass area" of the room, in square feet, by twelve (12);

Divide the "outside wall exposure" of said room in square feet by sixty (60);

Divide the "cubical contents" of said room, in cubic feet, by eight hundred (800);

Add the above quotients and multiply by nine (9). The result thus obtained will be required area expressed in square inches.

(b) For the area of a leader pipe, or pipes, to serve any second floor room, proceed as provided in (a), but multiply the sum of the quotients thus obtained by six (6).

(c) For the area of a leader pipe, or pipes, to serve any third floor room, proceed as provided in (a), but multiply by five (5).

(d) For the area of a wall stack, or stacks, to serve a first floor room, proceed throughout as provided in (a).

(e) For the area of a wall stack, or stacks, to serve a second floor room, proceed throughout as provided in (b) and then deduct thirty (30) per cent from the area of that portion of the stack which is in a vertical position.

(f) For the area of a wall stack, or stacks, to serve a third floor room, proceed throughout as provided in (c), and then deduct thirty (30) per cent from the area of that portion of the stack which is in a vertical position. (Ord. 52113 § 6; Dec. 2, 1926).

3.78.070 Heating capacity and equipment in dwellings. For the heating of any dwelling, any warm air furnace hereafter installed must have a heating capacity of at least ten (10) per cent greater than the actual rating for the combined pipe area of the leaders running off the same. The heating capacity of all furnaces shall be rated and arrived at by the following formula of the University of Illinois, with the various factors defined:

(a) Square inches of leader pipe supplied

$$= \frac{(0.75 \times C \times G \times F \times E)}{\left(1 + 0.02 \frac{136}{R - 20}\right)} \times$$

in which:

0.75 = An average value of the fraction of the heat available at the furnace which is delivered actually at the registers.

G = Grate area, square feet.

C = Combustion rate, pounds coal burned per square foot of grate per hour. This depends on register temperature desired, and for a register temperature of 175 degrees F. is 7.5.

F = Calorific value of fuel as fired, B.T.U. per pound.

E = Efficiency of heater, or heat available at bonnet divided by heat available in fuel, which at 175 degrees at the register is approximately 0.55.

R = Ratio of heating surface area (exclusive of ashpit) to grate area.

0.02 = The amount of increase or decrease in rating for each unit in the value of R above or below 20 (as the case may be).

136 = B.T.U. carrying value of one square inch of pipe in an average installation assuming half of the heat is delivered to first and

half to second-story rooms. This corresponds to a register temperature of 175 degrees.

If the values for F and E which were found in the tests at the University are substituted, the formula becomes thus:

$$\begin{aligned} & \text{Square inch leader supplied} \\ & = 0.75 \times 7.5 \times G \times 12790 \times 0.55 \end{aligned}$$

$$\left(\frac{136}{1 + 0.02 (R - 20)} \right)$$

or square inch leader pipe supplied

$$= 292 G \left(1 + 0.02 (R - 20) \right)$$

(b) Every warm air furnace shall be equipped with a water pan or humidifying device to evaporate moisture into the air, and it is strongly recommended for physical comfort, health and fuel economy that every furnace be equipped with a humidifying device capable of maintaining relative humidity of 40 per cent, at 10 degrees above zero (Fahrenheit) outside temperature, and 68 degrees (Fahrenheit) inside temperature. (Ord. 52113 § 7; Dec. 2, 1926).

3.78.080 Capacity in occupancies other than dwellings. The capacity of any such warm air furnace intended for heating churches, stores, theaters, public garages and other buildings not classified under "dwellings" shall be subject to the approval of the Department of Buildings. (Ord. 52113 § 8; Dec. 2, 1926).

3.78.090 Furnace number and rating required for permit. Before a permit shall be issued by the Department of Buildings for the installation of any warm air heating furnace or plant, the heating contractor, or owner, shall furnish said Department with the manufacturer's furnace number and rating, as determined in accordance with the provisions of Section 3.78.070. (Ord. 52113 § 9; Dec. 2, 1926).

3.78.100 Transition from warm air leader pipes to stacks. Transition from warm air leader pipes to stacks shall be made with well designed elbows or boots so constructed that their internal areas of opening will at no point be less than the required areas of opening of the stacks to which they are connected. (Ord. 52113 § 10; Dec. 2, 1926).

3.78.110 Register—Free area. (a) Registers shall have a total free area of openings equal to or greater than the wall stack or warm air leader pipe requirements for the room to be served, as determined by Section 3.78.060.

(b) Each register face shall have a free area of opening of at least seventy (70) per cent of the gross area.

(c) Register heads shall have a total free throat area equal to or greater than the wall stack or warm air leader pipe requirements for the room or rooms to be served, as determined by Section 3.78.060. (Ord. 52113 § 11; Dec. 2, 1926).

3.78.120 Registers—Location and specifications. (a) Wherever practicable, any warm air furnace hereafter installed in any building shall be so located as to equalize as much as possible the length of warm air leader pipes, giving preference, in dwellings, to pipes supplying living and dining rooms and main halls.

(b) The base ring of the furnace shall be cemented to the furnace foundation, making an air tight joint.

(c) All joints and sections shall be tightly fitted, and all joints requiring cement shall be caulked with asbestos rope or cemented with asbestos furnace cement.

(d) Each such furnace shall be enclosed in metal casings, or within walls of brick or concrete.

(e) Such metal casings, including casing tops, shall be of galvanized iron not lighter than No. 26 U. S. standard gauge, and shall be dust tight and be securely fastened to the furnace front.

(f) No ovaling of casing collar shall be permitted.

(g) In no case shall a distance of less than eight (8) inches be maintained between the top of furnace and the top of casing or bonnet.

(h) The top of all side casing collars shall be on the same level, and shall be fitted into place with a proper flange or bead in such manner as to make a dust-tight joint. All such collars shall be of the same sizes as the warm air pipes connected to them.

(i) The metal casing top of each warm air heating furnace shall be covered with sand to a depth which shall not be less than two (2) inches, and such further fireproofing shall be installed as is required by the ordinances of the City of Seattle.

(j) No furnace casing or top shall be closer than six (6) inches to any ceiling, joists, beams or girders.

(k) A solid fuel steel warm air furnace shall have a radiator which shall not be lighter than No. 14 U. S. standard gauge and to contain not less than seven (7) square feet of heating surface. The furnace body or shell shall not be lighter than No. 8 U. S. standard gauge, except combination cast iron and steel furnaces of 20-inch shell diameter and less, so constructed that two openings are provided from the furnace body to the radiator that has for its purpose a division of the draft in the furnace body itself which shall not be lighter than No. 10 U. S. standard gauge.

Furnaces of tubular construction where the proportion of grate area to heating surface is greater than one to twenty, radiators will not be

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required. The body or shell of the furnace where exposed to the direct flames shall not be less than 8 gauge. The body or shell in tubular furnaces or any type of furnace in which the flames do not come in direct contact with the body or shell shall not be less than 10 gauge.

Such casings shall be lined with sheet metal extending from top casing ring down to grate level, and there shall be at least one thickness of $\frac{1}{4}$ inch air cell asbestos paper or not less than a $\frac{1}{2}$ inch air space between casing and lining. (Ord. 52113 § 12; Dec. 2, 1926).

3.78.130 Warm air leader pipes. (a) No warm air leader pipe less than eight (8) inches in diameter shall hereafter be installed in any air heating plant.

(b) All warm air leader pipes shall be run as direct as possible without "dip" and where sharp turns and pipes longer than twelve (12) feet are unavoidable, the next larger standard size pipes shall be used.

(c) All warm air leader pipes shall be made of bright tin not lighter than "IC" or of galvanized iron. All side seams shall be locked and grooved seams. All joints shall be either double seamed or lapped not less than one and one-fourth inches ($1\frac{1}{4}$), and excepting at the casing collar, such joints shall be soldered in at least three (3) places, equally spaced, or secured with three (3) sheet metal screws. All pipes shall be properly supported from ceiling or joists. Any pipes fourteen (14) inches in diameter or larger shall be made of "IX" tin or of No. 26 U. S. standard gauge galvanized iron.

(d) No warm air leader pipe shall be run within one (1) inch of any woodwork, unless such woodwork is covered with sheet asbestos weighing not less than twelve (12) pounds per one hundred (100) square feet, and then covered with tin or iron.

(e) Each warm air pipe, where leaving the furnace, shall be provided with a proper damper, placed not more than two (2) feet from the furnace casing.

(f) Warm air leader pipes where passing through any wall or partition shall be double walled, having an air space of at least one-half ($\frac{1}{2}$) inch, or shall be covered with at least two layers of corrugated air cell asbestos. (Ord. 52113 § 13; Dec. 2, 1926).

3.78.140 Wall stacks or wall pipes. (a) All single wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections shall be made of bright tin not lighter than "IC", or of galvanized iron, and shall be covered with at least one (1) thickness of sheet asbestos weighing twelve (12) pounds per hundred (100) square feet, or with an equal and approved covering. Each such pipe shall be installed in such manner as not to obstruct the flow of air and to retain the full capacity of the pipe throughout. All joints shall be lapped not less than one and one-half ($1\frac{1}{2}$) inches and held in place by means of cleats. No joint shall depend upon solder to make it tight.

(b) Where double wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections are used, sheet asbestos or other covering will not be required.

(c) All double wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections shall be made of bright tin not lighter than "IC", or of galvanized iron, and shall be made double from and including the boot or foot piece to the top of each stack and register head, and a continuous uniform air space of not less than five-sixteenths (5/16) inch shall be maintained between the inner and outer walls of all such stacks and fittings.

(d) All such pipes and fittings, either single or double, shall be firmly secured in place. No wall pipes or fittings shall be used which depend wholly upon soldered joints. Each member shall be so made that all joints are locked and soldered, and the several members shall be attached to each other with snug fitting slip-joints. (Ord. 52113 § 14; Dec. 2, 1926).

3.78.150 Baseboard, wall and floor registers. (a) Baseboard or wall registers shall be fitted to the wall and stack head and the opening around the stack head tightly sealed with asbestos, making the connection between stack and head and register tight. The flanges of a one-piece register shall extend into the collar of head at least one-half ($\frac{1}{2}$) inch.

(b) When floor registers are used, the opening in the floor in which the register is placed shall be made not less than one-half ($\frac{1}{2}$) inch larger than the floor register box.

(c) Registers for warm air pipes shall not be located in outer walls of buildings. (Ord. 52113 § 15; Dec. 2, 1926).

3.78.160 Cold air return. (a) In no case shall air for circulation purposes be supplied to any furnace from the basement or furnace room.

(b) The cold air supply must have a minimum total area of at least twenty (20) per cent greater than the combined net areas of all warm air pipes leading from the furnace.

(c) When a cold air or a return air shoe is connected to the casing at the base of the furnace, the opening, except as provided in Paragraph (d) of this section, shall not be extended above the level of the grate. The width of the shoe shall be sufficient to provide an area not less than the area of the return air pipe connected to it. Such shoe shall be used on all returns larger than twelve (12) inches that enter furnace above base.

(d) When the dimensions of the shoe referred to under subdivision (c) of this section are too large to maintain proper height with respect to grate level, a metal shield shall be placed midway between the casing and the fire pot in such manner as to prevent updrafts in the return pipes and

so as not to obstruct the circulation of air. Said shield shall extend from a height of at least six inches above the top of the shoe, down at least to the grate level.

(e) Each horizontal return air pipe shall be so constructed as to maintain a constant net area of opening throughout its entire length at least ten per cent greater than the area of the vertical connecting pipe. Such pipes shall be made of galvanized iron not lighter than No. 26 U. S. standard gauge, except that No. 30 gauge galvanized iron may be used for boxing joists or for top and bottom of channel boxes the sides of which are made of wood. All return air pipes shall be securely jointed and tacked with solder or fastened with sheet metal screws not less than three places at each joint.

(f) The net free area of opening of a cold air or return air face shall be at least ten per cent larger than the free area of opening of the return air duct to which it is connected.

(g) The height of any vertical cold air or return air register face shall not be greater than one and one-half times the horizontal distance from the register face to the opposite side of the return air stack opening in floor immediately back of said register face. (Ord. 52113 § 16; December 2, 1926).

3.78.170 Duplex grating, casing, joists, heating capacity. (a) When but one duplex grating is used for warm air and cold air in a so-called pipeless furnace, the area of the cold air intake shall be at least equal to the area of the warm air outlet of the grating.

(b) Subdivisions (d) to (k) inclusive, of Section 3.78.120, relative to casing, shall not govern when a pipeless furnace is installed but such installation shall comply with the requirements of this section.

(c) The inner and outer casings of any pipeless furnace shall be made of either black or galvanized iron not lighter than No. 26 U. S. standard gauge. A uniform air space shall be maintained at all points between the inner and outer casing. In no case shall the top of the furnace be allowed closer than twelve inches to any ceiling or (sic) joists above the furnace.

(d) Where joists are cut to accommodate the installation of any such furnace, proper headers shall be put in and additional supports shall be provided where necessary to prevent weakening of the structure, in a manner subject to the approval of the Department of Buildings.

(e) In figuring the heating capacity of a pipeless furnace, the same method of computation shall be employed as for pipe furnaces, as set forth in Section 3.78.070, and to the heating capacity so found shall be added twenty-five per cent. In no case shall any such pipeless furnace be installed in any building whose heating capacity after the above twenty-five per

cent is added is less than the total combined warm air leader pipe capacity which would be required by Section 3.78.060 were a pipe furnace to be installed to heat said building.

(f) Where one warm air register is used and separate face or faces for cold air supply are used, Sections 3.78.140 and 3.78.160 shall apply. (Ord. 52113 § 17; December 2, 1926).

3.78.180 Penalty for violations. Any person, firm or corporation violating any of the provisions of this chapter shall be deemed guilty of a misdemeanor, and, on conviction shall be fined in any sum not exceeding three hundred dollars, or imprisoned in the City Jail for a term not exceeding thirty days, or may be both fined and imprisoned. (Ord. 52113 § 18; December 2, 1926).

Chapter 3.84

BUSINESS SECURITY DEVICES

Sections:

- 3.84.010 Security requirements—Exemptions.
- 3.84.020 Enforcement—Right of entry.
- 3.84.030 Responsibility for compliance.
- 3.84.040 Inspection—Notice.
- 3.84.050 Security measures and locking devices.
- 3.84.060 Front doors.
- 3.84.070 Rear, side and basement doors.
- 3.84.080 Roof doors.
- 3.84.090 Glass windows.
- 3.84.100 Accessible transoms.
- 3.84.110 Roof openings.
- 3.84.120 Security measures—Intrusion detection devices.
- 3.84.130 Appeal from intrusion detection device requirements.
- 3.84.140 Penalties for violations.

3.84.010 Security requirements—Exemptions. Except as hereinafter specifically exempted, all existing and future buildings in the city used by any person for the purpose of conducting, managing, or carrying on any business, shall, when not occupied by a watchman, maintenance personnel, or other authorized persons during the period that such building is closed to business, be so secured as to prevent unauthorized entry in accordance with specifications for physical security of exterior accessible openings as provided in Sections 3.84.050 through 3.84.120; Provided, that buildings used for Group “C”, “D”, “H”, “I”, or “J” occupancy as defined in the Building Code (this title) shall be exempt from the provisions of this chapter; and provided further that:

(1) buildings used for Group “A” or “B” occupancy as defined in the Building Code, and

(2) buildings required by the Building Code to have exit doors equipped with panic hardware locks, shall be exempt from the provisions of this chapter relating to exterior doors. (Ord. 98900 § 1; May 14, 1970).

3.84.020 Enforcement—Right of entry. The chief of police is authorized and directed to enforce the provisions of this chapter, and upon presentation of proper credentials, the chief of police or his duly authorized representative may, with the consent of the occupant or pursuant to a lawfully issued warrant, enter at reasonable times, any building or premises used for business purposes for the purpose of inspecting the physical security of exterior accessible openings of such building or premises. (Ord. 98900 § 2; May 14, 1970).

3.84.030 Responsibility for compliance. Responsibility for compliance with the specifications set forth in Sections 3.84.050 through 3.84.120 shall be as follows:

(1) As to buildings occupied by a business establishment which does not share the exterior openings of such building with any other business establishment, the person operating such business shall be responsible;

(2) As to buildings occupied by two or more business establishments which share the use of exterior openings of such building, the owner of said building, or his agent having charge, care or control of such building, shall be responsible. (Ord. 98900 § 3; May 14, 1970).

3.84.040 Inspection—Notice. The chief of police shall inspect or cause to be inspected the accessible exterior openings of every building subject to the provisions of this chapter, and if he finds accessible exterior openings in any such building which do not comply with the specifications set forth in Sections 3.84.050 through 3.84.120, he shall give notice in writing to the person responsible, as designated in Section 3.84.030 hereof, setting forth the deficiencies which are to be corrected, and the period of time within which such correction shall be completed. Failure to comply with such notice within the period of time specified shall be a violation of this chapter. (Ord. 98900 § 4; May 14, 1970).

3.84.050 Security measures and locking devices generally. All exterior openings of any building used for business purposes and subject to the provisions of this chapter and not otherwise protected by photoelectric, ultrasonic or other intrusion detection devices, approved by the chief of police, shall be secured as provided in Sections 3.84.050 through 3.84.110; provided that locking devices on exit doors in buildings used for Group "E", "F" and "G" occupancies as defined in the Building Code (this title) shall comply with the requirements of Section 3303 of the Building Code. (Ord. 98900 § 5 (part); May 14, 1970).

3.84.060 Front doors. All front doors of any building or premises shall comply with the following requirements:

(1) Tempered glass doors, wood or metal doors with tempered glass panel, solid wood or metal doors shall be secured as follows:

(a) A single door shall be equipped with either double cylinder dead lock that unlocks from both the outside and inside by key, or with cylinder dead lock that unlocks from the outside by key and inside by turnpiece, handle, or knob, or with dead locking latch having guarded bolt that unlocks from the outside by key and inside by turnpiece, handle or knob.

(b) On double doors the active leaf shall be equipped with a type of lock as prescribed for single doors above and the inactive leaf shall be equipped with flush bolts at head and foot.

(2) Doors with glass panels not of tempered glass and doors that have nontempered glass panels adjacent to the door frame, shall be secured as follows:

(a) A single door shall be equipped with cylinder dead lock that unlocks from both the outside and inside by a key.

(b) On double doors the active leaf shall be equipped with cylinder dead lock that unlocks from both the outside and inside by a key and the inactive leaf shall be equipped with flush bolts at head and foot.

(3) Rolling overhead doors that are not controlled or locked by electric power operation shall be equipped on the inside with the following protective devices:

(a) Manually operated doors shall be provided with slide bolts on the bottom bar.

(b) Chain operated doors shall be provided with a cast iron keeper and pin for securing the hand chain.

(c) Crank operated doors shall be provided with a means for securing the operating shaft.

(4) A solid overhead, swinging, sliding, or accordion garage-type door shall be secured with a cylinder lock, padlock, and/or metal slide bar, bolt, or crossbar on the inside when not otherwise controlled or locked by electric power operation. If padlock is used, it shall be of hardened steel shackle, with minimum four pin tumbler operation. In the event that this type of door provides the only entrance to the front of the building, a cylinder lock or padlock may be used on the outside.

(5) Metal accordion grate or grill-type doors shall be equipped with metal guide track at top and bottom and a cylinder lock and/or padlock with hardened steel shackle and minimum four pin tumbler operation.

(6) Outside hinges on all front doors shall be provided with nonremovable pins. Such hinge pins may be either welded, flanged, or secured by a screw. (Ord. 98900 § 5 (A); May 14, 1970).

3.84.070 Rear, side and basement doors. All accessible rear, side and basement doors of any such building or premises shall comply with the following requirements:

(1) All doors of the types listed below shall comply with the requirements of Section 3.84.060 for front doors:

(a) Tempered glass doors, wood or metal doors, with tempered glass panel;

(b) Metal doors;

(c) Rolling overhead doors;

(d) Solid overhead, swinging, sliding, or accordion garage-type doors;

(e) Metal accordion grate or grill-type doors.

(2) Doors with glass panels and doors that have glass panels adjacent to the door frame shall be secured as follows:

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(a) The glass panel shall be covered with iron bars of at least one-half inch round or one inch by one-quarter inch flat steel material, spaced not more than five inches apart, or

(b) Iron or steel grills of at least one-eighth inch material of 2 inch mesh;

(c) If the door or glass panel barrier is on the outside, it shall be secured with rounded head flush bolt on the outside;

(d) If the remaining portion of a door panel exceeds eight inches by twelve inches (excluding door frame), is of wood, but not of solid core construction, or is less than one and three-eighths inches thick, said portion shall be covered on the inside with at least 16 gauge sheet steel attached with screws.

(3) Wood doors, not of solid core construction, or with panels therein less than one and three-eighths inches thick, shall be covered on the inside with at least 16 gauge sheet steel attached with screws.

(4) Locking Devices:

(a) A single door shall be equipped with either double cylinder dead lock that unlocks from both the outside and inside by key, with cylinder dead lock that unlocks from the outside by key and inside by turnpiece, handle, or knob, with dead locking latch having guarded bolt that unlocks from outside by key and inside by turnpiece, handle, or knob, or with approved slide bar bolt, crossbar, and/or padlock. If padlock is used, it shall be of hardened steel shackle, with minimum four pin tumbler operation;

(b) On double doors the active leaf shall be equipped with a type of lock as prescribed for single doors above and the inactive leaf shall be equipped with flush bolts at head and foot.

(5) Outside hinges on all rear, side and basement doors shall be provided with nonremovable pins. Such hinge pins may be either welded, flanged, or secured by a screw. (Ord. 98900 § 5 (B); May 14, 1970).

3.84.080 Roof doors. All doors that exit onto the roof of any such building or premises shall comply with the following requirements:

(1) Doors with glass panels and any glass panels that are adjacent to the door frame shall be protected as follows:

(a) The glass portion shall be covered with iron or steel grills of at least one-eighth inch material of no more than two inch mesh securely fastened;

(b) If the door or glass panel barrier is on the outside, it shall be secured with rounded head flush bolt on the outside;

(c) If the remaining portion of a door panel exceeds eight inches by twelve inches (excluding door frame) and is of wood, but not of solid core construction, or is less than one and three-eighths inch thick, said portion shall be covered on the inside with at least 16 gauge sheet steel attached with screws.

(2) Wood doors not of solid core construction, or with panels therein less than one and three-eighths inch thick, shall be covered on the inside with at least 16 gauge sheet steel attached with screws.

(3) All roof doors shall be provided with a lock that will permit the door to be opened from the inside without the use of a key or any special knowledge or effort.

(4) Outside hinges on all roof doors shall be provided with nonremovable pins. Such hinge pins may be either welded, flanged, or secured by a screw. (Ord. 98900 § 5(C); May 14, 1970).

3.84.090 Glass windows. The chief of police shall, with the advice and assistance of the chief of the fire department, determine the extent of protection, if any, that will be required for accessible glass windows at the side or rear of such building. Glass windows shall be deemed accessible if less than eighteen feet above ground. In making his determination he shall consider whether the side of the building fronts on a street, the area, location and contents thereof, and whether such openings are protected by intrusion detection devices.

(1) The chief of police may require side and rear glass windows with a pane exceeding ninety-six square inches in area, with its smallest dimension exceeding six inches, to be protected in the following manner:

(a) Inside or outside iron bars of at least one-half inch round or one inch by one-quarter inch flat steel material, spaced not more than five inches apart, securely fastened, or

(b) Inside or outside iron or steel grills of at least one-eighth inch material of two inch mesh securely fastened.

If such barrier is on the outside, it shall be secured with rounded head flush bolt on the outside.

(2) If the side or rear window is of the type that can be opened, it shall, where applicable, be secured on the inside with either a glide bar, bolt, crossbar, and/or padlock with hardened steel shackle, and minimum four pin tumbler operation.

(3) Outside hinges on all side and rear glass windows shall be provided with nonremovable pins. Such hinge pins may be either welded, flanged, or secured by a screw. (Ord. 98900 § 5 (D); May 14, 1970).

3.84.100 Accessible transoms. All exterior transoms exceeding eight inches by twelve inches on the side and rear of any such building or premises shall be protected by either of the following:

(1) Outside iron bars of at least one-half inch round or one inch by one-quarter inch flat steel material, spaced no more than five inches apart, or

(2) Outside iron or steel grills of at least one-eighth inch material but not more than two inch mesh.

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Such barrier shall be secured with rounded head flush bolt on the outside. (Ord. 98900 § 5(E); May 14, 1970).

3.84.110 Roof openings. All exterior openings on the roof of any such building or premises shall be protected as follows:

(1) Glass skylights shall be provided with:

(a) Iron bars of at least one-half inch round or one inch by one-quarter inch flat steel material under the skylight and securely fastened; or

(b) A steel grill of at least one-eighth inch material of two inch mesh under the skylight and securely fastened.

(2) Hatchway openings shall be secured as follows:

(a) If the hatchway is of wooden material, it shall be covered on the inside with at least 16 gauge sheet steel attached with screws;

(b) The hatchway shall be secured from the inside with a slide bar or slide bolts. The use of crossbar or padlock is unauthorized, unless approved by the chief of the fire department;

(c) Outside hinges on all hatchway openings shall be provided with nonremovable pins. Such hinge pins may be either welded, flanged, or secured by a screw.

(3) Air duct or air vent openings exceeding eight inches by twelve inches shall be secured by covering the same with either of the following:

(a) Iron bars of at least one-half inch round or one inch by one-quarter inch flat steel material, spaced no more than five inches apart and securely fastened; or

(b) A steel grill of at least one-eighth inch material of two inch mesh and securely fastened.

If the barrier is on the outside it shall be secured with rounded head flush bolts on the outside. (Ord. 98900 § 5(F); May 14, 1970).

3.84.120 Security measures—Intrusion detection devices. If it is determined by the chief of police that the security measures and locking devices prescribed in Sections 3.84.050 through 3.84.110 do not adequately secure the building, he may require the installation and maintenance of photoelectric, ultrasonic, or other intrusion detection device. In making such determination he shall consider whether:

(a) The business establishment has experienced a high incidence of burglary in the past, or

(b) The type of merchandise and its inventory value require added security protection.

If he determines that such installation is required, notice in writing shall be given to the responsible person designated in Section 3.84.030 specifying the installation to be made and the period of time within which such installation shall be completed. Unless an appeal is filed in accordance with Section 3.84.130, failure to comply with such notice within the

time specified shall be a violation of this chapter. (Ord. 98900 § 6, May 14, 1970).

3.84.130 Appeal from intrusion detection device requirements. Within ten days after the receipt of written notice from the chief of police requiring the installation and maintenance of photoelectric, ultrasonic, or other intrusion detection device, the person responsible for compliance therewith may appeal in writing to the city council. In filing such notice of appeal, the appellant shall set forth the specific grounds wherein it is claimed there was an error or abuse of discretion by the chief of police, or wherein the issuance of said written notice was not supported by proper evidence.

Upon receipt of such appeal, the city council shall set said matter for hearing and cause notice thereof to be given to the appellant and to the chief of police not less than five days prior to the date set for said hearing. At such hearing the appellant shall show cause on the grounds specified in the notice of appeal why the action excepted to should not be affirmed.

The city council may affirm, reverse, or modify the decision of the chief of police requiring the installation and maintenance of a photoelectric, ultrasonic, or other intrusion detection device. If said decision is affirmed or modified by the city council, the appellant shall be given written notice thereof by the chief of police setting forth the installation to be made and the period of time within which the same shall be completed. In no event shall the period be less than that originally granted appellant. Failure to comply with such notice within the time specified shall be a violation of this chapter. (Ord. 98900 § 7; May 14, 1970).

3.84.140 Penalties for violations. Anyone violating or failing to comply with the provisions of this chapter shall, upon conviction thereof, be punishable by a fine of not more than five hundred dollars, or by imprisonment for not more than six months, or by both such fine and imprisonment. (Ord. 98900 § 8; May 14, 1970).

