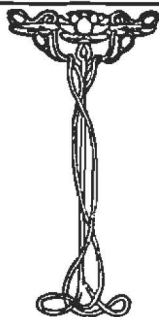


UNIFORM BUILDING CODE

1930 Edition



PREPARED BY

Pacific Coast
Building Officials Conference

19 Pine Avenue
Long Beach, California

COPYRIGHT—1930

Preface to 1927 Edition

The Pacific Coast Building Officials' Conference takes great pride in presenting to the public the Uniform Building Code, 1927 Edition, representing several years of preparation and the final result of many preliminary drafts which have been widely studied and commented upon.

Knowledge of the lack of uniformity existing in city and state building codes was one of the reasons for the formation of the Pacific Coast Building Officials' Conference in 1922. The idea grew rather slowly until the fall of 1925. At that time the Conference took very definite steps toward dividing the coast area into three districts, northern, central and southern. These districts were organized with chairmen and during the year of 1926 district meetings were held for the purpose of publicly discussing the various problems attendant upon the formulation of the proposed Uniform Building Code. Data was gathered from every source possible, preliminary outlines prepared and the Code then developed part by part.

The final preliminary draft of this Code published in September, 1926, represented the first definite accomplishment in the way of a completed code although not then complete in all details. On the basis of this draft the Conference proceeded to get comments, criticisms and suggestions and continued through the medium of further district meetings to perfect the Code.

Even in this preliminary stage of development the Code was adopted by Sacramento, Alhambra, Fontana, Redlands, Ocean-side and San Bernardino in California and by Klamath Falls in Oregon. A number of other cities and organizations used this preliminary draft as a model for revisions of existing building codes or in preliminary code work.

Throughout the entire preparation of the Code the policy of hearing all opinions and then weighing them carefully was closely adhered to, with the result that the completed Code represents not only one individual's experiences or ideas but is in fact a broad, equitable and unbiased document for the safe regulation of building construction. Safe practices based upon minimum safe standards have been created to permit of the greatest economy. Continual research brings to light many vital points in the engineering design of buildings and structures and the Conference has endeavored to recognize all authentic information in the effort to be just in its recommended practices. No definite limit of valuation can be placed on a human life and the Code therefore provides protection not only for ordinary use of the building but for cases of emergency when such protection is imperative.

Two printed drafts of this Code have been published previously and a number of mimeographed drafts were distributed,

all in the process of development of this 1927 Edition. At each successive stage of development the Code has been subjected to critical examination by more than 60 active building officials on the Pacific Coast. Many architects, engineers and contractors have given advice from the store of information gained through years of activity in their respective fields; private and governmental research bureaus and experts have generously contributed technical data. The reports of many national committees and organizations have been incorporated in the Code because of their significance and general application, and manufacturers of building materials through the various national organizations have contributed excellent information to help in producing the Code and have generously assisted in carrying this work through to completion.

A great deal of thought was given to the logical arrangement of the details in the Code. It is divided into ten parts and these parts are further divided into chapters and sections for more ready reference. Repetition was eliminated by using direct section, chapter or part references to general details wherever those details applied to various parts of the Code.

Classification of buildings according to use or the character of the occupancy allows the application of proper safety features and construction according to the hazard inherent in a particular use or occupancy. Such details as construction, height, area, location on property, protection of openings, exits, safeguards for special hazards and separations from adjoining occupancies are found properly graded in the occupancy chapters 5 to 15, inclusive.

In order that all materials and types of construction might be treated in a thoroughly unbiased manner, a fire test basis was adopted as prepared by the American Society for Testing Materials. Materials and combinations of materials upon which authentic test data were obtainable have been tabulated in Part VIII and are applied by direct reference throughout the Code.

The Code has been criticized by some individuals and organizations because it did not serve the selfish purposes in which they were interested. The Conference has endeavored in the formulation of the Code to serve no private or selfish interest but to deal fairly with all in the effort to produce safe buildings for the greatest economy and good of the public. It is true that everyone has a different estimate of just what is best and in deciding these various issues combined in the Code it was necessary to draw upon a wide field of opinion. The result finally represented is no doubt better than any individual opinion. Wherever the Uniform Building Code can be improved it is the desire of the Conference to so improve it, for it is not and never will be perfect. Fair constructive criticism and proper guidance will make the Code better through years of use and application so that ultimately much good may result.

Appreciation is given by the Conference for the fine assistance given by many individuals and organizations in the preparation of this 1927 Edition of the Uniform Building Code. Mention should be made of the reports, research and findings of the Department of Commerce Building Code Committee, the U. S. Bureau of Standards, the Underwriters' Laboratories, Inc., the

American Society for Testing Materials, the National Board of Fire Underwriters, the American Engineering Standards Committee, the American Concrete Institute, the Joint Committee on Reinforced Concrete, U. S. Forest Products Laboratory, Bureau of Entomology of the U. S. Department of Agriculture, and the individual work of many members of these organizations, all of which has contributed to make the Code better. The Conference is deeply indebted to the many national and Pacific Coast trade associations who have supported the code development from the very beginning. To the many building inspectors, engineers, architects, and contractors who assisted, the Conference is indeed grateful. Certain members of the Conference are especially to be thanked for the excellent service rendered through many hours of ceaseless labor to make the Uniform Code possible. Special recognition is given to A. C. Horner, former and original secretary to the Conference, for his initiating the real active work which commenced the preparation of the Code and instituting fundamentals which form the basis of the Uniform Building Code.

As a recommended set of minimum safe practices for building construction the Uniform Building Code has gained international renown. In addition to having been adopted as the building ordinance of 32 cities (as of December 1, 1928), it has served as a model in framing amendments to many existing building codes.

Seven cities are now planning immediate use of the Code and two of these have already started adoption by ordinance. Such widespread use of the Uniform Building Code is recognition of its careful preparation and its equitable handling of the general problem of building regulation.

Since January, 1928, the following cities have adopted the Uniform Building Code, 1927 edition: Alhambra, Pomona, Fresno, Piedmont, San Rafael, Coronado, El Monte, Ontario, San Jose, Visalia, Fullerton, South San Francisco, Pittsburg, Claremont, Walnut Creek, Tulare, San Fernando, Livermore and Berkeley, California; Eugene and Klamath Falls, Oregon; Prescott and Tucson, Arizona. Shreveport, Louisiana, and Laguna Beach, California, had previous to this time adopted the preliminary draft published September, 1926, and the proof draft published October, 1927, respectively.

To prevent diverting the Code from its original purpose of serving the public in an honest and ethical manner, it has been copyrighted. Any city desiring to adopt the Uniform Code may do so upon proper application to the Pacific Coast Building Officials Conference, 19 Pine Avenue, Long Beach, California.

Future editions will be prepared from time to time so that the recommended practices will be kept thoroughly up-to-date. Comments or suggested improvements will be welcomed for the future consideration of the many communities participating in the Uniform Building Code movement.

I. E. M. November, 1928.

INTERNATIONAL CODE COUNCIL

Copyright © 1930 I.C.C. ALL RIGHTS RESERVED.

Accessed by Howard Cook (howard@bayarearetrofit.com).

(-) Order Number #101943106 on Feb 04, 2025 01:31 PM

Preface to 1930 Edition

The 1930 Edition of the Uniform Building Code is a further refining and bringing up-to-date of the 1927 edition. It is the result of the very studious effort of eight code changes committees appointed and starting their work at the 8th Annual Meeting of the Pacific Coast Building Officials' Conference, held at Portland, Oregon, in September, 1929.

Seventy-four cities to date have adopted the Code as their building ordinance. Located in eleven states, these cities range in population from less than 1,000 to 325,000. The majority of them adopted the Code without changes, using the method of adoption by reference. A complete list of adoption cities up-to-date may be obtained from Conference headquarters upon request.

• The Pacific Coast Building Officials' Conference intends to make such additions and changes each year as research, increased knowledge and new materials and types of construction may necessitate.

D. H. M., April, 1930.

OUTLINE OF CONTENTS BY PARTS, CHAPTERS AND SECTIONS

PART I—ADMINISTRATIVE.

CHAPTER 1. Title and Scope.....	1
SEC. 101. Title	
102. Purpose	
103. Scope	
104. Application to Existing Buildings	
(a) Major Alterations and Repairs	
(b) Changed Use	
(c) Additions	
(d) Minor Alterations and Repairs	
105. Maintenance	
CHAPTER 2. General Provisions.....	3
SEC. 201. Application for Permit	
202. Building Permits	
203. Fees	
204. Inspection and Registered Inspectors	
Special Engineering Supervision	
205. Certificate of Compliance	
206. Certificate of Occupancy	
207. Change of Occupancy	
CHAPTER 3. Enforcement	8
SEC. 301. Powers and Duties of Building	
Inspector	
302. Alternate Materials and Types of	
Construction	
303. Appeals	
304. Board of Examiners and Appeals	
305. Violations and Penalties	

PART II—DEFINITIONS.

CHAPTER 4. Definitions	12
SEC. 401. Definitions	

PART III—REQUIREMENTS BASED ON OCCUPANCY.

CHAPTER 5. Classification of All Buildings by Use or	
Occupancy and General Requirements	
for All Occupancies.....	16
SEC. 501. Occupancy Classified	
502. Change in Use	
503. Mixed Occupancy	
504. Location on Property	

CHAPTER 6. Requirements for Group A Buildings.....	19
SEC. 601. Group A Occupancies Defined	

- 602. Construction, Height and Area Allowable
- 603. Location on Property
- 604. Stairs and Exits
- 605. Light and Ventilation
- 606. Enclosure of Vertical Openings
- 607. Fire Extinguishing Apparatus
- 608. Special Hazards
- 609. Exceptions and Deviations
- 610. Mixed Occupancies

CHAPTER 7. Requirements for Group B Buildings..... 26

- SEC. 701. Group B Occupancies Defined
- 702. Construction, Height and Area Allowable
- 703. Location on Property
- 704. Stairs and Exits
- 705. Light and Ventilation
- 706. Enclosure of Vertical Openings
- 707. Fire Extinguishing Apparatus
- 708. Special Hazards
- 709. Exceptions and Deviations
- 710. Mixed Occupancies

CHAPTER 8. Requirements for Group C Buildings..... 31

- SEC. 801. Group C Occupancies Defined
- 802. Construction, Height and Area Allowable
- 803. Location on Property
- 804. Stairs and Exits
- 805. Light and Ventilation
- 806. Enclosure of Vertical Openings
- 807. Fire Extinguishing Apparatus
- 808. Special Hazards
- 809. Exceptions and Deviations
- 810. Mixed Occupancies

CHAPTER 9. Requirements for Group D Buildings..... 34

- SEC. 901. Group D Occupancies Defined
- 902. Construction, Height, and Area Allowable
- 903. Location on Property
- 904. Stairs and Exits
- 905. Light and Ventilation
- 906. Enclosure of Vertical Openings
- 907. Fire Extinguishing Apparatus
- 908. Special Hazards
- 909. Exceptions and Deviations
- 910. Mixed Occupancies

CHAPTER 10. Requirements for Group E Buildings..... 37

- SEC. 1001. Group E Occupancies Defined
- 1002. Construction, Height and Area Allowable
- 1003. Location on Property
- 1004. Stairs and Exits

- 1005. Light, Ventilation and Sanitation
- 1006. Enclosure of Vertical Openings
- 1007. Fire Extinguishing Apparatus
- 1008. Special Hazards
- 1009. Exceptions and Deviations
- 1010. Mixed Occupancies
- CHAPTER 11. Requirements for Group F Buildings..... 41
 - SEC. 1101. Group F Occupancies Defined
 - 1102. Construction, Height and Area Allowable
 - 1103. Location on Property
 - 1104. Stairs and Exits
 - 1105. Light, Ventilation and Sanitation
 - 1106. Enclosure of Vertical Openings
 - 1107. Fire Extinguishing Apparatus
 - 1108. Special Hazards
 - 1109. Exceptions and Deviations
 - 1110. Mixed Occupancies
- CHAPTER 12. Requirements for Group G Buildings..... 43
 - SEC. 1201. Group G Occupancies Defined
 - 1202. Construction, Height and Area Allowable
 - 1203. Location on Property
 - 1204. Stairs and Exits
 - 1205. Light, Ventilation and Sanitation
 - 1206. Enclosure of Vertical Openings
 - 1207. Fire Extinguishing Apparatus
 - 1208. Special Hazards
 - 1209. Exceptions and Deviations
 - 1210. Mixed Occupancies
- CHAPTER 13. Requirements for Group H Buildings..... 45
 - SEC. 1301. Group H Occupancies Defined
 - 1302. Construction, Height and Area Allowable
 - 1303. Location on Property
 - 1304. Stairs and Exits
 - 1305. Light, Ventilation and Sanitation
 - 1306. Enclosure of Vertical Openings
 - 1307. Fire Extinguishing Apparatus
 - 1308. Special Hazards
 - 1309. Exceptions and Deviations
 - 1310. Mixed Occupancies
- CHAPTER 14. Requirements for Group I Buildings..... 48
 - SEC. 1401. Group I Occupancies Defined
 - 1402. Construction, Height and Area Allowable
 - 1403. Location on Property
 - 1404. Stairs and Exits
 - 1405. Light, Ventilation and Sanitation
 - 1406. Enclosure of Vertical Openings
 - 1407. Fire Extinguishing Apparatus
 - 1408. Special Hazards
 - 1409. Exceptions and Deviations
 - 1410. Mixed Occupancies

CHAPTER 15. Requirements for Group J Buildings..... 50

- SEC. 1501. Group J Buildings Defined
 1502. Construction, Height and Area Allowable
 1503. Location on Property
 1504. Stairs, Exits, Aisles and Seats
 1505. Light and Ventilation
 1506. Enclosure of Vertical Openings
 1507. Fire Extinguishing Apparatus
 1508. Special Hazards
 1509. Exceptions and Deviations
 1510. Mixed Occupancies

PART IV.—REQUIREMENTS BASED ON LOCATION
IN FIRE ZONES.

CHAPTER 16. Restrictions in Fire Zones..... 53

- SEC. 1601. Fire Zones Defined
 1602. Restrictions in Fire Zone No. 1
 1603. Restrictions in Fire Zone No. 2
 1604. Restrictions in Fire Zone No. 3
 1605. Restrictions in Fire Zone No. 4

PART V.—REQUIREMENTS BASED ON TYPES OF
CONSTRUCTION.CHAPTER 17. Classification of All Buildings by
Types of Construction..... 56

- SEC. 1701. General
 1702. Classification by Types of Construction

CHAPTER 18. Type I Buildings (Fire-resistive)..... 57

- SEC. 1801. Definition
 1802. Height Allowable
 1803. Area Allowable
 1804. Foundations
 1805. Exterior and Inner Court Walls
 1806. Partitions
 1807. Enclosure of Vertical Openings
 1808. Structural Framework
 1809. Fireproofing of Structural Members
 1810. Floor Construction
 1811. Roof Construction
 1812. Stairs
 1813. Doors and Windows
 1814. Projections from the Building
 1815. Penthouses and Skylights
 1816. Combustible Materials Regulated

CHAPTER 19. Type II Buildings (Heavy Timber
Construction)..... 62

- SEC. 1901. Definitions
 1902. Height Allowable
 1903. Area Allowable

- 1904. Foundations
- 1905. Exterior and Inner Court Walls
- 1906. Partitions
- 1907. Enclosure of Vertical Openings
- 1908. Structural Framework
- 1909. Fireproofing of Structural Members
- 1910. Floor Construction
- 1911. Roof Construction
- 1912. Stair Construction
- 1913. Doors and Windows
- 1914. Projections from the Building
- 1915. Penthouses and Skylights
- 1916. Combustible Materials Regulated

CHAPTER 20. Type III Buildings (Ordinary Masonry) 67

- SEC. 2001. Definition
- 2002. Height Allowable
- 2003. Area Allowable
- 2004. Foundations
- 2005. Exterior and Inner Court Walls
- 2006. Partitions
- 2007. Enclosure of Vertical Openings
- 2008. Structural Framework
- 2009. Fireproofing Structural Members
- 2010. Floor Construction
- 2011. Roof Construction
- 2012. Stair Construction
- 2013. Doors and Windows
- 2014. Projections from the Building
- 2015. Penthouses and Skylights
- 2016. Combustible Materials Regulated

CHAPTER 21. Type IV Buildings (Metal Frame)..... 70

- SEC. 2101. Definition
- 2102. Height Allowable
- 2103. Area Allowable
- 2104. Foundations
- 2105. Exterior Walls
- 2106. Partitions
- 2107. Enclosure of Vertical Openings
- 2108. Structural Framework
- 2109. Fireproofing Structural Members
- 2110. Floor Construction
- 2111. Roof Construction
- 2112. Stair Construction
- 2113. Doors and Windows
- 2114. Projections from the Building
- 2115. Penthouses and Skylights
- 2116. Combustible Materials Regulated

CHAPTER 22. Type V Buildings (Wood Frame)..... 72

- SEC. 2201. Definition
- 2202. Height Allowable
- 2203. Area Allowable
- 2204. Foundations

- 2205. Exterior Walls and Wall Coverings
- 2206. Interior Partitions
- 2207. Floor Construction
- 2208. Roof and Ceiling Construction
- 2209. Roof Covering
- 2210. Enclosure of Vertical Openings
- 2211. General

PART VI—ENGINEERING REGULATIONS, QUALITY AND DESIGN OF THE MATERIALS OF CONSTRUCTION.

CHAPTER 23. Live and Dead Loads..... 80

- SEC. 2301. Definitions
- 2302. General
- 2303. Special Load Considerations
- 2304. Unit Live Loads
- 2305. Roof Loads
- 2306. Reduction of Live Loads
- 2307. Wind Pressure
- 2308. Live Loads and Seating Capacity
Posted
- 2309. Occupancy Permits for Changed Floor
Loading
- 2310. Retaining Walls and Basement Floors
- 2311. Earthquake Regulations

CHAPTER 24. Masonry (Quality and Design)..... 85

- SEC. 2401. Quality of Materials and Tests Required
- 2402. Brick
- 2403. Sand-Lime Brick
- 2404. Concrete Brick
- 2405. Plain Concrete
- 2406. Hollow Concrete Block or Tile
- 2407. Gypsum
- 2408. Hollow Clay Tile
- 2409. Mortars
- 2410. Allowable Working Stresses
- 2411. General Requirements

CHAPTER 25. Wood (Quality and Design)..... 93

- SEC. 2501. General
- 2502. Determination of Required Sizes
- 2503. Allowable Unit Stresses
- 2504. Columns: Allowable Unit Stresses
- 2505. Framing Details: Vertical Members
- 2506. Framing Details: Horizontal Members
- 2507. Framing Details: Stud Walls and Par-
titions
- 2508. Roof Framing
- 2509. Framing Details: Trusses
- 2510. Fire Stops
- 2511. Termite Provisions

CHAPTER 26. Reinforced Concrete (Quality and Design)103

- SEC. 2601. Quality
- 2602. Design

2603.	Definitions
2604.	Materials
2605.	Tests of Materials
2606.	Quality of Concrete
2607.	Proportions and Consistency
2608.	Control of Proportions
2609.	Mixing and Placing Concrete
2610.	Forms and Details of Construction
2611.	Assumptions for Design
2612.	Notations
2613.	Working Stresses
2614.	Flexural Computations
2615.	Moment Coefficients: Freely Supported, Slightly Restrained
2616.	Moment Coefficients: Fully Restrained
2617.	Moment Coefficients: Unequal Spans, Non-uniform Loads
2618.	Shear and Diagonal Tension
2619.	Bond and Anchorage
2620.	Flat-Slab Construction
2621.	Reinforced Concrete Columns
2622.	Footings

CHAPTER 27. Steel and Iron (Quality and Design).....128

SEC. 2701.	Quality and Design
2702.	Allowable Unit Stresses
2703.	Eccentric Loads
2704.	Beams and Girders
2705.	Thickness of Materials
2706.	Compression Splices
2707.	Net Sections
2708.	Connections
2709.	Rivets and Bolts
2710.	Welded Connections
2711.	Construction Details
2712.	Lattice
2713.	Pins and Pin Holes
2714.	Steel Joists
2715.	Expansion
2716.	Workmanship
2717.	Painting
2718.	Erection

PART VII—DETAILED REGULATIONS

CHAPTER 28. Excavations, Footings and Foundations139

SEC. 2801.	Excavations
2802.	Footings and Foundations
2803.	Piles

CHAPTER 29. Walls and partitions.....142

SEC. 2901.	General Provisions: Solid Masonry Walls
2902.	Working Stresses

- 2903. Thickness of Exterior Walls other than Skeleton Construction
- 2904. Bonds
- 2905. Piers
- 2906. Chases and Recesses
- 2907. General Provisions: Hollow Walls
- 2908. Working Stresses
- 2909. Thickness and Height of Walls other than Skeleton Construction
- 2910. Bond
- 2911. Beam Supports
- 2912. Piers
- 2913. Chases and Recesses
- 2914. General Provisions: Reinforced Concrete Walls
- 2915. Working Stresses
- 2916. Thickness of Walls other than in Skeleton Construction
- 2917. Piers
- 2918. Chases and Recesses
- 2919. Quality of Material (Stone Walls)
- 2920. Working Stresses
- 2921. Lateral Support and Thickness
- 2922. Bond
- 2923. Chases and Recesses
- 2924. Quality of Material (Veneered Walls)
- 2925. Working Stresses
- 2926. Attachment of Veneering
- 2927. Height of Veneered Walls
- 2928. Quality of Material (Faced Walls)
- 2929. Working Stresses
- 2930. Thickness
- 2931. Bond
- 2932. Fire Walls: Solid Masonry
- 2933. Hollow Fire Walls
- 2934. Fire Division Walls
- 2935. Parapet Walls
- 2936. Bearing Partitions
- 2937. Non-bearing Partitions
- 2938. Foundation Walls
- 2939. Panel and Enclosure Walls
- 2940. Anchoring of Walls
- 2941. Use of Existing Walls

CHAPTER 30. Enclosure of Vertical Openings.....155

- SEC. 3001. Enclosures; When Required
- 3002. Stairway, Ramp and Elevator Enclosures
- 3003. Other Vertical Openings

CHAPTER 31. Floor Construction156

- SEC. 3101. General
- 3102. Concrete Floors
- 3103. Steel Joisted Floors
- 3104. Mill Constructed Floors
- 3105. Wood Joisted Floors
- 3106. Wood Surfaced Floors

CHAPTER 32.	Roof Construction and Covering.....	158
SEC. 3201.	General	
3202.	Construction	
3203.	Design	
3204.	Roof Coverings	
3205.	Access to Roof Space	
3206.	Roof Drainage	
CHAPTER 33.	Stairs, Ramps and Smokeproof Towers	159
SEC. 3301.	General Requirements	
3302.	General Design	
3303.	Arrangement and Access	
3304.	Doors	
3305.	Railings	
3306.	Lighting	
3307.	Detailed Requirements	
3308.	Stairway Enclosures	
3309.	Stairways Required	
3310.	Ramps	
3311.	Horizontal Exits	
3312.	Signs and Lighting	
3313.	Passageways and Corridors	
3314.	Exceptions	
3315.	Smokeproof Tower	
3316.	Outside Stairways	
CHAPTER 34.	Doors, Windows and Skylights.....	166
SEC. 3401.	Doors and Windows	
3402.	Skylights	
CHAPTER 35.	Bays and Balconies.....	167
SEC. 3501.	Construction	
CHAPTER 36.	Penthouses and Roof Structures.....	168
SEC. 3601.	Penthouses and Roof Structures	
3602.	Towers and Spires	
CHAPTER 37.	Chimneys and Heating Apparatus.....	169
SEC. 3701.	Chimneys	
3702.	Smokestacks	
3703.	Gas Vents	
3704.	Patent Chimneys	
3705.	Smoke Pipes and Thimbles	
3706.	Fireplaces	
3707.	Warm Air Furnaces	
3708.	Low Pressure Steam Heating Plants	
3709.	Boilers	
3710.	Stoves	
3711.	Gas Ranges, Domestic Water Heaters and Hot Plates	
3712.	Gas Ranges for Restaurants and Hotels	
3713.	Oil Burners	
3714.	Other Sources of Heat	

CHAPTER 38.	Fire Extinguishing Apparatus.....	178
SEC. 3801.	Automatic Sprinklers; Where Required	
3802.	Automatic Sprinkler Requirements	
3803.	Dry Standpipes; Where Required	
3804.	Dry Standpipe Requirements	
3805.	Wet Standpipes; Where Required	
3806.	Wet Standpipe Requirements	
3807.	Basement Pipe Inlets	
CHAPTER 39.	Stage Ventilators	182
SEC. 3901.	Stage Ventilators	
CHAPTER 40.	Motion Picture Machine Booths.....	183
SEC. 4001.	Motion Picture Machine Booths	
CHAPTER 41.	Proscenium Curtains	185
SEC. 4101.	Proscenium Curtains: General Requirements	
4102.	Curtain Coverings	
4103.	Design of Curtain	
4104.	Operating Equipment	
4105.	Tests	
4106.	New Designs	
PART VIII—	FIRE-RESISTIVE STANDARDS FOR FIRE PROTECTION	
CHAPTER 42.	General	188
SEC. 4201.	Fire-Resistive Construction Defined	
4202.	Fire-Resistive Materials	
4203.	Fire-Resistive Construction	
CHAPTER 43.	Fire-Resistive Standards	190
SEC. 4301.	Protection of Structural Parts	
4302.	Fire-Resistive Walls and Partitions	
4303.	Fire-Resistive Floor Construction	
4304.	Fire Doors, Shutters and Windows	
4305.	Roof Coverings	
PART IX—	REGULATIONS FOR USE OR OCCUPANCY OF STREETS AND PROJECTIONS OVER PUBLIC PROPERTY	
CHAPTER 44.	Temporary Use of Streets During Construction	203
SEC. 4401.	Temporary Use of Streets During Construction	
4402.	Deposit Required for Temporary Use of Streets	
CHAPTER 45.	Permanent Occupancy of Public Property	205
SEC. 4501.	Permanent Occupancy of Public Property	
PART X—	LEGISLATIVE	
CHAPTER 46.	Legislative	207
SEC. 4601.	Validity	
4602.	Appended Documents	
4603.	Ordinances Repealed	
4604.	Date Effective	
4605.	Publishing	
PART XI—	LEGISLATIVE	
CHAPTER 47.	Plastering (see appendix)	207

PACIFIC COAST CONFERENCE UNIFORM BUILDING CODE

Ordinance No.

An ordinance regulating the erection, construction, enlargement, alteration, repair, moving, removal, demolition, conversion, occupancy, equipment, use, height, area, and maintenance of buildings and/or structures in the City of

.....; providing for the issuance of permits and collection of fees therefor; declaring and establishing Fire Districts; providing penalties for the violation thereof, and repealing all ordinances and/or parts of ordinances in conflict therewith.

Be it ordained by the of the City of as follows: .

ADMINISTRATIVE

CHAPTER 1 — TITLE AND SCOPE

Sec. 101. This Ordinance shall be known as the "1930 Edition of the Pacific Coast Conference Uniform Building Code." **Title**
may be cited as such and will be referred to in this Ordinance as "this Code."

Sec. 102. The purpose of this Code is to provide certain **Purpose**
minimum standards, provisions and requirements for safe and stable design, methods of construction and uses of materials in buildings and/or structures hereafter erected, constructed, enlarged, altered, repaired, moved, converted to other uses or demolished and to regulate the equipment, maintenance, use and occupancy of all buildings and/or structures.

The provisions of this Code shall be deemed to supplement any and all state laws of the State of relating to buildings.

Sec. 103. New buildings and/or structures hereafter erected **Scope**
in the City of, shall conform to all requirements of this Code; and all requirements in this Code, unless specifically provided, shall apply to new buildings.

Additions, alterations, repairs, and changes of use or occupancy in all buildings shall comply with the requirements specified in Section 104 of this Code.

Sec. 104. The following specified requirements shall apply **Application**
to existing buildings which for any reason whatsoever do not **to Existing**
conform to the requirements of this Code for new buildings: **Building**

(a) If alterations and/or repairs in excess of fifty (50) per **Major**
cent of the value of an existing building are made to such existing **Alterations**
building within any period of twelve months, the entire building **and Repairs**
shall be made to conform with the requirements given herein for new buildings; provided, however, that any existing building which for any reason whatsoever, requires repairs, at any one time, in excess of fifty (50) per cent of the value thereof, not deducting from such value any loss caused by fire or any other reason, shall be made to conform to the requirements of this Code or shall be entirely demolished.

(b) If the existing use or occupancy of an existing building **Changed**
is changed to a use or occupancy which would not be permitted **Use**
in a similar building hereafter erected, the entire building shall be made to conform with the requirements given herein for new buildings; provided, however, that if the use or occupancy of only a portion or portions of an existing building is changed and such portion or portions are segregated as specified in Section 503 of this Code then only such portion or portions of the building need be made to comply with said requirements; and pro-

vided, further, that the Building Inspector is hereby given authority to approve any change in the use or occupancy of an existing building within any one Group of Occupancy as specified in Part III, even though such building is not made to fully conform to the requirements of this Code, when it is obvious that such a change in the use or occupancy of the existing building will not extend or increase any existing non-conformity or hazard of the building.

Additions

(c) Any existing building not covered by the preceding paragraphs (a) and (b) which has its floor area or its number of stories increased or its use or occupancy changed in any way from its former or existing use or occupancy shall be provided with stairways, emergency exits and fire protection facilities as specified in this Code for buildings hereafter erected for similar uses or occupancies.

Minor Alterations and Repairs

(d) Every alteration or repair to any structural part or portion of an existing building shall when deemed necessary in the opinion of the Building Inspector be made to conform to the requirements of this Code for new buildings. Minor alterations, repairs and changes not covered by the preceding paragraphs (a), (b) and (c) may be made with the same materials of which the building is constructed; provided, that not more than twenty-five (25) per cent of the roof covering of any building shall be replaced in any period of twelve (12) months unless the entire roof covering is made to conform with the requirements of this Code for new buildings.

New roofing meeting the requirements of this Code may be placed over existing roofings when the existing roofing and roof framing is such as to permit the new roofing to be properly supported and securely fastened.

Maintenance

Sec. 105. The requirements contained in this Code, covering the maintenance of buildings, shall apply to all buildings and/or structures now existing or hereafter erected. All buildings and/or structures and all parts thereof shall be maintained in a safe condition, and all devices or safeguards which are required by this Code at the erection, alteration or repair of any building shall be maintained in good working order.

This section shall not be construed as permitting the removal or non-maintenance of any existing devices or safeguards unless authorized in writing by the Building Inspector.

CHAPTER 2 — GENERAL PROVISIONS

Sec. 201. No person shall erect or construct any building or structure, nor add to, enlarge, move, improve, alter, convert, extend or demolish any building or structure, or cause the same to be done, without first obtaining a building permit therefor from the Building Inspector.

**Application
for Permit**

Any person desiring a building permit as required by this Code shall file with the Building Inspector an application therefor in writing on a blank form to be furnished for that purpose.

Every such application for a permit shall describe the land upon which the proposed building or work is to be done, either by lot, block and/or tract, or similar general description that will readily identify and definitely locate the proposed building or work.

Every such application shall show the use or occupancy of all parts of the building and such other reasonable information as may be required by the Building Inspector.

Copies of plans and specifications and a lot plan showing the location of the proposed building and of every existing building thereon, shall accompany every application for a permit, and shall be filed in duplicate with the Building Inspector; provided, however, that the Building Inspector may authorize the issuance of a permit without plans or specifications for small or unimportant work.

Plans shall be drawn to scale upon substantial paper or cloth and the essential parts shall be drawn to a scale of not less than one-eighth (1/8) inch to one foot.

Plans and specifications shall be of sufficient clarity to indicate the nature and character of the work proposed and to show that the law will be complied with. Computations, strain sheets, stress diagrams and other data necessary to show the correctness of the plans, shall accompany the plans and specifications when required by the Building Inspector.

Any specifications in which general expressions are used to the effect that "work shall be done in accordance with the Building Code" or "to the satisfaction of the Building Inspector" shall be deemed imperfect and incomplete and every reference to this Code shall be to the section or sub-section applicable to the material to be used or to the method of construction proposed.

All plans shall bear the name of the Architect, Structural Engineer or Designer. (See Appendix).

Sec. 202. The application, plans and specifications filed by an applicant for a permit shall be checked by the Building Inspector and if found to be in conformity with the requirements of this Code and all other laws or ordinances applicable thereto, the Building Inspector shall, upon receipt of the required fee, issue a permit therefor.

**Building
Permits**

When the Building Inspector issues the permit he shall endorse in writing or stamp both sets of plans and specifications "Approved." One such approved set of plans and specifications shall be retained by the Building Inspector as a public record, and one such approved set of plans and specifications shall be returned to the applicant, which set shall be kept on such building or work at all times during which the work authorized

101943106
thereby is in progress and shall be open to inspection by public officials. Such approved plans and specifications shall not be changed, modified or altered without authorization from the Building Inspector, and all work shall be done in accordance with the approved plans.

Fees

Sec. 203. Any person desiring a building permit shall, at the time of filing an application therefor, as provided in Sec.

201 of this Code, pay to the a fee as required in this Section. (See Appendix.)

For a total valuation of \$50.00 or less no fee.

For a total valuation from \$50.00 to \$1,001 a \$2.00 fee;

and an additional fee of \$2.00 for each additional \$1000 or fraction thereof of total valuation to and including \$15,000;

and an additional fee of \$1.00 for each additional \$1000 or fraction thereof of total valuation to and including \$50,000;

and an additional fee of 50c for each additional \$1000 or fraction thereof of total valuation exceeding \$50,000.

The City of, the County of,
the State of, and the United States of America,
shall be exempt from the paying of any fee for any building permit.

Where work for which a permit is required by this Code is started or proceeded with prior to obtaining said permit, the fees above specified shall be doubled, but the payment of such double fee shall not relieve any persons from fully complying with the requirements of this Code in the execution of the work nor from any other penalties prescribed herein.

The Building Inspector shall keep a permanent, accurate account of all fees collected and received under this Code and give the name 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.

Inspection and Registered Inspectors

Sec. 204. The Building Inspector shall inspect or cause to be inspected at various intervals during the erection, construction, enlarging, alteration, repairing, moving, demolition, conversion, occupancy and underpinning all buildings and/or structures referred to in this Code and located in the City of

..... and a final inspection shall be made of every building and/or structure hereafter erected prior to the issuance of the Certificate of Occupancy as specified in Sec. 206.

No building construction, alteration, repair or demolition requiring a building permit shall be commenced until the permit holder or his agent shall have posted the building permit card in a conspicuous place on the front premises and in such position as to permit the Building Inspector to conveniently make the required entries thereon respecting inspection of the work. This permit card shall be maintained in such position by the permit holder until the Certificate of Occupancy has been issued by the Building Inspector.

The Building Inspector upon notification from the permit holder or his agent shall make the following inspections of Type

struction as completed or shall notify the permit holder or his agent wherein the same fails to comply with the law.

Foundation Inspection: To be made after trenches are excavated and the necessary forms erected and when all materials for the foundation are delivered on the job.

Frame Inspection: To be made after the roof, all framing, fire-blocking and bracing is in place and all pipes, chimneys and vents are complete.

Stucco Inspection: To be made after all lathing and backing is in place and all plastering and stucco materials are delivered on the job, but before any stucco is applied.

Final Inspection: To be made after building is completed and is ready for occupancy.

No work shall be done on any part of the building and/or structure beyond the point indicated in each successive inspection without first obtaining the written approval of the Building Inspector. 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 above four inspections. (See Appendix).

No reinforcing steel or structural framework of any part of any building or structure shall be covered or concealed in any manner whatsoever without first obtaining the approval of the Building Inspector.

In all buildings where plaster is used for fire protection purposes the permit holder or his agent shall notify the Building Inspector after all lathing and backing is in place and all plastering materials are delivered on the job and no plaster shall be applied until the approval of the Building Inspector has been received.

Any person engaged in the erection or causing the erection of a building and/or structure, except Type V Buildings and/or structures, where the estimated cost exceeds \$20,000 shall employ a "registered inspector" properly qualified as specified in this section or shall cause his employment by the architect, structural engineer or designer of such structure; provided, that the Building Inspector may authorize the proposed construction without requiring a "registered inspector" when in his estimation such special supervision is not necessary. The Building Inspector may designate any building and/or structure as requiring a "registered inspector" when deemed necessary or where there is a complicated design or where new materials or methods of construction are intended to be used.

The "registered inspector" shall be approved by, registered with, deputized by and assigned to a particular building or structure by the Building Inspector. Such "registered inspector" shall be thoroughly qualified by knowledge and experience in the design and construction of the structure to which he is assigned by the Building Inspector and he shall be thoroughly familiar with the requirements of this Code applying to that building or structure and of their practical application. The Building Inspector may authorize one such "registered inspector" to supervise the construction of a limited number of buildings and/or structures provided that his service shall extend over all the important details of framing, erection and assembly and that he is able to render full engineering inspection service

**Special
Engineering
Supervision**

on each building and/or structure under his supervision and control.

Before commencing his duties the "registered inspector" shall obtain a certificate of registration from the Building Inspector for which he shall pay the sum of one dollar (\$1.00), and he shall deposit with the Building Inspector a surety bond in the sum of five thousand dollars (\$5000) conditioned upon the faithful and efficient performance of his duties, said bond to

be made payable to the City of..... and to be furnished for the term of one year. The "registered inspector" shall remain constantly upon the work during the process of construction and his duties shall terminate only when a Certificate of Compliance is issued by the Building Inspector in approval and acceptance of the work on which he may be engaged as specified in Section 205.

Each such "registered inspector" shall carefully inspect all materials entering into the construction of the structure and be responsible for obtaining full information regarding the strength of materials where new or untried materials are intended for any use involving structural safety. He shall report in writing, upon the special forms furnished by the Building Department, the true details regarding the progress of the work, the condition of same, deviation, defects, delays, general character of materials, working situations, weather conditions and all and any influencing factors that effect in any manner the structural safety and strength of the building. He shall be held directly responsible for the enforcement of this Code wherever same is applicable to the structure upon which he is engaged. He shall notify the Building Inspector of any attempt to cover, conceal, patch or repair any defect in materials or workmanship before such materials have been examined by the Building Inspector or his duly authorized representative. He shall be held directly responsible for the infraction of any ruling of the Building Inspector and shall have the authority to compel the removal of defective materials or to suspend or stop work pending the rulings of the Building Inspector. He shall not be engaged in any other labor on the project upon which he is employed.

Certificate
of
Compliance

Sec. 205. The duties of the "registered inspector" shall terminate only when a Certificate of Compliance has been issued by the Building Inspector. Such Certificate of Compliance shall bear a statement signed by the "registered inspector" stating that the work upon the building or structure to which he has been assigned has been completed in a satisfactory manner and that the regulations of this Code affecting the structural features of such building or structure have been fully complied with. If there have been any infractions of this ordinance they shall be noted in this statement. The Building Inspector shall approve such Certificate of Compliance filed by the "registered inspector" if after inspection the structural features of such building or structure are found to be in accordance with the provisions of this Code. Each Certificate of Compliance shall bear the legal description of the property upon which such building or structure is located and an identifying description

of the building. A duplicate of each Certificate of Compliance shall be kept on file permanently in the office of the Building Inspector.

Sec. 206. No building shall be occupied in any part thereof unless or until a Certificate of Occupancy has been issued by the Building Inspector. The Building Inspector shall, after an application therefor has been filed by the owner or his agent, issue a Certificate of Occupancy for such building, if after inspection it is found that such building complied with the provisions of this Code and all other requirements of law or ordinance applicable thereto. Such Certificate of Occupancy shall show the use to which the structure may be put and the maximum allowable floor loads for each floor thereof. A temporary Certificate of Occupancy may be issued by the Building Inspector for the temporary use of a portion of a building prior to the completion and occupancy of the entire building.

**Certificate
of
Occupancy**

Sec. 207. The use or occupancy of any building shall not be changed until a Certificate of Occupancy permitting the new use or occupancy is issued by the Building Inspector when the new occupancy is such as to require alterations or repairs of the building, as specified in this Code. No such Certificate of Occupancy shall be issued unless the building shall comply with the requirements of this Code as specified in Section 104.

**Change of
Occupancy**

CHAPTER 3 — ENFORCEMENT

**Powers and
Duties of
Building
Inspector**

Sec. 301. The office of Building Inspector is hereby created and the Building Inspector is hereby authorized and directed to enforce all of the provisions of this Code and for such purpose he shall have the powers of a police officer.

The Building Inspector or his authorized representative may enter any building or premises for the purpose of inspection or to prevent violation of this Code, upon presentation of the proper credentials.

Whenever any building work is being done contrary to the provisions of this Code, or is being done in an unsafe or dangerous manner, the Building Inspector may order the work stopped by notice in writing served on any persons engaged in the doing or causing such work to be done, and any such person shall forthwith stop such work until authorized by the Building Inspector to recommence and proceed with the work.

Whenever any building or portion thereof is being used or occupied contrary to the provisions of this Code the Building Inspector shall order such use or occupancy discontinued and the building or portion thereof vacated by notice served on any person using or causing such use or occupancy to be continued and such person shall vacate such building or portion thereof within ten days after receipt of such notice, or make the building or portion thereof comply with the requirements of this Code; provided, however, that in the event of an emergency the following paragraph shall apply.

Any building or portion thereof, including buildings and/or structures in process of erection, if found to be dangerous to persons or property, or unsafe for the purpose for which it is being used, or in danger from fire due to defects in construction, or dangerous for use because of insufficient means of egress in case of fire, or which violates the provisions of this Code due to the removal, decay, deterioration or the falling off of any thing, appliance, device or requirement originally required by this Code, or which has become damaged by the elements or fire to an extent of fifty (50) percent of its value, may be condemned by the Building Inspector. The Building Inspector may order portions of the structural frame of a building or structure to be exposed for inspection when in his opinion they are in an unsafe condition. In any of the aforesaid cases the Building Inspector shall serve notice in writing on the owner, reputed owner or person in charge of such a building or premises, setting forth what must be done to make such building safe. The person receiving such notice shall commence within forty-eight hours thereafter to make the changes, repairs or alterations set out in such notice and diligently proceed with such work or demolish the building. No such building shall be occupied or used for any purpose after the Building Inspector serves written notice of its unsafe or dangerous condition until the instructions of the Building Inspector have been complied with.

If, at the expiration of the time as set forth in the first notice, the instructions, as stated, have not been complied with, a second notice shall be served personally upon the owner, his agent, or the person in possession, charge or control of such building or structure or part thereof, stating therein such pre-

cautionary measures as may be necessary or advisable to place such building or structure or part thereof in a safe condition. Should the necessary changes not be made within thirty days after the service of such second notice the Commission may order the Building Inspector to proceed with the work specified in such notice. A statement of the cost of such work shall be transmitted to the Commission, who shall cause the same to be paid and levied as a lien against the property. Proper service of either such notices shall be personal service upon the owner of record, if he shall be within the City of.....

If he is not in the City of..... such service may be had upon any person accustomed to collect rents on the property in question who may be in the City of....., and in the absence of such a person, upon the tenant of the premises. In the event such premises are vacant, and the owner is not in the City of....., such service will be completed when the notice is sent by registered mail to the last known address of the said owner. Whenever the owner, agent or tenant is a corporation, service may be upon the President, Vice-President, Secretary or Treasurer, or in the absence of any of these, the local representatives of such corporation.

Sec. 302. The provisions of this Code are not intended to prevent the use of types of construction or materials offered as an alternate for the types of construction or materials required by this Code, but such alternate types of construction or materials to be given consideration shall be offered for approval as specified in this chapter.

**Alternate
Materials
and Types
of Con-
struction**

Any person desiring to use types of construction or materials not specifically mentioned in this Code shall file with the Building Inspector authentic proof in support of claims that may be made regarding the sufficiency of such types of construction and materials and request approval and permission for their use.

The Building Inspector may approve such alternate types of construction or materials and may recommend an amendment to this Code in order to make permissible the use of same. If the evidence and proof are not sufficient, in the opinion of the Building Inspector, to justify approval or recommendation for an amendment, the applicant may refer the entire matter to the Board of Examiners and Appeals as specified in Section 303.

Sec. 303. Any person whose application for a building permit for the use of an alternate material or type of construction has been refused by the Building Inspector or who may consider that the provisions of this Code do not cover the point raised or that any particular provision would cause a manifest injury to be done may appeal to the Board of Examiners and Appeals by serving written notice on the Building Inspector in which it shall be stated that the applicant desiring to use the alternate materials or types of construction shall guarantee payment of all expenses for necessary tests made or ordered by the Board

Appeals

of Examiners and Appeals. Such notice shall be at once transmitted to the Board which Board shall arrange for a hearing on the particular point raised.

Such written notice shall be accompanied with the sum of ten dollars (\$10.00) payable to the..... If the appeal be denied such fee shall be retained by the City of, otherwise the fee shall be returned to the appellant.

Board of Examiners and Appeals

Sec. 304. In order to determine the suitability of alternate materials and construction and to provide for reasonable interpretations of the provisions of this Code, there shall be and is hereby created a Board of Examiners and Appeals, consisting of five (5) members, who are qualified by experience and training to pass on matters pertaining to building construction. One member shall be a practicing architect, one a competent builder, one a lawyer and two structural engineers, each of whom shall have had at least ten years' experience as an architect, builder, lawyer or structural engineer. The Building Inspector shall be an ex-officio member and shall act as Secretary to the Board. The Board of Examiners and Appeals shall be appointed byand shall hold office at.....pleasure. The Board shall adopt reasonable rules and regulations for conducting its investigations and shall render all decisions and findings in writing to the Building Inspector with a duplicate copy to the appellant and may recommend to the City Council such new legislation as is consistent therewith.

The Board of Examiners and Appeals may interpret the provisions of the Code to cover a special case, if it appears that the provisions of the Code do not definitely cover the point raised or that a manifest injustice might be done, provided that every such decision shall be by unanimous vote of the Board of Examiners and Appeals. Decisions as to the use of alternate materials and/or types of construction shall be by majority vote and if not permitted by this Code shall become effective only when authorized by an amendment to this Code.

Violations and Penalties

Sec. 305. It shall be unlawful for any person, firm or corporation to erect, construct, enlarge, alter, repair, move, remove, demolish, convert, equip, use or occupy or maintain any building and/or structure or any portion of any building and/or structure in the City of....., contrary to or in violation of any provision of this Code or to cause, permit or suffer the same to be done.

Any person, firm or corporation violating 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 the conviction of any such violation such person shall be punishable by a fine of not more than....., or by imprisonment in the

..... jail for not
more than..... or by both such
fine and imprisonment.

The issuance or granting of a permit or approval of plans and/or specifications shall not be deemed or 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 upon plans and specifications shall not prevent the Building Inspector 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 of.....

Every permit issued by the Building Inspector under the provisions of this Code shall expire by limitation and become null and void, if the building or work authorized by such permit is not commenced within sixty days from the date of such permit, or if the building or work authorized by such permit is suspended or abandoned at any time after the work is commenced for a period of sixty days. Before such work can be recommenced a new permit shall be first obtained so to do, and the fee therefor shall be one-half the amount required for a new permit.

PART II.

DEFINITIONS

CHAPTER 4

Definitions **Sec. 401.** For the purpose of this Code, certain terms, phrases and words and their derivatives shall be construed as set out in this section. Words used in the singular include the plural and the plural the singular. Words used in the masculine gender include the feminine, and the feminine the masculine. Wherever a section, chapter or part is referred to in this Code by number it shall be understood to refer to a section, chapter or part of this Code.

"ALLEY" Any public space, public park or thoroughfare less than sixteen (16) feet but not less than ten (10) feet in width which has been deeded to the public for public use.

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

"APARTMENT HOUSE" is any building, or portion thereof, which is designed, built, rented, leased, let or hired out to be occupied, or which is occupied as the home or residence of three or more families living independently of each other and doing their own cooking in the said building, and shall include flats and apartments.

"APARTMENT" is a room or suite of rooms which is occupied or which is intended or designed to be occupied by one family for living and sleeping purposes.

"APPROVED" as to materials and types of construction, refers to approval by the Building Inspector as the result of investigation and tests conducted by him, or by reason of accepted principles or tests by national authorities, technical or scientific organizations.

"AREA" or **"FIRE AREA"** (See **"Floor Area"**).

"ATTIC" or **"ATTIC STORY"** is any story situated wholly or partly in the roof, so designated, arranged or built as to be used for business, storage or habitation.

"BASEMENT" is that portion of a building between floor and ceiling, which is partly below and partly above grade (as defined in this Section), but so located that the vertical distance from grade to the floor below is less than the vertical distance from grade to ceiling. (See **"Story"**).

"BAY WINDOW" is a rectangular, curved or polygonal window, supported on a foundation extending beyond the main wall of the building.

"BUILDING" is any structure built for the support, shelter and enclosure of persons, animals, chattels or movable property of any kind; and when separated by an **"Absolute Fire Separation"** each portion of such building so separated shall be deemed a separate building.

"BUILDING INSPECTOR" - the Chief Building Inspector or any regularly authorized deputy.

"CELLAR" is that portion of a building between floor and ceiling which is wholly or partly below grade (as defined in this Section) and so located that the vertical distance from grade to the floor below is equal to or greater than the vertical distance from grade to ceiling. (See "Story").

"COURT" is an open, unoccupied space, bounded on two or more sides by the walls of the building. An inner court is a court entirely within the exterior walls of a building. All other courts are outer courts. (See Appendix).

"DEAD LOAD" in a building includes the weight of the walls, permanent partitions, framing, floors, roofs and all other permanent, stationary construction forming a part of the building.

"DWELLING" is any building or any portion thereof, which is not an "Apartment House" or a "Hotel" as defined in this Code, which contains one or more "Apartments" or "Guest Rooms", used, intended or designed to be used, built, rented, leased, let or hired out to be occupied, or which are occupied for living purposes.

"EXISTING BUILDING" is a building already erected or one for which a legal permit has been issued prior to the adoption of this Code.

"FAMILY" is one person living alone or a group of two or more persons living together, whether related to each other by birth or not.

"FLOOR AREA" is the area included within exterior walls or within exterior walls and fire walls of a building exclusive of vent shafts and courts.

"FRONT OF LOT" means the front boundary line of lot bordering on the street, and in the case of a corner lot may be either frontage.

"FOOTING" or "FOUNDATION" is the spreading course at the base or bottom of a foundation wall, column or pier.

"GARAGE" is a building or portion thereof in which a motor vehicle containing gasoline, distillate or other volatile, inflammable liquid in its tank, is stored, repaired, or kept.

"PRIVATE GARAGE" is a building, or a portion of a building, in which motor vehicles used by the tenants of the building or buildings on the premises are stored or kept. (See Section 1509.)

"GRADE" (1) For buildings adjoining one street only, the elevation of the sidewalk at the center of that wall adjoining the street.

(2) For buildings adjoining more than one street, the average of the elevations of the sidewalk at centers of all walls adjoining streets.

(3) For buildings having no wall adjoining the street, the average level of the ground (finished surface) adjacent to the exterior walls of the building. All walls approximately parallel to and not more than five (5) feet from a street line are to be considered as adjoining a street.

"GUEST" means any person hiring and occupying a room for living and sleeping purposes.

"GUEST ROOM" means a room in a building occupied, or

intended and designed to be occupied, let or hired out to "Guests".

"HEIGHT OF BUILDING" is the vertical distance from the "Grade" to the highest point of the coping of a flat roof or to the deck line of a mansard roof or to the average height of the highest gable of a pitch or hip roof.

"HOTEL" is any building containing six or more rooms intended or designed to be used, or which are used, rented or hired out to be occupied, or which are occupied for sleeping purposes by guests.

"LINTEL" is the beam or girder placed over an opening in a wall, and which supports the wall construction above.

"LIVE LOADS" are all imposed, fixed or transient loads other than "Dead Loads."

"MASONRY" is that form of construction composed of stone, brick, concrete, gypsum, hollow clay tile, concrete blocks or tile, or other similar building units or materials or a combination of these materials laid up unit by unit and set in mortar. For the purpose of this Code plain monolithic concrete shall be considered as Masonry. (See Section 2405.)

"SOLID MASONRY" means masonry built without hollow spaces.

"MEZZANINE" or "MEZZANINE FLOOR" is an intermediate floor placed in any story or room. When the total area of any such "Mezzanine Floor" exceeds thirty-three and one-third ($33\frac{1}{3}$) percent of the total floor area in that room or story in which said "Mezzanine Floor" occurs, it shall be considered as constituting an additional "Story". The clear height above or below a "Mezzanine Floor" construction shall be not less than seven (7) feet.

"OCCUPANCY" as used in this Code pertains to and is the purpose for which a building is used or intended to be used. Change of occupancy is not intended to include change of tenants or proprietors.

"ORIEL WINDOW" is a window that projects from the main line of an enclosing wall of a building and is carried on brackets or corbels.

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

"REPAIR" means the reconstruction or renewal of any part of an existing building for the purpose of its maintenance. The word "Repair" or "Repairs" shall not apply to any change of construction.

"SEATING CAPACITY" The seating capacity of a theatre, auditorium, or any room or place of public assemblage in which seats are not fixed shall be determined on the basis of seven (7) square feet of floor, balcony and/or gallery area per person, and in the case of fixed seats such as pews or benches the seating capacity shall be based on one person to each eighteen (18) inches of pew or bench length.

"SHAFT" means a vertical opening through a building for elevators; dumb waiter, light, ventilation or similar purposes.

"SHALL" as used in this Code, is mandatory.

"STORY" means that portion of a building included between

the upper surface of any floor and the upper surface of the floor next above, except that the topmost story shall be that portion of a building included between the upper surface of the topmost floor and the ceiling or roof above. A basement or cellar shall not be considered a story unless the ceiling thereof is more than five (5) feet above grade.

"STREET" is any thoroughfare or public park not less than sixteen (16) feet in width which has been dedicated or deeded to the public for public use.

"STRUCTURE" is that which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

"VALUE" of a building shall be the estimated cost to replace the building in kind.

"VENEER" is the outer facing of brick, stone, concrete or tile attached to an enclosing wall for the purpose of providing ornamentation, protection or insulation but not counted as adding strength to the wall.

"WALLS".

"BEARING WALL" is a wall which supports any load other than its own weight.

"CURTAIN WALL" is a non-bearing wall between columns or piers which is not supported by girders or beams.

"ENCLOSURE WALL" is an exterior, non-bearing wall in skeleton construction, anchored to columns, piers or floors, but not necessarily built between columns or piers.

"FIRE DIVISION WALL" is a wall of masonry or reinforced concrete which subdivides a building to restrict the spread of fire, but is not necessarily continuous through all stories nor extended through the roof.

"FIRE WALL" is a wall of masonry or reinforced concrete which subdivides a building to prevent the spread of fire by starting at the foundation and extending continuously through all stories to and above the roof.

"INTERIOR WALL" is a wall entirely surrounded by the exterior walls of the building.

"NON-BEARING WALL" is a wall which supports no load other than its own weight.

"PANEL WALL" is a non-bearing wall in skeleton construction built between columns or piers and wholly supported at each story.

"PARAPET WALL" is that part of any wall entirely above the roof line.

"PARTY WALL" is a wall used or adapted for joint service between two buildings.

"RETAINING WALL" is any wall used to resist the lateral displacement of any material.

"YARD" is an open, unoccupied space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this Code, and on the lot on which a building is situated.

PART III.

REQUIREMENTS BASED ON OCCUPANCY

CHAPTER 5 — CLASSIFICATION OF ALL BUILDINGS BY USE OR OCCUPANCY AND GENERAL RE- QUIREMENTS FOR ALL OCCUPANCIES

Occupancy
Classified

Sec. 501. Every building, whether existing or hereafter erected, shall for the purpose of this Code be classified by the Building Inspector according to its use or the character of its occupancy, as a building of Group A, B, C, D, E, F, G, H, I or J, as defined in Chapters 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15 respectively. (See Chart in Section 503.)

Any occupancy not mentioned specifically or about which there is any question shall be classified by the Building Inspector and included in the Group which its use most nearly resembles based on the existing or proposed life and fire hazard:

The Types of Construction referred to in Chapters 6 to 15 inclusive, are:

Type I — Fire-Resistive Construction,

Type II — Heavy Timber Construction.

Type III — Ordinary Masonry Construction,

Type IV — Metal Frame Construction,

Type V — Wood Frame Construction,

and are defined in Chapters 18, 19, 20, 21 and 22 respectively.

Change
in Use

Sec. 502. No change shall be made in the character of occupancy or use of any building which would place the building in a different Group of occupancy, unless such building is made to comply with the requirements of this Code for that Group.

EXCEPTIONS

The character of the occupancy of existing buildings may, subject to the approval of the Building Inspector, be changed and occupied for purposes in other Groups without conforming to all the requirements of the Code for those Groups, provided the new or proposed use is less hazardous, based on life and fire risk, than the existing use.

No change in the character of occupancy of a building shall be made without a Certificate of Occupancy, as required in Section 207 of this Code.

Buildings in existence at the time of the passage of this Code, may have their existing use or occupancy continued, if such use or occupancy was legal at the time of the passage of this Code, provided such continued use is not dangerous to life.

Mixed
Occupancy

Sec. 503. (a) When the occupancy of a building is such that different portions of the building are placed in different occupancy Groups, a "Fire Separation" as specified in this Section shall be provided so that each Group is entirely segregated. Such "Fire Separation" shall provide either a complete vertical or horizontal separation, or a combination of both. Each portion of a building so segregated shall be considered, for the purpose of this Code, to be a separate building and as such shall conform to the specific requirements applying to that use or occupancy; provided, however, that "Fire Separations" shall not affect or alter the requirement for fire walls when and where required because of area as specified in Part III, except when such "Fire Separation" provides the necessary complete vertical separation as specified in Section 2032.

(b) "Fire Separations may be vertical and/or horizontal, depending upon the locations of the portions of the building to be segregated and shall consist of a system of walls, partitions and/or floors of materials and construction so arranged as to provide, during the period specified, a complete, secure and continuous fire-break between the buildings or portions thereof as required. "Fire Separations" are, for the purpose of this Code, classified as "Absolute", "Special" and "Ordinary" and shall be not less than as specified in the following paragraphs.

(1) An "Absolute Fire Separation" shall provide an effective resistance to the passage of fire for not less than four hours as specified in Chapters 42 and 43. No openings shall be allowed through an "Absolute Fire Separation."

(2) A "Special Fire Separation" shall provide an effective resistance to the passage of fire for not less than three hours as specified in Chapters 42 and 43, except that all openings in walls forming such separation shall be protected on each side thereof by self-closing one hour fire-resistive doors as specified in Section 4304 (a). Such doors shall be kept normally closed. The total width of all openings in any vertical "Special Fire Separation" shall not exceed in any one story twenty-five (25) percent of the length of the wall in that story and no single opening shall have an area greater than one hundred twenty (120) square feet.

Enclosure walls of vertical or horizontal enclosures passing through a "Special Fire Separation" shall be of not less than two hour fire-resistive construction as specified in Section 4304.

(3) An "Ordinary Fire Separation" shall provide an effective resistance to the passage of fire for not less than one hour as specified in Chapters 42 and 43. Openings in "Ordinary Fire Separations" shall be protected by self-closing metal clad doors, as provided in Section 4304 and such doors shall be kept normally closed.

(c) "Fire Separations" shall be provided between the various Groups and Divisions of occupancies as specified in the tabulation which follows, except that in no case need the separation be more fire-resistive than the exterior walls of the building in which the separation occurs; provided, however, that where any fire separation is required the minimum shall be a one-hour "Fire Separation."

Sec. 504. The location of all buildings and the protection of certain openings shall conform to the requirements of the Occupancy Group in which such building is classified in this Code according to the use or character of the occupancy; provided, that exterior walls which form an angle of seventy-five (75) degrees or more with the adjacent property line may have openings therein which are protected by not less than one-hour fire-resistive construction as specified in Section 4304.

The specific requirements given in Sections 603, 703, 803, 903, 1003, 1103, 1203, 1303, 1403, and 1503, regulating the construction of exterior walls and the protection of openings therein with respect to adjacent property lines, shall apply to buildings erected on the same property, but with reference to an imaginary property line located between such buildings and parallel to the face of either building.

Location
on
Property

"FIRE SEPARATIONS" REQUIRED FOR MIXED OCCUPANCY

OCCUPANCY			GROUPS AND DIVISIONS OF OCCUPANCY																													
Chapter Reference	Group	Division*	A			B			C			D			E			F			G			H			I			J		
			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3			
6	A	1—Major theatres (stage depth back of proscenium wall more than 5 feet)..... 2—Moving Picture theatres (seating 1000 or more)..... 3—Places of public assemblage (other than theatres or moving picture theatres) having a seating capacity of 3500 or more in any one room.....	N	N	N	N	N	N	S	S	A	A	A	S	A	A	A	S	A	A	A	S	O	S	S	O	A	N	N			
			N	N	N	N	N	N	S	S	A	A	A	S	A	A	A	S	A	A	A	S	O	S	S	O	A	N	N			
			N	N	N	N	N	N	S	S	A	A	A	S	A	A	A	S	A	A	A	S	O	O	O	O	A	N	N			
7	B	1—Theatres and moving picture theatres (stage depth back of proscenium wall 5 feet or less)..... 2—Same as Group A, Division 3, but having a seating capacity of 500 to 3500 in any one room.....				N	N	N	S	S	A	A	A	S	A	A	A	S	A	A	A	S	O	S	S	O	A	N	N			
						N	N	S	S	A	A	A	S	A	A	A	S	A	A	A	S	O	N	N	O	A	N	N				
8	C	1—Same as Group A, Division 3, but having a seating capacity in any one room of less than 500.....							N	O	O	A	S	A	O	O	O	O	O	N	N	N	N	N	A	N	N	N				
9	D	1—Jails, prisons, reformatories, asylums, similar buildings..... 2—Hospitals, sanitariums, orphanages, nurseries and similar buildings (accommodating more than 5 patients).....							N	O	A	S	A	S	O	O	A	O	O	O	O	O	O	O	O	S	N	N				
									N	A	S	A	O	S	S	A	O	O	O	O	O	O	O	O	S	N	N					
10	E	1—Public garages, paint or petroleum products storage, dry cleaning..... 2—Planing mills, box factories, woodworking and mattress factories..... 3—Storage of hay and highly inflammable or explosive materials.....												S	S	A	S	S	S	S	S	O	S	S	S	O	O	S				
														N	O	S	N	N	S	N	N	A	A	O	D	N	S					
														N	S	S	S	S	S	O	A	A	S	S	S	S	S					
11	F	1—Wholesale and retail stores, office buildings, restaurants, undertaking parlors, printing plants, municipal police and fire stations..... 2—Factories and workshops using materials not highly inflammable or explosive..... 3—Storage and sales rooms for combustible goods.....															N	N	N	O	N	N	O	O	N	O	N	O				
																	N	N	O	N	N	O	O	O	O	N	O					
																	N	O	N	N	O	O	O	O	N	O	N					
12	G	1—Ice plants, power plants, pumping plants, cold storage, creameries..... 2—Factories and workshops using incombustible or non-explosive materials..... 3—Storage and sales rooms of incombustible or non-explosive goods.....																	N	N	O	S	S	O	N	N	N					
																			N	N	O	O	N	N	N	N						
																			N	O	N	N	N	N	N	N						
13	H	1—Hotels, apartment houses, dormitories, lodging houses..... 2—Convents, monasteries, old peoples' homes (accommodating 10 or more).....																							N	N	N					
																								N	N	N						
14	I	1—Dwellings.....																							N	O	N					
15	J	1—Private garages..... 2—Accessory buildings and structures such as tents, sheds, fences over 6 feet high, water tanks, towers..... 3—Stadiums, reviewing stands, amusement park structures.....																								N	N					
																										N	N					
																										N	N					

Legend: A—Absolute Separation. S—Special Separation. O—Ordinary Separation. N—No separation required.

Note: *Refer to Chapters 6 to 15 inclusive for more complete listing of occupancies and definitions.

†Provided that any two garages, two paint or petroleum products storage spaces, two dry cleaning plants, may occur in the same building without any separation being required.

‡Provided that an "Ordinary Separation" shall be permitted between public garages and dwellings.

§Provided that in Type I buildings, no separation shall be required.

¶Provided that three-fourths (¾) of an inch of metal lath and plaster on the garage side and a self-closing, tight-fitting one and three-eighths (1⅜) inch solid slab wood door shall be permitted where the private garage space will accommodate not more than four (4) automobiles.

CHAPTER 6 — REQUIREMENTS FOR GROUP A BUILDINGS

Sec. 601. Each Group A occupancy shall be considered as a separate building and the Group shall include:

**Group A
Occupancies
Defined**

Division 1: All major theatres having a permanent stage, with a depth of more than five (5) feet between the proscenium wall and the rear wall, upon which permanent and/or transient stage scenery and theatrical apparatus is or may be installed.

Division 2: All theatres and motion picture theatres having a stage as noted above and/or having a seating capacity of one thousand (1000) or more.

Division 3: All auditoriums, schools, churches, lodges, clubs, museums, dance halls, armories, libraries, gymnasiums, passenger stations administration buildings of the city, county or state and similar buildings having a total seating capacity of more than thirty-five hundred (3500) in any one room.

Sec. 602. (a) General. Buildings or parts of buildings classed in Group A because of use or occupancy shall be of Type I Construction and shall not be limited as to location in fire zone, seating capacity, height or floor area.

**Construction, Height
and Area
Allowable**

(b) Special Construction. The stage portion of the building shall be of Type I Construction except as specified in Section 609.

The stage shall be completely separated from the auditorium by a wall extending not less than four (4) feet above the roof over the stage and designated a proscenium wall, of four-hour fire-resistive construction as specified in Section 4302. Such wall 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 floor level, each of which shall be not more than twenty-five (25) square feet in area and shall be protected on each side thereof by a one-hour fire-resistive door as specified in Section 4304. The proscenium opening, which shall be the main opening for viewing performances, shall be provided with a self-closing curtain as specified in Chapter 41.

The dressing room section, workshops and storerooms shall not be located under or on the stage nor in the auditorium but shall be separated from each other and from the stage by a "Special Fire Separation" as specified in Section 503.

The slope of the main floor of the auditorium shall not exceed one (1) in eight (8).

Sec. 603. All Group A buildings shall front directly upon at least one public street not less than twenty (20) feet in width in which front shall be located the main entrance and exit of such building. The main floor of every Group A occupancy shall be located at or near the ground floor level.

**Location
on
Property**

All exterior walls or parts of walls, except on street fronts, of Group A buildings which are less than five (5) feet from adjacent property lines shall have no openings therein. All openings in exterior walls, except on street fronts, which are less than ten (10) feet from adjacent property lines shall be protected by doors or windows of one-hour fire-resistive con-

struction as specified in Section 4304. See Section 504 for regulating adjacent buildings on the same property.

Stairs and Exits

Sec. 604. (a) Main Entrance and Exits. In every Group A building there shall be not less than one (1) exit on each of three sides of the auditorium and one from each side of every balcony or gallery. Each of these exits shall be not less than three feet six (3'-6") inches in width and shall open directly upon a street or into an open exit court which shall be directly connected to a street as specified in paragraph (b) of this Section.

One such exit on a street front which shall serve as the main entrance shall be proportioned on the basis of two (2) feet of width for each one hundred (100) persons or major fraction thereof to and including one thousand (1000) persons, with an additional one (1) foot per hundred persons for each additional one hundred (100) persons or major fraction thereof to and including two thousand (2000) persons and an additional six (6) inches for each additional one hundred (100) persons or major fraction thereof, all based upon the total seating capacity of the building served by such entrance and/or exit, plus the number of persons allowed in the foyer and lounging rooms as provided in part (1) of this Section.

At the main entrance of each Group A building there shall be a foyer having an area of one (1) square foot to each seat in such building having access to such foyer. The foyer shall be at the same level as the back of the auditorium and all changes in elevation between the foyer and the public street adjacent thereto shall be by ramps with a slope of not more than one (1) in ten (10).

The foyer if not abutting directly upon a public street shall communicate thereto by a straight and unobstructed corridor or passageway equal in width to that required for the main entrance which shall be used only as an exit or entrance; provided, however, that not to exceed ten (10) per cent of such required width may be used for the placing of a ticket booth.

(b) Exit Courts. Along each side and the full length of the side of the auditorium not fronting directly upon a street (not including that side bounded by the stage) shall be an open court or space not less than ten (10) feet in width when the total seating capacity is one thousand (1000) or less, and such width shall be increased by one (1) foot for each additional five hundred (500) persons or major fraction thereof. These required widths may be reduced by fifty (50) per cent if there are no balconies or galleries or if all balcony and/or gallery exits lead directly to a street and are not connected with such exit court in any manner.

The courts shall extend full width to a street or shall be connected to the street by a passageway of the same required width, with a height of not less than seven (7) feet and such passageway shall not exceed a length of fifty (50) feet. The court or passageway shall meet the street level and all changes in elevation shall be by ramps with a slope of not more than one (1) in eight (8).

All doors opening into such courts or open spaces shall be arranged so as not to decrease the clear width of the court when open.

(c) Main Floor Auditorium Exits. Exits, located on each side of and not less than one-half the length of the auditorium from the foyer, shall be provided on the main floor of each Group A building. These exits shall be proportioned on the basis of not less than twenty-two (22) inches of combined width to each one hundred fifty (150) seats or major fraction thereof on the main floor of the auditorium, and this exit width shall be equally divided to each side of the auditorium. All such exits shall open directly upon a street or exit court or may be connected thereto by corridors having a width not less than the exit opening into same. There shall be no openings in such corridors other than the exit openings, and the exit doors shall be hung so as not to decrease the required width. Egress from the main floor of the auditorium to the street shall be by means of ramps having a slope of not more than one (1) in eight (8), except as specified in part (a) of this Section.

Where fixed seats are not provided the exits shall be proportioned on the seating capacity as defined in Section 401.

(d) Balcony and Gallery Exits. Exits shall be provided from each side of each balcony or gallery, leading to a street or exit court. These exits shall have a combined width of not less than twenty-two (22) inches for every seventy-five (75) seats or major fraction thereof in such balcony or gallery and such exits shall be equally divided to each side. No exit shall be less than three feet and six inches (3'-6") in width and shall be served by stairs or ramps completely enclosed and constructed as specified in Chapter 33. All such exits shall be located as far apart as is practicable and all combined exits shall continue the full combined width to the street. No stair exit shall be continued to or communicate with a basement.

Where fixed seats are not provided the exits shall be proportioned on the seating capacity as defined in Section 401.

A handrail shall be provided on each side of every stair four (4) feet or more in width, and on one side of each stairway less than four feet (4'-0") in width.

Stairs emptying into exit courts shall meet the court floor at not less than the stair width from the near side of any main floor exit opening into such exit court.

(e) Stage Exits. Not less than one exit two feet and six inches (2'-6") wide shall be provided from each side of the stage opening directly or by means of a passageway not less than three (3) feet in width to a street or exit court. An exit stair not less than two feet and six inches (2'-6") wide shall be provided for egress from each fly gallery. Each tier of dressing rooms shall be provided with at least two means of egress not less than two feet and six inches (2'-6") wide and all such stairs shall be constructed as specified in Chapter 33. The stairs required in this sub-section need not be enclosed.

(f) Aisles. Aisles on the main floor shall be located so that there are not more than six (6) seats between any seat and an aisle. Every aisle shall be not less than two feet and six inches (2'-6") wide if having seats on only one side and not less than three (3) feet wide if having seats on both sides. Such minimum width shall be measured at the end farthest from the foyer and shall be increased by two (2) inches for each ten (10)

feet in length toward the foyer for aisles having seats on one side only, and three (3) inches for each ten (10) feet in length toward the foyer for aisles having seats on both sides. There shall be no steps or obstructions of any kind in any aisles, and aisles may have a slope of not more than one (1) in eight (8).

Aisles in balconies or galleries shall be located so that there are not more than five (5) seats between any seat and an aisle. Aisles shall be not less than three feet and six inches (3'-6") in width. There shall be provided in all balconies or galleries having more than twenty (20) rows of seats a cross aisle not less than three (3) feet wide from the back of one chair to the edge of the seat when down in the next row. Such cross aisle shall lead directly to an entrance or to an emergency exit.

Risers shall be not more than seven and one-half (7½) inches and shall be the full width of the aisle and no tread shall be less than ten (10) inches. When the slope of the aisle is not more than one (1) in eight (8) it shall be ramped. All aisles shall be not less than three feet and six inches (3'-6") in clear width and shall lead directly to exits.

(g) Seats. Seats on the main floor shall be spaced not less than thirty-three (33) inches back to back and there shall be not more than six (6) seats between any seat and an aisle.

Seats in balconies or galleries shall be spaced not less than thirty (30) inches back to back and there shall be not more than five (5) seats between any seat and an aisle.

All seats in buildings of Divisions 1 and 2 of Group A and in buildings of Division 3 when used for assembly purposes on the main floor and in balconies and galleries shall be fastened securely to the floor and shall be not less than eighteen (18) inches in minimum width.

(h) Boxes. Boxes may be served by stairs not less than three (3) feet in width with a rise and tread as required for main stair exits. Boxes accommodating more than twenty-five (25) persons shall be considered as balconies. Seats in boxes need not be fastened to the floor.

(i) Doors and Gates. All exit and entrance doors or gates shall swing in the direction of exit travel and if provided with latches such latches shall be of self-releasing type, such as panic bolts or similar devices, which will permit the door to open when pressed against. All doors shall be installed so as not to decrease the required width of any opening, passageway or corridor in any manner whatsoever. No single door shall be more than three feet and six inches (3'-6") in width and every exit door on the exterior of such building shall be of not less than one-hour fire resistance as specified in Section 4304 except at the main entrance and exit. Doors opening from within the building into a stair or ramp enclosure may be metal-clad doors as specified in Section 4304.

(j) Exit Lights. All exits shall be marked with illuminated signs bearing the word "EXIT" in letters at least five (5) inches high. Each sign shall be provided with two (2) separate electric light globes each on separate circuits, one circuit being separate from any other circuit in the building. All exit signs shall be illuminated during any time the building is occupied.

(k) Smokeproof Tower. Where there is more than one balcony or gallery all balconies or galleries above the first shall be served by not less than one smokeproof tower located on each side of such balcony or gallery and constructed as specified in Chapter 33.

(l) General. Any exits which are combined shall be continued the full combined width to the street.

No persons or obstructions of any kind, either permanent or movable shall be placed in any aisle, exit, passageway or corridor and all dimensions given shall refer to the clear width. This shall be construed as prohibiting radiators, chairs, stools, stands, slot machines, easels and similar objects from being placed in any exit, aisle, passageway or corridor.

The number of persons allowed in the foyer and lounging rooms during a performance shall not exceed that number determined on the basis of one (1) person to each twelve and one-half ($12\frac{1}{2}$) square feet of floor area in such foyer and lounging rooms exclusive of the passageways from the aisles, ramps and/or stairs to the exits. Seating accommodations may be provided for such number of persons providing the seats or chairs are not placed in any required exit, aisle, passageway or corridor space.

No bars shall be placed upon any window or any other opening in any Group A building.

All doors shall have a clear height of not less than six feet and eight inches (6'-8").

Sec. 605. All portions of Group A buildings customarily used by human beings and all dressing rooms shall be provided with light and ventilation by means of windows and/or skylights with an area not less than one-eighth ($1/8$) of the total floor area, or shall be provided with artificial light and a mechanically operated ventilating system. The mechanically operated ventilating system shall supply at least thirty (30) cubic feet of pure air per minute for each occupant thereof in all portions of the building and such system shall be kept continuously in operation during such time as the building is occupied. If the velocity of the air at the register exceeds ten (10) feet per second the register must be placed more than eight (8) feet above the floor directly beneath.

**Light and
Ventilation**

Lights in all parts of the building customarily used by human beings shall be on a separate circuit from that of the stage and shall be controlled from the box office. Lights in corridors, exit courts and exit passageways shall be protected by a wire cage.

All registers or vents supplying air back stage shall be equipped with automatic closing devices with fusible links.

Sec. 606. Main stair or ramp exits from the first or lower balcony or gallery need not be enclosed but all other stair exits shall be enclosed as specified in Chapter 30. There shall be no openings into stair or ramp enclosures except necessary entrance and exit doors. All emergency stair or ramp enclosures shall lead directly to a public street or alley or exit court.

**Enclosure
of
Vertical
Openings**

All elevator shafts, vent shafts and other vertical openings shall be enclosed as specified under Types of Construction.

Openings through stage floors shall be equipped with tight fitting trap doors of wood not less than two (2) inches thick.

Fire Extinguishing Apparatus

Sec. 607. Stages, basements, property rooms, dressing rooms and all portions of the stage and rooms under the stage and back of the proscenium wall shall be equipped with automatic sprinklers as specified in Chapter 38.

A one and one-half (1½) inch outlet shall be provided on each side of the stage, on each side of the rear of the auditorium, and on each side of the rear of balconies. These outlets shall connect to a two (2) inch wet standpipe which may or may not branch from a four (4) inch wet standpipe. A dry standpipe shall be located at or near a stage exit door and in each smokeproof tower, each equipped with a Siamese inlet located on the main street front of the building. Such standpipes shall be constructed and equipped as specified in Chapter 38.

In the roof of every stage there shall be an automatic ventilator having a free ventilating area of not less than one-tenth (1/10) the area of the stage, constructed as specified in Section 3901.

Special Hazards

Sec. 608. Where any of the special hazards mentioned below are present the detailed regulations applying to such hazards as specified in the chapters indicated shall be complied with:

Moving picture booths, Chapter 40.

Chimney and heating apparatus, Chapter 37.

No inflammable liquids shall be placed, stored or used in a Group A building; except, that in paint-shops and work-shops inflammable liquids of Class III, as defined in Section 1008, may be used and stored in quantities of not to exceed a total of one hundred (100) gallons, and that liquids of Class I and II may be used and stored in quantities not to exceed a total of one (1) gallon provided that all such liquids not in actual use shall be kept in tight or sealed containers.

Any gas service to the stage portion of the building shall be separate from any other service to the building and each gas service shall be provided with a shut-off valve at a convenient and conspicuous place outside the building and adequately marked.

Every boiler room or room containing a heating plant shall be separated from the rest of the building with an "Absolute Fire Separation" as specified in Section 503.

Exceptions and Deviations

Sec. 609. Gridirons, fly-galleries and pin-rails shall be constructed of incombustible materials and fireproofing of steel and iron may be omitted. Gridirons and fly-galleries shall be designed to support not less than seventy-five (75) pounds per square foot.

All parts of the stage which are not movable shall be of incombustible construction except that part of the stage extending back from and the full width of the proscenium opening which if not of fire-resistive construction shall be constructed of steel or heavy timbers covered with a wood floor not less than one and five-eighths (1⅝) inches thick. No part of the combustible construction shall be carried through the proscenium

Secs. 609-610

wall. All parts of the stage floor shall be designed to support not less than one hundred (100) pounds per square foot.

A protecting hood shall be provided over and the full length of the stage switchboard.

Gymnasiums and similar buildings may have running tracks constructed of wood or unprotected steel or iron.

Note: Existing buildings not complying with the requirements of this chapter may be classed as Group A buildings and so used if the requirements of Sections 602, 604, 607, 608 and 609 are fully complied with and not less than a "Special Fire Separation" as specified in Section 503 is provided as a separation between the Group A occupancy and all other adjacent occupancies.

Sec. 610. Separation of Group A occupancies from all other occupancies shall be provided as specified in Section 503.

Mixed
Occupancies

CHAPTER 7 — REQUIREMENTS FOR GROUP B BUILDINGS

Group B Occupancies Defined

Sec. 701. Each Group B occupancy shall be considered as a separate building and the Group shall include:

Division 1: All theatres and motion picture theatres having a seating capacity of less than one thousand (1000), and/or having no stage or having a permanent stage with a depth of five (5) feet or less between the proscenium wall and the rear wall.

Division 2: Auditoriums, schools, churches, lodges, clubs, museums, dance halls, armories, gymnasiums, libraries, passenger stations, administration buildings of city, county or state, and similar buildings having a total seating capacity in any one room of five hundred (500) or more but less than thirty-five hundred (3500).

Construction, Height and Area Allowable

Sec. 702. (a) General. Buildings or parts of buildings classed in Group B because of use or the character of the occupancy shall conform to the following specific requirements:

Type of Construction Permissible	Height Limit (Ft.)	Maximum Total Seating Capacity in Any One Room	Floor Area Permissible (Sq. Ft.)
Type I	No limit	3500	No limit
Type II	75	1000*	No limit
Type III	55	750*	15,000

* Seating capacity may be increased, except for Division 1 Group B occupancies, not to exceed fifty (50) per cent when no balconies or galleries are constructed as a part of such building and when the auditorium floor is located at or near ground floor level, in which case all exits shall be at street level or shall meet street level by means of ramps.

(b) Special Construction. When a stage is provided for the use of permanent and/or transient stage scenery or theatrical apparatus it shall be completely separated from the auditorium by a wall designated the proscenium wall, of not less than four-hour fire-resistive construction as provided in Section 4302. All openings, except the proscenium opening, in such wall shall be not more than twenty-five (25) square feet in area and shall be protected by metal-clad doors constructed as specified in Section 4304. The proscenium opening, which shall be the main opening for viewing performances, shall be provided with a self-closing curtain installed and arranged to operate as specified in Chapter 41.

Location on Property

Sec. 703. All Group B buildings shall front directly upon at least one public street not less than twenty (20) feet in width, in which front shall be located the main entrance and exit of such building, or such building may be connected to the street by an entrance passageway as specified in Section 704. The main floor of each Group B occupancy shall be located at or near the ground floor level, provided that occupancies in Division 2 of Group B buildings having a total seating capacity of not more than fifteen hundred (1500) may be located above the

ground floor or in the first basement, and stairs may be used as a means of ingress and egress.

All exterior walls or parts of walls, except on street fronts, of Group B buildings which are less than five (5) feet from adjacent property lines shall have no openings therein. All openings in exterior walls, except on street fronts, which are less than ten (10) feet from adjacent property lines shall be protected by doors or windows of one-hour fire-resistive construction as specified in Section 4304. See Section 504 for regulating adjacent buildings on the same property.

Sec. 704. (a) Main Entrance and Exits. In every Group B building there shall be not less than three exits each not less than three feet six (3'-6") inches in width leading directly to streets, to alleys or to courts or other open spaces on the same property which lead directly to streets or alleys, and two such exits shall be located at or near the end of the auditorium opposite from the main entrance. One such exit shall open directly upon or be connected by means of a straight passageway to a street not less than twenty (20) feet in width and such main entrance and passageway shall be proportioned on the basis of two (2) feet of width for each one hundred (100) persons or major fraction thereof to and including one thousand (1000) persons, with an additional one (1) foot for each additional one hundred (100) persons or major fraction thereof to and including two thousand (2000) persons and an additional six (6) inches for each additional one hundred (100) persons or major fraction thereof, all based upon the total seating capacity of the building served by such entrance and/or exit plus the number of persons allowed in the foyer and lounging rooms as provided in part (k) of this Section.

Stairs
and
Exits

Each balcony and gallery shall have not less than one exit not less than three feet and six inches (3' 6") wide on each side thereof.

All changes in elevation along any exits, aisles, or passageways of all Division 1 Group B buildings shall be by ramps with a slope of not more than one (1) in eight (8), except that the main entrance shall be sloped not more than one (1) in ten (10).

(b) Main Floor Auditorium Exits. Exits located at the end of the auditorium opposite from the main entrance shall be proportioned on the basis of twenty-two (22) inches of combined width to each one hundred fifty (150) seats or major fraction thereof on the main floor of the auditorium and this exit width shall be equally divided to each side of the auditorium. When more than two five (5) foot exits are required the remaining required exits shall be placed on the sides of the auditorium but not less than one-half ($\frac{1}{2}$) the length of the auditorium from the main entrance.

If an exit court is provided, the width shall be the same as for Group A buildings. (See Section 604, paragraph (b).)

When fixed seats are not provided the exits shall be proportioned on the seating capacity as defined in Section 401.

(c) Balcony and Gallery Exits. Exits shall be provided from each side of each balcony or gallery leading to a street or alley, or to a court or open space on the same property lead-

ing directly to a street or alley. These balcony exits shall have a combined width of not less than twenty-two (22) inches to every seventy-five (75) seats or major fraction thereof in such balcony or gallery and such exits shall be equally divided to each side.

All stairs serving as exits from Group B buildings shall be constructed as specified in Chapter 33, except as specified in part (k) of this Section.

(d) Stage Exits. Each stage shall have not less than one exit two feet and six (2' 6") inches wide opening directly or by means of a passageway not less than three (3) feet in width to a street or alley. Each dressing room shall be provided with at least two means of egress not less than two feet and six inches (2' 6") wide. Stairs required in this Sub-section (d) shall have a rise and tread as specified in Chapter 33 but such stairs need not be enclosed.

(e) Aisles. Aisles on the main floor shall be located so that there are not more than six (6) seats between any seat and an aisle. Every aisle shall be not less than two feet and six inches (2' 6") wide if having seats on only one side and not less than three (3) feet wide if having seats on both sides. Such minimum width shall be measured at the end farthest from the foyer and shall be increased by two (2) inches for each ten (10) feet in length toward the foyer for aisles having seats on one side only, and three (3) inches for each ten (10) feet in length toward the foyer for aisles having seats on both sides. There shall be no steps or obstructions of any kind in any aisles, and aisles may have a slope of not more than one (1) in eight (8).

Aisles in balconies or galleries shall be located so that there are not more than five (5) seats between any seat and an aisle. Aisles shall be not less than three feet and six inches (3' 6") in width. There shall be provided in all balconies or galleries having more than twenty (20) rows of seats a cross aisle not less than three (3) feet wide from the back of one chair to the edge of the seat when down in the next row. Such cross aisle shall lead directly to an entrance or to an emergency exit.

Risers shall be not more than seven and one-half (7½) inches and shall be the full width of the aisle and no tread shall be less than ten (10) inches. When the slope of the aisle is not more than one (1) in eight (8) it shall be rammed. All aisles shall be not less than three feet and six inches (3' 6") in clear width and shall lead directly to exits.

(f) Seats. Seats on the main floor shall be spaced not less than thirty-three (33) inches back to back and there shall be not more than six (6) seats between any seat and an aisle.

Seats in balconies or galleries shall be spaced not less than thirty (30) inches back to back and there shall be not more than five (5) seats between any seat and an aisle.

In all buildings of Division 1 of Group B and in buildings of Division 2 used for public assemblage all seats on the main floor and in balconies and galleries shall be fastened securely to the floor and shall be not less than eighteen (18) inches in minimum width.

(g) Boxes. Boxes may be served by stairs not less than three (3) feet in width with a rise and tread as required for main stair exits. Boxes accommodating more than twenty-five (25) persons shall be considered as balconies. Seats in boxes need not be fastened to the floor.

(h) Doors and Gates. All exit and entrance doors or gates shall swing in the direction of exit travel and if provided with latches such latches shall be of a self-releasing type, such as panic bolts or similar devices, which will permit the door to open when pressed against. All doors shall be installed so as not to decrease the required width of any opening, passageway or corridor in any manner whatsoever. No single door shall be more than three feet and six inches (3'-6") in width and every exit door on the exterior of such building shall be of not less than one-hour fire resistance as specified in Section 4304, except at the main entrance and exit. Doors opening from within the building into a stair or ramp enclosure shall be constructed as specified in Section 4304.

(i) Exit Lights. All exits shall be marked with illuminated signs bearing the word "EXIT" in letters at least five (5) inches high. Each sign shall be provided with two (2) separate electric light globes each on separate circuits, one circuit being separate from any other circuit in the building. All exit signs shall be illuminated during any time that the building is occupied.

(j) Smokeproof Tower. Where there is more than one balcony or gallery all balconies or galleries above the first shall be served by not less than one (1) smokeproof tower located on each side of such balcony or gallery and constructed as specified in Chapter 33. Not less than one smokeproof tower constructed as specified in Chapter 33 shall be installed to serve as direct exit from each Group B occupancy placed above the third floor of any building, and one additional such exit shall be installed for each additional twenty thousand (20,000) square feet or major fraction thereof in excess of fifteen thousand (15,000) square feet. Such exits shall be placed as far apart as possible.

(k) General. Any exits which are combined shall be continued the full combined width to the street or alley.

No persons or obstructions of any kind, either permanent or movable, shall be placed in any aisle, exit, passageway or corridor and all dimensions given shall refer to the clear width. This shall be construed as prohibiting radiators, chairs, stools, stands, slot machines, easels and similar objects from being placed in any exit, aisle, passageway or corridor.

The number of persons allowed in the foyer and lounging rooms during a performance shall not exceed that number determined on the basis of one (1) person to each twelve and one-half (12½) square feet of floor area in such foyer and lounging rooms exclusive of the passageways from the aisles, ramps and/or stairs to the exits. Seating accommodations may be provided for such number of persons providing the seats or chairs are not placed in any required exit, aisle, passageway or corridor space.

No bars shall be placed upon any window or any other opening in any Group B building.

All stairs and ramps serving as entrances or exits for any

Group B occupancy shall be designed and constructed as specified in Chapter 33; provided, that when such Group B occupancy is located on the second floor of a two-story building or when leading to and serving such occupancy only, such stairs or ramps need not be enclosed when stairs lead directly to the outer air or are connected thereto by direct passages with unpierced walls and ceilings. All emergency stairs and ramps shall lead directly to a public street or alley or to a court or space not less than five (5) feet in clear width connected directly to a street or alley.

Light and Ventilation

Sec. 705. All portions of Group B buildings customarily used by human beings, and all dressing rooms shall be provided with light and ventilation, either natural or artificial, as specified in Section 605.

Enclosure of Vertical Openings

Sec. 706. All vertical openings such as elevator shafts, stairs, ramps and vent shafts shall be enclosed as specified in Chapter 30, provided, however, that stair or ramp exits serving only a Group B occupancy on the second floor of a building need not be enclosed. There shall be no openings into stair or ramp enclosures except necessary entrance and exit doors.

Fire Extinguishing Apparatus

Sec. 707. Automatic sprinklers, standpipes and basement pipe inlets shall be installed as and when specified in Chapter 38.

Special Hazards

Sec. 708. Chimneys and heating apparatus shall conform to the requirements of Chapter 37.

Motion picture machine booths shall conform to the requirements of Chapter 40.

No inflammable liquids shall be placed, stored or used in a Group B building.

Any gas service to a Group B building shall be provided with an outside shut-off conspicuously marked.

Every boiler room or room containing a heating plant shall be separated from the rest of the building with an "Absolute Fire Separation" as specified in Section 503.

Exceptions and Deviations

Sec. 709. Gymnasiums and similar buildings may have running tracks constructed of wood or unprotected steel or iron.

All partitions and floors in Group B buildings and all bearing partitions and floors below a Group B occupancy when such occupancy is placed or is to be placed above the first floor of a building or structure shall be of not less than one-hour fire-resistive construction as specified in Chapter 43.

Type IV and V Construction shall not be permitted for use of Group B occupancies.

Mixed Occupancies

Sec. 710. Separation of Group B occupancies from any other occupancies shall be provided as specified in Section 503.

CHAPTER 8

REQUIREMENTS FOR GROUP C BUILDINGS

Sec. 801. Each Group C occupancy shall be considered as a separate building and the Group shall include all buildings of the following occupancies having a total seating capacity in any one room of less than five hundred (500): auditoriums, schools, churches, lodges, clubs, museums, dance halls, armories, gymnasiums, libraries, passenger stations, and administration buildings of city, county or state.

Group C Occupancies Defined

Sec. 802. (a) General. Buildings or parts of buildings classed in Group C because of use or the character of the occupancy shall be of Types I, II, III, IV or V Construction and the maximum height and floor areas shall not exceed those specified in the following table.

Construction Height and Area Allowable

Maximum Allowable Floor Areas as Determined by Height of Building, Street Frontage and Type of Construction

Types of Construction	Maximum Height for Corresponding Areas		Maximum Floor Areas (Sq. Ft.)			
			Building Fronting on			Increase for Complete Sprinkling*
	Feet	Stories	1 street	2 streets	3 or more streets	
Type I	NO RESTRICTIONS					
Type II	75 ft.	7 stories	12,000	15,000	18,000	100 %
	55 ft.	5 stories	15,000	18,000	20,000	
	65 ft.	1 story	20,000	25,000	30,000	
Type III	55 ft.	5 stories	12,000	15,000	18,000	100 %
	20 ft.	1 story	18,000	22,000	26,000	
Type IV	45 ft.	1 story	15,000	18,000	21,000	100 %
Type V	35 ft.	2 stories	6,000	7,000	8,000	100 %
	20 ft.	1 story	8,500	9,500	10,500	

Note:—*Increase shall not be permitted unless the area is entirely protected by an automatic sprinkler installation as specified in Chapter 38.

(b) **Special Construction.** All public or private school buildings two stories in height shall be of Type III Construction or better and shall have all stairs and corridors of not less than one-hour fire-resistive construction as specified in Chapter 43. All school buildings more than two stories in height shall be of Type I Construction.

Secs. 803-809**Location
on
Property**

Sec. 803. All Group C buildings shall front directly upon at least one public street not less than twenty (20) feet in width, in which front shall be located the main entrance and exit of such building, or such building may be connected to such street by an entrance passageway as specified in Section 804.

All exterior walls or parts of walls, except on street fronts, of Group C buildings which are less than three (3) feet from adjacent property lines shall have no openings therein and shall be of masonry or reinforced concrete. All openings in exterior walls, except on street fronts, which are less than five (5) feet from adjacent property lines shall be protected by doors or windows of one-hour fire-resistive construction as specified in Section 4304. See Section 504 for regulating adjacent buildings on the same property.

**Stairs
and
Exits**

Sec. 804. Requirements for stairs and exits shall be the same as for Group B buildings as specified in Section 704.

**Light and
Ventilation**

Sec. 805. All portions of Group C buildings customarily used by human beings shall be provided with light and ventilation, either natural or artificial, as specified in Section 605.

**Enclosure
of
Vertical
Openings**

Sec. 806. All vertical openings such as elevator shafts, stair wells and vent shafts which permit the passage of fire or smoke through more than two stories shall be enclosed as specified in Chapter 30.

**Fire Extinguishing
Apparatus**

Sec. 807. Automatic sprinklers, standpipes and basement pipe inlets shall be installed as and when specified in Chapter 38.

**Special
Hazards**

Sec. 808. Chimneys and heating apparatus shall conform to the requirements of Chapter 37.

Motion picture machine booths shall conform to the requirements of Chapter 40.

Every boiler room or room containing heating apparatus shall be separated from the rest of the building with an "Absolute Fire Separation" as specified in Section 503.

No inflammable liquids shall be placed, stored or used in any Group C buildings except in small quantities as necessary in laboratories, and such liquids shall be kept in tight or sealed containers when not in actual use.

**Exceptions
and
Deviations**

Sec. 809. Gymnasiums and similar buildings may have running tracks constructed of wood or unprotected steel or iron.

All partitions and floors of Group C buildings when more than one story in height and all bearing partitions and floors

Secs. 809-810

below a Group C occupancy when such occupancy is placed or is to be placed above the first floor of a building or structure shall be of not less than one-hour fire-resistive construction as specified in Chapter 43.

Three-story buildings of Type V Construction shall not be permitted for use of Group C occupancies.

Sec. 810. Separation of Group C occupancies from any **Mixed** other occupancies shall be provided as specified in Section 503. **Occupancies**

CHAPTER 9 — REQUIREMENTS FOR

GROUP D BUILDINGS

Group D
Occupancies
Defined

Sec. 901. Each Group D occupancy shall be considered as a separate building and the Group shall include:

Division 1: Jails, prisons, reformatories, houses of correction, asylums for the insane or feeble-minded, and similar buildings.

Division 2: Hospitals, sanitariums, orphanages, nurseries and similar buildings (accommodating more than six.)

Construction
Height and
Area
Allowable

Sec. 902. (a) Buildings or parts of buildings classified in Group D because of use or the character of the occupancy shall be of Type I, II, III, IV or V Construction, and the maximum height and floor areas shall not exceed those specified in the following table.

Maximum Allowable Floor Areas as Determined by Height of Building, Street Frontage and Type of Construction

Types of Construction	Maximum Height for Corresponding Areas		Maximum Floor Areas (Sq. Ft.)			
	Feet	Stories	Building Fronting on			Increase for Complete Sprinkling*
			1 street	2 streets	3 or more streets	
Type I	NO RESTRICTIONS					
Type II	55 ft.	5 stories	15,000	18,000	20,000	100 %
	65 ft.	1 story	20,000	25,000	30,000	
Type III	35 ft.	3 stories	10,000	12,500	15,000	100 %
	20 ft.	1 story	15,000	20,000	25,000	
Type IV	35 ft.	1 story	15,000	20,000	25,000	100 %
Type V	20 ft.	1 story	5,000	6,000	7,000	100 %

Note:— *Increase shall not be permitted unless the area is entirely protected by an automatic sprinkler installation as specified in Chapter 38.

(b) Special Construction. All Division 1 buildings of Group D shall be of Type I construction throughout; and all Division 2 buildings more than one story in height shall have all floors and partitions of not less than one-hour fire-resistive construction as specified in Chapter 43.

Sec. 903. All exterior walls or parts of walls, except on street fronts, of Group D buildings which are less than five (5) feet from adjacent property lines shall have no openings therein and shall be of masonry or reinforced concrete. All openings in exterior walls, except on street fronts, which are less than ten (10) feet from adjacent property lines shall be protected by doors or windows of one-hour fire-resistive construction as specified in Section 4304. See Section 504 for regulating adjacent buildings on the same property.

**Location
on
Property**

Sec. 904. Not less than two exits shall be provided from each floor in every group D building regardless of the height or area of the building, and additional exits shall be provided as specified in Chapter 33.

**Stairs
and
Exits**

In hospitals or sanitariums, ramps with a slope of not more than one (1) in ten (10) shall be installed instead of stairways or in addition thereto to serve all portions of the building where bed-ridden patients are or may be placed. These ramps shall land at the first or ground floor level at points giving the most direct access practicable to the outer air.

Except in places of detention, exit doors shall not be fastened against exit by any device except self-releasing latches, panic bolts or similar devices which can readily be opened from the inside at all times without the use of keys or any special knowledge or effort.

Smokeproof towers shall be provided as specified in Chapter 33.

Sec. 905. All portions of Group D buildings customarily used by human beings shall be provided with light and ventilation by means of windows and/or skylights with an area equal to one-eighth ($\frac{1}{8}$) of the total floor area, or shall be provided with artificial light and a mechanically operated ventilating system. The mechanically driven ventilating system shall supply at least thirty (30) cubic feet of pure air per minute for each occupant thereof in all portions of the building and such system shall be kept continuously in operation during such time as the building is occupied.

**Light and
Ventilation**

Sec. 906. All elevator shafts, vent shafts and other vertical openings shall be enclosed as specified under Types of Construction.

**Enclosure
of Vertical
Openings**

Sec. 907. Automatic sprinklers, standpipes and basement pipe inlets shall be installed as and when specified in Chapter 38.

**Fire Extinguishing
Apparatus**

Sec. 908. Chimneys and heating apparatus shall conform to the requirements of Chapter 37.

**Special
Hazards**

Motion picture machine booths shall conform to the requirements of Chapter 40.

No storage of volatile inflammable liquids shall be allowed in Group D buildings and the handling of such liquids shall not be permitted in any Group D buildings in quantities of more than one gallon unless such handling complies with the suggested ordinance Regulating the Use, Handling, Storage and

INTERNATIONAL CODE COUNCIL®

Secs. 908-910

Sale of Flammable Liquids and the Products Thereof, adopted by the National Fire Protection Association, May, 1926.

Any gas service to a Group D building shall be provided with an outside shut-off conspicuously marked.

Every boiler room or room containing heating apparatus shall be separated from the rest of the building with an "Absolute Fire Separation" as specified in Section 503.

**Exceptions
and
Deviations**

Sec. 909. No requirements of this Chapter shall be so construed as to prohibit the construction of cell blocks in jails or prevent the use of any locks or safety devices in buildings where it is necessary to forcibly restrain the inmates.

Two or three story buildings of Type V Construction shall not be permitted for use of Group D occupancies.

**Mixed
Occupancies**

Sec. 910. Separation of Group D occupancies from any other occupancies shall be provided as specified in Section 503.

CHAPTER 10 — REQUIREMENTS FOR**GROUP E BUILDINGS**

Sec. 1001. Each Group E occupancy shall be considered as a separate building and the Group shall include all industrial or commercial buildings in which the nature of the occupancy creates a serious fire or life hazard, such as:

**Group E
Occupancies
Defined**

Division 1: Public garages, paint or petroleum storage, dry cleaning plants, gasoline service stations, paint shops.

Division 2: Planing mills, box factories, woodworking and mattress factories.

Division 3: Storage of hazardous and highly inflammable or explosive materials and/or liquids.

Note:—Inflammable liquids shall be deemed to be those with a flash point below 190 degrees Fahrenheit as determined by the closed cup tester.

Sec. 1002. (a) General. Buildings or parts of buildings classed in Group E because of use or the character of the occupancy shall be of Type I, II, III, IV or V Construction and the maximum height and floor areas shall not exceed those specified in the following table.

**Construction,
Height
and Area
Allowable**

**Maximum Allowable Floor Areas as Determined by Height
of Building, Street Frontage and Type of Construction**

Types of Construction	Maximum Height for Corresponding Areas		Maximum Floor Areas (Sq. Ft.)			
			Building Fronting on			Increase for Complete Sprinkling*
	Feet	Stories	1 street	2 streets	3 or more streets	
Type I	NO RESTRICTIONS					
Type II	75 ft.	7 stories	8,000	10,000	12,000	100 %
	55 ft.	5 stories	10,000	12,000	15,000	
	65 ft.	1 story	18,000	22,000	26,000	
Type III	55 ft.	5 stories	8,000	10,000	12,000	100 %
	20 ft.	1 story	12,000	15,000	18,000	
Type IV	45 ft.	1 story	10,000	12,000	15,000	100 %
Type V	30 ft.	1 story	8,000	9,000	10,000	100 %

Note:—*Increase shall not be permitted unless the area is entirely protected by an automatic sprinkler installation as specified in Chapter 38.

Secs. 1003-1005

**Location
on
Property**

Sec. 1003. All exterior walls or parts of walls, except on street fronts, of Group E buildings which are less than five (5) feet from adjacent property lines shall have no openings therein and shall be of masonry or reinforced concrete. All openings in exterior walls, except on street fronts, which are less than ten (10) feet from adjacent property lines shall be protected by doors or windows of one-hour fire-resistive construction as specified in Section 4304. See Section 504 for regulating adjacent buildings on the same property.

**Stairs and
Exits**

Sec. 1004. All Group E buildings shall have not less than two means of egress from each story including basements or cellars unless such basements or cellars are used for heating apparatus only, in which latter case only one exit shall be required.

All stairs and exits shall comply with the requirements specified in Chapter 33.

Smokeproof towers shall be installed as and when specified in Chapter 33.

Where ramps are used for the transfer of automobiles from one floor to another such ramps shall meet the ground floor level at a point not less than twenty (20) feet from the exit from such building.

**Light, Venti-
lation and
Sanitation**

Sec. 1005. All portions of Group E buildings customarily used by human beings shall be provided with light and ventilation by means of windows and/or skylights with an area equal to one-eighth ($\frac{1}{8}$) of the total floor area or shall be provided with artificial light and mechanically operated ventilating system. The mechanically driven ventilating system shall supply at least thirty (30) cubic feet of pure air per minute for each occupant thereof in all portions of the building and such system shall be kept continuously in operation during such time as the building is occupied.

In all buildings used for the storing or handling of automobiles operated under their own power and in all buildings where inflammable liquids are used exhaust ventilation shall be provided sufficient to produce one complete change of air every fifteen minutes. Such exhaust ventilation shall be taken from a point at or near the floor level.

All buildings where more than four persons are employed shall be provided with at least one toilet. All buildings and each subdivision thereof where both sexes are employed shall be provided with access to at least two toilets either located in such building or conveniently located in a building adjacent thereto.

Sec. 1006. All elevator shafts, vent shafts and other vertical openings shall be enclosed as specified under Types of Construction.

**Enclosure
of
Vertical
Openings**

Doors which are part of an automobile ramp enclosure may be kept normally open but shall be equipped with fusible links and so arranged as to be self-closing when released.

Sec. 1007. Automatic sprinklers, standpipes and basement pipe inlets shall be installed as and when specified in Chapter 38.

**Fire Extinguishing
Apparatus**

Sec. 1008. Chimneys and heating apparatus shall conform to the requirements of Chapter 37, except that no open flame nor any heater with an enclosed flame shall be installed or maintained in any garage, dry cleaning establishment or place of storage of volatile or inflammable liquids.

**Special
Hazards**

In dry cleaning establishments the walls of the cleaning rooms or room in which volatile inflammable liquids are used shall have vent holes at the floor line not less than sixteen (16) square inches in area placed not more than sixteen (16) feet apart at or near the floor line, properly protected by iron bars or screens; or such room may be equipped with exhaust ventilation sufficient to cause a complete change of air four times an hour with exhaust duct openings located at or near the floor line.

The use, handling, storage and sale of gasoline, fuel oil and other inflammable liquids shall not be permitted in any Group E building unless such use, handling, storage and sale complies with the suggested ordinance Regulating the Use, Handling Storage and Sale of Flammable Liquids and the Products Thereof, adopted by the National Fire Protection Association, May, 1926.

All doors leading into rooms in which volatile inflammable liquids are used shall be of not less than one-hour fire-resistive construction as specified in Section 4304 and kept normally closed but shall be equipped with fusible links and so arranged as to be self-closing when released.

Each machine in dry cleaning establishments which uses a volatile inflammable liquid shall have an adequate steam line directly connected to it, so arranged as to have the steam automatically released to the inside of such machine should an explosion occur in the machine.

Sec. 1009. Public garages, dry cleaning establishments using inflammable liquids and all buildings in which inflammable liquids are used, sold or stored shall not be of Type V Construction, shall not be of Type III construction when more than two (2) stories in height, and shall be not over six hundred (600) square feet in area or twenty-five (25) feet in height when of Type IV construction.

**Exceptions
and
Deviations**

All public garage floors shall be of incombustible materials and if not placed directly on the ground shall conform to the requirements for floors of Type I Construction, or the floors may be of Type II Construction properly protected with incombustible materials against saturation by oil and grease.

Gasoline filling stations shall not be of Type V Construction.

Secs. 1009-1010

Division 3 buildings of Group E more than five (5) stories in height shall have all floors of not less than three-hour fire-resistive construction as specified in Section 4303.

Mixed Occupancies **Sec. 1010.** Separation of Group E occupancies from all other occupancies shall be provided as specified in Section 503.

CHAPTER 11 — REQUIREMENTS FOR GROUP F BUILDINGS

Sec. 1101. Each Group F occupancy shall be considered as a separate building and the Group shall include all moderately hazardous industrial and commercial occupancies, such as:

**Group F
Occupancies
Defined**

Division 1: Wholesale and retail stores, office buildings, restaurants, undertaking parlors, printing plants, municipal police and fire stations.

Division 2: Factories and workshops using materials not highly inflammable or combustible.

Division 3: Storage and sales rooms for combustible goods.

Sec. 1102. Buildings or parts of buildings classed in Group F because of use or the character of the occupancy shall be of Types I, II, III, IV or V Construction and the maximum height and floor areas shall not exceed those specified in the following table.

**Construction
Height
and Area
Allowable**

Maximum Allowable Floor Areas as Determined by Height of Building, Street Frontage and Type of Construction

Types of Construction	Maximum Height for Corresponding Areas		Maximum Floor Areas (Sq. Ft.)			Increase for Complete Sprinkling *
			Building Fronting on			
	Feet	Stories	1 street	2 streets	3 or more streets	
Type I	NO RESTRICTIONS					
Type II	75 ft.	7 stories	12,000	15,000	18,000	100 %
	55 ft.	5 stories	15,000	18,000	20,000	
	65 ft.	1 story	20,000	25,000	30,000	
Type III	55 ft.	5 stories	12,000	15,000	18,000	100 %
	20 ft.	1 story	18,000	22,500	25,000	
Type IV	45 ft.	1 story	20,000	25,000	30,000	100 %
Type V	35 ft.	3 stories	5,000	6,000	7,000	100 %
	20 ft.	1 story	10,000	12,000	14,000	

Note:—*Increase shall not be permitted unless the area is entirely protected by an automatic sprinkler installation as specified in Chapter 38.

Sec. 1103. All exterior walls or parts of walls, except on street fronts, of Group F buildings which are less than four (4) feet from adjacent property lines shall have no openings therein and shall be of masonry or reinforced concrete. All openings in

**Location on
Property**

Secs. 1103-1110

exterior walls, except on street fronts, which are less than eight (8) feet from adjacent property lines shall be protected by doors or windows of one-hour fire-resistive construction as specified in Section 4304. See Section 504 for regulating adjacent buildings on the same property.

Stairs and Exits

Sec. 1104. Stairs and exits shall be provided as specified in Chapter 33.

Smokeproof towers shall be provided as and when specified in Chapter 33.

Light, Ventilation and Sanitation

Sec. 1105. All portions of Group F buildings customarily used by human beings shall be provided with light and ventilation by means of windows and/or skylights with an area not less than one-eighth ($1/8$) of the total floor area or shall be provided with artificial light and a mechanically operated ventilating system. In no case shall less than four changes of air per hour be provided.

Every building or portion thereof where more than four persons are employed shall be provided with at least one toilet. Every building and each subdivision thereof where both sexes are employed shall be provided with access to at least two toilets either located in such building or conveniently located in a building adjacent thereto.

Enclosure of Vertical Openings

Sec. 1106. All elevator shafts, vent shafts and other vertical openings shall be enclosed as specified under Types of Construction.

Fire Extinguishing Apparatus
Special Hazards

Sec. 1107. Automatic sprinklers, standpipes and basement pipe inlets shall be installed as and when specified in Chapter 38.

Sec. 1108. Chimneys and heating apparatus shall conform to the requirements of Chapter 37.

No storage of volatile inflammable liquids shall be allowed in Group F buildings and the handling and use of gasoline, fuel oil and other inflammable liquids shall not be permitted in any Group F building unless such use and handling complies with the suggested ordinance Regulating the Use, Handling, Storage and Sale of Flammable Liquids and the Products Thereof, adopted by the National Fire Protection Association, May, 1926.

Exceptions and Deviations

Sec. 1109. Roof covering on Type V buildings may be of galvanized iron or sheet metal laid directly on the wood roof framing without solid sheathing.

Division 3 buildings of Group F more than six (6) stories in height shall have all floors of not less than three-hour fire-resistive construction as specified in Section 4303.

Mixed Occupancies

Sec. 1110. Separation of Group F occupancies from all other occupancies shall be provided as specified in Section 503.

CHAPTER 12

REQUIREMENTS FOR GROUP G BUILDINGS

Sec. 1201. Each Group G occupancy shall be considered as a separate building and the Group shall include non-hazardous industrial and commercial occupancies which create a low fire and life hazard, such as:

Group G Occupancies Defined

Division 1: Ice plants, power plants, pumping plants, cold storage, creameries.

Division 2: Factories and workshops using incombustible and/or non-explosive materials.

Division 3: Storage and sales rooms of incombustible and/or non-explosive materials.

Sec. 1202. Buildings or parts of buildings classed in Group G because of use or the character of the occupancy shall be of Types I, II, III, IV or V Construction and the maximum height and floor areas shall not exceed those specified in the following table.

Construction, Height and Area Allowable

Maximum Allowable Floor Areas as Determined by Height of Building, Street Frontage and Type of Construction

Types of Construction	Maximum Height for Corresponding Areas		Maximum Floor Areas (Sq. Ft.)			Increase for Complete Sprinkling*
			Building Fronting on			
	Feet	Stories	1 street	2 streets	3 or more streets	
Type I	NO RESTRICTIONS					
Type II	75 ft.	7 stories	15,000	18,000	20,000	100 %
	55 ft.	5 stories	20,000	25,000	30,000	
	65 ft.	1 story	UNRESTRICTED			
Type III	55 ft.	5 stories	12,000	15,000	18,000	100 %
	20 ft.	1 story	20,000	25,000	30,000	
Type IV	45 ft.	1 story	25,000	30,000	35,000	100 %
Type V	35 ft.	3 stories	10,000	12,500	18,000	100 %
	20 ft.	1 story	12,000	15,000	15,000	

Note:—*Increase shall not be permitted unless the area is entirely protected by an automatic sprinkler installation as specified in Chapter 38.

Sec. 1203. All exterior walls or parts of walls, except on street fronts, of Group G buildings which are less than three

Location on Property

Secs. 1203-1210

(3) 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 Section 4302. See Section 504 for regulating adjacent buildings on the same property.

Stairs and Exits

Sec. 1204. Stairs and exits shall be provided as specified in Chapter 33.

Smokeproof towers shall be provided as and when required in Chapter 33.

Light, Ventilation and Sanitation

Sec. 1205. All portions of Group G buildings customarily used by human beings shall be provided with light and ventilation.

Every building or portion thereof where more than four persons are employed shall be provided with at least one toilet. Every building and each subdivision thereof where both sexes are employed shall be provided with access to at least two toilets either located in such building or conveniently located in a building adjacent thereto.

Enclosure of Vertical Openings

Sec. 1206. Except as specified in Chapter 33, vertical openings are not required to be enclosed.

Fire Extinguishing Apparatus

Sec. 1207. Automatic sprinklers, standpipes and basement pipe inlets shall be installed as and when specified in Chapter 38.

Special Hazards

Sec. 1208. Chimneys and heating apparatus shall conform to the requirements of Chapter 37.

The storage, use and handling of gasoline, fuel oil and other inflammable liquids shall not be permitted in any Group G building unless such storage and handling complies with the suggested ordinance Regulating the Use, Handling, Storage and Sale of Flammable Liquids and the Products Thereof, adopted by the National Fire Protection Association, May, 1926.

Exceptions and Deviations

Sec. 1209. Roof covering on Type V buildings may be of galvanized iron or sheet metal laid directly on the wood roof framing without solid sheathing. Fireproofing of the under side of all roof framing of Group G buildings may be omitted in all Types of Construction.

Mixed Occupancies

Sec. 1210. Separation of Group G occupancies from all other occupancies shall be provided as specified in Section 503.

CHAPTER 13

REQUIREMENTS FOR GROUP H BUILDINGS

Sec. 1301. Each Group H occupancy shall be considered as a separate building and the Group shall include:

Group H Occupancies Defined

Division 1: Hotels, apartment houses, dormitories, lodging houses.

Division 2: Convents, monasteries, old people's homes (accommodating ten or more persons).

Sec. 1302. Buildings or parts of buildings classed in Group H because of use or the character of the occupancy shall be of Types I, II, III, IV or V Construction and the maximum height and floor areas shall not exceed those specified in the following table.

Construction Height and Area Allowable

Maximum Allowable Floor Areas as Determined by Height of Building, Street Frontage and Type of Construction

Types of Construction	Maximum Height for Corresponding Areas		Maximum Floor Areas (Sq. Ft.)			
			Building Fronting on			Increase for Complete Sprinkling*
	Feet	Stories	1 street	2 streets	3 or more streets	
Type I	NO RESTRICTIONS					
Type II	75 ft.	7 stories	12,000	15,000	18,000	100 %
	55 ft.	5 stories	15,000	18,000	20,000	
	65 ft.	1 story	20,000	25,000	30,000	
Type III	55 ft.	5 stories	12,000	15,000	18,000	100 %
	20 ft.	1 story	18,000	20,000	22,500	
Type IV	45 ft.	1 story	15,000	18,000	22,500	100 %
Type V	35 ft.	3 stories	6,000	7,000	8,000	100 %
	20 ft.	1 story	8,000	9,000	10,000	

Note:—*Increase shall not be permitted unless the area is entirely protected by an automatic sprinkler installation as specified in Chapter 38.

Sec. 1303. All exterior walls or parts of walls, except on street fronts, of Group H buildings which are less than three (3) 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 Section 4302. All openings in exterior

Location on Property

Secs. 1303-1308

walls, except on street fronts, which are less than five (5) feet from adjacent property lines shall be protected by doors or windows of one-hour fire-resistive construction as specified in Section 4304. See Section 504 for regulating adjacent buildings on the same property.

Location of Group H buildings on the property shall meet the requirements of the.....Housing Act of the.....of..... (See Appendix.)

Stairs and Exits

Sec. 1304. Stairs and exits shall be provided as specified in Chapter 33.

Smokeproof towers shall be provided as and when specified in Chapter 33.

All stairs and exits in Group H buildings shall open directly upon a street or alley or upon a yard or court not less than four (4) 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 (7) feet in height.

Light, Ventilation and Sanitation

Sec. 1305. All rooms of Group H buildings used for eating, living and/or sleeping purposes shall be provided with light and ventilation by means of windows with an area not less than one-eighth ($\frac{1}{8}$) of the total floor area of such room or rooms.

Every building shall be provided with at least one toilet. Every building and each subdivision thereof where both sexes are accommodated shall be provided with at least two toilets located in such building and one such toilet shall be conspicuously marked "For Women" and the other conspicuously marked "For Men." Not less than one toilet shall be provided for each fifteen (15) persons or major fraction thereof that such building is designed to accommodate.

Light, ventilation and sanitation shall be provided as specified by the.....Housing Act of the.....of.....

Enclosure of Vertical Openings

Sec. 1306. All elevator shafts, vent shafts, stairways and other vertical openings shall be enclosed as specified under Types of Construction, except stairways in buildings two (2) stories in height.

Fire Extinguishing Apparatus

Sec. 1307. Automatic sprinklers, standpipes and basement pipe inlets shall be installed as and when specified in Chapter 38.

Special Hazards

Sec. 1308. Chimneys and heating apparatus shall conform to the requirements of Chapter 37.

Every boiler room or room containing a central heating plant using solid or liquid fuel shall be separated from the rest of the building by a "Special Fire Separation" as specified in Section 503; except, that in buildings of Type V Construction an "Ordinary Fire Separation" may be used.

Secs. 1308-1310

The storage and handling of gasoline, fuel oil and other inflammable liquids shall not be permitted in any Group H building unless such storage and handling complies with the suggested ordinance Regulating the Use, Handling, Storage and Sale of Flammable Liquids and the Products Thereof, adopted by the National Fire Protection Association, May, 1926. All doors leading into rooms in which volatile inflammable liquids are used or kept shall be of one-hour fire-resistive construction as specified in Section 4304 and shall be kept normally closed.

Sec. 1309. Furnaces may be used without a "Fire Separation" in buildings not more than two (2) stories in height.

Sec. 1310. Separations between Group H occupancies and all other occupancies shall be provided as specified in Section 503.

Mixed
Occupancies

CHAPTER 14 — REQUIREMENTS FOR GROUP I BUILDINGS

Group I Occupancies Defined

Sec. 1401. Each Group I occupancy shall be considered as a separate building and the Group shall include any buildings or parts of buildings used as dwellings.

Construction, Height and Area Allowable

Sec. 1402. Buildings or parts of buildings classed in Group I because of use or the character of the occupancy shall be of Types I, II, III, IV or V Construction. The floor areas of Types I and II shall be unlimited, the floor area of Types III and IV shall be limited to ten thousand (10,000) square feet, and the floor-area of Type V shall be limited to seventy-five hundred (7500) square feet.

Location on Property

Sec. 1403. All exterior walls or parts of walls, except on street fronts, of Group I buildings which are less than three (3) 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 Section 4302. See Section 504 for regulating adjacent buildings on the same property.

Stairs and Exits

Sec. 1404. Stairs and exits shall be provided as and when specified in Chapter 33.

Light Ventilation and Sanitation

Sec. 1405. All rooms of Group I buildings used for eating, living and/or sleeping purposes shall be provided with light and ventilation by means of windows with an area not less than one-eighth ($\frac{1}{8}$) of the total floor area of such room or rooms.

Light, ventilation and sanitation shall be provided as specified by the Housing Act of the of

Enclosure of Vertical Openings

Sec. 1406. Stairs in Group I buildings need not be enclosed. Dumb-waiter shafts, clothes chutes and other similar vertical openings shall be protected as specified in Section 3003.

Fire Extinguishing Apparatus

Sec. 1407. Fire extinguishing apparatus when installed shall conform to the requirements of Chapter 38.

Special Hazards

Sec. 1408. Chimneys and heating apparatus shall conform to the requirements of Chapter 37.

Inflammable liquids shall not be stored or used in Group I buildings in quantities in excess of one (1) gallon and all such inflammable liquids shall be kept in tight or sealed containers when not in actual use.

Secs. 1409-1410

Sec. 1409. Dwellings constructed on the roof of multiple storied buildings shall be considered as an additional story in so far as the construction, location, exposure, stairs, exits and fire extinguishing apparatus is concerned. **Exceptions and Deviations**

Sec. 1410. Separation of Group I occupancies from all other occupancies shall be provided as specified in Section 503. **Mixed Occupancies**

CHAPTER 15 — REQUIREMENTS FOR

GROUP J BUILDINGS

**Group J
Buildings
Defined**

Sec. 1501. Each Group J building or occupancy shall be considered as a separate building and the Group shall include:

Division 1: Private garages.

Division 2: Accessory buildings and structures such as sheds, fences over six (6) feet high, water tanks, towers.

Division 3: Stadiums, reviewing stands and amusement park structures.

**Construction,
Height
and Area
Allowable**

Sec. 1502. Buildings or parts of buildings classed in Group J because of use or the character of the occupancy shall be of Types I, II, III, IV or V Construction as regulated by the requirements of Chapter 16. The floor area of Types I and II construction shall not be limited, the floor area of Types III and IV shall be limited to ten thousand (10,000) square feet and buildings of Type V construction shall not exceed one thousand (1000) square feet in area and/or two (2) stories in height, except that such restriction of Type V construction shall not apply to stadiums, reviewing stands or amusement park structures of the open skeleton-framed type.

Reviewing stands and amusement park structures shall be designed and constructed in a substantial manner so as to fully withstand all impact loads in addition to the static loads specified in Chapter 23. (See appendix.)

**Location
on
Property**

Sec. 1503. All exterior walls or parts of walls, except on street fronts, of Group J buildings which are less than three (3) 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 Section 4302. See Section 504 for regulating adjacent buildings on the same property.

**Stairs, Exits,
Aisles and
Seats**

Sec. 1504. (a) Stairs and exits for amusement park devices shall be provided as specified in Chapter 33 except that stairs and ramps in buildings not exceeding two stories in height need not be enclosed.

(b) Stairs, exits, aisles and seating for stadiums and reviewing stands shall be as follows:

1. Stairs. All stairs shall have a rise of not more than seven and one-half ($7\frac{1}{2}$) inches and a tread of not less than ten (10) inches not including the nosing.

2. Exits. There shall be provided one exit not less than seven (7) feet wide for each two thousand (2000) persons or

major fraction thereof which the stadium or reviewing stand is designed to seat. Such exits shall be spaced not more than seventy-five (75) feet apart. Passageways serving such exits shall be not less than seven (7) feet in clear height nor less than seven (7) feet in clear width.

3. Aisles. Aisles not less than three feet six inches (3' 6") in width shall be provided so that there are not more than twenty (20) seats between any seat and an aisle.

4. Seats. Where seats are not spaced or marked off in any stadium or reviewing stand, a distance of eighteen (18) inches along any bench or platform shall constitute one seat in computing the required aisles, stairs and exits. Seats shall be spaced not less than twenty-six (26) inches back to back and where backs are provided for the seats they shall be spaced thirty (30) inches back to back.

Where the space under the stadium or reviewing stand is used for any purpose whatsoever, exits passing through this space shall be separated therefrom by walls, floors and ceilings of not less than one-hour fire-resistive construction.

Sec. 1505. Private garages which are constructed in conjunction with any Group H or I buildings and which have openings into such buildings shall be equipped with fixed louvered or screened openings or exhaust ventilation with exhaust openings located within six (6) inches of the floor. The clear area of the louvered openings or of the openings into the exhaust ducts shall be not less than sixty (60) square inches per car stored in such private garage. Under no circumstances shall a private garage have any opening into a living or sleeping room.

Light and Ventilation

Amusement park structures which have enclosed spaces open to and used by the public shall be provided with light and ventilation, either natural or artificial, sufficient for safe and healthful conditions.

Sec. 1506. Elevator shafts, vent shafts, stair-wells and similar vertical openings shall be enclosed as specified in Chapter 30 when extending through three or more stories.

Enclosure of Vertical Openings

Sec. 1507. Fire extinguishing apparatus shall be installed as and when specified in Chapter 38.

Fire Extinguishing Apparatus

Where more than three automobiles are stored in any private garage there shall be installed not less than one two-and-one-half (2½) gallon chemical extinguisher to each five cars or major fraction thereof.

Sec. 1508. Chimneys and heating apparatus shall conform to the requirements of Chapter 37.

Inflammable liquids shall not be stored, handled or used in Group J buildings unless such storage or handling shall comply with the suggested ordinance *Regulating the Use, Handling, Storage and Sale of Flammable Liquids and the Products Thereof*, adopted by the National Fire Protection Association, May, 1926.

Special Hazards

Sec. 1509. When storage space, termed by this Code a private garage, is designed and provided in any building for the storage of more than ten (10) automobiles, such storage space shall be deemed to be a public garage.

Exceptions and Deviations

Amusement park structures into which the public is admitted, other than those of the open frame type of construction, when more than one story or two hundred (200) square feet in area shall have the exterior walls, bearing partitions and floors of not less than one-hour fire-resistive construction as specified in Chapter 43.

Mixed Occupancies **Sec. 1510.** Separation of Group J occupancies from any other occupancies shall be provided as specified in Section 503 and in Section 1509.

PART IV.

REQUIREMENTS BASED ON LOCATION IN FIRE ZONES

CHAPTER 16—RESTRICTIONS IN FIRE ZONES

Sec. 1601. For the purpose of this Code, the entire City of is hereby declared to be and is hereby established a Fire District and said Fire District shall be known and designated as Fire Zones One, Two, Three and Four, and shall include such territory or portions of said city as outlined in an ordinance of said City, entitled, "An Ordinance Creating and Establishing Fire Zones in the City of....." Wherever such ordinance creating and establishing fire zones, reference is made to any fire zone, it shall be construed to mean one of the four fire zones designated and referred to in this Chapter. (See Appendix.)

**Fire
Zones
Defined**

Sec. 1602. (a) No building or structure of Type V Construction shall be erected or constructed in or moved into Fire Zone No. 1.

**Restrictions
in Fire Zone
No. 1**

(b) No building or structure of Type IV Construction having an area greater than four hundred (400) square feet shall be erected or constructed in or moved into Fire Zone No. 1.

(c) Any building or structure in Fire Zone No. 1 which is enlarged, altered, raised or built upon to an extent exceeding an expenditure of twenty (20) per cent of the value of such building, shall be made to completely comply with the requirements of a Type I, II or III building.

(d) Any building or structure moved into Fire Zone No. 1 shall comply with all the requirements for new buildings in Fire Zone No. 1.

(e) No building of Type IV Construction in excess of four hundred (400) square feet in 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 building may be entirely demolished.

(2) Such building may be moved entirely outside the limits of Fire Zone No. 1.

(3) Changes, alterations and repairs to the interior of such building or to the front facing a public street may be made, provided such changes shall not increase in the opinion of the Building Inspector, the fire hazard of such building.

(4) Roofs of such buildings may be covered only with a "Fire-Retardant" roof as specified in Section 4305.

(f) 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 Zone No. 1 by special permit

Secs. 1602-1603

from the Building Inspector for a limited period of time and such structures shall be completely removed upon the expiration of the time limit in such permit.

(g) All doors, windows and other openings in exterior walls of all buildings erected in Fire Zone No. 1 shall be protected by doors or windows of one-hour fire-resistive construction as specified in Section 4304.

Exceptions: The provisions of paragraph (g) shall not apply to doors, windows or other openings which face directly upon and are not within fifty (50) feet of the opposite side of a public street or other public place, this distance to be measured at right angles to the plane of the wall in which such openings occur.

The provisions of paragraph (g) shall not apply to openings twenty (20) feet or more from buildings on the same property, or twenty (20) feet or more from adjacent property lines other than street fronts, as regulated by the first exceptions; nor shall such provisions apply to openings in courts which are at least twenty (20) feet in their least dimension. For the purpose of this paragraph the adjacent property line may be considered as the opposite side of adjoining alleys, streets or other public places if such exist.

(h) All buildings of Type III construction erected in Fire Zone No. 1 shall have all partitions and floors of not less than one-hour fire-resistive construction as specified in Chapter 43.

(i) No Group E buildings except public garages or gasoline filling stations shall be constructed or erected in Fire Zone No. 1 and no existing buildings shall be used or occupied in any manner whatsoever by Group E occupancies except as public garages or gasoline filling stations.

Restrictions in Fire Zone No. 2

Sec. 1603. (a) Buildings of Type V Construction erected or constructed in Fire Zone No. 2 shall have all exterior walls of not less than one-hour fire-resistive construction as specified in Section 4302; provided, that when such exterior walls are less than three (3) feet from adjacent property lines or less than six (6) feet from buildings on the same property the exterior walls shall be of masonry or reinforced concrete and in both cases the roofs of such buildings shall be covered with a "Fire-Retardant" roofing as specified in Section 4305.

(b) No building of Type IV Construction having an area greater than one thousand (1000) square feet shall be erected or constructed in Fire Zone No. 2.

(c) Any building in Fire Zone No. 2 which is enlarged, altered, raised or built upon to an extent exceeding an expenditure of fifty (50) per cent of the value of such building shall be made to comply with the requirements of a Type I, II, III, IV or V building.

(d) Any building or structure moved into Fire Zone No. 2 shall comply with all the requirements for new buildings in Fire Zone No. 2.

(e) No building of Type IV Construction in excess of one thousand (1000) square feet in area, nor any building of Type V Construction, except as noted in paragraph (a) of this Section, 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 entirely demolished.

(2) Such building may be moved entirely outside the limits of Fire Zone No. 2.

(3) Such building may be made to conform to the provisions of paragraph (a) of this Section.

(4) Changes, alterations and repairs to the interior of such building or to the front facing a public street may be made provided such changes do not increase the fire hazard of such building.

(5) Roofs of such buildings may be covered only with a "Fire-Retardant" roof as specified in Section 4305.

(f) 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 Zone No. 2 by special permit from the Building Inspector for a limited period of time and such structures shall be completely removed upon the expiration of the time limit in such permit.

(g) No group E buildings except public garages or gasoline filling stations shall be constructed or erected in Fire Zone No. 2 and no existing buildings shall be used or occupied in any manner whatsoever by Group E occupancies except as public garages or gasoline filling stations.

Sec. 1604. Any building complying with the requirements specified in this Code may be erected or moved into or within Fire Zone No. 3.

**Restrictions
in Fire Zone
No. 3**

Sec. 1605. (a) No building or structure of Type V Construction shall be erected in Fire Zone No. 4 with an area in excess of four thousand (4000) square feet.

(b) Any building in Fire Zone No. 4 which is enlarged, altered, raised or built upon to an extent exceeding an expenditure of fifty (50) per cent of the value of such structure shall be made to comply with the requirements of a Type I, II, III, IV or V buildings except that floors in the first story of such buildings need not comply with such requirements.

(c) Any building or structure moved into or within Fire Zone No. 4 shall comply with all requirements for new buildings in Fire Zone No. 4.

(d) Buildings of Type V Construction may be built in excess of four thousand (4000) square feet providing such buildings are divided by "Special Fire Separation" as specified in Section 503, into areas not exceeding four thousand (4000) square feet.

**Restrictions
in Fire Zone
No. 4**

PART V.

REQUIREMENTS BASED ON TYPES
OF CONSTRUCTION

CHAPTER 17 — CLASSIFICATION OF ALL BUILDINGS
BY TYPES OF CONSTRUCTION

General

Sec. 1701. The requirements of Part V are the minimum requirements for the various Types of Construction. In order that a building may be classed in any specific Type of Construction, it is necessary that all of the requirements for that Type of Construction be complied with.

No building or portion thereof 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 (Part III) or Location in Fire Zone (Part IV) even though certain features of such building actually conform to a higher Type of Construction. (See Appendix.)

The various Types of Construction herein specified represent varying degrees of public safety and resistance to fire. 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, as specified in this Code, may be used.

Any system or method of construction to be used shall admit of a rational analysis in accordance with well established principles of mechanics.

Classification by
Types of
Construction

Sec. 1702. All buildings for the purpose of this Code shall be divided into the following Types of Construction based upon their resistance to fire, and for the purpose of this Code Type I shall be deemed to be the most fire-resistive and Type V the least fire-resistive Type of Construction.

- Type I — FIRE-RESISTIVE Construction.
- Type II — HEAVY TIMBER Construction.
- Type III — ORDINARY MASONRY Construction.
- Type IV — METAL FRAME Construction.
- Type V — WOOD FRAME Construction.

When two or more types of construction occur in the same building and are not separated by an "Absolute Fire Separation" as specified in Section 503, the entire building shall be classed in the least fire-resistive type of construction and such building shall be subject to the restrictions of such type. Any building erected prior to the passage of this Code, which by its construction cannot be definitely classified as Type I, II, III, IV or V as defined herein, shall for the purpose of this Code be deemed to belong to the least fire-resistive class of the two types to which it most nearly conforms.

CHAPTER 18 — TYPE I BUILDINGS (Fire-Resistive)

Sec. 1801. "Type I" or "Type I Buildings". The structural frame of Type I buildings shall be of structural steel or iron which shall be fireproofed, or shall be of reinforced concrete. The foundation, exterior walls, inner court walls and walls enclosing vertical openings, shall be of masonry or reinforced concrete. The roof construction and floors shall be of fire-resistive materials. Exterior doors and windows, except as specified in Section 1813 shall be of fire-resistive construction. (Note: Fire-resistive materials and fire-resistive construction have a specific meaning in this Code, as specified in Chapters 42 and 43.)	Definition
Sec. 1802. The height of Type I buildings shall not be limited. (See Appendix.)	Height Allowable
Sec. 1803. The floor area of Type I buildings shall not be limited.	Area Allowable
Sec. 1804. Foundation walls and footings shall be of solid masonry as specified in Chapter 29 or of reinforced concrete as specified in Chapters 26 and 29, and shall be designed as specified in Sections 2306 and 2802.	Foundations
Sec. 1805. All exterior walls, fire walls and fire division walls shall be of masonry or reinforced concrete as specified in Chapter 29 and shall be of not less than four-hour fire-resistive construction as specified in Section 4302.	Exterior and Inner Court Walls
Inner court walls shall be of masonry or reinforced concrete of not less than three-hour fire-resistive construction as specified in Section 4302.	
Sec. 1806. Interior partitions shall be constructed of incombustible materials and shall be of not less than one-hour fire-resistive construction as specified in Section 4302.	Partitions
Exceptions: Partitions dividing portions of stores, offices or similar places occupied by one tenant only may be constructed of wood panels or similar light construction up to three-fourths (3/4) the height of the room in which placed; when more than three-fourths (3/4) the height of the room, such partitions shall have not less than the upper one-fourth (1/4) of the partition constructed of glass set in sash.	
Sec. 1807. Enclosures for elevator shafts, vent shafts, stair wells and other vertical openings, when required because of Occupancy in Part III shall be of two-hour fire-resistive construction and all openings therein shall be protected by fire-resistive doors or windows as specified in Chapters 30 and 43.	Enclosure of Vertical Openings
A parapet wall or hand rail at least thirty (30) inches in height above the roof shall be provided around all open shaft enclosures extending through the roof.	
Sec. 1808. Structural framework shall be of structural steel or iron as specified in Chapter 27 or shall be of reinforced concrete as specified in Chapter 26.	Structural Framework

The structural frame shall be considered as the columns, and all girders, beams, trusses or spandrels having rigid connections

Secs. 1808-1809

to the columns. The members of floor or roof panels which have no connection to the columns, shall be considered secondary members. The structural frame and secondary members shall be designed and constructed to carry all dead, live and other loads to which they may be subjected both during erection and after completion of the structure. Unless otherwise provided for in the structural frame the floor and roof panel construction shall be designed and constructed to carry the horizontal forces to such parts of the structural frame as are designed to carry the horizontal forces to the foundations.

The entire structural frame and each member which is a part of such frame shall be so designed and constructed that the stresses may be satisfactorily determined by a rational analysis in accordance with well established principles of mechanics and sound engineering practice.

**Fireproof-
ing of
Structural
Members**

Sec. 1809. (a) All structural steel or iron members, not including forms or structural members for elevators and elevator enclosures, shall be thoroughly fire-proofed with not less than four-hour fire-resistive protection for columns, beams and girders and three-hour fire-resistive protection for floors, for all buildings more than eight (8) stories or eighty-five (85) feet in height; and with three-hour fire-resistive protection for columns, beams and girders and two-hour fire-resistive protection for floors for all buildings which are eight (8) stories or eighty-five (85) feet or less in height; and all such fire-resistive protection shall be as specified in Chapter 43.

Exceptions: (1) The thickness of the fireproofing on the outer edge of lugs or brackets on columns may be reduced to not less than one (1) inch.

(2) The masonry over window openings may be supported by a steel plate, angle or similar member which is not fireproofed on the under side, provided the member is supported at proper intervals from a structural beam or girder which is fireproofed on all sides. For openings in masonry bearing walls not exceeding four (4) feet in width, an angle or similar member supported by masonry and not fireproofed on the under side may be used.

(3) Where every part of the structural steel framework of the roof of a Group A, B or C building is not less than twenty-five (25) feet above any floor or balcony, fireproofing of all members of the roof construction may be omitted.

(4) Where every part of the structural steel framework of the roof of a Group A, B or C building is more than eighteen (18) feet and less than twenty-five (25) feet above any floor or balcony the roof construction shall be protected by a suspended ceiling of not less than one-hour fire-resistive construction as specified in Chapter 43, and such ceiling shall be not less than six (6) inches distant from any part of such roof construction.

(b) All reinforced concrete columns, beams and girders shall be thoroughly fireproofed with four-hour fire-resistive protection and all floors, joists and slabs shall be thoroughly fireproofed with not less than three-hour fire-resistive protection for all buildings more than eight (8) stories or eighty-five (85) feet in height; and all reinforced concrete columns, beams and

girders shall be thoroughly fireproofed with not less than three-hour fire-resistive protection and all floors, joists and slabs shall be thoroughly fireproofed with not less than two-hour fire-resistive protection for all buildings which are eight (8) stories or eighty-five (85) feet or less in height; and all such fire-resistive protection shall be as specified in Chapter 43.

Sec. 1810. Floors shall be constructed of reinforced concrete, brick or hollow tile arches, reinforced gypsum or may be composite floors of those materials in combination with structural steel or iron or reinforced concrete or such floor panel construction shall consist of any floor system providing not less than two-hour fire-resistive construction as specified in Section 4303 for buildings which are eight (8) stories or eighty-five (85) feet or less in height and providing not less than three-hour fire-resistive construction as specified in Section 4303 for all buildings more than eight (8) stories or eighty-five (85) feet in height.

Floor Construction

The type of floor construction used shall provide means to keep the beams and girders from spreading, either by installing ties or bridging, with no laterally unsupported length of joists being permitted to exceed eight (8) feet except as otherwise provided in Sections 3102 and 3103. The floor and roof panel construction shall be so designed and constructed as to transfer horizontal forces to such parts of the structural frame as are designed to carry the horizontal forces to the foundations.

Where wood sleepers are used for laying wood floors the space between the floor slab and the underside of the wood flooring shall be filled with incombustible material in such a manner that there will be no open spaces under the flooring which will exceed one hundred (100) square feet in area and such space shall be filled solidly under all partitions so that there is no communication under the flooring between adjoining rooms.

Sec. 1811. Roofs shall be constructed of any materials or combination of materials as allowed for floors in Section 1810.

Roof Construction

Roof Covering shall be a "Fire-Retardant" roofing as specified in Section 4305.

Any drainage fill placed on a roof deck of any building shall be an incombustible material and such fill shall be considered as a part of the dead load in designing the roof framing.

Sec. 1812. 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 hard incombustible materials may be used for the finish of such treads and risers.

Stairs

All stairs shall be designed and constructed as specified in Chapter 33 and as specified under Occupancy in Part III.

Sec. 1813. (a) Doors, windows and other openings in the exterior walls shall be protected by one-hour fire-resistive construction as specified in Section 4304.

Doors and Windows

Exceptions: (1) The provisions of this Section shall not apply to doors, windows and other openings which face di-

rectly upon, and are not within fifty (50) feet in Fire Zone No. 1 or are not within thirty (30) feet in Fire Zones No. 2, 3 and 4, of the opposite side of a public street or other public place, this distance to be measured at right angles to the plane of the wall in which such openings occur.

(2) The provisions of paragraph (a) of this Section shall not apply to openings in an outer court twenty (20) feet or more in width parallel to and facing upon a street or public place, provided such openings are not within twenty (20) feet of an adjacent property line.

Projections from the Building

Sec. 1814. Bays, oriels and similar projections shall be constructed of incombustible materials with walls, floors and roofs as specified in this Chapter and as specified in Chapter 35.

Porches and exterior balconies shall be constructed of incombustible materials but structural steel or iron members need not be fireproofed; provided, that loading platforms for warehouses, freight depots and similar buildings may be of heavy timber construction with wood floors not less than one and five-eighths (1 5/8) inches thick. Such wood construction shall not be carried through the exterior walls of any Type I building.

Cornices, marquises and similar appendages which are a part of a Type I building shall be constructed of substantial incombustible materials and as specified in Chapter 45.

Penthouses and Sky- lights

Sec. 1815. Penthouses and other roof structures shall be constructed of masonry or reinforced concrete, and all doors, windows and other openings therein shall be protected by one-hour fire-resistive construction or shall have one-hour fire-resistive windows as specified in Chapters 36 and 43.

Skylights shall be constructed of one-hour fire-resistive materials as specified in Chapter 43 and in Section 3402.

Combustible Materials Regulated

Sec. 1816. Wood or unprotected steel or iron shall be permitted in the following places:

(1) Mezzanine floors may be of wood or unprotected steel provided that there shall be not more than two such mezzanines in any room of any building and provided, further, that no such mezzanine floor or floors shall cover more than thirty-three and one-third (33 1/3) per cent of the area in the room where located. Such mezzanine floors constructed in Fire Zone No. 1 shall be of heavy timber construction as specified for floor construction in Type II buildings.

(2) Show window frames and aprons, also show cases and other appurtenances on the first floors of stores or other similar buildings may be of wood with or without unprotected steel or iron.

(3) Trim, picture molds, chair rails, wainscoting, baseboards, hand rails, show window backing, temporary partitions, floors, and sleepers may be of wood. Wood doors may be used except in stair, elevator or other shaft enclosures or where specifically prohibited under Occupancy in Part III.

Sec. 1816

(4) Roofs may be sheathed by wood planks of two and one-half (2 1/2) inch nominal thickness when such sheathing is more than thirty (30) feet distant from any floor, balcony or gallery and when such plank sheathing is protected on the underside by a ceiling of not less than one-hour fire-resistive construction as specified in Section 4301.

CHAPTER 19 — TYPE II BUILDINGS

(Heavy Timber Construction)

Definition

Sec. 1901. "Type II" or "Type II Buildings". The structural frame shall be of structural steel or iron which shall be fire-proofed, of reinforced concrete, of masonry or of heavy timbers, provided, that in buildings not exceeding one story and sixty-five (65) feet in height the structural steel or iron may have the fire-proofing omitted. Foundations and exterior walls shall be of solid masonry or reinforced concrete. Inner court walls shall be of masonry or reinforced concrete or of protected solid wood. Roof construction shall be of wood, or incombustible materials. Floors and non-bearing partitions shall be of wood or incombustible materials.

Height Allowable

Sec. 1902. Type II buildings shall not exceed a height of seventy-five (75) feet in which height there shall be not more than seven (7) stories; provided, that the height of a building erected on sloping ground may be not to exceed seventy-five (75) feet plus a vertical distance equal to the vertical change in slope along the length of any side of such building but in no case shall such height exceed eighty-five (85) feet above the adjacent finished ground level; provided, further, that no one-story building shall exceed a height of sixty-five (65) feet.

Towers, spires and steeples erected as a part of the building and not used for habitation or storage may extend not to exceed twenty (20) feet above such height limit.

Area Allowable

Sec. 1903. The floor area of a Type II building shall be limited according to Occupancy as specified in Part III of this Code.

Foundations

Sec. 1904. Foundation walls and footings shall be of solid masonry as specified in Chapter 29 or of reinforced concrete as specified in Chapters 26 and 29, and shall be designed as specified in Sections 2306 and 2802.

Exterior and Inner Court Walls

Sec. 1905. All exterior walls, fire walls and fire division walls shall be of masonry or reinforced concrete as specified in Chapter 29 and shall be of not less than four-hour fire-resistive construction as specified in Section 4302.

All walls within five (5) feet of adjacent property lines (excepting property lines abutting a street or an alley) and all walls within ten (10) feet of other buildings on the same property shall be provided with a parapet wall at least thirty (30) inches high above the roof at all points, provided that parapet walls need not be constructed on buildings twenty (20) feet or less in height or where the roof slopes more than twenty (20) degrees from the horizontal back from the exterior wall of such building.

Inner court walls shall be constructed the same as exterior walls or shall be of not less than four-inch solid wood laminated construction protected on the weather side thereof by incombustible fire-resistive materials as provided in Section 4202.

Sec. 1906. Interior partitions shall be of one-hour fire-resistant construction as specified in Section 4302 or may be of solid wood construction formed of two layers of one-inch nominal matched boards or of two-inch nominal tongued and grooved wood planking or of solid wood laminated construction not less than three and five-eighths (3 5/8) inches thick.

Where wood partitions abutt or adjoin masonry walls they shall be tied as specified in Section 2507.

Temporary partitions as specified in Section 1806 may be used.

Sec. 1907. Enclosures for elevator shafts, vent shafts, stair wells and other vertical openings shall be of two-hour fire-resistive construction as specified in Chapters 30 and 43; provided, that in buildings not more than three (3) stories in height which are completely sprinkled as specified in Chapter 38 such enclosure walls may be of any construction permitted for interior partitions.

A parapet wall or hand rail at least thirty (30) inches in height above the roof shall be provided around all open shaft enclosures extending through the roof.

Sec. 1908. The structural frame shall be of reinforced concrete as provided in Chapter 26, structural steel as provided in Chapter 27, or of solid wood construction as specified in Chapter 25.

All wood columns in such structural frame shall be directly superimposed, one above the other, (no girders or bolsters between columns) and shall be provided with steel or cast iron caps or pintles which shall be self-releasing wherever any horizontal members are framed into such columns. No wood column shall be less than eight (8) inches nominal in its least dimension and no beam, girder or joist shall be less than six (6) inches nominal in its least dimension nor less than forty-eight (48) square inches nominal in cross-sectional area. In no case shall masonry or reinforced concrete be supported on wood construction, except tile or concrete floor finishes not more than three (3) inches in thickness.

Sec. 1909. (a) All structural steel or iron members (not including frames and structural members for elevators and elevator enclosures) shall be thoroughly fireproofed. Such fireproofing shall be of three-hour fire-resistive protection for columns, and two-hour fire-resistive protection for beams, girders and floor systems, and all fireproofing shall be determined as specified in Chapter 43; provided, that such fireproofing may be omitted when the building does not exceed a height of one story and sixty-five (65) feet.

Exceptions: (1) The thickness of the fireproofing on the outer edge of lugs or brackets on columns may be reduced to not less than one (1) inch.

(2) The masonry over window openings may be supported by a steel plate, angle or similar member which is not fireproofed on the under side, provided the member is supported at proper intervals from a structural beam or girder which is fireproofed on all sides. For openings in masonry bearing walls not exceeding four (4) feet in width,

an angle or similar member supported by masonry and not fireproofed on the under side may be used.

(3) Where the structural steel framework of the roof of a Group A, B or C building is not less than twenty-five (25) feet above any floor or balcony, fireproofing of all members of the roof construction may be omitted.

(4) Where the structural steel framework of the roof of a Group A, B or C building is more than eighteen (18) feet and less than twenty-five (25) feet above any floor or balcony the roof construction shall be protected by a suspended ceiling of not less than two-hour fire-resistive construction as specified in Chapter 43, and such ceiling shall be not less than six (6) inches distant from any part of such roof construction.

(b) Wood structural members shall not be required to be fireproofed.

(c) All reinforced concrete columns shall be thoroughly fireproofed with not less than three-hour fire-resistive protection and all joists, beams, girders and slabs shall be thoroughly fireproofed with not less than two-hour fire-resistive protection outside of all steel reinforcing as specified in Section 4301.

Floor Construc- tion

Sec. 1910. Floor construction shall be as specified for Type I buildings or shall be of one of the types noted below:

(1) Floor construction shall be of tongued and grooved or splined lumber not less than three (3) inches nominal in thickness with a top layer of flooring of one (1) inch nominal in thickness laid thereon.

(2) Construction of solid lumber placed on edge and securely spiked together to make a floor not less than four (4) inches nominal in thickness.

If such floor is six (6) inches nominal or more in thickness the lumber shall be air seasoned or kiln dried.

A space of one-half (1/2) inch shall be required between all floor construction and the wall which it adjoins, to allow for swelling in case the floor becomes wet. This space shall be properly covered by a molding so arranged that it will not interfere with the swelling and shrinking movements of the flooring.

Wood joists, beams and girders supported by masonry walls shall be anchored thereto as specified in Section 2506.

The timbers and planking shall be self-releasing at end support on walls and no planking or timber shall extend through or across any fire, party or division walls.

Roof Con- struction

Sec. 1911. Roof construction shall be as specified for floor construction in Section 1910 except that the minimum allowable thickness shall be two and one-half (2 1/2) inches nominal, the timbers and planking shall be self-releasing at end support on walls and no planking or timber shall extend across or through fire, party or division walls. Wood joists, beams, girders and rafters supported by masonry walls shall be anchored thereto as provided in Section 2508.

Roof covering shall be a "Fire-Retardant" roofing as specified in Section 4305 and shall be required over all combustible roof construction.

Secs. 1912-1916

Sec. 1912. Stair construction may be of wood in buildings not exceeding three (3) stories in height. **Stair Construction**

In buildings four (4) or more stories in height all stairs and stair construction shall be as required for Type I buildings.

All stairs and exits shall be designed and constructed as specified in Chapter 33 and as specified under Occupancy in Part III.

Sec. 1913. (a) Doors, windows and other openings in the exterior walls shall be protected by one-hour fire-resistive construction as specified in Section 4304. **Doors and Windows**

Exceptions: (1) The provisions of this Section shall not apply to doors, windows and other openings which face directly upon, and are not within fifty (50) feet in Fire Zone No. 1 or are not within thirty (30) feet in Fire Zones No. 2, 3 and 4, of the opposite side of a public street or other public place, this distance to be measured at right angles to the plane of the wall in which such openings occur.

(2) The provisions of paragraph (a) shall not apply to openings in an outer court twenty (20) feet or more in width parallel to and facing upon a street or public place, provided such openings are not within twenty (20) feet of an adjacent property line.

Sec. 1914. Bays, oriels and similar projections shall be constructed of incombustible materials with walls, floors and roof as specified in this Chapter and in Chapter 35. **Projections from the Building**

Porches and exterior balconies shall be constructed of incombustible materials but structural steel or iron members need not be fireproofed; provided, that loading platforms for warehouses, freight depots and other similar buildings may be of heavy timber construction with wood floors not less than one and five-eighths (1 5/8) inches thick. Such wood construction shall not be carried through the exterior walls of any Type II building.

Cornices, marquises and similar appendages which are a part of a Type II building shall be constructed of substantial incombustible materials and as specified in Chapter 45.

Sec. 1915. Penthouses shall be as required for Type I construction or shall be constructed with two-hour fire-resistive construction as specified in Chapters 36 and 43. **Penthouses and Skylights**

Skylights shall be of one-hour fire-resistive construction as specified in Chapters 34 and 43.

Sec. 1916. No wood lath or wood furring shall be allowed in any building of Type II Construction, but unprotected steel or iron or wood will be allowed in the following places: **Combustible Materials Regulated**

(1) Mezzanine floors may be of wood or unprotected steel, provided that there shall be not more than two such mezzanines in any room of any building, and provided, further, that no such mezzanine floor or floors shall cover more than thirty-three and one-third (33 1/3) per cent of the area in the room where located.

(2) Show window frames and aprons, also show cases and other appurtenances on the first floors of stores and other sim-

Sec. 1916

ilar buildings may be of wood, with or without unprotected steel or iron.

(3) Trim, hand rails, show window backing and temporary partitions as specified in Section 1906, picture molds, chair rails and wainscoting or baseboards may be of wood. Wood doors may be used, except in stair, elevator and other shaft enclosures, or where specifically prohibited under Occupancy in Part III.

CHAPTER 20 — TYPE III BUILDINGS**(Ordinary Masonry)**

Sec. 2001. "Type III" or "Type III Buildings." The interior load bearing construction may be masonry or reinforced concrete walls or a structural frame of steel, reinforced concrete or wood. Foundations and exterior walls shall be of masonry or reinforced concrete. Partitions, floors and roof framing may be of wood. **Definition**

Sec. 2002. Type III buildings shall not exceed a height of fifty-five (55) feet in which height there shall be not more than five (5) stories; provided, that the height of a building erected on sloping ground may be fifty-five (55) feet plus a vertical distance equal to the vertical change in slope along and in the length of any side of such building but in no case shall such height exceed sixty-five (65) feet above the adjacent finished ground level; and provided, further, that towers, spires and steeples erected as a part of such building and not used for habitation or storage may extend not to exceed fifteen (15) feet above such height limit. **Height Allowable**

Sec. 2003. The floor area of Type III buildings shall be limited according to Occupancy as specified in Part III. **Area Allowable**

Sec. 2004. Foundation walls and footings shall be of solid masonry as specified in Chapter 29 or of reinforced concrete as specified in Chapters 26 and 29, and shall be designed as specified in Sections 2306 and 2802. **Foundations**

Sec. 2005. All exterior walls, fire walls and fire division walls shall be of masonry or reinforced concrete as specified in Chapter 29 and shall be of not less than four-hour fire-resistive construction as specified in Section 4302. **Exterior and Inner Court Walls**

Inner-court walls and all other walls not forming the exterior walls of the building may be constructed as required for Type I or Type II buildings, or shall be of not less than one-hour fire-resistive construction as specified in Chapter 43.

All walls within five (5) feet of adjacent property lines (except property lines abutting a street or alley) and all walls within ten (10) feet of other buildings on the same property shall be provided with parapet walls at least thirty (30) inches high above the roof at all points; provided, that parapet walls need not be constructed on buildings twenty (20) feet or less in height or where the roof slopes more than twenty (20) degrees from the horizontal back from the exterior wall of such building.

Sec. 2006. Partitions of wood shall be constructed as required in Chapter 25. In buildings of four (4) stories or more in height all partitions shall be of one-hour fire-resistive construction as specified in Section 4302. Bearing partitions, when constructed of wood, shall not support more than two (2) stories and a roof. **Partitions**

Exceptions: Partitions dividing portions of stores, offices or similar places occupied by one tenant only may be constructed of wood panels or similar light construction up to

three-fourths (3/4) of the height of the room in which placed; when more than three-fourths (3/4) the height of the room, such partitions shall have not less than the upper one-fourth (1/4) of the partition constructed of glass set in sash.

Enclosure of Vertical Openings

Sec. 2007. Enclosures for elevator shafts, vent shafts, stair wells and other vertical openings when required because of Occupancy in Part III shall be of one-hour fire-resistive construction as specified in Chapters 30 and 43.

A parapet wall or hand rail at least thirty (30) inches in height above the roof shall be provided around all open shaft enclosures extending through the roof.

Structural Frame- work

Sec. 2008. Structural framework shall be of steel, iron, reinforced concrete, masonry or wood and shall be designed and erected as specified in Chapter 26 for reinforced concrete, Chapter 27 for steel and iron, Chapters 22 and 25 for wood and Chapters 24 and 29 for masonry.

Fireproof- ing Structural Mem- bers

Sec. 2009. Fireproofing of steel, iron or wood structural members may be omitted unless otherwise provided because of Location as in Part IV or Occupancy as in Part III, or as specified in Section 2010.

Floor Con- struction

Sec. 2010. Floors may be constructed of reinforced concrete as specified in Chapter 26, of masonry as specified in Chapter 24, of wood as specified in Chapter 25, or of steel or iron as specified in Chapter 27.

In buildings of four (4) stories or more in height the lower side of all metal or wood floor or roof construction shall be entirely protected by a ceiling of one-hour fire-resistive construction as specified in Chapter 43.

In all buildings having a cellar or basement, except Group I buildings, the under side of the first floor construction when of metal or wood shall be protected by a ceiling of one hour fire-resistive construction as specified in Chapter 43.

Wood joists, beams and/or girders supported by masonry walls shall be anchored thereto as specified in Section 2506.

Roof Con- struction

Sec. 2011. Roof construction shall be of any Type of Construction permitted for floors except in buildings four (4) stories or more in height as specified in Section 2010 and except where otherwise required because of Occupancy in Part III.

Wood rafters, joists, purlins, beams and girders supported by masonry walls shall be anchored thereto as specified in Section 2508.

Attic or roof spaces shall be divided into areas not exceeding twenty-five hundred (2500) square feet as specified in Section 2510.

Roof covering shall be a "Fire-Retardant" roofing as specified in Section 4305.

Stair Con- struction

Sec. 2012. Stairs may be of steel, iron, reinforced concrete, masonry or wood and shall be designed and constructed as specified in Chapter 33, and as specified under Occupancy in Part III.

Sec. 2013. Doors, windows and other openings in exterior walls may be of wood or of plain glass and wood sash unless otherwise specified under Occupancy in Part III or Location in Part IV. **Doors and Windows**

Sec. 2014. Bays, oriels and similar projections shall be constructed of incombustible materials with walls, floors and roof as specified in this Chapter and in Chapter 35. **Projections from the Building**

Porches and exterior balconies shall be constructed of incombustible materials but structural steel or iron members need not be fireproofed; provided that loading platforms for warehouses, freight depots and similar buildings may be of heavy timber construction with wood floors not less than one and five-eighths (1 5/8) inches thick. Such wood construction shall not be carried through the exterior walls of any Type III building.

Cornices, marquises and similar appendages which are a part of a Type III building shall be constructed of substantial incombustible materials and as specified in Chapter 45.

Sec. 2015. Penthouses and other roof structures shall be of not less than one-hour fire-resistive construction as specified in Chapters 36 and 43. **Penthouses and Skylights**

Skylights shall be of not less than one-hour fire-resistive construction as specified in Chapters 34 and 43.

Sec. 2016. Wood shall be permitted in a building of Type III Construction except where specifically prohibited as specified under Occupancy in Part III or Location in Part IV. **Combustible Materials Regulated**

No enclosed air space in any vertical wood framing shall have a dimension greater than seven (7) feet.

Combustible insulating materials may be placed in the partition, floor or roof framing but shall in no way interfere with the fire blocking or fire separations required by this Code.

CHAPTER 21 — TYPE IV BUILDINGS (Metal Frame)

- Definition** Sec. 2101. "Type IV" or "Type IV Buildings." The structural framework shall be of steel, iron, masonry or reinforced concrete and the exterior walls and roof shall be of metal or other incombustible materials. Foundations shall be of masonry or reinforced concrete. Partitions and floor construction shall be as specified in this Chapter.
- Height Allowable** Sec. 2102. Type IV buildings shall not exceed a height of forty-five (45) feet in which height there shall be not more than one (1) story and a mezzanine floor; provided that the height of such building erected on sloping ground may be forty-five (45) feet plus a vertical distance equal to the vertical change in slope along and in the length of any side of such building, but in no case shall such height exceed fifty-five (55) feet above the adjacent finished ground level; provided, further, that towers, spires and steeples erected as part of such building and not used for habitation or storage may extend not to exceed ten (10) feet above such height limit.
- Area Allowable** Sec. 2103. The floor area of a Type IV building shall be limited as specified under Occupancy in Part III and Location in Part IV.
- Foundations** Sec. 2104. Foundation walls and footings shall be of solid masonry as specified in Chapter 29 or of reinforced concrete as specified in Chapters 26 and 29, and shall be designed as specified in Sections 2306 and 2802.
- Exterior Walls** Sec. 2105. Exterior walls shall be of galvanized iron or other non-corrodible metal of not less than twenty-six (26) gauge or shall be of incombustible materials.
- Partitions** Sec. 2106. Interior partitions shall be of metal or other incombustible materials.
- Enclosure of Vertical Openings** Sec. 2107. No restrictions.
- Structural Framework** Sec. 2108. The structural framework shall be of steel or iron as specified in Chapter 27, or masonry as specified in Chapters 24 and 29 or of reinforced concrete as specified in Chapter 26.
- Fireproofing Structural Members** Sec. 2109. Fireproofing of structural members shall not be required.
- Floor Construction** Sec. 2110. The floors shall be of any type of construction permitted in Type III buildings or may be of wood blocks or of any incombustible material.
- Roof Construction** Sec. 2111. Roof construction shall be entirely of metal or other incombustible materials provided that wood purlins not less than four (4) inches nominal in least dimension may be used to support metal roof covering.

Secs. 2111-2116

Roof covering shall be of a non-corrodible metal or may be a "Fire-Retardant" roofing as specified in Section 4305.

Sec. 2112. Stairs shall be of steel, iron, reinforced concrete, masonry or wood and shall comply with the requirements of Chapter 33. **Stair Construction**

Sec. 2113. Openings in exterior walls shall be protected by doors, windows or shutters of metal or of metal frame, metal sash and wire glass; provided that such protection may be omitted when such openings are sixteen (16) feet or more from the opposite side of any street, alley or public place, from an adjoining building or from adjacent property lines. **Doors and Windows**

Sec. 2114. Porches, cornices, marquises, canopies and all other similar projections from the building shall be of metal or incombustible materials, except that a loading platform may be constructed of wood. **Projections from the Building**

Sec. 2115. Penthouses and other roof structures shall be constructed entirely of incombustible materials except that roofs of such structures may be constructed as specified in Section 2111. **Penthouses and Skylights**

Skylights shall be of one-hour fire-resistive construction as specified in Chapters 34 and 43.

Sec. 2116. The inner side of walls and under side of roof shall not be ceiled with wood or wood lath and plaster but may be ceiled with any incombustible material. **Combustible Materials Regulated**

CHAPTER 22 — TYPE V BUILDINGS (Wood Frame)

Definition

Sec. 2201. "Type V" or "Type V Buildings". Enclosing walls, interior walls, partitions, floors and roofs shall be of wood or of wood in combination with other materials except where prohibited as specified under Occupancy in Part III. Any buildings which cannot be classed as a Type I, II, III or IV building shall be considered to be of Type V.

Height Allowable

Sec. 2202. Type V buildings shall not exceed a height of thirty-five (35) feet in which height there shall be not more than three (3) stories; provided that the height of a building erected on sloping ground may be thirty-five (35) feet plus a vertical distance equal to the vertical change in slope along and in the length of any side of such building but in no case shall such height exceed forty-five (45) feet above the adjacent finished ground level; provided, further, that spires, towers or steeples erected as a part of such building and not used for habitation or storage may extend not to exceed ten (10) feet above such height limit.

Area Allowable

Sec. 2203. The maximum floor area allowable for a Type V building shall in no case exceed that specified under Occupancy in Part III or Location in Part IV.

Foundations

Sec. 2204. All exterior walls of Type V buildings shall be supported on continuous masonry or reinforced concrete walls or footings and shall be of sufficient size to safely support the loads imposed as determined from the character of the soil. (See appendix for table of footing dimensions for type V building.)

Exceptions: (1) For Type V buildings (except residence buildings) of post and girder construction continuous walls or footings shall not be required.

(2) A one (1) story building, except a dwelling, which does not exceed four hundred (400) square feet in area, may be constructed without a masonry or reinforced concrete foundation, providing such building is placed on an all-heart redwood, cedar or cypress, or on a creosoted wood mudsill.

Foundations for all buildings where the surface of the ground slopes more than one (1) foot in ten (10) feet shall be level or shall be stepped so that both top and bottom of such foundation shall be level.

Foundation walls used as retaining walls and all retaining walls shall be not less than eight (8) inches in thickness when five (5) feet or less in height. Such walls when more than five (5) feet in height shall be not less than eight (8) inches in thickness at the top and shall be increased one (1) inch in thickness for every additional foot in height.

Foundations of Type V buildings may be of piles, constructed as provided in Chapter 28.

Screened openings through foundation walls or exterior walls shall be provided for cross ventilation under the first floor on the basis of two (2) square feet for each twenty-five lineal feet or major fraction thereof of exterior wall, except that such openings need not be placed in the front of such building. The screen for covering such openings shall have a maximum of one-half ($\frac{1}{2}$) inch mesh and shall be galvanized. (See Appendix.)

Exterior Walls and Wall Coverings

Sec. 2205. Exterior walls of all Type V buildings having a floor area of four hundred (400) square feet or more shall be constructed with studding not less than two inches by four inches (2"x 4") spaced not more than sixteen (16) inches on centers, or such walls may be constructed of not less than four inch by four inch (4"x 4") posts spaced not more than five (5) feet on centers, or of larger members designed as specified in Chapter 25, or may be of post and beam framing with plank sheathing not less than one-and one-half (1½) inches thick or may be of laminated construction not less than four (4) inches nominal in thickness with the structural assembly properly designed to support all loads.

Buildings three stories in height shall have the first story studs not less than two inches by six inches (2"x 6") spaced not more than sixteen (16) inches on centers.

Where studs continue through more than one story, joists shall be nailed securely to the studs and shall be supported upon a one inch by three inch (1"x 3") ribbon notched into the studs and securely nailed thereto. Where stories are framed separately, each tier of studding shall have top and bottom plates and the top plates shall be doubled and lapped at all corners and intersections. Laps in separate pieces of the top plate shall be staggered not less than two (2) feet.

All exterior walls and partitions shall be thoroughly and effectively angle braced.

Maximum allowable height of two inch by four inch (2"x 4") stud framing shall be fourteen (14) feet and of two inch by six inch (2"x 6") stud framing shall be twenty (20) feet unless the wall is supported laterally by adequate framing in a horizontal direction, perpendicular to the direction of the stud wall.

All walls shall be effectively fire stopped at the floor and ceiling and at the spring of cove in a coved ceiling. Fire stops shall also be placed between the floor and the ceiling in such a manner that there shall be no concealed air spaces with a dimension greater than seven (7) feet. Fire stopping shall consist of not less than two (2) inch material and shall be the full thickness of the stud wall. Where stories are not framed separately, fire stopping shall be placed behind the ribbon at the ceiling line and at the top of joists at the floor line. Such fire stopping shall be two (2) inches thick and the full width of the stud.

All openings four (4) feet wide or less shall be provided with double headers not less than two (2) inches thick placed on edge, and such headers shall have two (2) inch solid bearing to the floor or bottom plate. All openings more than four (4) feet wide shall be trussed or provided with lintels which shall have not less than two (2) inch solid bearing to the floor or bottom plate. (See Section 2507, paragraph (g)).

Underpinning shall be not less in size than the studding of the story above; provided, that all underpinning exceeding four (4) feet in height shall be not less in size than the studding required for an additional story. All such underpinning shall be effectively braced.

The space under the first floor joists of all Type V buildings (except such space as is occupied by a basement or cellar) shall

be provided with a sufficient number of ventilating openings to insure ample ventilation and such openings shall be covered with wire mesh with openings in such mesh not greater than one-half (1/2) inch in any dimension. Such ventilating openings shall be proportioned on the basis of two (2) square feet for each twenty-five (25) lineal feet or major fraction thereof of exterior wall; except, that such openings need not be placed in the front of such building.

An all-heart redwood, cedar or cypress, or a creosoted wood mudsill not less than two (2) inches thick and not less in width than the wall framing supported thereon shall be placed under all walls or partitions that rest on masonry or reinforced concrete foundations.

All Type V buildings three (3) stories in height shall have the exterior walls thoroughly covered with a solid sheathing of wood not less than five-eighths (5/8) of an inch thick, or approved fiber-board not less than seven-sixteenths (7/16) of an inch thick or approved incombustible sheathing not less than one-half (1/2) an inch thick.

All exterior walls shall be covered on the outside with weatherboarding, shingles, stucco, masonry veneer or galvanized metal as specified in this section or by other similar approved materials.

The minimum requirements for wall coverings for Type V buildings are as specified in parts (a), (b), (c), (d), and (e) of this Section.

(a) Weatherboarding. Studs shall be covered on the outside face with one layer of two-ply waterproofed building paper applied and tacked shingle fashion with joints horizontal. Horizontal joints of the paper shall be lapped at least two (2) inches and perpendicular joints at least six (6) inches. Weatherboarding, when in place, shall have an average thickness of not less than five-eighths (5/8) of an inch and a minimum thickness of not less than three-eighths (3/8) of an inch. Such weatherboarding shall be placed over the paper and shall be securely nailed to the studding with not less than two nails to each stud in each piece of such weatherboarding. Horizontal joints in the weatherboarding shall be tongued and grooved or ship-lapped joints, or such weatherboarding shall be laid shingle fashion and lapped not less than one-half (1/2) inch. Building paper may be omitted where the interior face of the studs is not covered or where there is no human occupancy. Weatherboarding of lesser thickness may be used provided the outside face of the studs is first sheathed solid with boards not less than five-eighths (5/8) of an inch thick.

(b) Shingles or Shakes. Shingles or shakes may be used for the exterior wall covering when applied as follows: The outside face of the studs shall be first sheathed with board of uniform thickness not less than twenty-five thirty-seconds (25/32) of an inch thick and such sheathing shall be securely nailed to the studding with not less than two (2) eight penny (8) common nails to each stud in each piece of sheathing eight (8) inches or less in width and not less than three (3) such nails when such sheathing boards exceed eight (8) inches in

width. Shingles or shakes shall be applied over such sheathing as specified for roofs in Section 4305.

(c) Stucco. Stucco may be applied with or without sheathing or similar backing.

In all cases except in back plastered construction a substantial waterproofed paper or asphalt saturated felt weighing not less than fourteen (14) pounds per one hundred (100) square feet or any substantial waterproofed paper which successfully passes a sixty (60) pound Mullen test shall be applied weather-board fashion directly over the studs or sheathing. Horizontal joints shall be lapped not less than two (2) inches and vertical joints not less than six (6) inches. Where sheathing or similar backing is not used a sixteen (16) W. & M. gauge wire stretched taut horizontally across the stud frame at not more than eight (8) inch centers shall be securely fastened in place before the paper or felt is applied; provided, that where such paper or felt is fastened to the metal reinforcing in such a manner as not to affect the waterproof qualities of such paper or felt the wire need not be installed.

In all cases a metal reinforcement shall be used of either expanded metal or wire fabric as follows:

1. Expanded metal cut from sheets not less than twenty (20) U. S. gauge in thickness with mesh not less than three-fourths ($3/4$) inch in least dimension, nor more than four (4) inches in greatest dimension and not exceeding six (6) square inches in area; the fabric shall weigh not less than one and eight-tenths (1.8) pounds per square yard.

2. Wire fabric composed of wires not smaller than shown in the following table and with no openings or mesh therein less than three-fourths ($3/4$) inch nor greater than two (2) inches. The minimum allowable gauge of the wire for the various meshes shall be as follows:

For openings not exceeding 1 inch—18 W. & M. Gauge.

For openings not exceeding 2 inches—16 W. & M. Gauge.

3. Expanded metal lath weighing not less than three (3) pounds per square yard.

4. Electrically welded wire of sixteen (16) W. & M. gauge with openings not exceeding two (2) inches in greatest dimension and not exceeding four (4) square inches in area.

Metal reinforcing shall be securely fixed in place using a furring device that will positively fur the metal reinforcing at least one-fourth ($1/4$) inch from the studs, sheathing or other backing. No form of strips or metal rods shall be used for furring which will serve to weaken the stucco. Metal reinforcing shall be secured with not less than four penny (4d) nails driven to at least three-fourths ($3/4$) inch penetration in the studs or sheathing. Nails and furring devices shall be not more than six (6) inches apart vertically. Horizontal and vertical joints of the metal reinforcing shall be lapped at least one full mesh. All horizontal joints between studding shall have not less than one tie with number eighteen (No. 18) annealed tie wire except when building is sheathed and all vertical joints shall be made at the studs when attached directly thereto.

Secs. 2205-2206

Stucco shall consist of three (3) coats: (1) First or scratch coat, (2) Second or brown coat, (3) Finish coat. The total thickness of the three coats shall be not less than seven-eighths ($7/8$) of an inch thick at every point. No one coat of stucco shall be less than one-fourth ($1/4$) inch thick, except the finish coat, which shall be not less than one-eighth ($1/8$) inch in thickness at any point.

The stucco shall be of Portland cement and sand as specified in Chapter 26, with an addition of not more than ten (10) per cent of hydrated lime or similar material based on volume of cement in either the scratch coat or brown coat and with not more than thirty-three and one-third ($33\frac{1}{3}$) per cent of hydrated lime or similar material based on volume of cement in the finish coat.

The first or scratch coat of stucco shall be shoved thoroughly through the metal reinforcing until all space between the metal and the backing is filled solidly and such coat shall be kept thoroughly moist during the first twenty-four (24) hours after being applied. At least seven (7) days shall elapse between the application of the scratch coat and the application of the brown coat.

The above requirements shall not apply to stucco placed on masonry backing. Before applying stucco on any masonry backing such backing shall be thoroughly washed and cleaned.

Gunitite, as defined in Chapter 26, shall be applied in not less than two (2) coats, and shall be reinforced as specified for "Stucco" in this Section. Gunitite shall be not less than three-fourths ($3/4$) of an inch in thickness on one or two story buildings and not less than one (1) inch in thickness on three story buildings.

(d) Masonry Veneer. In all cases before applying masonry veneer a substantial waterproofed paper or asphalt saturated felt weighing not less than fourteen (14) pounds per one hundred (100) square feet shall be applied weatherboard fashion directly over the studs, sheathing or backing as specified for "Stucco" under part (c) of this Section, except that no wire need be stretched back of such paper.

Masonry veneer shall be not less than two and one-half ($2\frac{1}{2}$) inches thick for one story only, and not less than four (4) inches thick for more than one story. The masonry shall be bonded to the studs by means of corrugated galvanized iron twenty-four (24) gauge strips or twenty penny (20d) nails, in both cases not more than sixteen (16) inches apart horizontally and twelve (12) inches apart vertically. Such veneer shall not be permitted above two stories, except for gables. The veneer shall be supported directly on the foundation.

(e) Galvanized Iron. Galvanized iron not less than twenty-eight (28) gauge may be used on stud walls without sheathing. Walls shall be effectively braced and nailing strips shall be placed in such manner as to permit the metal to be nailed at vertical intervals of not more than four (4) feet. (For complete plastering provisions, see appendix, refer to Chapter 47.)

Interior
Partitions

Sec. 2206. All interior partitions shall be constructed, framed and fire stopped as required for exterior walls as spe-

- cified in Section 2205, except that interior non-bearing partitions may have a single top plate, and except that where non-bearing partitions are approximately parallel and not more than four (4) feet apart, two inch by three inch (2"x 3") studs sixteen (16) inches on centers, may be used.

Sec. 2207. Girders supporting first floor joists in residence buildings shall be not less than four inches by four inches (4"x 4") for spans of five (5) feet or less, or not less than four inches by six inches (4"x 6") (placed on edge) for spans not more than seven (7) feet.

**Floor
Construction**

The following table gives the maximum allowable spans for floor joists of Douglas fir (Oregon pine) common structural joist grade, based on a forty (40) pound per square foot uniformly distributed live load.

Size of Joists (Inches)	Spacing of Joists, Center to Center (Inches)	Maximum Allowable Span (Feet and Inches)	
		Plastered Ceiling Below	Without Plastered Ceiling Below
2 x 6	12	10- 0	12- 0
	16	9- 1	10- 6
	24	8- 0	8- 7
2 x 8	12	13- 3	15-11
	16	12- 1	13-11
	24	10- 8	11- 5
2 x 10	12	16- 8	19-11
	16	15- 3	17- 4
	24	13- 5	14- 5
2 x 12	12	20- 1	23-11
	16	18- 5	20-11
	24	16- 2	17- 5
2 x 14	12	23- 5	27- 8
	16	21- 5	24- 4
	24	18-11	20- 3
3 x 6	12	11- 8	15- 0
	16	10- 8	13- 1
	24	9- 4	10-10
3 x 8	12	15- 4	19- 8
	16	14- 0	17- 4
	24	12- 4	14- 4
3 x 10	12	19- 3	24- 7
	16	17- 8	21- 8
	24	15- 7	18- 0
3 x 12	12	23- 1	29- 4
	16	21- 3	25-11
	24	18- 9	21- 8
3 x 14	12	26-11	30- 0
	16	24-10	30- 0
	24	22- 1	25- 2

Joists of other grades, other woods and other sizes may be

used, in which case they shall not be stressed to exceed the maximum allowable fiber stress as specified in Chapter 25.

Floor joists shall have a clearance of not less than twelve (12) inches between the bottom of the joists and the surface of the ground underneath. (See Appendix—Section 2511.)

Joists under bearing partitions shall be installed as specified in Section 2506-(j). All joists, beams and girders shall be framed away at least two (2) inches from all flues and chimneys and at least four (4) inches from the back of any fireplace. All wood floor joists having a span of more than eight (8) feet shall have bridging as specified in Section 2506-(k).

Solid blocking not less than two (2) inches in thickness and the full depth of the joists shall be provided in the following places: over all girders except when not ceiled on the under side of joists, bearing walls, bearing partitions and around all stairways or other vertical openings. Such solid blocking shall serve as the required bridging specified in Section 2506-(k).

Trimmers and header joists more than four (4) feet long shall be doubled. Header joists over six (6) feet long and tail joists over twelve (12) feet long shall be hung in stirrups or metal joist hangers. Header beams shall be placed not closer than eighteen (18) inches from the face of a chimney. All spaces between chimneys and wood joists or beams shall be filled with loose incombustible materials placed in an incombustible support, or a metal collar connected to the chimney and fastened to the joists, beams or flooring to form an effective fire stop.

All joists shall have a minimum bearing of two (2) inches except when supported on a ribbon board and nailed securely to the adjoining stud.

Cutting of wood girders, beams or joists shall be limited to that permitted in Section 2506-(m).

Sec. 2208. The following table gives the maximum allowable span for Douglas fir (Oregon pine) common structural joist grade, ceiling joists and roof rafters.

Roof and
Ceiling
Construction

Size of Joists (Inches)	Spacing of Joists, Center to Center (Inches)	Maximum Allowable Span	
		(Feet and Inches) For Ceiling Joists	For Roof Rafters
2 x 4	12	11- 0	10- 4
	16	10- 0	9- 0
	24	8-11	7- 5
	32	7-10	6- 0
2 x 6	12	16- 7	15- 8
	16	15- 4	13- 9
	24	13- 8	11- 5
	32	12- 0	10- 0
2 x 8	12	21- 8	20- 8
	16	20- 2	18- 2
	24	18- 0	15- 1
	32	15-10	12- 0
2 x 10	12	26-10	25- 9
	16	25- 0	22- 9
	24	22- 6	18-10
	32	19- 6	14- 6

Joists or rafters of other grades, other woods and other sizes may be used, in which case they shall not be stressed to exceed the maximum allowable fiber stress as specified in Chapter 25.

The allowable span of roof rafters shall be measured from plate to ridge, except that where rafters are braced to ceiling joists and a complete truss is formed, to the satisfaction of the Building Inspector, the span shall be considered as the distance between intersecting points of trussing, when the allowable stresses are not exceeded.

Roof framing and trussing shall be thoroughly and effectively angle braced. Roof joists when supported on a ribbon board shall be well nailed to the stud.

Roof spaces shall be subdivided by a tightly fitted partition of matched wood or approved incombustible materials extending from the ceiling to the roof sheathing, so located as to subdivide this space into areas not exceeding twenty-five hundred (2500) square feet. All openings in such partitions shall have self-closing doors or equally effective devices to provide effective resistance to the passage of flames and gases.

Sec. 2209. Roof covering shall be a "Fire Retardant" roofing, except that for Groups H, I and J buildings an ordinary roofing may be used as specified in Section 4305. Wherever a composition roofing is used, the roof construction shall be solidly sheathed with wood, sheathing to be not less than twenty-five thirty-seconds (25/32) of an inch thick.

**Roof
Covering**

Sec. 2210. Enclosure walls for elevator shafts, vent shafts, stair wells and similar vertical openings through a building shall be of not less than one-hour fire-resistive construction as specified in Chapters 30 and 43 and where required under Occupancy in Part III, except that chutes and dumb-waiter shafts with a cross sectional area of not more than four (4) square feet may be lined with not less than one-fourth (1/4) inch asbestos covered with not less than twenty-six (26) gauge sheet metal with all joints in such sheet metal lock-lapped. All openings into any such vertical enclosures shall be protected by metal or metal-clad doors with either metal or metal-clad jambs, casings or frames.

**Enclosure
of Vertical
Openings**

Sec. 2211. Other parts of Type V buildings may be constructed of wood or shall be constructed of approved combustible or incombustible materials, and all such wood construction shall be as specified in Chapter 25. The carrying capacity of all members shall be calculated by the accepted principles of mechanics. The actual dimensions of timbers shall be used and not the nominal sizes in computations for stress and determination of size.

General

Combustible insulating materials may be placed in partitions, floor or roof framing but shall in no way interfere with the fire blocking or fire separations required by this Code.

PART VI.

ENGINEERING REGULATIONS, QUALITY AND DESIGN OF THE MATERIALS OF CONSTRUCTION

CHAPTER 23 — LIVE AND DEAD LOADS

Definitions

Sec. 2301. Dead Load. The dead load of a building shall include the weight of the walls, permanent partitions, framing, floors, roofs and all other permanent stationary construction entering into and becoming a part of a building. (See appendix for weights of construction materials.)

Live Load. The live load includes all loads except dead loads.

General

Sec. 2302. (a) Loads. Buildings and all parts thereof shall be of sufficient strength to support the estimated or actual imposed dead and live loads in addition to their own proper dead load, without exceeding the stresses noted elsewhere in this Code, provided that no building or part thereof shall be designed for live loads less than those specified in the following sections. Impact shall be considered in the design of any structure where impact loads occur. (See appendix for impact considerations.)

(b) **Design.** Any system or method of construction to be used shall admit of a rational analysis in accordance with well established principles of mechanics.

Special Load Con- siderations

Sec. 2303. (a) Provision shall be made in designing office floors for load of two thousand (2000) pounds placed upon any space two and one-half ($2\frac{1}{2}$) feet square wherever this load upon an otherwise unloaded floor would produce stresses greater than those caused by a uniformly distributed load of fifty (50) pounds per square foot.

(b) Corridors in dwellings shall be designed for not less than forty (40) pounds per square foot.

(c) In designing floors to be used for industrial or commercial purposes the actual live load caused by the use to which the building or part of the building is to be put, shall be used in the design of such building or part thereof, and special provision shall be made for machine or apparatus loads when such machine or apparatus would cause a greater load than specified for such use in Section 2304.

(d) Floors in office buildings and in other buildings subject to shifting of partitions without reference to arrangement of floor beams or girders shall be designed to support in addition to other loads a single partition of the type used in the building placed in any position.

(e) Public garages and commercial or industrial buildings in which loaded trucks are placed, used or stored shall have the

floor systems designed to support a concentrated rear wheel load of a loaded truck placed in any possible position.

Sec. 2304. The following unit loads shall be taken as the minimum live loads in pounds per square foot 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 loadings. **Unit Live Loads**

Apartments	40
Armories	150
Auditoriums—Fixed Seats	50
Movable Seats	100
Balconies and Galleries—Fixed Seats	50
Movable Seats	100
Dance Halls	100
Drill Rooms	100
Dwellings	40
Exterior Balconies	100
Fire Escapes	100
Garages	100
Gymnasiums	100
Hospitals—Wards and Rooms	40
Corridors and Public Rooms	100
Hotels—Guest Rooms and Corridors	40
Public Rooms	100
Corridors (Public)	100
Libraries—Reading Rooms	60
Corridors	100
Stack Rooms	125
Loft Building	100
Manufacturing—Light	75
Heavy	125
Marquise	60
Offices	50
Printing Plants—Press Rooms	150
Composing and Linotype Rooms	100
Public Rooms	100
Rest Rooms	50
Reviewing Stands and Bleachers	100
Roof Loads	(See Section 2305)
Schools—Class Rooms	40
Corridors	100
Sidewalks—800 lbs. Concentrated or	250
Skating Rinks	100
Stairways	100
Storage—Light	125
Heavy (Load to be determined from proposed use or occupancy, but never less than	250
Stores—Retail (Light Merchandise)	75
Wholesale (Light Merchandise)	100

Sec. 2305. Roofs having a rise of four (4) inches or less per foot of horizontal projection shall be designed for a vertical live load of thirty (30) pounds per square foot of horizontal projection applied to any or all slopes. **Roof Live Loads**

Reduction of Live Loads

(1) No reduction of the assumed live load shall be allowed in the design of any slabs, joists or beams.

(2) A reduction of the total live load used in the design of girders based on a certain tributary floor area shall be permitted as noted in the following schedule. This reduction shall not be carried into the columns nor shall such reduction be used in design of buildings to be used or occupied as warehouses or for storage purposes.

Reduction Allowed	Tributary Floor Area
5%	100 sq. ft.
10%	200 sq. ft.
15%	300 sq. ft. or more

(3) For determining the total live loads carried by columns the following reductions shall be permitted, the reductions being based on the assumed live loads applied to the entire tributary floor area:

Allowable Reductions for Warehouses and Storage Buildings

Carrying the roof.....	0	per cent
Carrying 1 floor and roof.....	0	per cent
Carrying 2 floors and roof.....	5	per cent
Carrying 3 floors and roof.....	10	per cent
Carrying 4 floors and roof.....	15	per cent
Carrying 5 or more floors and roof.....	20	per cent

Live Load Reductions for Manufacturing Buildings, Stores and Garages

Carrying the roof.....	0 per cent
Carrying 1 floor and roof.....	0 per cent
Carrying 2 floors and roof.....	10 per cent
Carrying 3 floors and roof.....	20 per cent
Carrying 4 or more floors and roof.....	30 per cent

Allowable Live Load Reductions for All Other Buildings

Carrying the roof.....	0 per cent
Carrying 1 floor and roof.....	0 per cent
Carrying 2 floors and roof.....	10 per cent
Carrying 3 floors and roof.....	20 per cent
Carrying 4 floors and roof.....	30 per cent
Carrying 5 floors and roof.....	40 per cent
Carrying 6 floors and roof.....	45 per cent
Carrying 7 or more floors and roof.....	50 per cent

(4) The base area of the footings of all buildings shall be designed in the following manner: The area of the footing which has the largest percentage of live load to total load shall be determined by dividing the total load by the allowable soil load. From the area thus obtained the dead load soil pressure of such footing is determined and the areas of all other footings of the building shall be determined on the basis of their respective dead loads only and such dead load soil pressure. In no case shall the load per square foot under any portion of any footing, due to the combined dead, live, wind and/or any other loads, exceed the safe sustaining power of the soil upon which the footing rests. The total reduced live load occurring in the column immediately above the footing shall be the live load used in the above computation.

Sec. 2307. For purposes of design the wind pressure upon all vertical plane surfaces of all buildings and structures, shall be taken at not less than ten (10) pounds per square foot for those portions of the building less than forty (40) feet above ground and at not less than twenty (20) pounds per square foot for those portions more than forty (40) feet above ground. **Wind Pressure**

The wind pressure upon sprinkler tanks, sky signs, or other similar exposed structures and their supports shall be taken as not less than thirty (30) pounds per square foot of the gross area of the plane surface, acting in any direction. In calculating the wind pressure on circular tanks, towers or stacks this pressure shall be assumed to act on six-tenths (6/10) of the projected area.

Where it shall appear that a building or structure will be exposed to the full force of the wind throughout its entire height and width, the pressure upon all vertical surfaces thus exposed shall be taken at not less than twenty (20) pounds per square foot.

The overturning moment resulting from the above calculations shall in no case exceed fifty (50) per cent of the dead load resisting moment.

Sec. 2308. 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 using durable metal signs, and it shall be unlawful to remove or deface such notices. The occupant of the building shall be responsible for keeping the actual load below the allowable limits. **Live Loads and Seating Capacity Posted**

The maximum seating capacity shall be conspicuously posted by the owner of the building 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 it shall be unlawful to remove or deface such notice or to permit more than this legal number of persons within such space.

Sec. 2309. Plans for other than residential buildings filed with the Building Inspector with applications for permits shall show on each drawing the live loads per square foot of area covered, for which the building is designed, and occupancy permits for buildings hereafter erected shall not be issued until the floor load signs, required by Section 2308, have been in- **Occupancy Permits for Changed Floor Loading**

Secs. 2309-2311

stalled. No changes in the occupancy of a building now existing or hereafter erected shall be made until a revised occupancy permit has been issued by the Building Inspector certifying that the floors are suitable for the loads characteristic of the proposed occupancy. (See Sections 206 and 207.)

**Retaining
Walls and
Basement
Floors**

Sec. 2310. When earth or water, or earth and water cause or may cause a pressure on any building or structure, such total pressure created shall be calculated in accordance with the best accepted engineering practice, and such calculations and design shall take into account any possible surcharge due to moving or fixed loads.

**Earthquake
Regulations**

Sec. 2311. (See Appendix).

CHAPTER 24 — MASONRY

(Quality and Design)

Sec. 2401. The quality and design of materials used in the construction of masonry buildings or of the masonry portions of any building shall conform to the minimum standards as specified in this Chapter. **Quality of Materials and Tests Required**

The following materials when used with mortar, and plain concrete and gypsum shall be classed as masonry and wherever used in any building shall conform to the minimum requirements specified in this Chapter.

- | | |
|--|-------------------------------|
| (a) Brick (clay, sand lime or concrete). | (c) Concrete (block or tile). |
| (b) Concrete (plain concrete). | (e) Hollow tile (clay). |
| | (d) Gypsum (see note (a)). |
| | (f) Stone. |

The Building Inspector may require structural and fire-resistant materials to be subjected to tests to determine their quality whenever there is reason to believe the materials used do not come up to the requirements of this Code and may require any tests to be repeated if there is any reason to believe that the material is no longer up to the specifications on which the approval was based.

Tests of materials shall be made in accordance with the Standard Specifications of the American Society for Testing Materials as such standard specifications are noted in this Chapter.

Note (a). This applies only to gypsum used in floor or roof construction, non-bearing walls or partitions, fireproofing or similar uses where not exposed to the weather.

Sec. 2402. Brick as used in this Code shall mean a structural unit of burned clay or shale formed while plastic into a rectangular prism, usually solid and about eight inches by three and three-fourth inches by two and one-fourth inches (8"x3 3/4"x2 1/4") in size. **Brick**

Brick shall be divided into three grades; namely, A, B and C, and the classification as to strength of any lot of brick shall be determined by the results of tests for that strength requirement in which it is lowest. Tests of brick shall be in accordance with the Tentative Methods of Testing Brick, A. S. T. M. Designation C67-28T of the American Society for Testing Materials. All brick shall conform to the Standard Specifications for Building Brick, A. S. T. M. Designation C62-29 of the American Society for Testing Materials. Brick shall be of quality at least equal to one of the three grades noted below:

Classification of Brick by Strength

Grades	Compressive Strength (Bricks Flatwise) (lbs. per sq. in.)		Modulus of Rupture (Bricks Flatwise) (lbs. per sq. in.)	
	Mean of Five Tests	Individual Minimum	Mean of Five Tests	Individual Minimum
A	4500 or more	3500	600 or more	400
B	2500 to 4500	2000	450 or more	300
C	1250 to 2500	1000	300 or more	200

**Sand
Lime
Brick**

Sec. 2403. Sand-lime brick shall be of a quality at least equal to one of the three grades noted below:

Grade	Absorption Limits per cent		Modulus of Rupture (Bricks flatwise) lbs. per sq. in.	
	Mean of 5 tests	Individual Maximum	Mean of 5 tests	Individual Minimum
A	9 or less	12	600 or more	400
B	9 to 15	18	450 or more	300
C	15 or more	No limit	300 or more	200

Tests shall be made in accordance with the Tentative Methods of Testing Brick, A. S. T. M. Designation C67-28T of the American Society for Testing Materials.

Sand-lime brick shall conform to the Tentative Specifications for Sand-Lime Building Brick, A. S. T. M. Designation C73-28T of the American Society for Testing Materials.

**Concrete
Brick**

Sec. 2404. Concrete brick shall be of a quality at least equal to one of the two grades noted below:

Grade	Compressive Strength (Bricks flatwise) lbs. per sq. in.		Modulus of Rupture (Bricks flatwise) lbs. per sq. in.	
	Mean of 5 tests	Individual Minimum	Mean of 5 tests	Individual Minimum
B	2250	1500	450	300
C	1250	1000	300	200

Tests shall be made in accordance with the Tentative Methods of Testing Brick, A. S. T. M. Designation C67-28T of the American Society for Testing Materials.

Concrete brick shall conform to the Tentative Specifications for Concrete Building Brick, A. S. T. M. Designation C55-28T of the American Society for Testing Materials.

**Plain
Concrete**

Sec. 2405. Monolithic concrete construction containing less than two-tenths (2/10) of one (1) per cent of reinforcement shall be classed as plain concrete. Plain concrete in walls and piers shall have a strength of not less than fifteen hundred (1500) pounds per square inch as specified in Section 2606, and such concrete shall be governed by the requirements specified in Chapter 26.

Cement, fine aggregate and coarse aggregate shall conform to the requirements specified in Chapter 26.

**Hollow
Concrete
Block or
Tile**

Sec. 2406. Hollow concrete block or tile shall be of a quality at least equal to either Grade A or B units as specified in this Section.

Classification of Hollow Concrete Block or Tile

Grade	Average Compressive Strength on Gross Cross-sectional Area as Laid in Wall (lbs. per sq. in.)	Absorption in 24 Hour Immersion (per cent)
A	1000	8
B	700	10

Grade A hollow concrete block or tile shall have a height of not more than one-half the width of the unit, shall have webs and shells of not less than one and one-half ($1\frac{1}{2}$) inches in thickness, and the air spaces in the individual unit shall not exceed one-third of the gross volume of the unit. The concrete used in Grade A units shall comply with the requirements for concrete specified in Chapter 26.

Where concrete block or tile have an average compressive strength of over twelve hundred (1200) pounds per square inch gross area, or where they are not exposed to a dampness, or where they are coated with stucco, the requirements as to absorption may be waived. For block or tile made of concrete weighing less than one hundred and forty (140) pounds per cubic foot, the average absorption in per cent by weight shall be not more than ten (10) multiplied by one hundred and forty (140) and divided by the unit weight in pounds per cubic foot of the concrete under consideration.

Hollow concrete units complying with the requirements for Grade A hollow concrete block or tile, as specified in this Section, and also complying with the requirements of the "Underwriters' Laboratories' Standard for Hollow Concrete Building Units," dated February 21, 1929, shall be considered as Grade A-Special concrete units. Underwriters' Laboratories' certificated hollow concrete building units may be considered as Grade A-Special units.

Tests on concrete block or tile shall be conducted in accordance with the Standard Specifications, Serial Designation P-1A-29 of the American Concrete Institute.

Sec. 2407. Gypsum as used in this Section means a product containing not less than sixty-four and one-half ($64\frac{1}{2}$) per cent by weight of calcium sulphate combined with water. **Gypsum**

Neat Gypsum, gypsum fiber concrete or gypsum coarse aggregate concrete used in floor and roof construction of either the reinforced gypsum suspension system or reinforced gypsum in which the gypsum acts structurally shall develop the following minimum ultimate compressive strength in pounds per square inch when dried to constant weight.

- (a) Neat gypsum (as used in pre-cast tile).....1800
- (b) Gypsum fiber concrete containing not more than twelve and one-half ($12\frac{1}{2}$) per cent by weight of wood chips, excelsior or fiber 500

Secs. 2407-2409

Gypsum coarse aggregate concrete of the following volumetric mixes:

- (c) One and one-half ($1\frac{1}{2}$) parts gypsum cement;
one (1) part sand; three (3) parts cinders..... 500
- (d) One and one-half ($1\frac{1}{2}$) parts gypsum cement;
one (1) part sand; three (3) parts slag..... 800
- (e) One and one-half ($1\frac{1}{2}$) parts gypsum cement;
one (1) part sand; three (3) parts gravel..... 800
- (f) One and one-half ($1\frac{1}{2}$) parts gypsum cement;
one (1) part sand; three (3) parts stone..... 800

Note: Compressive tests shall be made on four inch by twelve inch by four inch ($4 \times 12 \times 4$) specimens with the load applied to the four inch by twelve inch (4×12) face. The average compressive strength shall be not less than noted above and no one specimen shall test less than seventy-five (75) per cent of the average of the lot tested and not less than five (5) samples from the lot shall be tested to determine the average.

Gypsum tile or block used for partitions, walls, furring and enclosures may contain, intimately, mixed, not more than fifteen (15) per cent by weight of binding material consisting of wood chips, excelsior or fiber.

Gypsum partition tile or block shall be equal in quality to that specified in the Standard Specifications for Gypsum Partition Tile or Block, A. S. T. M. Designation C52-27, of the American Society for Testing Materials.

The chemical and physical properties of the gypsum and calcined gypsum shall be equal to that specified in the Standard specifications for Gypsum and Calcined Gypsum, A. S. T. M. Designation C22-25 and C23-22 respectively, of the American Society for Testing Materials.

Hollow
Clay
Tile

Sec. 2408. All hollow burned-clay load-bearing wall tile used for exterior, party, fire or division walls shall be well burned building units of clay or shale of a quality at least equal to one of the two grades noted below:

Grade	Absorption Limits per cent		Compressive Strength Based on Gross Area in lbs. per sq. in.*			
			End Construction		Side Construction	
	Mean of 5 tests	Individual Maximum	Mean of 5 Tests	Individual Minimum	Mean of 5 Tests	Individual Minimum
A	16 or less	19	1400 or more	1000	700 or more	500
B	25 or less	28	1000 or more	700	500 or more	350

*Gross area shall be taken as the total area enclosed by the outside dimensions of the unit taken in a direction perpendicular to that in which the load is carried.

All hollow burned-clay load-bearing wall tile shall meet the requirements of the Standard Specifications and Tests for Hollow Burned-Clay Load-Bearing Wall Tile, A. S. T. M. Designation C34-27 of the American Society for Testing Materials.

Mortars

Sec. 2409. All cement and limes used in mortar shall conform to the requirements of the Standard Specifications for these materials issued by the American Society for Testing Materials, having A. S. T. M. Designations as listed below:

- Quicklime for Structural Purposes.....C-5-26
- Hydrated Lime for Structural Purposes.....C6-24
- Specifications and tests for Portland Cement.....C9-26

Secs. 2409-2410

All mortar used in exterior and bearing walls, parapet, party, fire and fire division walls and piers shall be either lime-cement mortar or Portland cement mortar; provided, that when such walls of one story buildings are of solid masonry and do not exceed a height of sixteen (16) feet they may be built with lime mortar. Only lime-cement and Portland cement mortars shall be used for walls built of hollow units or built as hollow walls.

Lime Putty for masonry mortar shall be made by slaking to a smooth paste fresh and properly burned quicklime. The resultant paste shall be stored in a suitable box or other receptacle for not less than forty-eight (48) hours before mixing with sand. Hydrated lime may, in all cases, be substituted for an equivalent amount of lime putty.

(a) Lime mortar shall be composed of one (1) part of lime putty or dry hydrated lime to not over three (3) parts of sand by volume. Portland cement may be added to lime mortar replacing equal volumes of lime putty. When such addition is made the working stress may be increased proportionately up to the stress specified for lime-cement mortar.

(b) Lime-Cement Mortar shall be composed of one (1) part lime putty or dry hydrated lime, one (1) part Portland cement and six (6) parts of sand by volume.

(c) Cement Mortar shall be composed of one (1) part of cement and three (3) parts of sand by volume with an allowable addition of lime putty or hydrated lime of not to exceed fifteen (15) per cent by volume of the cement content.

The above proportions shall be based strictly according to the volume of the constituent parts.

Sec. 2410. (a) Brick, sand-lime brick and concrete brick. The maximum allowable working compressive stresses in brick, sand-lime brick and concrete brick masonry due to combined live, dead and other loads shall not exceed the following limits and the strength of the individual units in each class shall conform to the strength requirements as given in Section 2402 for the respective class of working stress.

**Allowable
Working
Stresses**

Grades and Minimum Average	Maximum Unit Working Stresses (pounds per square inch) Using various mortars		
	Lime Mortar	Lime Cement	Cement Mortar
A 4500	110	300	400
B 2500	100	250	300
C 1250	90	150	175

The above stresses are based on good workmanship with full mortar beds and full mortar joints and shall be allowed only with such construction.

The maximum allowable compressive stresses in hollow walls of brick due to combined live and dead loads, shall not exceed the stresses given in the above table, based upon the effective net cross sectional area of the wall.

(b) Concrete — plain. The maximum allowable working stresses in masonry of plain concrete shall be the following percentages of the ultimate strength of the concrete in compression as determined by the requirements of Chapter 26:

Compression 0.20 f'_c

Shear and diagonal tension 0.04 f'_c

where f'_c represents the ultimate compressive strength.

(c) Concrete block or tile. The maximum allowable compressive stresses in masonry of concrete block or concrete tile, due to combined live and dead loads, shall not exceed eighty (80) pounds per square inch of gross cross-sectional area when laid with Portland cement mortar, and seventy (70) pounds per square inch of gross cross-sectional area when laid with lime-cement mortar.

(d) Gypsum. Gypsum suspension systems, poured-in place or pre-cast, shall not be less than three (3) inches in thickness, and shall be designed to carry the total estimated dead, live and other loads, with a factor of safety of not less than four (4), and shall be of such character as to be readily calculable by the use of accepted engineering formulas, in which the stress in the suspension wires or cables shall be determined by the formula:

$$T = \frac{WL}{8d} \sqrt{L^2 + 16d^2}$$

NOTE:

T equals maximum tension in wires or cables in pounds per foot width of slab.

W equals load in pounds per square foot.

L equals clear span in feet between supports.

d equals deflection or "dip" of wires or cables in feet at center of span.

The wires or cables used shall be cold-drawn steel in which the allowable working stress shall not exceed twenty thousand (20,000) pounds per square inch.

When pre-cast or poured-in-place slabs or tiles or reinforced gypsum in which the gypsum acts structurally, are used, they shall be designed to carry the total dead, live and other loads in accordance with the accepted formulae for reinforced concrete construction as published in the report of the Joint Committee for Concrete and Reinforced Concrete as of August, 1924.

The following working stresses expressed in pounds per square inch shall not be exceeded:

	NEAT GYPSUM	GYPSUM FIBER CONCRETE with not more than 12½ per cent of wood chips, excelsior or fiber	GYPSUM COARSE AGGREGATE CONCRETE
Extreme fiber stress in compression in flexure	350	125	125
Direct compression or bearing	200	100	100
Bond between gypsum and reinforcing	40	30	30
Shearing Stress	30	20	20
Modulus of elasticity in lbs. per square inch	1,000,000	200,000	200,000
Ratio of modulus of elasticity of steel to that of gypsum (n).	30	150	150

(e) Hollow tile. The maximum allowable compressive stresses in masonry of hollow tile, due to combined live and dead loads, shall not exceed eighty (80) pounds per square inch of the gross cross-sectional area, when laid with Portland cement mortar, and seventy (70) pounds per square inch of gross sectional area when laid with lime-cement mortar.

(f) Stone. The maximum allowable compressive stresses in rubble stonework, due to combined live and dead loads, shall not exceed one hundred and forty (140) pounds per square inch when laid in Portland cement mortar, nor one hundred (100) pounds per square inch in lime-cement mortar.

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

Unit	Maximum Unit Working Stresses (pounds per square inch) laid in	
	Lime Cement Mortar	Portland Cement Mortar
Granite.....	640	800
Limestone.....	400	500
Marble.....	400	500
Sandstone.....	320	400

General Requirements

Sec. 2411. The effects of eccentric loads and lateral forces shall be fully analyzed and allowances made for them in design. Concentrated loads shall be distributed so as not to exceed the allowable working stresses as specified in Section 2410 by more than twenty-five (25) per cent.

CHAPTER. 25 — WOOD

(Quality and Design)

Sec. 2501. The quality and design of all wood except finish and millwork, used in the construction of all buildings shall conform to the requirements of this Chapter. **General**

All members shall be so framed, anchored, tied and braced together as to develop the maximum strength and rigidity necessary for the purpose for which they are used. No member shall be stressed in excess of the strength of its details and connections.

Workmanship in fabrication, preparation, and installation of material shall conform throughout to good engineering practice.

American Lumber Standards as set forth in "Simplified Practice Recommendations, R16-29" of the United States Department of Commerce, effective July 1, 1929, is hereby declared to be the basis for the determination of minimum acceptable sizes, for the assignment of allowable working stresses and quality of structural lumber for the purposes of this Code. Manufacturers association grades conforming to these provisions shall be accepted as complying with the requirements of this Code.

Sec. 2502. All wood structural members shall be of sufficient size and strength to carry their imposed loads safely and without exceeding the allowable working stresses as specified in Sections 2503 and 2504. **Determination of Required Sizes**

In computations to determine the required size of timber members the net cross sectional area or actual size shall be used and not the nominal size. Sizes required by this Code shall be deemed to refer to the nominal or commercial description of size unless stated in fractional minimums. American lumber standards dressed sizes shall be accepted as conforming to nominal or commercial descriptions of sizes.

Sec. 2503 (a) For the purpose of determining safe load-bearing capacity (or unit stress allowable) all lumber shall be included by the Building Inspector in one of the following classes: **Allowable Unit Stresses**

Class A. Lumber graded according to manufacturers' association commercial grades based on the provisions for structural material as defined in American Lumber Standards and lumber equivalent to the basic provisions for "Structural" material as defined in American Lumber Standards. Where lumber is grade-marked with the word "Structural" accompanied by the trade-mark of that manufacturers' association which publishes grading rules for the species so marked such lumber shall be included in Class A. Lumber which is not so grade-marked shall not be included in Class A unless other evidence as to its quality (grade) is furnished in accordance with the rulings of the Building Inspector.

Class B. Lumber manufactured in accordance with standard "Grading Rules" of a lumber manufacturers' association but which does not necessarily conform to the

Sec. 2503

basic provisions for "Structural" material as defined in American Lumber Standards. Lumber which is grade-marked and bears said manufacturers' association trade-mark shall be placed in this class. Lumber which is not so grade-marked shall not be included in Class B unless other evidence as to its quality (grade) is furnished in accordance with the rulings of the Building Inspector.

Class C. Other lumber.

(b) The safe carrying capacity of lumber included in Class A shall be determined by the following allowable unit working stresses:

TABLE I

**Allowable Unit Stresses for Structural Lumber and Timber
All Sizes, Dry Locations**

Species of Timber	Grade	Allowable Unit Stress in Pounds per sq. in.					
		Extreme Fibre in Bending		Maximum Horizontal Shear	Compression		Modulus of Elasticity
		Joist and Plank sizes 4" and less in thickness	Beam and Stringer Sizes 5" and thicker		Parallel to grain Short Columns	Perpendic- ular to grain	
	Working Stresses for Manufacturers' Association Standard Grades						
Douglas fir, Coast reg.	Dense Super-Structural	2000	2000	120	1466	380	1,600,000
	Super-Structural and Dense Structural.....	1800	1800	105	1300	345	1,600,000
	Structural	1600	1600	90	1200	345	1,600,000
	Common Structural	1200	1400	84	1100	325	1,600,000
Douglas fir Inland Empire	Dense Super-Structural	2000	2000	120	1466	380	1,600,000
	Dense Structural	1800	1800	105	1300	345	1,600,000
	No. 1 Common Dimension & Timbers.....	1135	1135	70	1010	315	1,500,000
Larch Western	No. 1 Common Dimension & Timbers.....	1135	1135	70	1010	325	1,300,000
Redwood	Super-Structural	2133	1707	93	1422	267	1,200,000
	Prime Structural	1707	1494	82	1245	267	1,200,000
	Select Structural	1280	1322	70	1100	267	1,200,000
	Heart Structural	1024	1150	56	1000	267	1,200,000

Sec. 2503

(c) The safe carrying capacity of lumber included in Class B shall be determined by the Building Inspector. The basis of determination of unit working stresses allowable shall be a comparison of the grade of lumber used with the provisions for "Common Structural" material in American Lumber Standards. The allowable unit working stress assigned by the Building Inspector shall bear the same proportion to the BASIC ALLOWABLE UNIT WORKING STRESS (for the same species) shown below as the grade of the lumber bears to the provisions for "Common Structural" material in American Lumber Standards. (The same Modulus of Elasticity for a given species may be used regardless of grade.)

Basic Allowable Unit Working Stresses—

(From Recommendations of United States Forest Products Laboratory for Lumber Conforming to the Basic Provisions of "COMMON STRUCTURAL" material in American Lumber Standards.)

Always Dry Locations

SPECIES	Allowable Stress in Pounds per sq. in.				Modulus of Elasticity
	Extreme Fibre in Bending	Compression		Horizontal Shear	
		Across Grain	With Grain*		
Cedar					
Western Red.....	720	200	560	64	1,000,000
Cedar					
Port Orford	880	250	720	72	1,200,000
Douglas Fir					
(Coast Region) ..	1200	325	880	72	1,600,000
Douglas Fir					
(Rocky Mt. Re.) ..	880	275	640	68	1,200,000
Fir, Golden, Noble Silver, White	880	300	560	56	1,100,000
Hemlock					
West Coast	1040	300	720	60	1,400,000
Larch, Western	960	325	880	80	1,300,000
Pine, Calif. Ida. & No. White, Lodgepole, Ponderosa Sugar, West. Yellow	720	250	600	68	1,000,000
Redwood	960	250	800	56	1,200,000
Spruce, Red, White, Sitka	880	250	640	68	1,200,000
Spruce, Engelmann.....	600	175	480	56	800,000

*For Posts and Timbers 6"x6" and larger and with unsupported length not greater than 10 times least dimension.

(d) The safe carrying capacity of lumber included in Class C shall be determined by the Building Inspector. The allowable unit stress assigned to any grade of Class C lumber by the Building Inspector shall not exceed eighty (80) per cent of

Sec. 2503

that stress which would be assigned to a similar grade of Class B lumber.

(e) Supplementary provisions to above allowable unit working stresses are:

Studding, posts and similar load-bearing members shall not be inferior in quality to No. 2 Common Dimension.

For joists, rafters, plank and similar horizontal load-bearing members no lumber shall be used unless it is of a grade equal to or better than No. 1 Common Dimension.

The allowable stresses given in this Section may be increased not to exceed fifty (50) per cent for dead and/or live loads in combination with wind or other loads, provided the resulting sections are not less than those required for dead and/or live loads alone.

The allowable stress in compression across the grain may be increased fifty (50) per cent above that specified in this Section for joists supported on a ribbon board and spiked to the studding.

Working values may be used without allowance for impact up to impact of one hundred (100) per cent of loads figured.

Shear stresses for joint details may be taken as fifty (50) per cent greater than the values for horizontal shear given in the table.

For direct tension the same values as for extreme fibre stress in bending may be used.

Sec. 2504

Allow-
able Unit
Stresses
for
Columns

Sec. 2504. (a) The unit working stresses in compression with grain for columns whose ratio of unsupported length to least dimensions does not exceed ten (10) (short columns), shall be not greater than that given in Section 2503.

(b) For columns the ratio of whose unsupported length to least dimension is greater than ten (10) (intermediate columns) the following formula shall be used until the reduction in allowable stress equals one-third the stress for short columns:

$$\frac{A}{P} = S \left[1 - \frac{1}{3} \left(\frac{l}{Kd} \right)^4 \right]$$

where

P=Total load in pounds

A=Area in square inches

P

=Unit compressive stress

A

S=Safe stress in compression with grain for short columns

l=Unsupported length in inches

d=Least dimension in inches

E=Modulus of elasticity

K=The — at the point of tangency of the
d

parabolic and Euler curves, at which

$$\frac{P}{A} = \frac{2}{3} S.$$

The value of K for any species and grade is,

$$\frac{\pi}{2} \sqrt{\frac{E}{6S}}$$

NOTE: The value of "S" is the value given in Section 2503 for "Compression With Grain" if the lumber used conforms to manufacturer's "structural" grades or to the provisions for "Common Structural" material in American Lumber Standards. For lumber of other grades the value of "S" shall be determined by the Building Inspector in the same manner as provided in Section 2503 (c) and Section 2503 (d).

(c) For columns the ratio of whose unsupported length to

least dimension ($\frac{l}{d}$) is greater than "K"

(long columns) the Euler formula below shall be used.

$$\frac{P}{A} = \frac{\pi^2 E}{36 \cdot \left(\frac{l}{d} \right)^2}$$

(d) Columns shall be limited in slenderness to $\frac{l}{d} = 50$.

Secs. 2505-2506

Sec. 2505. (a) Wood columns and posts shall be squared at the ends; shall be provided with metal base plates and dowels; shall be supported in basements by footings projecting at least two (2) inches above the finished floor; shall be superimposed on approved metal appliances where continuing through more than one story; shall not rest directly or indirectly on any floor beams, except in cases where there is no column below.

**Framing
Details;
Vertical
Members**

(h) Wood bolsters may be used to support a single floor or the roof beams only.

(c) Preservatives shall be applied to column ends where necessary to protect against possible dampness.

(d) Wood columns in basements when built in solid partitions shall be open on at least two (2) sides.

(e) Wood posts, except for minor structures and as piles, shall not be used as foundations below ground.

Sec. 2506. (a) Girders and beams where entering or resting on masonry walls shall have a bearing of at least four (4) inches with the under surface protected by a piece of asphalt saturated felt or paper or a metal bearing plate, or such end may be dipped or painted with creosote.

**Framing
Details;
Horizontal
Members**

Where members meet at columns they shall be fitted around or butted up close and held in place by metal strips unless the post caps provide sufficient anchorage.

(b) Built-up timbers shall have members bolted tightly together.

(c) Joists and rafter ends may be supported by a two-inch by four inch (2"x4") wood strip or cleat spiked or bolted to the girder.

(d) Wood members entering masonry party or fire walls shall be separated from the opposite side of the wall and from beams entering the opposite side of the wall by four (4) inch masonry. The ends of the joists, beams and/or girders shall be fire-cut to a bevel of not less than three (3) inches in their depth.

(e) Where girders and beams enter masonry they shall be provided with wall plates, boxes or anchors of an approved self-releasing type so arranged as to leave an air space of not less than one (1) inch at sides of member. Rigid boxes shall be provided in concrete walls. The ends of girders shall not be sealed in; provided, that where ends of timbers are well treated with creosote or other approved preservative they may be sealed in.

(f) Anchors for each tier of joists shall be provided where they enter masonry walls and also when they are parallel to masonry walls. Such anchors shall be not less than three-fourths (3/4) inch round iron anchors not less than thirty-six (36) inches long fitted with a three-fourths inch by ten-inch (3/4"x10") pin at the wall end, and with a two (2) inch hook at the inner end, and shall be spaced not more than six (6) feet apart. The hooks shall be inserted into a three-fourths (3/4) inch hole in the joists, two (2) inches up from the bottom when anchors are placed at the ends of joists. The pin at the opposite end shall be placed vertically in the wall four (4) inches from the opposite face, and embedded solidly in masonry and mortar. Such anchors shall in all cases occur on the opposite end of the same run of joists and ends of joists shall be

Secs. 2506-2507

lapped and spiked so as to form a continuous tie across the building. Anchors shall be placed across the top of the joists that run parallel to the wall, with the hook inserted into a three-fourths ($\frac{3}{4}$) inch hole in a two-inch by four-inch (2"x4") header fitted between the joists with similar headers continuous to the wall, parallel with the anchors. Pin ends shall be installed as herein provided for anchors at the ends of joists.

(g) The minimum permissible thickness of joists, rafters and studs shall be one and five-eighths (1 $\frac{5}{8}$) inches.

(h) Floor joists shall be supported by girders, bearing partitions or exterior walls. Where entering exterior stud walls, the joists shall be supported by a ribbon let into the studs if no plate is provided. Joists shall be well nailed to the supporting studs. Studs shall be doubled under the ends of doubled joists.

(i) Header joists over six (6) feet long and tail joists over twelve (12) feet long shall be hung in approved stirrup irons or joist hangers.

(j) Joists under bearing partitions and running parallel thereto shall be doubled and well spiked or separated by solid bridging not more than sixteen (16) inches on centers to permit the passage of pipes.

(k) Wood cross bridging shall be placed between joists if the span is over eight (8) feet. The distance between bridging or between bridging and bearing shall not exceed eight (8) feet. Wood cross bridging in dwellings may be three (3) inches in cross sectional area, but in other buildings shall not be less than six (6) inches.

Metal cross bridging of equal or greater strength may be used in place of the wood cross bridging.

(l) Solid two (2) inch bridging shall be placed between floor joists over all supports. Solid bridging shall be placed between joists at the edge of flooring when the attic space is only partially covered.

(m) Cutting of wood girders, beams or joists shall be limited to cuts and bore holes not deeper than one-fifth ($1/5$) the beam depth below its top located not further from the beam end than three (3) times the beam depth. Cuts in excess of above or bore holes with a diameter more than two (2) inches are not permitted without special provisions for framing the beams approved by the Building Inspector.

**Framing
Details;
Stud
Walls
and Partitions**

Sec. 2507. (a) Stud partitions shall be provided with soles or plates with dimensions not less than the studs where the partition studs do not rest on walls, girder beams, or do not pass through the floor to the top plate at the partition below.

(b) In bearing partitions the top plate shall be doubled and lapped at each intersection. Joints in the upper and lower members of the top plate shall be staggered not less than two (2) feet.

(c) Studs in bearing partitions and walls shall not be less than two inches by four inches (2"x4") in size. Where a bearing partition supports more than the weight of the roof and one floor the studs shall be not less than two inches by six inches (2"x6") or three inches by four inches (3"x4") except that underpinning may be of the same size as the studs immediately above when such underpinning is not more than four (4) feet in height.

Secs. 2507-2510

(d) Where studs pass through from floor to floor they shall be fire-stopped at point of passage through floors.

(e) Angles at corners where stud walls or partitions meet shall be framed solid so no lath can extend from one room to another. All exterior and main cross stud partitions shall be effectively and thoroughly angle braced.

(f) Stud partitions containing plumbing, heating or other pipes shall be so framed and the joists underneath so spaced as to give proper clearance for the 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 with solid bridging. Where plumbing, heating or other pipes are placed in or partly in a partition necessitating the cutting of the soles or plates, a metal tie not less than one-eighth ($\frac{1}{8}$) inch thick and one and one-half ($1\frac{1}{2}$) inches wide shall be fastened to the plate across and to each side of the opening with not less than four (4) sixteen-penny (16-d.) nails.

(g) Openings in stud partitions and walls shall be framed around with double studs at each side and double headers across the top resting on the short stud at each end. The double header shall be placed on edge and shall be trussed above for all openings over four (4) feet in width or where more than two (2) studs are cut away.

(h) Wood lath, furring or framing shall be placed not less than two (2) inches from any chimney and not less than four (4) inches from the back of any fireplace.

(i) Where wood partitions and masonry walls join, one-half ($\frac{1}{2}$) inch bolts ten (10) inches long with two inch by five inch by one-fourth ($2 \times 5 \times \frac{1}{4}$) inch iron plate washers shall be built into the masonry wall opposite each line of fire blocking and near the top, top plate or ribbon in each partition. The projecting end of the bolt shall pierce the partition and be securely fastened thereto.

Sec. 2508. (a) Valley rafters shall be not less than one and five-eighths by five and one-half inches ($1-5/8" \times 5-1/2"$) in size. Roof sheathing shall have a minimum thickness of twenty-five thirty-seconds ($25/32$) of an inch.

**Roof
Framing**

(b) Flashings shall be placed around all openings in and extensions of mechanical appliances or equipment through the roof.

(c) Anchors for joists and rafters shall be provided where they enter masonry walls and also where they are parallel to masonry walls as specified for joists in Section 2506 (f).

Sec. 2509. (a) Wood trusses and truss framing shall have all joints accurately cut and fitted together so that each bearing is true and drawn tight to the full bearing. All such trusses shall be properly secured in place by lateral bracing.

**Framing
Details;
Trusses**

(b) Washers of sufficient size to distribute the loads properly shall be used in connection with rods or metal members. Before a truss is loaded, the tension rods shall be well tightened.

(c) Timber trusses shall be securely anchored to the wall at points of bearing.

Sec. 2510. (a) Fire stops shall be provided at all inter-sections of interior and exterior walls with floors, ceilings and

**Fire
Stops**

Secs. 2510-2511

roof in such a manner as to effectively cut off communication by fire through hollow concealed spaces and prevent both vertical and horizontal drafts.

(b) Furred walls shall have fire stopping placed immediately above and below the junction of any floor construction with the walls or shall be fire-stopped the full depth of the joist.

(c) All stud walls or partitions shall have a continuous row of bridging or fire stopping which shall form a complete and effective separation in the entire width of partition at that point, placed in such a manner that there shall be no concealed air spaces greater than seven (7) feet in any dimension. Fire stops shall be the full width of the studding and sufficiently stiff to act as lateral bracing for the individual studs.

(d) Stair stringers shall be fire-stopped at least once in the middle portion of each run, and shall be fire-stopped by a header beam at the top and bottom, so as to effectively prevent the passage of fire. Full width fire blocking shall be placed between studs along and in line with the run of stairs adjoining such partitions.

(e) When sliding doors are pocketed in partitions, such pockets shall be completely fire-stopped at end, sides, top and bottom.

(f) All spaces between chimneys and wood framing shall be solidly filled with refuse mortar, loose cinders or other incombustible material placed in incombustible supports.

(g) All fire-stopping as required in this Section shall be not less than two (2) inches in thickness and not less in width than the enclosed space within the partition except as provided in paragraph (f) hereof for chimneys.

(h) All attic spaces or spaces between ceilings and the underside of roofs shall be divided into horizontal areas of not more than twenty-five hundred (2500) square feet with tight one-inch (1") partitions of matched wood or of approved incombustible materials. All openings through these partitions shall be protected by self-closing doors of the same thickness and materials as the partition.

Termite Provisions

Sec. 2511. Termite provisions. (See Appendix Sec. 2511.)

CHAPTER 26 — REINFORCED CONCRETE QUALITY AND DESIGN

- | | |
|---|--------------------------|
| <p>Sec. 2601. The quality of the materials used in reinforced concrete and the quality of reinforced concrete shall conform to the physical and chemical properties as specified in Section 2604.</p> | <p>Quality</p> |
| <p>Sec. 2602. The design of reinforced concrete shall conform to the rules and principles specified in this Chapter.</p> | <p>Design</p> |
| <p>Sec. 2603. The following definitions give the meaning of certain terms as used in this Chapter.</p> <p>Anchorage—The embedment in concrete of a portion of a reinforcement bar, either straight or with hooks, designed to prevent pulling out or slipping of the bar when subjected to stress. (The anchorage of tension reinforcement in beams includes only the embedded length beyond a point of contraflexure or of zero moment.)</p> <p>Column—An upright compression member, the length of which exceeds three times its least lateral dimension. (See Pedestal.)</p> <p>Column Capital—An enlargement of the upper end of a reinforced concrete column designed and built to act as a unit with the column and flat-slab.</p> <p>Concrete—A mixture of Portland cement, fine aggregate, coarse aggregate and water.</p> <p>Deformed Bar—(See Section 2604-d.)</p> <p>Effective Area of Reinforcement—The area obtained by multiplying the right cross-sectional area of the metal reinforcement by the cosine of the angle between its direction and that for which the effectiveness of the reinforcement is to be determined.</p> <p>Flat Slab—(See Section 2620.)</p> <p>Guniting—A mixture of Portland cement and fine aggregate, mixed dry, passed through a cement gun, hydrated at the nozzle and deposited under pressure in its place of final repose, and shall be considered as concrete for particulars of design as specified in Chapter 26.</p> <p>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 excess mixing water and usually recognized by its relatively light color.</p> <p>Mortar—A mixture of Portland cement, fine aggregate and water.</p> <p>Negative Reinforcement—Reinforcement so placed as to take tensile stress due to negative bending moment.</p> <p>Panel Length—The distance in either direction between centers of two columns of a panel, other than a diagonal direction.</p> <p>Pedestal—An upright compression member whose height does not exceed three times its least lateral dimension.</p> <p>Plain Concrete—(See Section 2405.)</p> <p>Portland Cement—The product obtained by finely pulverizing clinker produced by calcining to incipient fusion an intimate and properly proportioned mixture of argillaceous and calcareous materials, with no additions subsequent to calcination excepting water and calcined or uncalcined gypsum.</p> | <p>Definition</p> |

Positive Reinforcement—Reinforcement so placed as to take tensile stress due to positive bending moment.

Ratio of Reinforcement—The ratio of the effective area of the reinforcement cut by a section of a beam or slab to the effective area of the concrete cut by that section.

Reinforced Concrete—Concrete in which metal is embedded in such a manner that the two materials act together in resisting forces.

Materials

Sec. 2604. (a) Portland cement shall conform to the Standard Specifications and Tests for Portland Cement (A. S. T. M. Designation C9-26, of the American Society for Testing Materials.

(b) Concrete aggregates shall consist of natural sands, gravels, crushed rock, air-cooled blast-furnace slag, or other inert materials having clean, strong, durable, uncoated particles and shall meet the approval of the Building Inspector. Aggregates containing soft, friable, thin, flaky, elongated or laminated particles totaling more than three (3) per cent by weight, or containing shale in excess of one and one-half ($1\frac{1}{2}$) per cent, or silt and crusher dust finer than the No. 100 standard sieve in excess of two (2) per cent shall not be used. These percentages shall be used on the weight of the combined aggregate as used in the concrete. When all three groups of these injurious materials are present in the aggregate, the combined amounts shall not exceed five (5) per cent by weight, of the combined aggregate. Aggregates shall not contain strong alkali, or organic material which gives a color darker than the standard color when tested in accordance with the Standard Method of Tests for Organic Impurities in Sands for Concrete, A. S. T. M. Designation C40-27 of the American Society for Testing Materials.

The maximum size of the aggregate shall not be larger than one-fifth ($1/5$) of the narrowest dimension between forms of the member for which the concrete is to be used nor larger than three-fourths ($3/4$) of the minimum clear spacing between reinforcing bars, or between bars and forms. Maximum size of aggregate is defined as the clear space between the sides of the smallest square opening through which ninety-five (95) per cent by weight, of the material can be passed.

(c) Water used in mixing concrete shall be clean and free from injurious amounts of oil, acid, alkali, organic matter or other harmful substances.

(d) Metal reinforcement shall conform to the requirements of the Standard Specifications (A. S. T. M. Designation A15-14) for Billet-Steel Concrete Reinforcement Bars of structural, intermediate or hard grade or Standard Specifications (A. S. T. M. Designation A16-14) for Rail-Steel Concrete Reinforcement Bars, Standard Specifications of the American Society for Testing Materials, or Standard Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement (A. S. T. M. Designation A82-27); provided, that hard grade billet-steel bars larger than three-fourths ($3/4$) inch in diameter shall not be used where bending would be required; and provided, further, that the requirement in the above mentioned specifications for machining of deformed bars shall be eliminated.

Deformed bars, to receive that rating which permits the use of higher bond stresses than allowed for plain bars, shall show a bond strength twenty-five (25) per cent greater than that shown by plain bars of equivalent cross-sectional area.

(e) Storage of cement and aggregates shall be in a manner to prevent deterioration or the intrusion of foreign matter. Any material which has been damaged shall be immediately and completely removed from the work.

Sec. 2605. On concrete or reinforced concrete work the Building Inspector shall have the right to require the owner or his agent to make tests of the concrete from time to time to determine whether the materials and methods in use are such as to produce concrete or reinforced concrete of the quality specified and used in the design of the building or structure. The tests shall be made when ordered by the Building Inspector by the owner or his authorized representative and no responsibility for the expense of these tests shall attach to the Building Department. All such tests shall be made by competent persons approved by the Building Inspector and copies of the results shall be kept on file in the office of the Building Inspector for a period of not less than two years after the acceptance of the structure. Specimens for such tests shall be taken at the place where the concrete is being deposited and shall be taken, cured and tested in accordance with the Standard Method of Making and Storing Specimens of Concrete in the Field, A. S. T. M. Designation C31-27 of the American Society for Testing Materials.

**Test of
Materials**

Sec. 2606. Provisions for the design of structures embodied in this Chapter are based on the presumption of concrete of certain strength. To produce concrete of the required strength, the proportion of the mixing water to the cement shall be accurately controlled except that the ratios of water to cement suggested in this Section shall not apply to gunite.

The strengths of concrete indicated in the following table are the minimum ultimate strengths that may be expected of Portland cement concrete when using the tabulated ratios of water to cement and when the concrete is cured and tested as specified in Section 2605, but in all cases the strength used in the design shall be the ultimate measure and determining factor. Water or moisture contained in the aggregates must be included in determining the ratio of water to cement.

**Quality of
Concrete**

Approximate Proportions of Mixing Water to Cement

Strengths (Lbs. per sq. in.)	Water-Cement Ratio (U. S. Gal. of Water per cu. ft. of Cement)
1,500	8¼
2,000	7¼
2,500	6½
3,000	5¾

(See Appendix)

All structural drawings and plans submitted for approval shall show the proposed strength of concrete to be used and the water-cement ratio assumed to produce that strength, but the concrete produced and used shall develop a strength in twenty-eight (28) days not less than that shown on the plans as assumed in the design.

Secs. 2607-2609

Proportions
and
Consistency

Sec. 2607. The proportions of aggregates to cement for concrete of any water-cement ratio shall be such as to produce concrete that will work readily into the corners and angles of the form and around the reinforcement without excessive puddling or spading and without permitting free water to collect on the surface. The combined aggregates shall be of such composition of sizes that when separated by the No. 4 standard sieve, the weight retained on the sieve shall not be less than one-half ($\frac{1}{2}$) nor more than two-thirds ($\frac{2}{3}$) of the total, nor shall the amount of coarse material be such as to produce harshness in placing or honeycombing in the structure. When forms are removed, the faces and corners of the members shall be smooth and sound throughout.

Admixtures of lime or finely pulverized inert materials may be added but not in excess of six (6) per cent by volume of the cement used.

Control of
Proportions

Sec. 2608. The methods of measuring concrete materials shall be such that the proportion of water to cement can be accurately controlled during the progress of the work and easily checked at any time by the Building Inspector or his authorized representative. A tolerance of one-fourth ($\frac{1}{4}$) gallon of water per sack of cement in any batch of concrete will be allowed provided that the average for any ten (10) consecutive batches does not show a water content greater than that shown in the table and on plans as specified in Section 2606.

The method of delivering the aggregates to the work and of storing and handling shall be such that the moisture content of the aggregates as they come to the mixer shall not be subject to frequent or unnecessary changes.

Mixing and
Placing
Concrete

Sec. 2609. (a) Mixing. The concrete shall be mixed until there is a uniform distribution of the materials and the mass is uniform in color and homogeneous. In machine mixing, only hatch mixers shall be used. Each batch shall be mixed not less than one minute after all the materials are in the mixer and must be completely discharged before the mixer is recharged. Machine mixers shall have a peripheral speed of approximately two hundred (200) feet per minute.

(b) Cleaning Forms and Equipment. Before concrete is placed all equipment for mixing and transporting the concrete shall be cleaned, all debris shall be removed from the spaces to be occupied by the concrete, forms shall be thoroughly wetted (except in freezing weather) or oiled, and masonry that will be in contact with concrete shall be well drenched (except in freezing weather). Reinforcement shall be thoroughly cleaned and secured in position. Concrete shall not be placed until the forms and re-inforcement have been inspected and approved by the "Building Inspector."

(c) Removal of Water From Excavations. Water shall be removed from excavations before concrete is deposited, unless otherwise directed by the Building Inspector. Any flow of water into an excavation shall be diverted through proper side drains to a sump, or be removed by other approved methods which will avoid washing the freshly deposited concrete. Water vent pipes and drains shall be filled by grouting or otherwise, after the concrete has thoroughly hardened.

(d) **Transporting Concrete.** Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which shall prevent the separation or loss of the ingredients. It shall be deposited as nearly as practicable in its final position to avoid rehandling or flowing. Under no circumstances shall concrete that has attained its initial set be used.

(e) **Placing.** Concrete shall be thoroughly compacted with suitable tools. When necessary, openings shall be provided in the forms to permit the placing of concrete in such a manner as to avoid accumulations of hardened concrete on the forms or reinforcing bars. The concrete shall be thoroughly worked around the reinforcement.

(f) **Curing.** Exposed surfaces of concrete shall be kept moist for a period of at least seven (7) days after being deposited.

(g) **Depositing in Cold Weather.** When depositing concrete at freezing or near freezing temperatures, the concrete shall be maintained at a temperature of at least fifty (50) deg. F., but not more than one hundred twenty (120) deg. F. The concrete shall be maintained at a temperature of not less than fifty (50) deg. F. for not less than seventy-two hours after placing. When necessary, concrete materials shall be heated before mixing. Dependence shall not be placed on salt or other chemicals for the prevention of freezing.

(h) **Bonding Fresh and Hardened Concrete.** Before new concrete is deposited on or against concrete which has set, the forms shall be retightened, the surface of the set concrete shall be roughened, cleaned of foreign matter and laitance and thoroughly wetted but not saturated. The cleaned and wetted surfaces of the hardened concrete, including vertical and inclined surfaces, shall first be slushed with a coating of 1:2 cement mortar against which the new concrete shall be placed before the mortar has attained its initial set.

Sec. 2610. (a) Design of Forms. 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.

**Forms and
Details of
Construction**

Forms shall be so designed, braced and aligned as to keep the finished columns of the building plumb with not more than an error of 1 to 1,000 in the height of the exterior columns or of columns adjacent to elevators.

Temporary openings shall be provided at the base of column and wall forms, and at other points where necessary, to facilitate cleaning and inspection.

(b) **Removal of Forms.** Forms shall not be disturbed until the concrete has hardened sufficiently to permit their removal with safety. Shoring shall not be removed until the member has acquired sufficient strength to support safely its own weight and the load upon it. Members subject to additional loads during construction shall be adequately shored to support both the

member and construction loads in a manner that will protect the member from damage.

The Building Inspector may require forms to remain in place for a specified time.

(c) **Cleaning and Bending Reinforcements.** Metal reinforcement before being placed shall be thoroughly cleaned of loose mill and rust scale and of other coatings that will destroy or reduce the bond. Reinforcement shall be carefully formed to the dimensions indicated on the plans. Cold bends shall be made around a pin having a diameter of not less than four times the least dimension of the bar.

Metal reinforcement shall not be bent, straightened or handled in a manner that will injure the material. Bars with kinks or bends not shown on the plans shall not be used. Heating of reinforcement will be permitted only when approved by the Building Inspector.

(d) **Placing Reinforcement.** Metal reinforcement shall be accurately placed and secured and shall be supported by chairs, spacers, or hangers. The minimum clear distance between parallel bars shall be one and one-half ($1\frac{1}{2}$) times the diameter for round bars or one and one-half ($1\frac{1}{2}$) times the diagonal for square bars. The minimum clear distance between bars and forms shall be the diameter of round bars and the diagonal of square bars. If the ends of bars are anchored as specified in Section 2619, the clear spacing may be made equal to the diameter of round bars or to the diagonal of square bars, but in no case shall the spacing between bars be less than one (1) inch, nor less than one and one-third ($1\frac{1}{3}$) times the maximum size of the coarse aggregate. Bars shall be embedded a distance from any face of any member not less than the minimum distance as specified in Section 4301. The main longitudinal slab steel shall be spaced not more than two and one-half ($2\frac{1}{2}$) times the slab thickness, and not less than one-tenth ($1/10$) of one (1) per cent of transverse steel shall be provided.

(e) **Splices and Offsets in Reinforcement.** In slabs, beams and girders, splices of reinforcement shall not be made at points of maximum stress without the approval of the Building Inspector. Splices, where permitted, shall provide sufficient lap to transfer the stress between bars by bond and shear. In such splices the bars shall be spaced at the minimum distance specified in paragraph (d) of this Section.

Where changes in the cross-section of a compression member occur, the longitudinal bars shall be sloped for the full length of the member or offset in a region where lateral support is afforded. Where offset, the slope of the inclined portion from the axis of the member shall not be more than 1 in 6.

(f) **Protective Covering of Concrete.** At the under side of footings metal reinforcement shall have a minimum covering of three (3) inches of concrete.

In fire-resistive construction, metal reinforcement shall be protected as specified in Section 4301.

Exposed reinforcement bars intended for bonding with future extensions shall be protected from corrosion.

(g) **Construction Joints.** Joints not indicated on the plans shall be so made and located as to least impair the strength of the completed structure. Where a joint is to be made, any

excess water and laitance shall be removed from the surface after concrete is deposited. Before depositing of concrete is resumed the hardened surface shall be treated as specified in paragraph (h) of Section 2609.

At least one hour must elapse after concrete is deposited in the columns or walls before depositing in beams, girders, or slabs supported thereon. Haunches and column capitals shall be considered as part of, and to act continuous with, the floor.

Construction joints in floors shall be located near the middle 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. Provision shall be made for shear by use of reinforcement, inclined in both directions across the joint.

Pipes, conduits, or other openings shall not be allowed in concrete columns, and shall not be allowed in other reinforced concrete structural units unless special provision is made for the additional stress caused in the concrete and steel by the presence of the openings. No allowance shall be made for the strength of the pipe or conduits.

Sec. 2611. The design of reinforced concrete members shall be based on the following assumptions:

(a) Calculations shall be made with reference to working stresses and safe loads;

(b) A plane section before bending remains plane after bending, shearing distortions being neglected;

(c) The modulus of elasticity of concrete in compression is constant within the limits of working stresses, and the distribution of compressive stress in beams is rectilinear;

(d) The moduli of elasticity of concrete in computations for the position of the neutral axis, for the resisting moment of beams and for compression of concrete in columns, are as follows:

Moduli of Elasticity	Compressive Strength of Concrete at 28 days
(1) 1/15 that of steel	1,500 to 2,200 lbs. per sq. in.
(2) 1/12 that of steel	2,200 to 2,900 lbs. per sq. in.
(3) 1/10 that of steel	2,900 or more lbs. per sq. in.

(e) In calculating the moment of resistance of reinforced concrete beams and slabs the tensile resistance of the concrete is neglected;

(f) The bond between the concrete and the metal reinforcement remains unbroken throughout the range of working stresses. Under compression the two materials are therefore stressed in proportion to their moduli of elasticity;

(g) Initial stress in the reinforcement due to contraction or expansion of the concrete is neglected except in the design of reinforced concrete columns.

Sec. 2612. The symbols and notations used in this Chapter are defined as follows:

a = width of face of column or pedestal;

α = angle between inclined web bars and axis of beam;

A = total net area of column, footing, or pedestal, exclusive of fireproofing;

A' = loaded area of pedestal, pier or footing;

Assumptions for Design

Notation

- $A_c = A$ (1- p) net area of concrete core of column (core area minus reinforcement);
- A'_c = net area of concrete in columns with lateral ties (total column area minus area of reinforcement);
- A_s = effective cross-sectional area of metal reinforcement in tension in beams or compression in columns; and the effective cross-sectional area of metal reinforcement which crosses any of the principal design sections of a flat-slab and which meets the requirements of paragraph (d) of section 2620;
- A_v = total area of web reinforcement in tension within a distance of s (s_1, s_2, s_3 , etc.) or the total area of all bars bent up in any one point;
- b = width of rectangular beam or width of flange of T-beam;
- b_1 = dimension of the dropped panel of a flat-slab in the direction parallel to l_1 ;
- ϕ = base diameter of the largest right circular cone which lies entirely within the column (including the capital) whose vertex angle is 90 deg. and whose base is one and one-half ($1\frac{1}{2}$) inches below the bottom of the slab or the bottom of the dropped panel, (in flat-slab formulae);
- c = projection of footing from face of column (in footing formulae);
- d = depth from compression surface of beam or slab to center of longitudinal tension reinforcement;
- d' = depth from compression surface of a beam or slab to center of compression reinforcement;
- E_c = modulus of elasticity of concrete in compression;
- E_s = modulus of elasticity of steel = 30,000,000 lb. per sq. in.;
- f_c = compressive unit stress in extreme fiber of concrete;
- f'_c = ultimate compressive strength of concrete at age of twenty-eight (28) days, determined by tests made in accordance with Section 2605;
- f_r = compressive unit stress in metal core;
- f_s = tensile unit stress in longitudinal reinforcement;
- f_v = tensile unit stress in web reinforcement;
- F = total tension in a bar;
- F' = total tensile stress in a bar developed in the length " y ", (see paragraph (c) of Section 2619);
- h = unsupported length of column (see paragraph (b) Section 2621);
- I = moment of inertia of a section about the neutral axis for bending;
- j = ratio of lever arm of resisting couple to depth d ;
- k = ratio of depth of neutral axis to depth d ;
- l = span length of beam or slab (see paragraph (b) Section 2614);
- l = span length of flat-slab, center to center of columns, in the direction in which moments are considered;
- l_1 = span length of flat-slab, center to center of columns, perpendicular to the direction in which moments are considered;
- M = bending moment or moment of resistance in general;

M_o =sum of positive and negative bending moments in either direction, at the principal design sections of a panel of a flat-slab;

$n=E_s/E_c$ ratio of modulus of elasticity of steel to that of concrete;

Σ_o =sum of perimeters of bars in one set;

p =ratio of effective area of tension reinforcement to effective area of concrete in beams= A_s/bd ; and the ratio of effective area of longitudinal reinforcement to the area of the concrete core in columns;

P =total safe axial load on column whose h/R is less than 40;

P' =total safe axial load on long column;

r_a =permissible working stress in concrete over the loaded area of a pedestal, pier or footing;

R =ratio of positive or negative moment in two column strips or one middle strip of a flat slab, to M_o (in flat-slab formulae);

R =least radius of gyration of a section;

s =spacing of web members, measured at the mid-depth of the beam and in the direction of the longitudinal axis of the beam;

t =thickness of flange of T-beam;

t_1 =thickness of flat-slab without dropped panels or thickness of a dropped panel;

t_2 =thickness of flat-slab with dropped panels at points away from the dropped panel;

u =bond stress per unit of area of surface of bar;

v =shearing unit stress;

V =total shear;

w =uniformly distributed load per unit of length of beam or slab;

w =upward reaction per unit of area of base of footing (in footing formulae);

w' =uniformly distributed dead and live load per unit of area of a floor or roof;

W =total dead and live load uniformly distributed over a single panel area;

x =length of bar added for anchorage, including the hook, if any;

y =distance from the point at which the tension is computed to the point of beginning of anchorage;

Sec. 2613. As specified in Section 2606, the structural drawings and plans shall show the ultimate strength of concrete for which the several parts of the structures were designed. The working stresses for the design of buildings or structures shall be based on the ultimate strength indicated on the drawings as specified in Section 2606 and shall be in the ratios specified in this Chapter. The ultimate strength (f'_c) shall be the average strength attained at twenty-eight (28) days, based on six by twelve inch (6"x12") or eight by sixteen inch (8"x16") cylinders made, cured and tested in accordance with the Standard Methods of Making and Storing Specimens of Concrete in the Field (A. S. T. M. Designation C31-27) and

**Working
Stresses**

Standard Methods of Making Compression Tests of Concrete (A. S. T. M. Designation C39-27) of the American Society for Testing Materials. Gunit test cylinders shall be made in a manner that will permit the blast of air to firmly compact the materials and provide proper escapement of the air to eliminate possible back pressure, and such cylinders shall be cured and tested as specified above.

Working stresses in concrete and reinforcement are summarized as follows:

MAXIMUM ALLOWABLE STRESSES

CONCRETE: (a) Compression

1. Columns: varies (See paragraphs (c) and (d) Section 2621)
2. Long Columns: (See paragraph (h) Section 2621)
3. Piers and Pedestals..... $0.25f'_c$
4. Extreme Fibre, positive bending..... $0.40f'_c$
5. Extreme Fibre, negative bending..... $0.45f'_c$

(b) Shear: (1) Beams without special anchorage of longitudinal reinforcement.

6. No web reinforcement..... $0.02f'_c$
7. Stirrups and/or bent-up bars..... $0.06f'_c$
- (2) Beams with special anchorage of longitudinal reinforcement.

8. No web reinforcement..... $0.03f'_c$
9. Stirrups and/or bent-up bars..... $0.12f'_c$

NOTE: Web reinforcement in beams where the shear exceeds $0.06f'_c$ shall be subject to the approval of the Building Inspector and in no case shall the maximum unit shearing stress exceed 240 lbs. per sq. in.

(3) Flat-slabs.

10. At distance d from edge of column cap or dropped panel $0.03f'_c$

(4) Footings.

11. Same as 6.

12. Same as 8.

(c) Bond: (1) Plain Bars.

13. Beams and slabs, and one-way footings..... $0.04f'_c$
14. Two-way footings $0.03f'_c$

(2) Deformed Bars.

15. Beams and slabs, and one-way footings..... $0.05f'_c$
16. Two-way footings $0.0375f'_c$

STEEL:

(a) Tension.

17. Billet-steel bars:
Structural grade 16,000 lbs. per sq. in.
Intermediate grade 18,000 " " "
Hard grade (where permitted) 20,000 " " "
18. Rail-steel bars 20,000 " " " "

(b) Compression.

19. Ordinary reinforcing bars..... nf_c

20. Structural steel core of composite column 16,000 lbs. per sq. in.
(See paragraph (f) of Section 2621 for reduced stresses)
21. Structural steel column 16,000 lbs. per sq. in.
(See paragraph (g) of Section 2621 for reduced stresses)
22. Composite cast-iron column 10,000 lbs. per sq. in.
(See paragraph (f) of Section 2621 for reduced stresses)
23. Cold drawn steel wire 20,000 lbs. per sq. in.

Sec. 2614. (a) Formulas for Flexure. Computations of flexural resistance of reinforced concrete beams and slabs shall be based on the assumptions of Section 2611. The customary formulas or their equivalent shall be used.

Flexural Computations

(b) Span Length. The span length of freely supported beams and slabs shall be the clear span plus the depth of beam or slab but shall not exceed the distance between centers of the supports.

The span length for continuous or restrained beams built to act integrally with supports shall be the clear distance between faces of supports. For continuous or restrained beams having brackets built to act integrally with both beam and support and of a width not less than the width of the beam and making an angle of 45 deg. or more with the horizontal, the span may be measured from the section where the combined depth of the beam and bracket is at least one-third ($1/3$) more than the depth of the beam. No portion of such a bracket shall be considered as adding to the effective depth of the beam. Maximum negative moments are to be considered as existing at the ends of the span, as defined above.

In rectangular slabs reinforced in both directions the distribution of load shall be assumed to be inversely as the cubes of the spans.

(c) Unsupported Length of Beams. The distance between lateral supports of the compression area of a beam shall not exceed twenty-four (24) times the least width of compression flange.

(d) Requirements for T-Beams. In T-beam construction the slab shall be built integral with the beam. The effective flange width to be used in the design of symmetrical T-beams shall not exceed one-fourth ($1/4$) of the span length of the beam, and its overhanging width on either side of the web shall not exceed eight (8) times the thickness of the slab, and never more than one-half ($1/2$) the clear distance to the next beam.

For beams having a flange on one side only, the effective flange width to be used in design shall not exceed one-tenth ($1/10$) of the span length of the beam, and its overhanging width from the face of the web shall not exceed six (6) times the thickness of the slab, and never more than one-half ($1/2$) the clear distance to the next beam.

Where the principal slab reinforcement is parallel to the beam, transverse reinforcement, not less in amount than three-tenths (0.3) per cent of the sectional area of the slab, shall be provided in the top of the slab and shall extend across the beam and into the slab not less than two-thirds ($2/3$) of the

Secs. 2615-2616

width of the effective flange overhang. The spacing of the bars shall not exceed eighteen (18) inches.

Provision shall be made for the compressive stress at the support in continuous T-beam construction.

The overhanging portion of the flange of the beam shall not be considered as effective in computing the shear and diagonal tension resistance of T-beams.

Isolated beams in which the T-form is used only for purpose of providing additional compression area shall have a flange thickness not less than one-half ($\frac{1}{2}$) the width of the web and a total symmetrical flange width not more than four (4) times the web thickness.

Sec. 2615. Beams and slabs of equal spans freely supported or built to act integrally with beams, girders or other slightly restraining support, or beams and slabs built into masonry walls in a manner which develops only partial end restraint, and carrying uniformly distributed loads, shall be designed for the following moments at critical sections:

- (a) Beams and slabs of one span,
Maximum positive moment near center,
 $M = wl^2/8$ (1)
- (b) Beams and slabs continuous for two spans only,
(1) Maximum positive moment near center,
 $M = wl^2/10$ (2)
(2) Negative moment over interior support,
 $M = wl^2/8$ (3)
- (c) Beams and slabs continuous for more than two spans,
(1) Maximum positive moment near center and
negative moment at support of interior spans,
 $M = wl^2/12$ (4)
(2) Maximum positive moment near centers of end
spans and negative moment at first interior
support,
 $M = wl^2/10$ (5)
- (d) Negative moment at end supports for cases (a),
(b) and (c) of this Section.
 $M = \text{not less than } wl^2/16$ (6)

Sec. 2616. Beams and slabs of equal span built to act integrally with columns, walls, or other restraining supports and assumed to carry uniformly distributed loads, shall be designed, except as provided in Section 2615, for the following moments at critical sections:

- (a) Interior spans,
(1) Negative moment at interior supports except
the first,
 $M = wl^2/12$ (7)
(2) Maximum positive moment near centers of in-
terior spans,
 $M = wl^2/16$ (8)
- (b) End spans of continuous beams and slabs, and
beams and slabs of one span in which l/l is less
than twice the sum of the values of l/h for the
exterior columns above and below which are built
into beams;

**Moment Co-
efficients:
Freely
Supported,
Slightly
Restrained**

**Moment Co-
efficients:
Fully
Restrained**

Secs. 2616-2618

- (1) Maximum positive moment near center of span and negative moment at first interior supports,

$$M = w\ell^2/12 \dots\dots\dots (9)$$

- (2) Negative moment at exterior supports,

$$M = w\ell^2/12 \dots\dots\dots (10)$$

- (c) End spans of continuous beams, and beams of one span, in which l/l is equal to or greater than twice the sum of the values of l/h for the exterior columns above and below which are built into the beams:

- (1) Maximum positive moment near center of span and negative moment at first interior support,

$$M = w\ell^2/10 \dots\dots\dots (11)$$

- (2) Negative moment at exterior support,

$$M = w\ell^2/16 \dots\dots\dots (12)$$

In this section " I " represents the moment of inertia which for these calculations shall be computed on the assumption that the member is homogeneous, neglecting the reinforcement but including that part of the concrete section outside of the reinforcement which is ordinarily considered as fireproofing.

Sec. 2617. Continuously beams or slabs with unequal spans or with other than uniformly distributed loading, whether freely-supported or restrained, shall be designed for the actual moments under the conditions of loading and restraint.

Provision shall be made where necessary for negative moment near the center of short spans which are adjacent to long spans, and for the negative moment at the end supports, if restrained.

Sec. 2618. (a) The shearing unit stress, v , in reinforced concrete slabs, joists, beams and girders shall be computed by Formula 14 on the minimum width of rectangular beams and on the minimum web thickness in L or T-beams.

$$v = V/bjd \dots\dots\dots (14)$$

(b) Types of web reinforcement may consist of vertical or inclined stirrups or web reinforcing bars forming an angle of 30 deg. or more with the axis of the beam, or longitudinal bars bent up at an angle of 15 deg. or more with the axis of the beam, and shall be anchored at both ends as specified in paragraph (e) of Section 2619.

(c) Spacing of stirrups or bent-up bars shall not exceed the values given by Formula 15, where the shearing stress is not greater than $0.06f'_c$.

$$s = \frac{45d}{\alpha + 10} \dots\dots\dots (15)$$

Bent-up bars and stirrups shall be considered effective in reinforcing the web only within the area between two vertical planes distant $s/2$ in either direction from the point where the bent-up bar crosses the mid-depth of the beam.

Where the shearing stress is greater than $0.06f'_c$, the distance s shall be not greater than two-thirds ($2/3$) of the values given by Formula 15.

(d) Maximum shearing unit stresses computed by Formula 14, in beams where the longitudinal reinforcement is without

**Moment Coefficients:
Unequal
Spans, Non-
uniform Loads**

**Shear and
Diagonal
Tension**

special anchorage, shall not exceed the value given by Formula 16 and in no case shall it exceed $0.06f'_c$.

$$v = 0.02f'_c + \frac{f_v A_v}{bs} (\sin \alpha + \cos \alpha) \dots \dots \dots (16)$$

In beams in which the longitudinal reinforcement is anchored as specified in paragraph (e) of Section 2619, the shearing unit stress shall not exceed the value given by Formula 16 when $0.03f'_c$ is substituted for $0.02f'_c$, and in no case shall it exceed 240 lbs. per sq. in.

Where the entire web reinforcement consists of longitudinal bars bent up in a single plane the allowance for the quantity, $f_v A_v$,

$\frac{bs}{bs} (\sin \alpha + \cos \alpha)$ in Formula 16, shall not exceed 75.

(e) Combined web reinforcement shall be assumed to have a total shearing resistance of the sum of the shearing resistances computed of the various types separately, the shearing resistance of the concrete being included only once.

(f) Shearing unit stresses in flat-slabs, computed by Formula 14 (in which d shall be taken as $t - 1\frac{1}{2}$) on a vertical section which lies at a distance $t - 1\frac{1}{2}$ from the edge of the column capital and parallel with it, shall not exceed $0.02f'_c$ multiplied by the following factor: 1 plus the ratio which the cross-sectional area of the negative reinforcement in the width of strip directly above the column capital bears to the cross-sectional area of the negative reinforcement in the full width of two column strips. At least twenty-five (25) per cent of the total cross-sectional area of the negative reinforcement in two column strips must be within the width of strip directly above the column capital.

In no case shall the unit shearing stress exceed $0.03f'_c$.

The shearing unit stress, computed by Formula 14 (in which d shall be taken as $t - 1\frac{1}{2}$) on a vertical section which lies at a distance of $t - 1\frac{1}{2}$ from the edge of the dropped panel and parallel with it, shall not exceed $0.03f'_c$. At least fifty (50) per cent of the cross-sectional area of the negative reinforcement in two column strips must be within the width of strip directly above the dropped panel.

(g) Shear and diagonal tension in footings shall be taken as not less than that computed by Formula 14, and at the critical section shall not exceed $0.02f'_c$ for footings with straight bars nor $0.03f'_c$ for footings in which the bars are anchored at both ends by adequate hooks as specified in paragraph (e) of Section 2619.

The critical section for diagonal tension in footings on soil shall be computed on a vertical section through the perimeter of the lower base of a frustum of a cone or pyramid which has a base angle of 45 deg., and which has for its top the base of the column or pedestal and for its lower base the plane at the centroid of longitudinal reinforcement.

The critical section for diagonal tension in footings on piles shall be computed on a vertical section at the inner edge of the first row of piles entirely outside a section midway between the

face of the column or pedestal and the section defined for soil footings, but in no case outside of that section. For piles not arranged in rows, the critical section shall be taken midway between the face of the column and the section defined for soil footings.

Sec. 2619. (a) Bond stresses in beams where bar reinforcement is used to resist tensile stresses developed by beam action shall be taken as not less than that computed by Formula 17.

$$u = V / \Sigma_j d \dots \dots \dots (17)$$

For continuous or restrained members, the critical section for bond for the positive reinforcement shall be assumed to be at the point of inflection; that for the negative reinforcement shall be assumed to be at the face of the support, and at the point of inflection. For simple beams or at the outer ends of freely supported end spans of continuous beams, the critical section for bond shall be assumed to be at the face of the support.

Bent-up longitudinal bars, which, at the critical section, are within a distance $d/3$ from horizontal reinforcement under consideration may be included with the straight bars in computing Σ_j .

(b) Permissible bond stress where ordinary anchorage as described in paragraph (d) of this Section is provided, shall not exceed the values specified in Section 2613.

(c) Permissible bond stress where special anchorage is provided, as described in paragraph (e) of this Section, shall not exceed two and one-half ($2\frac{1}{2}$) times that specified in paragraph (b) of this Section. A sufficient additional length of bar shall be added beyond the theoretical point of zero moment to provide for the development of the excess in bond stress of that specified in paragraph (b) of this Section. The length x to be added for this purpose is expressed by Formula 18.

$$xu \Sigma_o = F - F' \dots \dots \dots (18)$$

The point of beginning of anchorage shall be taken at the edge of support for freely supported beams and at the point of inflection for fixed or continuous beams. Anchorage of negative reinforcing shall be toward the center of the beams from this point.

The length of bar added for anchorage may be either straight or bent. The radius of bend shall be not less than four (4) bar diameters.

(d) Ordinary anchorage in continuous, restrained or cantilever beams shall be the length of anchorage of the tensile negative reinforcement beyond the face of the support and shall provide for the full maximum tension by Formula 18. Such anchorage shall provide a length of bar not less than the depth of the beam. In the case of end supports which have a width less than three-fourths of the depth of the beam, the bars shall be bent down toward the support a distance not less than the effective depth of the beam. The portion of the bar so bent down shall be as near to the end of the beam as protective reinforcement permits. In continuous or restrained beams, negative reinforcement shall be carried to or beyond the point of inflection. Not less than one-fourth of the area of the positive

Bond and Anchorage

Secs. 2619-2620

reinforcement shall extend into the support to provide an embedment of ten (10) or more bar diameters.

In simple beams or at the outer ends of freely supported end spans of continuous beams at least one-fourth of the area of the tensile reinforcement shall extend along the tension side of the beam and beyond the face of the support to provide an embedment of ten (10) or more bar diameters.

(e) Special anchorage in addition to that required in paragraph (d) of this Section shall be provided as specified in this paragraph where increased shearing stresses are used as provided in paragraphs (c), (d), (f) and (g) of Section 2618, or where increased bond stresses are used as provided in paragraph (c) of this Section.

(1) In continuous and restrained beams, anchorage beyond points of inflection of at least one-third the area of the negative reinforcement and beyond the face of the support of at least one-third the area of the positive reinforcement, shall be provided to develop one-third of the maximum working stress in tension. The anchorage length x shall be computed by Formula 18, with bond stresses not greater than those specified in paragraph (b) of this section.

(2) At the edges of footings, anchorage for all the bars for one-third the maximum working stress in tension shall be provided within a region where the tension in the concrete, computed as an unreinforced beam, does not exceed 40 lbs. per sq. in. In any case the reinforcement bars shall extend to within four (4) inches of the edge of the footing but not closer than three (3) inches as specified in paragraph (f) of Section 2610.

(3) In simple beams or at the outer ends of freely supported end spans of continuous beams, at least one-half of the tensile reinforcements shall extend along the tension side of the beam to provide an anchorage beyond the face of the support for one-third of the maximum working stress in tension.

(f) Anchorage of web reinforcement at both ends shall be by providing continuity with longitudinal reinforcement, bending around the longitudinal bar or by means of a semi-circular hook which has a radius not less than four (4) times the diameter of the web bar.

Stirrup anchorage shall be so provided in the compression and tension regions of a beam as to permit the development of safe working tensile stress in the stirrup at a point $0.3d$ from either face.

The end anchorage of a web member not in bearing on the longitudinal reinforcement shall be such as to engage an amount of concrete sufficient to prevent the bar from pulling out. In all cases the stirrups shall be carried as close to the upper and lower surfaces as fireproofing requirements permit.

Sec. 2620. (a) Limitations. Flat-slab construction shall refer to concrete slabs having reinforcement bars extending in two or four directions, without beams or girders to carry the load to supporting members and with a ratio of length to width of panel not greater than 1.33. The moment coefficients, moment distribution and slab thicknesses specified herein are for slabs

**Flat-Slab
Construction**

which have three or more rows of panels in each direction, and in which the panels are approximately uniform in size. Slabs with paneled ceiling or with depressed paneling in the floor shall be considered as coming under the requirements herein given, provided the depth of the thicker portion of the slab does not exceed 1.5 times the depth of the remainder of the slab.

(b) **Panel Strips and Principal Design Section.** A flat-slab panel shall be considered as consisting of strips as follows:

A middle strip one-half panel in width, symmetrical with respect to the panel center line and extending through the panel in the direction in which moments are being considered;

Two Column strips, each one-quarter panel in width, occupying the two (2) quarter-panel areas outside of the middle strip.

When considering moments in the direction of the width of the panel, the panel is similarly divided by strips, the width of which are respectively one-half and one-fourth of the length of the panel.

The principal design sections are located as follows:

Sections for Negative Moment shall be taken along the edges of the panel; that is, along the lines joining the column centers. For the column strips, the section shall follow the center line between the columns to the edge of the column capital and then around the circumference of the column capital for one-quarter ($\frac{1}{4}$) circumference.

Sections for Positive Moment shall be taken on the center line of the panel, crossing the strips for which moments are being considered.

(c) **Moments in Interior Panels.** Flat-slabs in which the ratio of reinforcement, p , for negative moment in the column strip is not greater than 0.01, the numerical sum of the positive and negative moments in the direction of either side of a rectangular panel shall be not less than that given by Formula 19.

$$M = 0.09 Wl (1 - 2c/3l)^2 \dots \dots \dots (19)$$

(d) **Moments in Principal Design Sections.** The moments in the principal design sections shall be those given in the accompanying table of moments, except as follows:

(1) The sum of the maximum negative moments in the two column strips may be greater or less than the values given in the table of moments by not more than $0.03M_o$.

(2) The maximum negative and the maximum positive moments in the middle strip and the sum of the maximum positive moments in the two column strips may be greater or less than the values given in the table of moments by not more than $0.01M_o$.

BENDING MOMENTS TO BE USED IN DESIGN OF FLAT SLABS

For Interior Panels Fully Continuous

Strip	Flat-Slabs without Dropped Panels		Flat-Slabs with Dropped Panels	
	Negative	Positive	Negative	Positive
Slabs with 2-way Reinforcement				
Column strip	0.23 M_o	0.11 M_o	0.25 M_o	0.10 M_o
2-Column strips	0.46 M_o	0.22 M_o	0.50 M_o	0.20 M_o
Middle strip	0.16 M_o	0.16 M_o	0.15 M_o	0.15 M_o
Slabs with 4-way Reinforcement				
Column strip	0.25 M_o	0.10 M_o	0.27 M_o	0.095 M_o
2-Column strips	0.50 M_o	0.20 M_o	0.54 M_o	0.190 M_o
Middle strip	0.10 M_o	0.20 M_o	0.08 M_o	0.190 M_o

(e) Lateral Dimensions of Dropped Panels. The dropped panel shall have a length or diameter in each direction parallel to a side of the panel of not less than one-third the panel length in that direction.

(f) Thickness of Slabs and Dropped Panels. The total thickness of the slab through the dropped panel, t , in inches, or of the slab if a dropped panel is not used, shall be not less than the value given by Formula 20.

$$t = 0.038 (1 - 1.44 c/l) l \sqrt{Rw'} l_1/b_1 + 1\frac{1}{2} \dots \dots \dots (20)$$

Note: The values of R in the above formula are the coefficients of M_o in the preceding table in this Section.

For slabs with dropped panels the total thickness in inches at points beyond the dropped panel shall be not less than

$$t = 0.02 l \sqrt{w'} + 1 \dots \dots \dots (21)$$

The dropped panel shall have a thickness of t_1 not greater than $1.5t_1$.

In determining minimum thickness by Formulas 20 and 21, the value of l shall be the panel length center to center of the columns, on the long side of panel and the value of l_1 shall be the panel width, center to center of the columns.

The slab thickness t_1 or t_2 shall in no case be less than $l/32$ for floor slabs, and not less than $l/40$ for roof slabs.

(g) Wall and Other Irregular Panels. In wall panels and other panels in which the slab is not continuous with an adjacent panel, the maximum negative moment at the edge of the panel opposite to the discontinuous edge and the maximum positive moment at the center of this panel shall be increased fifteen (15) per cent in the column strip perpendicular to the wall or discontinuous edge and thirty (30) per cent in the middle strip perpendicular to the wall or discontinuous edge. Such increase refers to the moments for interior panels as specified in paragraph (d) of this Section.

In these strips the bars used for positive moments perpendicular to the discontinuous edge shall extend to the edge of the panel at which the slab is discontinuous.

At the wall or discontinuous edge the negative moment in

the column strip shall be taken as not less than ninety (90) per cent and in the middle strip as not less than sixty-five (65) per cent of the corresponding moments for a normal interior panel as given in the table in paragraph (d) of this Section.

(h) Panels with Marginal Beams. A marginal beam which has a depth greater than the thickness of the dropped panel into which it frames, shall be designed to carry, in addition to the load superimposed directly upon it, a uniformly distributed load equal to at least one-fourth of the total live and dead load for which the adjacent panel or panels are designed. Slabs supported by marginal beams on opposite edges shall be designed as freely supported slabs for the entire load.

Column strips adjacent to and parallel with marginal beams having a depth less than the thickness of the dropped panel, shall be designed to resist the moment specified for a column strip in the table of moments. Column strips adjacent to and parallel with marginal beams having a depth less than the thickness of the dropped panel, shall be designed to resist a moment at least one-half as great as that specified for a column strip in the table of moments.

In wall columns where brackets are used in place of capitals, the value of c in the direction in which the bracket extends shall be taken as twice the distance from the center of the column to a point one and one-half ($1\frac{1}{2}$) inches back from the edge of the bracket and averaged with the value of c for an interior column capital in the computation for moments in Formula 19. The value of c for column strips parallel and adjacent to marginal beams shall be taken as equal to the width of the wall column if no bracket is used in this direction.

(i) Flat-Slabs on Bearing Walls. Where there is a beam or a bearing wall at the center line of columns in the interior portion of a continuous flat slab, the negative moment at the beam or wall line in the middle strip perpendicular to the beam or wall shall be taken as thirty (30) per cent greater than the negative moment specified in the table of moments in paragraph (d) of this Section for a middle strip. The column strip adjacent to and lying on either side of the beam or wall shall be designed to resist moments at least one-half of those specified in the table of moments for a column strip.

(j) Points of Inflection. In the middle strip the point of inflection for the slabs without dropped panels shall be assumed at a line $0.30 l$ distant from the center of the span, and for slabs with dropped panels $0.25 l$ distant from the center of the span.

In the column strip the point of inflection for slabs without dropped panels shall be at a line $0.30 (l-c)$ distant from the center of the panel and $0.25 (l-c)$ for slabs with dropped panels.

(k) Effective Reinforcement. The reinforcement which crosses any section and which fulfills the requirements given in paragraph (l) of this Section may be considered as effective in resisting the moment at the section. The sectional area of a bar multiplied by the cosine of the angle between the direction of the axis of the bar and any other direction may be considered effective as reinforcement in that direction.

(l) Arrangement of Reinforcement. The reinforcement

shall be securely fastened in place. All bars in rectangular or diagonal directions shall be carried to points at least twenty (20) diameters beyond the point of inflection on each side of a section of critical, positive, or negative moment. Lapped splices shall not be permitted at or near regions of maximum stress except as described in paragraph (e) of Section 2610. At least four-tenths (0.4) of all bars in each direction shall be of such length and shall be so placed as to provide reinforcement at two sections of critical negative moment and at the intermediate section of critical positive moment. Not less than one-third of the bars used for positive reinforcement in the column strip shall extend into the dropped panel at least twenty (20) diameters of the bar, or in case no dropped panel is used, shall extend to within one-eighth ($\frac{1}{8}$) of the span length from the center line of the column or the support.

(m) Special Panel Arrangement. For structures having a width of less than three rows of panels, or in which irregular or special panels are used, an analysis shall be made of the moments developed in both slabs and columns.

Reinforced Concrete Columns

Sec. 2621. (a) Limiting Dimensions. Reinforced concrete columns shall be not longer than forty (40) times the least radius of gyration, unless designed as long columns as specified in paragraph (h) of this Section. Principal columns shall have a minimum gross diameter of not less than twelve (12) inches.

(b) Unsupported Length and Radius of Gyration of Columns. The unsupported length of reinforced concrete columns shall be:

(1) In flat-slab construction the clear distance between the floor and under side of the capital or dropped panel above;

(2) In beam-and-slab construction, the clear distance between the floor and the under side of the shallowest beam framing into the column at the next higher floor level;

(3) In floor construction with beams in one direction only, the clear distance between floor slabs;

(4) In columns supported laterally by struts or beams only, the clear distance between consecutive pairs (or groups) of struts or beams, provided that to be considered an adequate support, two such struts or beams shall meet the column at approximately the same level and the angle between the two planes formed by the axis of the column and the axis of each strut respectively is not less than seventy-five (75) deg. nor more than one hundred five (105) deg.

When haunches are used at the junction of beams or struts with columns, the clear distance between supports may be considered as reduced by two-thirds of the depth of the haunch.

The radius of gyration of a column shall be computed from the concrete area of the core and the transformed section of the longitudinal steel area. That is, the actual area of the steel multiplied by n , this being assumed to be distributed uniformly around the periphery of the core.

(c) Design of Spiral Columns. The safe axial load on columns reinforced with longitudinal bars and closely spaced spirals enclosing a circular core, shall be not greater than that determined by Formula 22.

$$P = A [1 + (n-1)p] [300 + (0.10 + 4p)f'_c] \dots \dots \dots (22)$$

The longitudinal reinforcement shall consist of at least six bars of minimum diameter of one-half ($\frac{1}{2}$) inch, and the total effective cross-sectional area shall be not less than one (1) per cent nor more than six (6) per cent of that of the core.

The spiral reinforcement shall be not less than one-fourth ($\frac{1}{4}$) the volume of the longitudinal reinforcement. It shall consist of evenly spaced continuous spirals held firmly in place and true to line by at least three vertical spacer bars. The spacing of the spirals shall be not greater than one-sixth ($\frac{1}{6}$) of the diameter of the core and in no case more than three (3) inches.

Reinforcement shall be protected by a covering of concrete, cast monolithic with the core, of a thickness not less than that specified in Section 4301.

(d) Design of Columns with Lateral Ties. The safe axial load on columns reinforced with longitudinal bars and separate lateral ties shall be not greater than that determined by Formula 23.

$$P = (A'_c + A_s n) f_c \dots \dots \dots (23)$$

f_c shall not exceed $0.20f'_c$.

The amount of longitudinal reinforcement shall be not less than five-tenths (0.5) per cent nor shall the amount considered in the calculations be more than two (2) per cent of the total area of the column. The longitudinal reinforcement shall consist of not less than four bars of minimum diameter of one-half ($\frac{1}{2}$) inch and shall be protected by a covering of concrete, cast monolithic with the column, of a thickness not less than that specified in Section 4301.

Lateral ties shall be at least one-quarter ($\frac{1}{4}$) inch in diameter, spaced not more than eight (8) inches apart and the points of successive ties shall be placed in rotation around the column.

(e) Bending in Columns. The bending moments in interior and exterior columns shall be determined on the basis of loading conditions and end restraint and shall be provided for in the design.

In flat-slab construction, a bending moment at all interior columns equal to $W_l l / 40$ shall be assumed to cover all ordinary cases of unequal loading in floors and roofs. In this formula W_l = the total live load on one panel and l = the span, center to center of columns, lengthwise to the panels. Known eccentric loads and uneven spacing of columns shall be provided for in the design. Resistance to these bending moments shall be provided in the columns immediately above and below in direct proportion to the values of their ratios of l/h (See Section 2616 and paragraph (b) of this Section). In columns supporting roofs the moment shall be resisted by the column below.

Wall columns in flat-slab construction shall be designed to resist bending in the same manner as interior columns except that the total live and dead load in the panel shall be used

instead of the live load only when computing the moment. Any counter moment due to the weight of the structure that projects beyond the column center line may be deducted from the moment computed as just described.

The limiting unit stresses due to the combined axial load and bending shall be determined as follows:

(1) With Spiral Reinforcement—The compressive unit stress at the extreme fibre on the concrete within the core area under combined axial load and bending shall not exceed the value given by the expression $300 + (0.10 + 4p)f'_c$.

(2) With Lateral Ties—Additional longitudinal reinforcement may be used if required to provide for the bending stresses, and the compressive unit stress at the extreme fibre on the concrete under combined axial load and bending may be increased to $0.30f'_c$. The column section, however, shall be not less than that required by the provisions of paragraph (d) of this Section where axial load alone is considered. The total amount of reinforcement considered in the computations for combined stress shall be not more than four (4) per cent of the total area of the column.

(f) Composite Columns. The safe load on composite columns in which a structural steel or cast-iron column is thoroughly encased in a circumferentially reinforced concrete core shall be based on a unit stress of $0.25f'_c$ on the area within the spiral core plus the unit compressive stress on the steel or cast-iron core as determined by Formulae 24 and 25 respectively.

$$f_r = \frac{18,000}{1 + \frac{h^2}{18,000R^2}} \dots \dots \dots (24)$$

but shall not exceed 16,000 lbs. per sq. in.

$$f_r = 12,000 - 60 h/R \dots \dots \dots (25)$$

but shall not exceed 10,000 lbs. per sq. in.

The diameter of the cast-iron section shall not exceed one-half of the diameter of the core within the spiral. The spiral reinforcement shall be not less than five-tenths (0.5) per cent of the volume of the core within the spiral and shall conform in quality, spacing and other requirements to the provisions for spirals in paragraph (c) of this Section.

Ample section of concrete and continuity of reinforcement shall be provided at the junction with beams or girders. The area of the concrete between the spiral and the metal core shall be not less than that required to carry the total floor load of the story above on the basis of a stress in the concrete of $0.35f'_c$ unless special brackets are arranged on the metal core to receive directly the beam or slab load.

(g) Structural Steel Columns. The safe load on a structural steel column of a section which fully encases an area of concrete and which is protected by an outside shell of concrete at least three (3) inches thick, shall be computed in the same manner as for composite columns in paragraph (f) of Section 2621, allowing $0.25f'_c$ on the area of the concrete enclosed by the steel section. The outside shell shall be reinforced by wire mesh weighing not less than two-tenths (0.2) lbs. per sq. ft. or by ties or spirals of equal weight, and with a spacing of not

more than six (6) inches between strands or hoops. Special brackets shall be used to receive the entire floor load at each story. The safe load in steel columns calculated by Formula 24 shall not exceed 16,000 lbs. per sq. in.

(h) Long Columns. The permissible working load on the core in axially loaded columns which have a length greater than forty (40) times the least radius of gyration of the column core (40R) shall be not greater than that determined by Formula 26.

$$P' = P (1.33 - h/120R) \dots \dots \dots (26)$$

Sec. 2622. (a) General. The size of footings shall be determined as provided in Section 2306-(4). The requirements for flexure, shear and bond of Sections 2614 to 2619, inclusive, shall govern the design of footings, except as hereinafter provided.

Footings

(b) Loads. Footings resting directly on soil or on piles shall be proportioned as to area or number of piles on the basis of the total column load plus the weight of the footing itself. For computations of moments and shears, an upward reaction per unit area or per pile shall be based on the total column load (not including the weight of the footing itself) divided by the area or by the number of piles.

(c) Sloped or Stepped Footings. Footings in which the thickness has been determined by the requirements for shear as specified in paragraph (g) of Section 2618 may be sloped or stepped between the critical section and the edge of the footing; provided, that the shear on no section outside the critical section exceeds the value specified; and provided further, that the thickness of the footing above the reinforcement at the edge shall be not less than six (6) inches for footings on soil, nor less than twelve (12) inches for footings on piles. Sloped or stepped footings shall be cast as a unit.

(d) Bending in Footings. The critical section for bending in a concrete footing which supports a concrete column or pedestal shall be considered to be at the face of the column or pedestal. Where steel or cast-iron column bases are used, the moment in the footing shall be computed at the middle and at the edge of the base. The load shall be considered as uniformly distributed over the column or pedestal base.

The bending moment at the critical section in a square footing supporting a concentric square column shall be computed from the load on the trapezoid bounded by one face of the column, the corresponding outside edge of the footing, and the portions of the two diagonals. The load on the two corner triangles of this trapezoid shall be considered as applied at a distance from the face equal to six-tenths of the projection of the footing from the face of the column. The load on the rectangular portion of the trapezoid shall be considered as applied at its center of gravity. The bending moment is expressed by Formula 27.

$$M = w/2 (a + 1.2c) c^2 \dots \dots \dots (27)$$

For a round or octagonal column, the distance a shall be taken as equal to the side of a square of an area equal to the area enclosed within the perimeter of the column.

The sectional area of reinforcement shall be distributed

uniformly across the footing unless the width is greater than the diameter of the column or pedestal plus twice the effective depth of the footing, in which case the width over which the reinforcement is spread may be increased to include one-half the remaining width of footing. Additional reinforcement with a spacing double that within the effective belt shall be placed outside of the width specified, but such reinforcement shall not be considered as effective in resisting the calculated bending moment.

The extreme fibre stress in the concrete and steel shall be kept within the limits specified in Section 2613.

(e) Footings Other than Square. A rectangular or irregularly shaped footing shall be computed by dividing it into rectangles or trapezoids tributary to the sides of the column, using the distance to the center of gravity of the area as the moment arm of the upward forces. Outstanding portions of combined footings shall be treated in the same manner. Other portions of combined footings shall be designed as beams or slabs.

(f) Shearing and Bond Stresses. See paragraph (g) of Section 2618 and paragraphs (a) and (e) of Section 2619.

(g) Transfer of Stress at Base of Column. The compressive stress in longitudinal reinforcement at the base of a column shall be transferred to the pedestal or footing by either dowels or distributing bases. When dowels are used they shall be of the same size and number as the reinforcing bars in the columns. The dowels shall extend into the column and into the pedestal or footing not less than fifty (50) diameters for plain bars or forty (40) diameters for deformed bars.

When metal distributing bases are used, they shall have sufficient area and thickness to transmit safely the load from the longitudinal reinforcement in compression and bending. The permissible compressive unit stress on top of the pedestal or footing directly under the column shall be not greater than that determined by Formula 28.

$$r_s = 0.25f'_c \sqrt{A/A'} \dots\dots\dots (28)$$

In sloped or stepped footings A may be taken as the area of the top horizontal surface of the footing or as the area of the lower base of the largest frustum of a pyramid or cone contained wholly within the footing and having for its upper base the loaded area A' , and having side slopes of one (1) vertical to two (2) horizontal.

(h) Pedestals without Reinforcement. The allowable compressive unit stress on the gross area of a concentrically loaded pedestal or on the minimum area of a pedestal footing shall not exceed $0.25f'_c$ unless reinforcement is provided and the member designed as a reinforced concrete column.

The depth of a pedestal or pedestal footing shall be not greater than three-times its least width and the projection on any side from the face of the supported member shall be not

Sec. 2622

greater than one-half the depth. The depth of a pedestal whose sides are sloped or stepped shall not exceed three times the least width or diameter of the section midway between the top and bottom. A pedestal footing supported directly on piles shall have a mat of reinforcing bars having a cross-sectional area of not less than two-tenths (0.2) sq. in. per foot in each direction, placed three (3) inches above the top of the piles.

CHAPTER 27—STEEL AND IRON (Quality and Design)

Quality and Design

Sec. 2701. The quality and design of all structural steel and iron used in buildings shall conform to the requirements specified in this Chapter.

Structural steel shall be of such quality as to conform to Standard Specifications for Structural Steel for Buildings, A. S. T. M. Designation A9-24, of the American Society for Testing Materials.

Cast steel used in buildings and/or structures shall be of such quality as to conform with the Standard Specifications for Steel Castings, A. S. T. M. Designation A27-24, of the American Society for Testing Materials.

Cast iron used in buildings and/or structures shall be of such quality as to conform with the Standard Specifications for Gray Iron Castings, A. S. T. M. Designation A48-29, of the American Society for Testing Materials.

All structural steel shall be tested in accordance with the above specifications when deemed necessary by the Building Inspector and copies of such tests shall be filed in the office of the Building Inspector. No structural steel shall be used in any building or structure which does not comply with the above requirements or for which no test results have been filed with the Building Inspector. All steel tests shall be made by competent testing laboratories and at the expense of the owner.

The computations and design shall be properly made so that the unit working stresses specified in this Chapter are not exceeded. The structure and its details shall possess the requisite strength and rigidity for proper stability and the design of every structural frame shall be such as to admit of a rational analysis according to well established principles of mechanics and sound engineering practice.

All structural steel sections shall be straight and true and any section so damaged as to affect its proper carrying capacity shall not be used in the construction of any building.

Allowable Unit Stresses

Sec. 2702. All parts of the structure shall be so proportioned that the sum of the maximum static stresses in pounds per square inch shall not exceed those specified in this Section.

(a) Tension:

Rolled Steel, on net section.....	18,000
Cast Steel, on net section.....	16,000
Cast Iron, on net section.....	(Not allowed)

(b) Compression, on short lengths or where lateral deflection is prevented:

Rolled Steel	18,000
Cast Steel	16,000
Cast Iron	10,000

On gross section of structural steel columns:

$$P = \frac{18,000}{F}$$

$$1 + \frac{18,000}{r^2}$$

with a maximum of 15,000

For main compression members, the ratio l/r shall not exceed one hundred and twenty (120) and for bracing, struts and similar members two hundred (200).

On gross section of steel pipe columns, with square or fixed ends;

$$P=11,000-35 \ l/r$$

with a minimum gross diameter of five (5) inches.

On cast iron columns, with square or fixed ends;

$$P=9,000-40 \ l/r$$

with a minimum gross diameter of six (6) inches and with the ratio l/r never in excess of seventy (70).

In the foregoing formulae 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. On extreme fibers of rolled shapes, and built-up sections, net section, if lateral deflection is prevented, 18,000. When the unsupported length L exceeds fifteen (15) times b , the width of the compression flange, the stress in pounds per square inch in the latter shall not exceed F in the following formula:

$$F = \frac{20,000}{1 + \frac{L^2}{2,000b^2}}$$

The laterally unsupported length of beams and girders shall in no case exceed forty (40) times b the width of the compression flange.

Girders, beams, lintels and similar members may be laterally braced by joists, tie rods or similar members anchored thereto so as to laterally stay such members in both directions. Two or more cast iron or steel separators rigidly joining such members together shall be considered as lateral support if the length of flanges between separators does not exceed $40b$.

On extreme fibers of pins, when the forces are assumed as acting at the center of gravity of the pieces.....27,000

(d) Shearing. On pins	13,500
On power-driven rivets.....	13,500
On turned bolts in reamed holes with a clearance of not more than one- fiftieth (1/50) of an inch.....	13,500
On hand-driven rivets.....	10,000
On unfinished bolts.....	10,000

On the gross area of the webs of beams and girders, where h , the height between flanges in inches, is not more than sixty (60) times t , the thickness of the web in inches.....12,000

On the gross area of the webs of beams and girders if the web is not stiffened where h , the height between flanges in inches, is more than sixty (60) times t , the thickness of the web, the maximum shear per square inch, $S/4$ shall not exceed

$$1 + \frac{18,000 h^2}{7,200 t^2}$$

in which S is the total shear, and A is gross area of web in square inches.

	Double Shear	Single Shear
(e) Bearing.		
On pins	30,000	24,000
On power-driven rivets	30,000	24,000
On turned bolts in reamed holes	30,000	24,000
On hand-driven rivets	20,000	16,000
On unfinished bolts	20,000	16,000
On ends of web stiffeners	See Section 2704 (e)	

(f) Combined Stresses: For combined stresses due to wind and other loads, the permissible working stress may be increased thirty-three and one-third (33-1/3) per cent, provided the section thus found is not less than that required by the dead and live loads alone.

Members subject to both direct and bending stresses shall be so proportioned that the greatest combined stresses shall not exceed the allowed limits.

All members and their connections which are subject to stresses of both tension and compression due to the action of live loads shall be designed to sustain the stress giving the largest section, with fifty (50) per cent of the smaller stress added to it. If the reversal of stress is due to the action of wind, the member shall be designed for the stress giving the largest section and the connections proportioned for the largest stress.

(g) Members Carrying Wind Only: For members carrying wind stresses only, the permissible working stresses may be increased thirty-three and one-third (33-1/3) per cent.

(h) The load in pounds per linear inch on expansion rollers shall not exceed six hundred (600) times the diameter of the roller in inches.

Eccentric Loads

Sec. 2703. (a) Every member and combination of members shall be designed to provide for any stress due to an eccentric load or force, whenever the increase in stress due to eccentric load or force exceeds ten (10) per cent of the stress due to a direct load or force on the member or members; but a member framed directly to a central web of another member shall not be considered an eccentric load or force in case the resultant of the load or force acts parallel with the said central web.

(b) Where a structural member is directly connected or framed to the flange of another member by means of a web connection, the lever arm shall be taken as the distance in the direction of bending from the neutral axis to the flange connection plus one-half (1/2) inch; and in all other cases of an eccentric load or force, the lever arm shall be taken as the distance in the direction of bending from the neutral axis to the center line or center of bearing of the load or force.

(c) Where an eccentric load or force acts parallel with the axis of a compression member, the stresses due to the

eccentric action may be provided for by adding to any direct load or force on the compression member an amount equal to $M. K.$ as given in the following formula, and by then designing the compression member so that the maximum unit stress therein will not exceed that specified in Section 2702.

$M. K.$ equals $A (Pe/S)$;

in which formula $M. K.$ equals an equivalent concentric load or force for any given eccentric load or force; A equals the cross sectional area of the compression member; P equals the amount of the eccentric load or force in pounds; e equals the distance from the neutral axis of the compression member to the line of action of the eccentric load or force; and S equals the section modulus of the compression member in the direction of the bending.

Sec. 2704. (a) Rolled beams shall be proportioned by the moment of inertia of their net section. Plate girders with webs fully spliced for tension and compression shall be so proportioned that the unit stress on the net section does not exceed the stresses specified in Section 2702 as determined by the moment of inertia of the net section. Beams and Girders

When two (2) or more rolled beams or channels are used to form a girder, they shall be so connected to each other as to properly distribute the loads to be carried.

(b) Built-up Girders. Plate, box and similar structural steel girders shall be proportioned by the moment of inertia of their net sections, or shall be proportioned by assuming that one-eighth (1/8) of the gross area of the web or webs act as a part of the flanges thereof, in the event that every joint in the web is spliced so as to transmit the stress therein.

(c) Plate girder webs shall have a thickness of not less than one one-hundred-sixtieth (1/160) of the unsupported distance between the flanges.

(d) Web splices shall consist of a plate on each side of the web capable of transmitting the full stress through the splice rivets.

(e) Stiffeners shall be provided on both sides of the webs of built-up girders over bearings and at points of concentrated loading. Intermediate stiffeners shall be provided on both sides of the webs wherever the thickness of the web is less than one-sixtieth (1/60) of the unsupported distance between flanges and shall not be spaced farther apart in inches than the value of S in the following formula; and shall not exceed six (6) feet in any case:

$$S = 85t \sqrt{\frac{18,000A}{V}} - 1$$

in which formula A equals the gross area of the web in inches; V equals the total vertical shear on the web; t equals the thickness of the web in inches; and S equals the clear distance between stiffeners in inches; provided, however, that stiffeners need not be provided on both sides of webs in case other adequate provision is made against buckling, torsion and for the transmission of all stresses.

Secs. 2704-2707

Stiffeners over bearings and at points of concentrated loading shall not be crimped but shall be milled and fitted for bearing against the flange angles nearest the bearing load and shall be designed to distribute the force from the reactions and concentrated loads into the web. The bearing area of the ends of stiffeners shall be taken as the outstanding portion of the leg of the stiffener, excluding any chamfered portion thereof over the fillets of flange angles, and the bearing value of such portion may be taken at not to exceed twenty-four thousand (24,000) pounds per square inch; provided, however, that where fillers are provided between stiffeners and the web, equal in thickness to the radius of the fillet plus the thickness of the flange angle, the full area of the end of the stiffener may be used, but the bearing value shall not be taken at more than eighteen thousand (18,000) pounds per square inch.

Intermediate stiffeners need not bear against flange angles, and when girders are completely encased in concrete such stiffeners may be cut off at the edge of the fillet of the flange angle.

(f) Crane runway girders and the supporting framework shall be proportioned to resist a horizontal force equal to twenty (20) per cent of the maximum wheel loads.

(g) Rivets connecting the flanges to the web at points of direct load on the flange between stiffeners shall be proportioned to carry the resultant of the longitudinal and transverse shears.

(h) The flange plates of all girders, unless stiffened, shall be limited in width so as not to extend beyond the outer line of rivets connecting them to the flange angles more than six (6) inches or twenty (20) times the thickness of the thinnest outside plate connected.

(i) Beams, channels, girders and other members acting as skewbacks for floor arches shall be of ample strength and rigidity to withstand the lateral thrusts in addition to all other loads they may sustain.

**Thickness
of
Materials**

Sec. 2705. The minimum thickness of metal in structural steel shapes shall be one-fourth ($\frac{1}{4}$) inch at every point and shall not be less than one-half ($\frac{1}{2}$) inch at every point for any cast iron or cast steel member except as follows:

Exceptions: (1) The webs of channels and I-beams, the edges of rolled steel sections, steel joists, signs, skylight bars, non-bearing walls and partitions, suspended ceilings, cornice brackets, steel studs, and similar steel shapes shall not be limited by the above thickness requirements.

**Compression
Splices**

Sec. 2706. The ends and abutting joints of all compression members shall be fully spliced, or where laterally supported and where no reversal of stresses is possible, may be faced to a plain surface parallel to the surfaces against which they bear and normal to the line of stress, and be spliced sufficiently to hold the connected members accurately and firmly in place.

**Net
Sections**

Sec. 2707. In calculating tension members, the net section shall be used, and in deducting rivet holes they shall be assumed to be at least one-eighth ($\frac{1}{8}$) of an inch greater in diameter than the nominal diameter of the rivets.

Secs. 2707-2709

Pin-connected tension members shall have the section through the pin hole at least twenty-five (25) per cent in excess of the net section of the member, and a net section back of the pin hole equal to at least seventy-five (75) per cent of that required through the pin hole.

Sec. 2708. Connections carrying calculated stresses, except for lacing, sag bars or angles, hand rails, or beam connections, shall not have less than two (2) rivets; or for field connections not less than three (3) rivets. **Connections**

Members meeting at a joint shall have their lines of center of gravity meet at a point if practicable; if not, provision shall be made for any eccentricity.

The rivets at the ends of any member transmitting the stresses into that member should have their centers of gravity in the line of the center of gravity of the member; if not, provision shall be made for the effect of the resulting eccentricity. Pins may be so placed as to counteract the effect of bending due to dead load.

When a beam or girder is connected to another member in such a manner that such beam or girder acts as a continuous or fixed end beam, proper provision shall be made for the bending moments at such a connection.

Where stress is transmitted from one piece to another, through a loose filler, the number of rivets shall be properly increased; tight-fitting fillers shall be preferred.

All joints in riveted work, whether in tension or compression, shall be so spliced as to properly transmit all stresses, except as provided in Section 2706.

The minimum distance between center of the rivets and edge of plates or angles shall be one and one-half ($1\frac{1}{2}$) times the diameter of rivet.

The maximum pitch in the line of stress of compression members composed of plates and shapes shall not exceed sixteen (16) times the thinnest outside plate or shape, or twenty (20) times the thinnest enclosed plate or shape with a maximum of twelve (12) inches, and at right angles to the direction of stress the distance between lines of rivets shall not exceed thirty (30) times the thinnest plate or shape. For angles in built sections with two (2) gage lines, with rivets staggered, the maximum pitch in the line of stress in each gage line shall not exceed twenty-four (24) times the thinnest plate with a maximum of eighteen (18) inches.

Sec. 2709. In proportioning rivets, the nominal diameter of the rivet shall be used. **Rivets and Bolts**

Rivets carrying calculated stresses, and whose grip exceeds five (5) diameters, shall have their number increased one (1) per cent for each additional one-tenth ($1/10$) inch in the rivet grip. Special care shall be used in heating and driving such rivets.

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

Finished bolts in reamed holes may be used in shop or field work where it is impracticable to obtain satisfactory power-driven rivets. The finished shank shall be long enough to pro-

Secs. 2710-2711

vide full bearing, and washers used under the nuts to give full grip when turned tight.

Unfinished bolts may be used in shop or field work for connections in small structures used for shelters, and for secondary members of all structures such as purlins, girts, door and window framing, alignment bracing and secondary beams in floor.

Welded
Connections

Sec. 2710. (a) Fusion welding may be used (in place of riveting or bolting) for connecting structural steel or wrought iron parts or members to one another, but in no case shall the stresses in such joints exceed the allowable working unit stresses given in the following table:

Allowable Unit Working Stresses for Static Loads

Tension in weld metal (butt welds).....13,000 lbs. per sq. in.

Shear in weld metal (fillet welds).....11,300 lbs. per sq. in.

Compression in weld metal.....15,000 lbs. per sq. in.

Maximum fibre stresses due to bending shall not exceed the values prescribed above for tension and compression, respectively. In designing welded joints adequate provision shall be made for bending stresses due to eccentricity, if any, in the disposition or section of base metal parts.

(b) The same proportional increase in the above working stresses shall be allowed for the various given conditions as specified in parts (f) and (g) in Section 2702.

(c) The electrode wire shall conform to the American Welding Society Specifications E No. 1-A or E No. 1-B as published December, 1921, in the American Welding Society Bulletin No. 2.

All portions of the members at the point of welding shall be completely freed from rust, paint and other foreign matter by brushing the surfaces with an iron brush, by chipping or by hammering.

(d) The Building Inspector shall require the welding operator to furnish evidence of his experience and competence in structural arc welding and may require the welder to make sample butt welds. Such sample welds must show an average tensile strength of forty-five thousand pounds (45,000) pounds per square inch with no one sample developing a tensile strength of less than forty thousand (40,000) pounds per square inch.

(e) Where electric spot or resistance welding is used the portion of the members to be welded shall be thoroughly cleaned of rust, scale or other foreign matter by pickling in a suitable acid before welding.

Construc-
tion
Details

Sec. 2711. (a) Trusses preferably shall be riveted structures and only when there are good reasons to justify, such as where riveted field connections become unwieldy, may they be designed as pin-connected structures.

(b) All joints in riveted work, whether in tension or compression, shall be spliced as to properly transmit the stresses.

(c) Bracing shall be sufficient to safely withstand wind and other lateral forces when the building is in the process of erection as well as after completion.

(d) When two or more plates are in contact, they shall be stitch riveted with rivets not more than twelve (12) inches apart in either direction.

(e) The ends of beams, channels, girders and trusses that

hear on masonry or reinforced concrete shall be so framed that the allowable stresses for masonry or reinforced concrete shall not be exceeded, and anchors of ample size and strength shall be provided thoroughly embedded in the masonry or reinforced concrete construction.

(f) The ends of all beams, channels, girders, girts, purlins and similar members, that meet on a beam, girder, truss, column or pier shall be connected to each other by a strap or through the carrying members with not less than two (2) bolts or rivets each not less than five-eighths ($\frac{5}{8}$) of an inch in diameter in the end of each connecting member.

(g) Tie rods shall be proportioned to resist their respective stresses, and holes for them shall be placed as near the spring of the arches as practicable.

Sec. 2712 (a) Compression members of two or more pieces not connected by web or cover plates shall have their open sides provided with lattice bars or tie plates, and have tie plates as near each end as practicable, and at intermediate points where the lattice is interrupted. In main members the end tie plates shall have a length not less than the distance between the lines of rivets connecting them to the flanges, and intermediate ones not less than half this distance, and their thickness shall not be less than one-fiftieth ($1/50$) of the same distance and the rivet pitch shall not be more than four (4) diameters. The latticing of compression members shall be proportioned to resist a shearing stress at least equal to two (2) per cent of the direct stress in the member.

Lattice

(b) The minimum thickness for lattice bars shall be for single lattice one-fortieth ($1/40$) and for double lattice one-sixtieth ($1/60$) of the distance between end rivets, and not less than one-fourth ($\frac{1}{4}$) inch in thickness.

(c) The inclination of all lattice bars to the axis of the member shall not be less than forty-five (45) degrees and when the distance between the rivet lines in the flanges is more than fifteen (15) inches the lattice shall be doubled.

(d) Lattice bars shall be so spaced that the ratio l/r of the flange included between their connections shall not be over three-fourths ($\frac{3}{4}$) of that of the member as a whole, where l and r are as defined in Section 2702 (b).

Sec. 2713. (a) Pins shall be long enough to insure a full bearing of all parts connected upon the turned-down body of the pin.

**Pins and
Pin Holes**

(b) Members packed on pins shall be held against lateral movement.

(c) Pin holes shall be reinforced by plates wherever necessary to give proper bearing. At least one plate shall be as wide as the projecting flanges will allow. Where angles are used this plate shall contain sufficient rivets to distribute their portion of the pin pressure to the full cross section of the member.

Sec. 2714. (a) Steel joists may be rolled structural steel sections, sections built up of rolled structural sections, or shapes made from strip or sheet steel securely spot-welded together so as to form a cohesive structural unit, all of which shall have the general shape or contour of an I Beam, or such steel joist

**Steel
Joists**

may be of a determinate truss design built up of rolled structural steel sections effectively fusion welded together as specified in part (f) of this Section. Joists other than those consisting of a single rolled structural steel section with solid web, shall not be used in the floor construction of buildings over eight (8) stories in height.

(b) Steel joists shall be considered as secondary members of the structural steel frame. They shall be designed to carry all dead, live and other loads to which they may be subjected during the erection and after the completion of the structure. Such secondary members shall not be considered as affecting the vertical rigidity of the framework but they shall be designed and considered as carrying horizontal forces to such parts of the frame as are designed to carry these horizontal forces to the foundation.

(c) Stresses in steel joists shall not exceed those specified in Section 2702 and no joist under its calculated load shall have a deflection exceeding one three-hundred-sixtieth ($1/360$) of the span. Bridging shall be provided during the period of construction to adequately support the top chord or flange against lateral movement and such bridging shall be designed to hold each joist in a vertical plane. Permanent bridging shall be installed sufficient to laterally stay the joists and to transmit any horizontal forces in either direction perpendicular to the direction of the joists. Such bridging shall consist of solid concrete sections, structural steel shapes or plates, portal bridging, diagonal rods, or other bridging which will provide equivalent stiffness. Any row of bridging shall be capable of transferring five hundred (500) pounds from each joist to the adjoining joists. The actual spacing of the joists center to center shall be determined by their capacity to sustain the loads which they carry and the allowable load carrying capacity of the floor structure between the members.

(d) When used in buildings of Type I Construction, steel joists shall be connected to the supporting beams and/or girders by fusion welding, riveting, bolting or rigidly connecting. Fusion welds shall be made on both sides of each bearing, shall be not less than one (1) inch in length measured from the starting end to the center of the finishing crater, and shall have a minimum bead of one-fourth ($1/4$) inch. Riveting and bolting shall comply with the requirements of Section 2709. When steel joists are supported on masonry or reinforced concrete the end bearing shall be not less than four (4) inches in length and the ends of such joists shall be provided with approved joist anchors thoroughly embedded in the supporting masonry or reinforced concrete placed at not to exceed six (6) feet center to center. Bearing plates securely welded, bolted or riveted to the joists shall be provided when required by the design of the joist. In buildings over eight (8) stories in height in which steel joisted floor construction is used, all connections between steel joists and primary members of the structure shall be approved standard connection angles and power driven rivets, or unfinished bolts as provided for light steel beams in the handbook, Steel Construction, of the American Institute of Steel Construction, Inc., dated December, 1928.

(e) Strip or sheet steel used to produce strip steel joists shall in no case be less than seventy-two thousandths (0.072) of an inch in thickness. The flange width of such joists shall not exceed one-half ($\frac{1}{2}$) their depth.

(f) Trussed steel joists shall be so constructed that the lines of force of all connected members shall intersect at a point or proper allowance shall be made in the design for any resulting stress.

The joints of all trussed steel joists shall be made by connecting the members directly to one another by fusion welds or by rivets of sufficient capacity to develop the ultimate strength of the smallest connected member. When welds are used, each connection of member to member shall be made with not less than two (2) welds, and each weld shall be not less in length measured from starting end to the center of the finishing crater than twice the diameter of the smallest member connected, nor less in cross sectional area than one-fourth ($\frac{1}{4}$) of the cross sectional area of the smallest member connected. Welds shall be located symmetrically on both sides of all connected members so as to eliminate eccentricity at joints. When sections other than round bars are used, the length and cross sectional area of the welds shall be the same as those required for round bars of equivalent area.

(g) Whenever deemed necessary by the Building Inspector any welded connections or welded joints shall be tested to not less than twice the designed load by the manufacturer or user and such load shall be sustained without any signs of failure. Should any signs of failure develop the joist or joists shall be rejected and removed immediately from the premises.

Sec. 2715. Proper provision shall be made for expansion and contraction.

Expansion

Sec. 2716. (a) All workmanship shall be equal to the best practice in modern structural shops.

**Workman-
ship**

(b) Drifting to enlarge unfair holes shall not be permitted.

(c) The several pieces forming built-up sections shall be straight and fit close together; and finished members shall be free from twists, bends or open joints.

(d) Rolled sections shall not be heated in any manner which will impair their strength or quality.

(e) All steel castings shall be properly annealed.

(f) Material may be punched one-sixteenth ($\frac{1}{16}$) inch 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 ($\frac{1}{8}$) inch. When the metal is thicker than the diameter of the rivet, plus one-eighth ($\frac{1}{8}$) inch, the holes shall be drilled, or sub-punched and reamed.

(g) Rivets are to 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.

(h) 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.

Secs. 2716-2718

(i) Gas cutting may be done under the following conditions:

(1) The contractor shall be required to satisfy the Building Inspector as to his ability to produce satisfactory gas cuts.

(2) Gas cut edges shall be regular in contour.

(3) Gas cutting may be used in the preparation of base metal parts for welding, provided the edges so cut are thoroughly cleaned after cutting so as to expose clean metal.

(4) Gas cutting shall not be permitted to replace the milling of surfaces specified elsewhere in this Code.

(5) Gas cutting shall not be permitted on any member while it is carrying stress. This restriction shall not apply to detail cutting for the correction of minor fabricating errors, where the removal of metal resulting from such gas cutting would not reduce the required strength of the member that is to be cut.

(6) Gas cutting of holes in any member which has not been designed therefor shall not be permitted.

Painting

Sec. 2717. (a) Parts not in contact, but inaccessible after assembling, shall be properly protected by paint.

(b) All steel work, except where entirely encased in concrete, shall be thoroughly cleaned and given one coat of acceptable metal protection well worked into the joints and open spaces.

(c) Machine finished surfaces shall be protected against corrosion.

(d) Cast iron columns shall not be painted until after acceptance by the Building Inspector.

Erection

Sec. 2718. (a) The frame of all steel skeleton buildings shall be carried up true and plumb, and temporary bracing shall be introduced wherever necessary to take care of all loads to which the structure may be subjected, including erection equipment, and the operation of same. Such bracing shall be left in place as long as required for safety or deemed necessary by the Building Inspector.

(b) As erection progresses the work shall be securely bolted up to take care of all dead load, wind and erection stresses.

(c) Wherever piles of material, erection equipment, or other loads are carried during erection, proper provision shall be made to take care of the resulting stresses.

(d) No riveting or welding shall be done until the structure has been properly aligned.

(e) Rivets driven in the field shall be heated and driven with the same care as those driven in the shop.

(f) In the setting or erecting of steel work the individual pieces shall be considered plumb or level when the error does not exceed 1 to 500. For exterior columns and columns adjacent to elevator shafts of multiple story buildings the error shall not exceed 1 to 1000 of the total height of the column.

DETAILED REGULATIONS

CHAPTER 28—EXCAVATIONS, FOOTINGS AND FOUNDATIONS

Sec. 2801. All excavations for buildings and excavations accessory thereto shall be protected and guarded against danger to life and property. All permanent excavations shall have retaining walls of masonry or reinforced concrete of sufficient strength to retain the embankment together with any surcharged loads. No excavation for any purpose shall extend within one (1) foot 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. **Excavations**

Any person causing an excavation to be made on his own property, to a depth of twelve (12) feet, or less, below the grade, shall protect the excavation so that the soil of adjoining property will not cave in or settle, but shall not be liable for the expense of underpinning or extending the foundation of buildings on adjoining properties where his excavation is not in excess of twelve (12) feet in depth. Before commencing the excavation the owner shall notify in writing the owners of adjoining buildings not less than ten (10) days before such excavation is to be made that the excavation is to be made and that the adjoining buildings should be protected. The owners of the adjoining properties shall be given access to the excavation for the purpose of protecting such adjoining buildings.

Any person causing an excavation to be made exceeding twelve (12) feet in depth below the grade, shall protect the excavation so that the adjoining soil will not cave in or settle, and shall extend the foundation of any adjoining buildings below the depth of twelve (12) feet below grade at his own expense. The owner of the adjoining buildings shall extend the foundations of his building to a depth of twelve (12) feet below grade at his own expense as provided in the preceeding paragraph.

Sec. 2802. Footings and foundations, unless specifically provided, shall be constructed of masonry or reinforced concrete and shall in all cases extend below the frost line. Masonry units used in foundation walls and footings shall be laid up in Portland cement mortar. The base areas of all footings and foundations shall be proportioned as specified in Section 2306. **Footings and Foundations**

Footings shall be so designed that the allowable bearing capacity of the soil in tons per square foot as given below shall not be exceeded unless the particular soil on which the building is to be placed shows a greater bearing capacity than that specified in this Section.

Secs. 2802-2803

Rock.....	Not more than twenty per cent (20%) of the ultimate crushing strength of such rock.
Gravel or coarse sand, well cemented.....	6 tons
Dry, hard clay or coarse firm sand (hardpan).....	4 tons
Moderately dry clay or moderately dry sand and clay..	3 tons
Ordinary clay and sand.....	2 tons
Soft clay, sandy loam or silt.....	1 ton
Adobe	½ ton

Where the bearing capacity of the soil is not definitely known or is in question, the Building Inspector may require load tests or other adequate proof as to the permissible safe bearing capacity at that particular location. To determine the safe bearing capacity of soil it shall be tested by loading an area not less than two (2) square feet to not less than twice the maximum bearing capacity desired for use. Such double load shall be sustained by the soil until no additional settlement takes place for a period of not less than forty-eight (48) hours in order that such desired bearing capacity may be used. Examination of sub-soil conditions may be required when deemed necessary.

Foundations shall be built upon natural solid ground where possible. Loam or soil containing organic matter shall not be used to support buildings exceeding one story in height. Where solid natural ground does not occur at the foundation depth, such foundations shall be extended down to natural solid ground or piles shall be used, unless there is a practically level fill of good ground which has been in place a sufficient length of time to settle properly, when such fill may be used.

Piles

Sec. 2803. (a) General requirements. All piles used to support any building or part thereof shall be driven to a reasonably solid bearing in such a manner as not to impair their strength. No pile or group of piles shall be loaded eccentrically.

(b) Wood piles. Wood piles shall be of oak, fir, cedar or other approved wood which is sound and reasonably straight. The diameter of wood piles at the point shall be not less than six (6) inches and at the butt shall be not less than ten (10) inches for piles twenty-five (25) feet or less in length and shall be not less than twelve (12) inches at the butt for piles more than twenty-five (25) feet in length. All wood piles shall be cut off level and below low water level or below permanent ground water level and any capping or ranging timbers shall be so placed that the tops of such timbers shall be below the level required for pile cut-off. Wood piles shall be spaced apart not less than 2 feet six inches (2'-6") center to center.

The allowable load on a wood pile shall in no case exceed twenty-five (25) tons and shall in no case exceed the values determined by the following formulas:

For piles driven by drop hammer

$$L = 2 wh / s + 1 \quad (1)$$

For piles driven by steam hammer

$$L = 2 wh / s + 0.1 \quad (2)$$

Where L equals the safe load in tons, w equals the weight of the hammer in tons, h equals the height of fall or stroke

of hammer in feet, s equals the average penetration in inches under the last five (5) blows.

(c) Concrete piles. Concrete piles shall be of material complying with the requirements for Portland cement, fine aggregate, coarse aggregate and reinforcement as specified in Chapter 26 and steel as specified in Chapter 27. The maximum allowable working stress on any concrete pile shall not exceed twenty (20) per cent of the ultimate compressive strength of the concrete used in the piles, determined by tests as specified in Chapter 26. The maximum allowable load on any pile shall not exceed such working stress multiplied by the average cross sectional area of the pile.

Exception: When such pile is cast in a tight steel tube not less than five-sixteenths ($5/16$) inch thick, the allowable working stress shall be not more than twenty-five (25) per cent of the ultimate compressive strength of the concrete plus an allowable stress of not to exceed six thousand (6000) pounds per square inch for the steel tube, not including in such latter computation the outer one-sixteenth ($1/16$) inch of the steel shell.

Concrete piles cast in place 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 piles shall be limited to not more than thirty (30) times the average diameter, except that when cast in steel tubes with a thickness of not less than five-sixteenths ($5/16$) inch the length of such piles shall be not greater than forty (40) times the average diameter. The diameter of concrete-filled steel tubes shall be not less than twelve (12) inches and such piles shall be driven to a full bearing on rock. The diameter of other piles cast in place shall be not less than eight (8) inches at the point and shall have an average diameter of not less than eleven (11) inches.

Pre-cast concrete piles shall be sufficiently cured to attain the ultimate strength upon which their use is based, before driving. Such piles shall be reinforced and so handled as not to be fractured in any manner which will affect their durability or strength. Pre-cast concrete piles shall have a diameter at the point of not less than eight (8) inches, and an average diameter of not less than twelve (12) inches. The length of such piles when driven to rock shall be limited to twenty (20) times the average diameter and shall not exceed forty (40) times the average diameter in any other case.

The allowable load on a concrete pile when driven by a drop hammer or by a steam hammer shall not exceed the values determined by Formulas No. 1 and No. 2 respectively of this Section.

(d) The safe bearing power of any pile shall be determined by a load test whenever deemed necessary and ordered by the Building Inspector. The test pile or piles shall be loaded to twice the design load and the resultant settlement shall be measured until during a forty-eight (48) hour period no appreciable additional settlement takes place. The total settlement in inches shall not exceed one one-hundredth ($1/100$) times the test load in tons where the foundations carry a structure continuous over two or more spans nor twice this amount where the foundation carries non-continuous spans.

Solid Masonry Walls

Exceptions: (1) The top story exterior or bearing walls of a building not exceeding four (4) stories or fifty-five (55) feet in height, or the wall of a one-story building of Group E, F or G may be eight (8) inches; provided, that such eight (8) inch wall does not exceed twelve (12) feet unsupported height and that the roof beams or trusses are so placed or constructed as not to develop any direct thrust against the wall.

(2) Exterior walls for Group I buildings shall be as specified in part (c) of this Section.

(3) Solid masonry exterior bearing or party walls constructed as specified in part (d) of this Section may be of lesser thickness.

(b) Non-bearing walls of solid masonry shall be not less in thickness than specified in the following Table No. 2; provided, that in no case shall the uppermost fifteen (15) feet of such wall be less than eight (8) inches thick and that each successive fifty (50) feet or fraction thereof measured downward from the top shall be increased not less than four (4) inches in thickness.

Table No. 2

8th	8							
7th	12	8						
6th	12	12	8					
5th	12	12	12	8				
4th	12	12	12	12	8			
3rd	16	12	12	12	12	8		
2nd	16	16	12	12	12	12	8	
1st	16	16	16	16	12	12	8	8
Basement	20	16	16	16	16	12	12	8

Stories	8	7	6	5	4	3	2	1
---------------	---	---	---	---	---	---	---	---

Exceptions: (1) Solid masonry non-bearing walls for Group I buildings not over three (3) stories high shall be as specified in part (c) of this Section.

(c) Solid masonry walls, either bearing or non-bearing, for Group I buildings not over three (3) stories in height shall not be less in thickness than specified in Table No. 3.

Table No. 3

3rd	8		
2nd	8	8	
1st	12	8	8
Basement	12	12	8

Stories	3	2	1
---------------	---	---	---

(d) Where solid masonry bearing or non-bearing walls other than fire walls or fire division walls are strengthened laterally by masonry buttresses or cross walls the wall thicknesses specified in parts (a), (b) and (c) of this Section may be reduced between buttresses by one-half ($\frac{1}{2}$) the thickness added at the buttress, except that no part of such butteressed wall shall be less than eight (8) inches thick. Buttresses shall be not less than one-eighth ($\frac{1}{8}$) the clear distance between them in width and their clear distance apart shall not exceed twenty-four (24) times the reduced wall thickness. Principal girders and trusses shall rest on the buttresses.

Secs. 2903-2906

In one-story buildings having walls not over sixteen (16) feet high to the under side of girders or trusses and pilastered as above provided for an eight (8) inch wall between pilasters, such walls may be considered as bearing walls for roof loads and parapet walls only.

Bonds

Sec. 2904. In all solid unit masonry walls at least every sixth course on both sides of the wall shall be a header course or there shall be at least one full header in every seventy-two (72) square inches of each wall surface. In walls more than twelve (12) inches thick the inner joints of header courses shall be covered with another header course which shall break joints with the course below.

Where running bond is used, every sixth course on each face shall be bonded into the backing by using a full header course at right angles to the face behind split brick.

Piers

Sec. 2905. The unsupported height of isolated piers shall not exceed ten (10) times their least dimension. Piers of solid unit masonry shall be laid up in cement mortar.

Walls in which the openings are of such an extent as to leave relatively narrow sections exceeding ten (10) feet in height shall have such narrow sections computed and constructed as for isolated piers.

**Chases
and
Recesses**

Sec. 2906. There shall be no chases in eight (8) inch walls or within the required area of any pier, and no chase in any wall or pier shall be deeper than one-third ($1/3$) the wall thickness. No horizontal chase shall exceed four (4) feet in length nor shall the horizontal projection of any diagonal chase exceed four (4) feet. No vertical chase shall be closer than two (2) feet to any pilaster, cross wall, end wall or other stiffener.

Recesses for stairways or elevators may be made in walls, but in no case shall the walls at such points be less than the required thickness of walls of the fourth story above the ground floor unless reinforced by additional piers, by steel or reinforced concrete girders or steel or reinforced concrete columns and girders, securely anchored to the walls on each side of such recesses. Recesses for alcoves and similar purposes shall have not less than eight (8) inches of material at the back. Such recesses shall be not more than eight (8) feet in width and shall be arched over or spanned with lintels.

The aggregate area of recesses and chases in the wall of any one story shall not exceed one-fourth ($1/4$) the whole area of the face of the wall in that story.

No chases or recesses shall be permitted in fire or fire division walls that will reduce the thickness below the minimum specified in this Code.

Openings for doors and windows shall have well buttressed arches or lintels of masonry, or of metal with bearing at each end of not less than four (4) inches on the wall. On the inside of openings less than four (4) feet wide, in which the thickness of arches and lintels is less than that of the wall supported, timber may be used, which will rest at each end not more than two (2) inches on the wall and be chamfered or cut to serve as arch centers.

The maximum percentage of openings in the horizontal cross section of any wall shall not exceed fifty (50) per cent unless the wall is increased four (4) inches in thickness or such portions of the wall between openings shall be as required for piers in Section 2905.

ARTICLE II

Walls of Hollow Tile, Concrete Block or Tile, Hollow

Walls of Brick and Hollow Monolithic Plain Concrete Walls

Sec. 2907. Walls of hollow clay tile, of concrete block or tile, hollow walls of solid masonry units and hollow monolithic plain concrete walls shall be supported at right angles to the face at intervals not exceeding sixteen (16) times the wall thickness in top stories of buildings more than one story in height, or eighteen (18) times the wall thickness elsewhere.

The general provisions relating to solid masonry walls shall apply to hollow walls as included in this Section; provided, that corbeling from hollow walls shall not be permitted except when such corbels are constructed of solid masonry or reinforced concrete.

Where air spaces are built into the wall the area of such air spaces combined with the area of the cellular space in the tile used in the construction of the wall shall not exceed forty-five (45) per cent of the gross cross-sectional area of the wall.

No combination solid masonry and hollow unit wall shall be allowed less than ten (10) inches nominal in total thickness.

Sec. 2908. The maximum allowable compressive stresses in walls of hollow tile, concrete block or tile, hollow walls of brick or hollow monolithic plain concrete walls due to combined live, dead and other loads shall not exceed those specified in Sections 2410 and 2411.

Sec. 2909. Walls of hollow clay tile and concrete block or tile, hollow walls of solid masonry units and hollow monolithic concrete walls shall be not less in thickness than as specified in the following Table No. 4; provided, that in no case shall the uppermost twenty-five (25) feet of such walls be less than twelve (12) inches in thickness, and each successive twenty-five (25) feet or fraction thereof measured downward from the top shall be increased not less than four (4) inches in thickness.

Table No. 4

8th	12							
7th	12	12						
6th	16	12	12					
5th	16	16	12	12				
4th	20	16	16	12	12			
3rd	20	20	16	16	12	12		
2nd	24	20	20	16	16	12	12	
1st	24	24	20	20	16	16	12	12
Basement	28	24	24	20	20	16	16	12
Stories	8	7	6	5	4	3	2	1

Except that walls of Grade A hollow clay tile or Grade A or Grade A Special hollow concrete block or tile, as specified in Sections 2406 and 2408, may be of the same thickness as solid masonry walls when not exceeding two (2) stories in

**General Provisions:
Hollow Walls**

Working Stresses

Thickness and Height of Walls Other Than Skeleton Construction

height, an dsuch walls shall be laid in cement mortar proportioned as specified in Section 2409.

One-story private garages and one-story residences may have bearing and non-bearing walls of hollow tile, concrete block or tile, hollow brick or hollow monolithic plain concrete walls six (6) inches thick.

Bond

Sec. 2910. All hollow masonry units in a wall shall have all contact surfaces solidly embedded in mortar and laid with a full bond.

Where two (2) or more hollow units are used to make up the thickness of a wall the inner and outer courses shall be bonded every course by lapping at least one cell completely over the cell below.

Beam Supports

Sec. 2911. Suitable provision shall be made in hollow walls or walls of hollow units at each line of floor joists or beams to shut off the spaces above from those below with incombustible material.

Except where hollow units having at least three (3) cells in each eight (8) inches of thickness are laid with cells horizontal, joists, beams or other structural members shall not be seated directly on hollow walls or walls of hollow units, but shall be supported on at least three (3) courses of brick or equivalent concrete or metal plate of sufficient thickness and size to distribute the load to the webs and shells in such a manner as not to exceed the allowable unit stress.

Piers

Sec. 2912. Hollow tile or concrete block or tile, except Grade A hollow clay tile and Grade A or Grade A Special hollow concrete block or tile, shall not be used for isolated piers. Wall sections greater in height than ten (10) times their least dimension and two (2) feet or less in width shall be considered as isolated piers. Isolated piers shall be laid up in cement mortar.

Chases and Recesses

Sec. 2913. Chases and recesses in walls of hollow tile, hollow concrete block or tile, or in hollow walls of brick shall not exceed in extent those permitted for solid masonry walls under the same conditions. Chases and recesses shall not be cut in walls of the above types, but may be built in. No chases or recesses shall be permitted in fire walls that will reduce the thickness below the minimum specified in this Code.

Reinforced tile lintels over openings made by filling the cells of the hollow units with cement mortar or concrete and inserting reinforcing bars may be used. Such lintels shall be computed as reinforced concrete beams on the basis of the enclosed concrete or mortar.

General Provisions: Reinforced Concrete Walls

ARTICLE III Reinforced Concrete Walls

Sec. 2914. The general provisions of Chapter 26 of this Code shall apply to the design and construction of reinforced concrete walls provided that where any conflict may occur the provisions of this Article shall govern.

Reinforced concrete bearing walls shall have a thickness of not less than one twenty-fifth (1/25) of the unsupported height;

provided, that approved buttresses, built-in columns or piers may be used in lieu of greater thicknesses.

Reinforced concrete walls shall be supported at right angles to the wall face at intervals not exceeding twenty-two (22) times the wall thickness in the top story or twenty-five (25) times the wall thickness elsewhere. Such lateral support may be obtained by masonry or reinforced concrete cross walls, piers, buttresses or built-in columns when the limiting distance is measured horizontally or by floors or roof when the limiting distance is measured vertically. Bonding and anchoring shall be provided between the wall and the supports to resist the assumed wind force acting in an outward direction. Piers, buttresses or built-in columns relied upon for lateral support shall have sufficient strength and stability to transfer the wind force acting in either direction, to the ground. When walls are dependent upon floors for their lateral support, provision shall be made in the building to transfer the lateral forces resisted by all floors, to the ground. Anchoring of interior wood framing shall be as specified in Chapter 25.

Corbeling of reinforced concrete walls for the support of beams, girders and other members shall be fully provided for in the design of the wall at that point.

Sec. 2915. The maximum allowable compressive stress in reinforced concrete walls due to combined live, dead, and other loads shall not exceed $0.07 f'_c$ when the unsupported height of the wall is twenty-five (25) times the thickness, nor $0.15 f'_c$ when the unsupported height of the wall is fifteen (15) times the thickness or less with allowable stresses proportional between those limits of height.

**Working
Stresses**

Sec. 2916. The thickness of reinforced concrete bearing walls shall be sufficient at all points to keep the combined stresses due to dead, live and/or other loads for which the building is designed, within the limits specified in Section 2915.

**Thickness
of Walls
Other Than
in Skeleton
Construction**

The minimum thickness of reinforced concrete bearing or party walls shall be not less than the thickness specified in Table No. 5.

Table No. 5

8th	8							
7th	9	8						
6th	10	9	8					
5th	11	10	9	8				
4th	12	11	10	9	8			
3rd	13	12	11	10	9	8		
2nd	14	13	12	11	10	9	8	
1st	15	14	13	12	11	10	9	8
Basement	16	15	14	13	12	11	10	8
Stories	8	7	6	5	4	3	2	1

Such reinforced concrete walls shall have not less than one-tenth (1/10) of one (1) per cent of reinforcement in each direction, horizontally and vertically and the steel shall be distributed equally to each face of the wall with a maximum bar spacing of twenty-four (24) inches in each face.

INTERNATIONAL CODE COUNCIL®

Secs. 2916-2923

Non-bearing walls of reinforced concrete complying with all of the provisions of this Section shall be of not less thickness than that specified in the following Table No. 6.

Table No. 6

8th	6							
7th	7	6						
6th	8	7	6					
5th	9	8	7	6				
4th	10	9	8	7	6			
3rd	11	10	9	8	7	6		
2nd	12	11	10	9	8	7	6	
1st	13	12	11	10	9	8	7	6
Basement	14	13	12	11	10	9	7	7
Stories	8	7	6	5	4	3	2	1

All such reinforced concrete walls shall be laterally supported by a reinforced concrete or fire-proofed structural steel floor system when supported from one side only and may be supported by combustible floors when supported laterally from both sides.

Piers

Sec. 2917. The unsupported height of piers of reinforced concrete walls shall not exceed ten (10) times their least dimensions unless designed as reinforced concrete columns.

Walls in which the openings are of such an extent as to leave relatively narrow sections exceeding ten (10) times their least dimension in height shall be considered as piers.

Chases and Recesses

Sec. 2918. Chases and recesses shall be as permitted in solid masonry walls in Section 2906.

Openings for doors and windows shall have reinforced concrete lintels designed as specified in Chapter 26, or fire-proofed steel lintels as specified in Chapter 27.

ARTICLE IV.

Stone Walls

Quality of Material

Sec. 2919. Stone used in masonry wall construction shall be at least equal in strength to the minimum specified for plain concrete in Section 2405.

Working Stresses

Sec. 2920. The maximum allowable compressive stresses in rubble stonework due to combined live, dead and other loads shall not exceed those specified in Sections 2410 and 2411.

Lateral Support and Thickness

Sec. 2921. Rubble stone walls shall be four (4) inches thicker than is required for solid brick or concrete walls of the same respective heights, but in no part less than sixteen (16) inches.

The minimum thickness for walls or piers of ashlar masonry properly bonded shall be the same as required for solid brick walls and piers under similar conditions.

The lateral support for stone walls shall conform to the same requirements specified for solid masonry walls in Section 2901.

Bond

Sec. 2922. Bond stones extending through the wall and uniformly distributed shall be provided to the extent of not less than ten (10) per cent of the area, and there shall be at least one bond stone for every eight (8) stretchers.

Sec. 2923. Chases and recesses in stone walls shall not exceed in extent those permitted for solid masonry walls under the same conditions.

Chases
and
Recesses

ARTICLE V. Veneered Walls

Sec. 2924. Materials used in the veneering and backing of veneered walls shall conform in all respects to the requirements prescribed for such materials in Part VI. Stone or cellular architectural terra cotta, ashlar, or other approved masonry material used for veneering shall be not less than three (3) inches thick. In stone ashlar each stone shall have a reasonable uniform thickness, but all stones need not necessarily be the same thickness.

Quality of
Material

Sec. 2925. The maximum allowable compressive stress on the backing of veneered walls, due to combined live and dead loads, shall not exceed those permitted for masonry of the type which forms such backing. In no case shall the veneering be considered a part of the wall in computing the strength of bearing walls, nor shall it be considered a part of the required thickness of the wall.

Working
Stresses

Sec. 2926. When walls are veneered with brick, terra cotta, stone or concrete trim stone the veneering shall be tied into the backing either by a header for every three hundred (300) square inches of wall surface, or by substantial non-corrodable metal wall ties spaced not farther apart than one (1) foot vertically and two (2) feet horizontally. Headers shall project at least three and three-quarters (3-3/4) inches into the backing, and anchors shall be of substantial pattern. When veneering is used special care shall be taken to fill all joints flush with mortar around wall openings.

Attachment
of
Veneering

Sec. 2927. Veneer on masonry walls, other than panel or enclosure walls, shall not exceed forty (40) feet in height above foundations, or other definite and secure supports.

Height of
Veneered
Walls

ARTICLE VI. Faced Walls

Sec. 2928. Material used in the backing and facing of faced walls shall conform in all respects to the requirements prescribed for such materials in Part VI.

Quality of
Material

Materials used for facing shall be not less than three and three-fourths (3-3/4) inches thick, and in no case less in thickness than one-eighth (1/8) the height of the unit, excepting that spandrel and other recessed panels, when approved, may be higher than eight (8) times their thickness, provided they are of the minimum thickness required in this paragraph.

Sec. 2929. The maximum allowable compressive stresses on faced walls due to combined live, dead and other loads shall not exceed those permitted for masonry of the type which forms the backing. Where bonded to the backing as provided in Section 2931, the full cross section of the facing may be considered in computing bearing strength.

Working
Stresses

Thickness

Sec. 2930. Faced walls shall be not less in thickness than is required for masonry walls of the type which forms the backing. Where bonded to the backing as provided in Section 2931 the facing may be considered a part of the wall thickness.

Bond

Sec. 2931. Solid unit masonry facing shall be bonded to wall of solid masonry or of hollow clay tile, or of concrete block or tile with at least one (1) header course in every six (6) courses, or there shall be at least one (1) full length header in every seventy-two (72) square inches of wall surface.

Stone ashlar facing shall have at least fifteen (15) per cent of the superficial area not less than three and three fourths (3-3/4) inches thicker than the remainder of the facing to form bond stones, which shall be uniformly distributed throughout the wall.

When some stones in every alternate course are at least seven and one-half (7-1/2) inches thick, and at least twenty (20) per cent of the superficial area of the wall is constituted of such bond stone uniformly distributed the ashlar facing may be counted as part of the wall thickness. Every stone not a bond stone and every projecting stone shall be securely anchored to the backing with substantial non-corrodible metal anchors three-sixteenths inch by one inch (3/16"x1") into the masonry backing. There shall be at least one anchor to each stone and not less than two anchors for each stone more than two (2) feet in length or three (3) square feet in superficial area. Facing stones over twelve (12) square feet in area shall have at least one (1) anchor to each four (4) square feet of superficial face area.

ARTICLE VII.**Fire Walls, Fire Division Walls and Parapet Walls****Fire
Walls:
Solid
Masonry**

Sec. 2932. Solid masonry and reinforced concrete fire walls shall be not less in thickness than required for exterior bearing walls of corresponding height but never less than twelve (12) inches thick except that solid masonry fire walls for Group H and I buildings, shall be not less than eight (8) inches thick for the uppermost twenty-five (25) feet of height and shall be not less than twelve (12) inches thick for the remaining lower portion. No eight (8) inch fire wall shall be broken into subsequent to building, for the insertion of structural members, and a separation of not less than four (4) inches of solid masonry shall be provided in all fire and party walls between combustible members which may enter such walls from opposite sides. Party walls which function also as fire walls shall conform to the requirements of fire walls. No chases or recesses shall be built into fire walls which will reduce the required minimum thickness.

**Hollow
Fire
Walls**

Sec. 2933. Hollow masonry fire walls shall not be permitted as fire walls in Fire Zone No. 1 unless faced on each side thereof by not less than a four (4) inch veneer of brick work well bonded into the hollow wall construction.

Fire walls of hollow clay tile, concrete block or tile shall be not less than sixteen (16) inches thick in any part, except that

for Groups H and I buildings they may be not less than twelve (12) inches thick. Hollow walls of solid masonry units used as fire walls shall be not less than twelve (12) inches thick. No fire walls of the above types shall be broken into, subsequent to erection for the insertion of structural members.

When combustible or unprotected steel building members frame into the hollow part of fire walls of thickness not greater than twelve (12) inches, they shall not project more than four (4) inches into the walls and shall be so spaced that the distance between embedded ends is not less than four (4) inches. The space above, below and between such members shall be filled solidly with burnt clay materials, mortar, concrete or equivalent fire-resistive materials, to a depth of not less than four (4) inches on all sides of the members.

All open cells in tile blocks occurring at wall ends shall be filled solid with concrete or cement mortar for at least a depth of six (6) inches, or closure tile set in the opposite direction shall be used.

Party walls which function as fire walls shall conform to the requirements of fire walls.

Sec. 2934. Fire division walls of solid masonry shall be not less than eight (8) inches thick. Fire division walls of hollow clay tile, concrete block or tile, hollow walls of brick or of hollow monolithic concrete shall be not less than ten (10) inches thick. Fire division walls of reinforced concrete shall be not less than six (6) inches thick. The wall thicknesses specified in this Section shall be increased fifty (50) per cent when used for separating buildings of Group E occupancies and Divisions 2 and 3 of Group F occupancies.

**Fire
Division
Walls**

Sec. 2935. On all buildings, except on Group H and I buildings three (3) stories or less in height, all exterior, fire or party walls shall project above the roof as parapets; provided, that where such wall fronts on a street and where the roof construction is entirely of incombustible materials, such parapet wall may be omitted; and provided, further, that for buildings twenty (20) feet or less in height or where the adjoining roof slopes more than twenty (20) degrees from the horizontal such parapet walls may be omitted. All required parapet walls shall be not less than thirty (30) inches above the roof immediately adjacent thereto and when exceeding six (6) times their thickness in height shall be laterally supported.

**Parapet
Walls**

All parapet walls shall have a coping of incombustible material. On Group H and I buildings not more than three (3) stories high, exterior and fire walls shall extend above combustible roofs to a height not less than twenty-four (24) inches above the roof where the pitch of the roof does not exceed three (3) inches in twelve (12) inches. Where the pitch of the roof exceeds three (3) inches in twelve (12) inches such walls may terminate at the upper side of the roof boards.

ARTICLE VIII.

Partitions

Sec. 2936. All interior bearing walls, which do not extend through more than one (1) story, except fire walls, fire

**Bearing
Partitions**

division walls and party walls shall be considered as bearing partitions.

Solid masonry bearing partitions shall be not less than eight (8) inches thick and those of hollow clay tile, concrete block or tile or hollow walls of brick shall be not less in thickness than one-eighteenth (1/18) of the height between floors or floor beams but never less than eight (8) inches.

Non-bearing Partitions

Sec. 2937. Brick non-bearing partitions shall be not less than three an three-fourths (3-3/4) inches thick for a height not exceeding twelve (12) feet between floors or floor beams or roofs. Non-bearing partitions of hollow clay tile, concrete block or tile, plain concrete, hollow walls of brick or of gypsum block or other similar materials shall be built solidly against the floor and ceiling construction below and above and shall not exceed the following unsupported heights:

Thickness Exclusive of Plaster (Inches)	Maximum Unsupported Height (Feet)
2	8*
3	12
4	15
6	20
8	25

*Height or length.

Solid or hollow non-bearing partitions of reinforced plaster shall have a thickness of not less than one-sixtieth (1/60) of the unsupported height, but never less than one and one-half (1½) inches for solid partitions nor have a shell thickness of less than three-fourths (¾) of an inch for hollow partitions. Such partitions shall have vertical steel or iron channels with a depth of not less than one-half (½) the thickness of the partition, made of not less than number twenty-four (No. 24) U. S. Gauge metal and spaced not more than twenty-four (24) inches o. c.

Solid or hollow non-bearing partitions of reinforced gunite shall have a thickness of not less than one-seventieth (1/70) of the unsupported height but never less than one and one-half (1½) inches for solid partitions nor have a shell thickness of less than three-fourths (¾) of an inch for hollow partitions. Vertical channels shall be installed in gunite partitions as specified for plaster partitions above.

ARTICLE IX.

Foundation Walls.

Foundation Walls

Sec. 2938. Solid masonry foundation walls and those of concrete block or coursed stone shall be not less in thickness than the wall immediately above and in no case less than twelve (12) inches thick unless otherwise specified in Chapter 28, except that when the space enclosed within the foundations is not excavated they may be eight (8) inches if included within

the allowable height of eight (8) inch walls and if the walls supported by such foundation are not more than eight (8) inches in thickness. When built of concrete cast in place, foundation walls shall be at least as thick as the walls supported, but in no case less than eight (8) inches. When built of rubble stone, they shall be at least sixteen (16) inches thick. Rough or random rubble without bonding or level beds shall not be used as foundations for walls exceeding thirty-five (35) feet in height nor shall coursed bonded rubble walls be used as foundations for walls exceeding seventy-five (75) feet in height.

Foundations for walls of hollow clay tile, concrete block or tile and hollow walls of brick, shall be of the same thickness, respectively, as required in the paragraph above, and shall be built of brick, stone, concrete (plain or reinforced), hollow clay tile, concrete block or tile, or as a hollow wall of brick. Tile foundation walls shall be not less than twelve (12) inches thick.

When the stresses due to earth pressure and superimposed building load exceed the maximum working stress permitted in this Code for the materials used, and the additional stresses are not otherwise provided for, the wall thickness shall be increased to bring the stresses within the required limits.

All foundation walls shall extend below the level of frost action, and shall not be constructed of gypsum.

Materials for foundation walls shall be equal in quality in all respects to those required for exterior bearing walls, except that mortar used for exterior foundation walls below grade shall be cement mortar.

Foundations built of masonry units, whether hollow or solid, shall be sealed below any woodwork with a cement wash or equally effective seal.

ARTICLE X.

Panel and Enclosure Walls

Sec. 2939. Panel and enclosure walls in skeleton framed buildings shall be not less than eight (8) inches thick if of solid brick, hollow clay tile, concrete block or tile, plain concrete or hollow walls of brick, nor less than one-twentieth ($1/20$) the distance between supporting or enclosing members. Panel and enclosure walls of reinforced concrete shall be not less than six (6) inches thick and sufficiently reinforced to resist the wind pressure specified in Section 2307 from either direction. Panel and enclosure walls of reinforced gunite shall be not less than four (4) inches thick and shall be reinforced as required for reinforced concrete walls.

Enclosure walls shall be securely fastened to the adjoining framing members.

When panel or enclosure walls are built monolithic with columns or bearing walls they may be reinforced to carry their own weight.

Panel and
Enclosure
Walls

ARTICLE XI.

Miscellaneous Requirements

Sec. 2940. All walls shall be securely anchored and bonded at points where they intersect and where they abutt or adjoin the frame of a skeleton framed building.

Anchoring
of Walls

Secs. 2940-2941

When walls are not built at the same time the perpendicular joint shall be regularly toothed with not less than four (4) inch offsets and the joint shall be provided with anchors not less than two inches by three-eighths inch (2"x3/8") metal with ends bent up not less than two (2) inches or with cross pins to form anchorage. Such anchors shall be not less than three (3) feet long extending eighteen (18) inches in from each side of the joint and spaced not more than three (3) feet apart in the direction of the height of the wall.

Reinforcing in concrete walls shall be extended not less than twenty-four (24) inches around all corners and wall intersections.

**Use of
Existing
Walls**

Sec. 2941. An existing masonry wall may be used in the renewal or extension of the building providing it meets the requirements of this Code, and is structurally sound or can be made so by reasonable repairs. Existing walls which are structurally sound but which are of insufficient thickness when increased in height shall be strengthened by an addition of the same material not less than eight (8) inches in thickness laid up in Portland cement mortar, or the wall may be built out with gunite to the thickness required for a new wall of that height. Foundations and lateral supports shall be provided as required for newly constructed walls under similar conditions. All additions or linings shall be thoroughly bonded into existing masonry by toothings to assure combined action of wall and lining. Such toothings shall be distributed uniformly throughout the wall and shall aggregate in vertical cross-sectional area not less than fifteen (15) per-cent of the total vertical area of the wall or lining.

CHAPTER 30

ENCLOSURE OF VERTICAL OPENINGS

Sec. 3001. Vertical openings are required to be enclosed in certain buildings depending upon the occupancy of the building, height of building or the type of construction. The vertical openings required to be enclosed are specified under Occupancy in Part III, and for stairways and ramps are specifically included in Chapter 33.

**Enclosures;
When
Required**

Sec. 3002. When stairways and/or ramps are required to be enclosed such enclosures shall also include a complete passageway not less in width at any part than the required width or such stairway or ramp and such enclosure shall extend from the lowest point to the highest point required. All doors opening into such enclosures shall be of metal or shall be metal-clad doors as specified in Section 4304, and all windows shall be of wire glass and metal frames and sash; except that when such openings face directly on a street or court and are not within ten (10) feet of an adjacent lot line such protection may be omitted. All such doors shall be self-closing and be kept normally closed.

**Stairway,
Ramp and
Elevator
Enclosures**

Walls and partitions enclosing stairways, ramps or elevators shall be of not less than two-hour fire-resistive construction as specified in Section 4302; except as specifically provided in Sections 1907 and 2007, where one-hour fire-resistive construction is specified. Enclosing walls of elevator shafts may consist of wire glass set in metal frames on the entrance side only. Elevator shafts extending through more than two (2) stories shall be equipped with an approved means of adequate ventilation to and through the main roof of the building.

Sec. 3003. All shafts, ducts, chutes and other vertical openings not covered in Section 3002 shall have enclosing walls conforming to the requirements specified under Type of Construction of the building in which they are located when they exceed nine (9) square feet in area, and all other shafts shall be lined with sheet metal having lock jointed or riveted seams and joints. Combustible material of partitions and floors through which the ducts pass shall be kept at least three (3) inches from the metal lining or be protected by not less than three-eighths (3/8) of an inch of plaster or one-fourth (1/4) of an inch of asbestos or plasterboard. Openings between any ducts and the floor construction through which they pass shall be filled with mortar or other incombustible material supported by wire baskets that prevent the passage of fire. All doors opening into such vertical shafts shall be of metal or shall be covered on the shaft side by not less than one-fourth (1/4) of an inch of asbestos and not less than twenty-six (26) gauge metal returned around all edges and well fastened to the door. Windows in such shafts shall be wire glass and metal frames and sash or such frame and sash may be of wood entirely clad with metal of not less than twenty-six (26) gauge.

**Other
Vertical
Openings**

CHAPTER 31

FLOOR CONSTRUCTION

General Sec. 3101. 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 4303.

The type of floor construction used shall provide means to keep the beams and girders from spreading by installing ties or bridging.

Concrete Floors

Sec. 3102. Concrete slab floors shall be not less than two and one-half ($2\frac{1}{2}$) inches thick. 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 ($\frac{1}{2}$) inch to the slab. Concrete joists shall be solidly bridged for lateral support as follows: The distance between lateral supports of the compression area of any joist shall not exceed twenty-four (24) times the least width of stem. Such bridging shall be the full depth and width of the joists.

Steel Joisted Floors

Sec. 3103. Steel joisted floors shall consist of steel joists as specified in Section 2714. When used in Type I or Type II buildings they shall have a reinforced concrete or gypsum slab not less than two and one-half ($2\frac{1}{2}$) inches thick placed on and secured to the top thereof, and a fire-resistive ceiling as specified in Section 4303 on the under side thereof, fully covering and protecting the joists; provided that when such joists are used in places where unprotected wood joists are permitted the steel joists need not be protected with fire-resistive materials as specified above. Fire-resistive ceilings as specified in Section 4303 shall, except in the case of one-hour fire-resistive construction, be designed and constructed to support a load of not less than ten (10) pounds per square foot in addition to its own weight.

The reinforced concrete or gypsum slab placed on and secured to the top of the steel joists shall be sufficiently reinforced to support all dead, live and/or other loads between joists. Joists other than those consisting of a single rolled structural steel section with solid web, shall be securely cross bridged at intervals not to exceed eight (8) feet along the joist length. The lateral unsupported length of the top chord of any steel joist shall not exceed forty (40) times the width of the compression flange.

Sec. 3104. Mill constructed floors shall be not less than three (3) inches nominal splined or tongued and grooved plank covered with one (1) inch nominal flooring laid crosswise or diagonal. Top flooring shall not extend closer than one-half (1/2) inch to walls to allow for swelling in case the floor becomes wet. Such one-half inch space shall be covered by a moulding 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.

**Mill
Constructed
Floors**

If laminated floors are used, at least two laminations at the wall shall be omitted until after glazing and roofing has been completed.

Laminated floors consisting of planks not less than six (6) inches wide set on edge close together and spiked at about eighteen (18) inch intervals shall have the joints broken in such manner that no continuous line will occur across the floor and such flooring shall not be spiked to the supporting girders. Joints shall be made only at the supports and at the quarter points with no more than two-thirds (2/3) of such joints away from support. Joints between the planks of a laminated floor shall be made and kept tight.

The framing, fire cutting and anchoring of supporting timbers shall comply with the requirements of Chapter 25.

Floor timbers shall be not less than six (6) inches nominal in either cross sectional dimension.

Sec. 3105. Wood joisted floors shall be framed and constructed and anchored to supporting wood stud or masonry walls as specified in Chapter 25. Wood joisted floors need not be fire protected on the under side except where specifically required under Occupancy in Part III, Location in Part IV or Type of Construction in Part V.

**Wood
Joisted
Floors**

CHAPTER 32

ROOF CONSTRUCTION AND COVERING

General

Sec. 3201. Roof covering shall be as required under Occupancy in Part III, Location in Part IV or Types of Construction in Part V. All roofs shall be so framed and tied into framework and supporting walls as to form an integral part of the whole building.

Construction

Sec. 3202. The general requirements for construction of floors as specified in Chapter 31 shall apply to roofs except that in Type II buildings the roof sheathing shall be not less than two and one-half ($2\frac{1}{2}$) inches nominal in thickness and except that concrete or gypsum roof slabs shall be not less than two (2) inches in thickness.

Roof trusses shall have all joints well fitted and shall have all tension members well tightened before any load is placed on the truss. Diagonal and sway bracing shall be used to brace all roof trusses. The allowable working stresses of materials in trusses shall be as specified in Chapters 25 and 27. The minimum net section of the members after framing shall be used in determining the strength of the truss at any point.

Design

Sec. 3203. The design of the roof construction shall be in accordance with engineering regulations for the materials used.

Roof Coverings

Sec. 3204. Roof covering shall be required over all combustible roof construction and shall be of one of the classes specified in Section 4305 as they are specified under Occupancy in Part III, Location in Part IV and Types of Construction in Part V.

Access to Roof space

Sec. 3205. All buildings shall have access provided to the attic space by means of a stairway or permanent ladder or a scuttle. The openings provided through the ceiling for such access into the attic space shall be not less than two feet by three feet ($2' \times 3'$) and shall be located in the hallway or corridor of all Type III and V buildings three (3) stories or more in height.

Roof Drainage

Sec. 3206. Roofs of all buildings shall be sloped so that they will drain to gutters and downspouts which shall be connected with conductors to carry the water down from the roof underneath the sidewalk to and through the curb. Overflows shall be installed at each low point of the roof to which the water drains.

CHAPTER 33

STAIRS, RAMPS AND SMOKEPROOF TOWERS

Sec. 3301. All exits as required for buildings in this Code shall comply with the requirements specified in this Chapter for a stairway, ramp or smokeproof tower. Wherever stairways are mentioned, ramps may be substituted when constructed as specified in Section 3310. A smokeproof tower constructed as specified in Section 3315 shall be considered as a required stairway as specified in Section 3309. Such smokeproof towers may be substituted for stairways wherever the latter are required in this Code.

General
Require-
ments

All stairways shall be constructed of materials permitted for floors as specified under Types of Construction in Part V for that type of building in which such stairways are located, except as specified in Sections 3315 and 3316. All stairways of wood construction shall be protected on the under side by not less than one-hour fire-resistive construction as specified in Chapter 43. Metal stairways entirely enclosed as specified in this Chapter shall not be required to be fireproofed as required for floors in Part V of this Code. The provisions of this Chapter shall not apply to Group I buildings except as specifically stated in this chapter.

Sec. 3302. All stairways and all platforms, landings and balconies forming a part of such stairway shall be designed to sustain an assumed live load of not less than one hundred (100) pounds per square foot.

General
Design

There shall be no variation in the width of treads in any flight and the variation in heights of risers in any flight shall not exceed three-sixteenths ($3/16$) of an inch. All treads shall have a nosing of not less than one (1) inch.

The surface material of stair treads and landings shall be such as not to involve danger of slipping.

An arrangement of treads known as winders shall be permitted in dwellings or for monumental stairways which are not serving as a required means of exit but in no case shall any tread have a width at any point less than eight (8) inches exclusive of nosing.

Stairways and intermediate landings shall continue with no decrease in width along the direction of exit travel, except that when three or more stairways are required, one-half the required number of stairways may be combined at the second floor level with such combined width extending to the first floor level.

Sec. 3303. One-half of the required number of stairways shall be continued their full width to and through the roof by means of a penthouse in all buildings three stories or more in height; provided, that not more than one stairway shall be required to continue to and through the roof when the roof has a slope of more than six (6) inches for each twelve (12) inches of horizontal projection. In two story buildings scuttles not less than two feet by three feet (2' x 3') shall be provided to and through the roof. Stairways leading to roofs of buildings shall have signs conspicuously placed with letters not less than four (4) inches in height indicating such access at the ground floor level.

Arrange-
ment and
Access

All stairways shall lead to the street directly or by means of a yard, court or fire-resistive passageway having a width at least equal to the aggregate widths of all the exits discharging into it; provided, that not to exceed one-half of the required number of stairs may terminate at the second floor level provided they lead directly to a street or alley front of the building and are provided with a balcony on the exterior of the building not less than three (3) feet wide and five (5) feet long. Such balcony shall be constructed of incombustible materials and when the floor of such balcony is located more than twelve (12) feet above the sidewalk directly below, such balcony shall be equipped with an approved counterbalanced stairway or ladder.

Where stairways discharge through the fire-resistive passageways such passageways shall be not less than eight (8) feet in clear height and with a width at least equal to the stairway or stairways served by such passageways. All openings into such passageways shall be protected by one-hour fire-resistive doors as specified in Section 4304.

All exits shall be so arranged as to make clear the direction of egress to the exterior of the building and shall be so located that they are readily accessible and visible. When not visible to all occupants, adequate signs shall be provided to indicate their location. For buildings with sleeping rooms, schools and places of detention, exits shall be so arranged that it is possible to go in either direction at any point in a corridor to an exit.

Stairways shall abutt on not more than one side of an elevator enclosure.

No portion of any building shall be more than one hundred fifty (150) feet (along the line of travel) from the nearest exit, and no corridor exit door shall be more than one hundred (100) feet (measured along the line of travel) from the nearest exit. In Group D and H buildings all doors providing egress from public hallways and all doors providing egress from the building shall open in the direction of exit travel, except sliding doors as provided in Section 3304.

Doors Sec. 3304. Doors shall not open immediately on a flight of stairs but on a landing at least equal to the width of the door.

Doors giving access to stairways shall swing with the direction of exit travel but where swinging doors are not practicable sliding doors approved by the Building Inspector may be permitted. Vertical sliding doors and rolling shutters shall not be used. There shall be no obstructions on stairways or landings nor to the full swing of doors. Swinging doors in their swing shall not reduce the effective width of stairways or landings to less than thirty (30) inches nor when open interfere with the full use of the stairs.

All doors in exit enclosures or providing access to exterior stairways shall be self-closing and be kept normally closed and shall be of not less than one-hour fire-resistive construction as specified in Section 4304, except that doors facing a street and at street level may be of unprotected wood. All doors shall be constructed and installed in a workmanlike and tight fitting manner.

All doors used in connection with exits shall be so arranged

as to be readily opened from the side from which egress is made or from both sides when the building is occupied. Locks if provided shall not require a key to operate from the inside.

Sec. 3305. All stairways shall have walls or well secured balustrades or guards on each side and handrails shall be placed on at least one side of every stairway and for stairways exceeding forty-four (44) inches in width shall have handrails placed on each side. Stairways over seven (7) feet wide shall be provided with one or more continuous intermediate handrails substantially supported and the number and position of intermediate handrails shall be such that there is not more than sixty-six (66) inches between adjacent handrails.

Railings

Handrails and railings shall be placed thirty (30) inches above the nosing of treads and ends of handrails shall be returned to the wall.

Sec. 3306. Every stairway or other means of exit into corridors and passageways appurtenant thereto shall be provided with an adequate system of lighting, either natural or artificial. Lights in the exit signs shall be kept burning at all times that the building served by such stairways or exits is being used or occupied.

Lighting

Sec. 3307. Stairways and landings, returns and passageways serving such stairways shall be not less than forty-four (44) inches wide; except, that for dwellings and when serving mezzanines or not more than one family or one apartment in buildings not exceeding two stories in height the required width may be reduced to not less than three (3) feet. All such widths shall be clear of all obstructions; except that handrails attached to walls may project within the required width not more than three and one-half ($3\frac{1}{2}$) inches at each side when the stairway is forty-four (44) or more inches in width and on one side when the stairway width is less than forty-four (44) inches. If newells project above tops of rails a minimum clear width of not less than that specified in this paragraph shall be provided between the face of the newell and the face of the wall or newell opposite.

Detailed Requirements

The rise of stairways shall be not more than seven and one-half ($7\frac{1}{2}$) inches and the tread exclusive of the nosing not less than ten (10) inches (maximum pitch 37 degrees,) and there shall be not more than seventeen (17) risers in any one run between landings; provided, that stairways in dwellings and stairways serving mezzanine floors may have a rise of not more than eight (8) inches and a tread exclusive of the nosing of not less than nine (9) inches.

The walls at the outer corners of landings shall be curved on a radius of at least two (2) feet, or a forty-five (45) degree splay not less than twenty (20) inches wide shall be provided to eliminate right angle corners.

Sec. 3308. All required stairways and ramps in buildings three stories or more in height, including landings and parts of floors between stairways which lie in the path of travel shall be enclosed as specified under Occupancy in Part II, under Types of Construction in Part V, and in Chapter 30; except that monumental stairways leading only from the street floor level to the second floor or basement and which do not constitute required

Stairway Enclosures

Secs. 3308-3309

means of exit in public buildings or stores shall be exempted from the enclosure requirements.

Exit enclosures shall not be used for storage in any manner whatsoever and shall not contain any material or equipment liable to cause fire, explosion or panic.

At the top of every stairway enclosure a ventilating skylight with a horizontal area of not less than eight (8) square feet shall be installed as specified in Section 3402, or in lieu of such skylight an equivalent window opening glazed with plain glass may be provided in the penthouse walls. Fixed openings not less than five hundred (500) square inches in area shall be provided at the top of each stairway enclosure for ventilation.

Stairways
Required

Sec. 3309. The number of stairways provided for each use or occupancy shall be as required in the following tabulation for three story buildings. For two story buildings the allowable areas may be increased fifty (50) per cent. For buildings four stories or more in height the allowable areas shall be decreased two (2) per cent per floor for each floor above the third floor to and including the eighth floor and shall be decreased one (1) per cent for each additional floor above the eighth floor; provided, that in no case shall there be less than two stairways serving each floor for each building three stories or more in height. Where the entire building is sprinkled in accordance with the provisions of Chapter 38 the allowable areas tabulated below may be increased thirty-three and one-third (33-1/3) per cent.

The number of required stairways for Group A, B and C buildings is specified in Chapters 6, 7 and 8, respectively.

Basic Areas for Computing Required Number of Stairways

No. of Stair- ways Re- quired	Maximum Areas for Types I and II Buildings (Sq. Ft.)				
	Group D Buildings	Group E Buildings	Group F Buildings	Group G Buildings	Group H Buildings
1	Up to 3,000	Up to 4,000	Up to 5,000	Up to 6,000	Up to 3,000
2	Up to 8,000	Up to 9,000	Up to 12,000	Up to 12,000	Up to 9,000
3	Up to 18,000	Up to 20,000	Up to 25,000	Up to 25,000	Up to 20,000
4	Up to 28,000	Up to 30,000	Up to 40,000	Up to 40,000	Up to 30,000
5	Up to 40,000	Up to 40,000	Up to 57,000	Up to 60,000	Up to 42,000
6	Up to 54,000	Up to 50,000	Up to 76,000	Up to 85,000	Up to 56,000
7	Up to 70,000	Up to 60,000	Up to 97,000	Up to 115,000	Up to 72,000
8	Up to 88,000	Up to 70,000			Up to 90,000
9	Up to 108,000	Up to 80,000			Up to 110,000
10		Up to 90,000			
	Maximum Areas for Types III, IV and V Buildings (Sq. Ft.)				
	Group D Buildings	Group E Buildings	Group F Buildings	Group G Buildings	Group H Buildings
1	Up to 3,000	Up to 4,000	Up to 5,000	Up to 6,000	Up to 3,000
2	Up to 8,000	Up to 9,000	Up to 12,000	Up to 12,000	Up to 9,000
3	Up to 15,000	Up to 17,000	Up to 21,000	Up to 24,000	Up to 17,000
4	Up to 24,000	Up to 27,000	Up to 32,000	Up to 38,000	Up to 26,000
5	Up to 35,000	Up to 38,000	Up to 45,000	Up to 56,000	Up to 37,000
6	Up to 48,000	Up to 52,000	Up to 60,000	Up to 79,000	Up to 50,000
7	Up to 63,000	Up to 68,000	Up to 77,000	Up to 108,000	Up to 65,000
8	Up to 80,000	Up to 86,000	Up to 96,000		Up to 82,000

Exceptions: (1) Group D buildings shall be provided with not less than one smokeproof tower constructed as specified in Section 3315 when such building exceeds two stories in height.

(2) Group E—In automobile storage garages, where a system of ramps continuous from the ground floor to the top floor is used to transport automobiles from floor to floor, the number of stairways required shall be not less than one-half that shown in the above tabulation.

(3) Under no circumstances shall the required number of stairways be less at any point in any building above third floor level than necessary to accommodate one hundred (100) persons per forty-four (44) inch width of stairway based upon the total number of occupants in the building above that point.

(4) Where one horizontal opening is provided, the allowable areas tabulated may be increased fifteen (15) per cent and where more than one such exit is provided, such areas may be increased not to exceed twenty-five (25) per cent.

Sec. 3310. Wherever stairways are required by this Code, ramps with a slope not greater than one (1) foot in eight (8) feet may be substituted. **Ramps**

Ramps shall comply with all the requirements for stairways as to construction, width, enclosures, landing, lighting and ventilation.

Ramps shall be surfaced with an approved non-slip material.

Handrails shall not be required where the slope of the ramp is less than one (1) foot in ten (10) feet.

Sec. 3311. A horizontal exit shall consist of one or more protected openings through or around an exterior or fire wall or of one or more bridges connecting two buildings or parts of buildings entirely separated by fire walls. **Horizontal Exits**

Openings used in connection with horizontal exits shall be protected by one-hour fire-resistive doors as specified in Section 4304. If swinging doors are used there shall be adjacent openings with doors swinging in opposite directions, with signs on each side of the wall indicating the exit door which swings with the travel from that side.

Such doors shall be kept continuously unlocked whenever the building is occupied and be normally closed or be self-closing and equipped with fusible links.

Sec. 3312. Signs having white letters not less than five (5) inches high on a red field indicating location of exits shall be provided not only at the exit but at other points in the building wherever necessary to clearly indicate the direction of egress. Lights shall be kept burning during all times that the building is used or occupied. **Signs and Lighting**

Sec. 3313. Safe and continuous passageways, aisles, or corridors leading to exits and so arranged as to provide convenient access to exits for every occupant shall be maintained at all **Passage-ways and Corridors**

Secs. 3313-3315

times on all floors and buildings. The minimum clear width of any passageway, aisle or corridor shall be three (3) feet at the narrowest point and doors swinging into such passageway shall not restrict the effective width at any point during their swing to less than the minimum width herein specified.

Exceptions

Sec. 3314. Stairways in dwellings, stairways serving only one apartment not above the second floor level, or stairways leading to mezzanine floors not exceeding one thousand (1000) square feet in area are exempted from the width, rise, tread and enclosure provisions in this Chapter but in no case shall such stairways have a rise of more than eight (8) inches and a tread exclusive of the nosing of less than nine (9) inches.

Smokeproof Tower

Sec. 3315. (1) Where required. A smokeproof tower consisting of a stairway with exterior access, entirely closed by masonry walls of not less than four-hour fire-resistive construction and floors and ceilings of not less than two-hour fire-resistive construction as specified in Chapter 43 and constructed as specified in this Section shall be required in every building of Group D, E, F, G and H occupancies five stories or more in height. Smokeproof towers shall be installed in Group A, B and C buildings as specified in Chapters 6, 7 and 8, respectively.

(2) Construction. The stairways, landings, platforms and balconies of smokeproof towers shall be constructed as required for stairways, except that they shall be of incombustible materials throughout, except for handrails which may be of wood. The enclosure shall extend from the street level to a penthouse on the roof of the building and shall be roofed over with incombustible materials. Light and ventilation shall be provided at the top of every such enclosure as required for stairways.

Balustrades on the vestibules and balconies shall be not less than three feet and six inches (3'-6") in height. Exit lights shall be provided as required in Section 3312.

(3) Access and Egress. Access to the smokeproof tower shall be provided from each story by means of vestibules open to the outside on an exterior wall or by means of balconies overhanging an exterior wall but not subject to severe fire exposure. Every such vestibule, balcony or landing shall have an unobstructed length not less than the combined required width of exit doors opening upon such balcony or landing and shall be directly open to a street, alley or yard or to an enclosed court open at the top and not less than fifteen (15) feet in width and six hundred (600) square feet in area.

Access from the building to vestibules or balconies and to the enclosure shall be through doorways not less than thirty (30) inches wide nor less than seventy-five (75) inches in clear height. These openings shall be provided with self-closing fire doors of not less than one-hour fire-resistive construction as specified in Section 4302, swinging in the direction of exit travel; provided that clear wire glass not exceeding seven hundred and twenty (720) inches in area shall be provided in all such doors giving access to the enclosure from the balcony or vestibule. Where locks or latches are provided they shall be of an approved

pressure-release type and shall be so designed as to provide access from the building at every floor and roof level.

Stairways of smokeproof towers shall provide continuous uniform egress from the roof and all stories to street grade. Egress shall be provided at the ground floor level either directly or through a passageway not less than forty-four (44) inches in clear width and eight (8) feet in clear height to a street, yard or alley not less than ten (10) feet in width. The walls of such passageway shall be of not less than four-hour fire-resistive construction and the ceiling and floor of not less than two-hour fire-resistive construction as specified in Chapter 43. The walls of any such passageway shall be unpierced throughout their entire length.

(4) Location. Every smokeproof tower required by this Code shall be located so as to furnish the best means of egress for the occupants of the building and access shall be provided thereto by means of a public room, public hall or passageway not less than thirty-six (36) inches in clear width and in no case shall access thereto be through another apartment, guest room, office or private room of any nature.

Sec. 3316. Outside stairways of the return platform or straight run type may be used as a required means of exit for buildings not exceeding five stories or fifty-five (55) feet in height but in no case shall such stairways constitute more than fifty (50) per cent of the required exit capacity. All outside stairways shall be located so as to lead directly to a street or alley or to a yard directly connected with a street or alley.

Outside Stairways

The stairways, landings, platforms and balconies shall be constructed as specified for stairways in this Chapter, except that they shall be of incombustible materials throughout; provided that stairways serving only the second floor may be constructed of combustible material. Structural metal shall be not less than one-quarter (1/4) inch thick and shall be so framed as to permit ready access for inspection and painting. All windows and other openings adjacent to such stairways shall be provided with fixed metal covered sash and frames and wire glass or be provided with shutters or doors of one-hour fire-resistive construction as specified in Chapter 43.

No part of any such outside stairway shall be within ten (10) feet of a lot line which does not form the boundary of a street or alley.

CHPATER 34

DOORS, WINDOWS AND SKYLIGHTS

Doors and
Windows

Sec. 3401. Fire doors where required shall be as specified in Section 4304. All such doors shall be self-closing and if not kept normally closed shall be arranged to close automatically with the fusing of an approved fusible link.

Windows required to have metal frames shall be constructed either of steel or wrought iron rolled shapes or of hollow galvanized sheet iron as specified in Section 4304.

When wire glass is required, it shall mean glass the thickness of which at the thinnest point shall not be less than one-fourth (1/4) of an inch and in which a wire netting is embedded. Wire glass shall be set with putty and metal stops.

Skylights

Sec. 3402. All skylights constructed with metal frames shall be substantially built with interlocking seams. All skylights, the glass of 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 one (1) foot above the roof. The curbs on which the skylight rests shall be constructed as required for inner court walls or for masonry.

When wire glass is required for skylights the size shall not exceed seven hundred and twenty (720) square inches in area or forty-eight (48) inches in any dimension in any one panel. All glass in skylights shall be wire glass, except that skylights over vertical shafts extending through two or more stories shall be glazed with plain glass as specified in this Section; provided, that wire glass may be used if ventilation equal to not less than one-eighth (1/8) the cross sectional area of the shaft but never less than four (4) feet is provided at the top of such shaft.

Any glass not wire glass shall be protected above and below with a screen constructed of wire not smaller than No. 12 B. and S. gauge with a mesh not larger than one (1) inch. The screen shall be substantially supported below the glass.

Skylights installed for the use of photographers may be constructed of metal frames and plate glass without wire netting.

Ordinary glass may be used in the roofs and skylights for greenhouses, provided the height of the greenhouse at the ridge does not exceed twenty (20) feet above the grade. The use of wood in the frames of skylights will be permitted in greenhouses outside of Fire Zones No. 1 and 2, if the height of the skylight does not exceed twenty (20) feet above the grade, but in other cases metal frames and metal sash bars shall be used.

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 (1/2) inch in thickness. Any such glass over sixteen (16) square inches in area, shall have wire mesh embedded in the same or shall be provided with a wire screen underneath as specified for skylights in this Section. All portions of the floor lights or sidewalk lights shall be of the same strength as is required by the Code for floor or sidewalk construction, except in cases where the floor is surrounded by a railing not less than three feet and six inches (3'-6") in height, in which case the construction shall be calculated for not less than skylight loads.

CHAPTER 35

BAYS AND BALCONIES

Sec. 3501. 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. Construction

All exterior balconies attached to or supported by masonry walls shall have brackets or beams constructed of wire, steel, concrete or other incombustible material. All railings for balconies or porches shall be not less than three feet and six inches (3'-6") in height above the floor of such balcony or porch. Balconies shall be designed to support in addition to their own weight a live load of not less than one hundred (100) pounds per square foot. Railings of balconies shall be designed to support a horizontal thrust of not less than twenty (20) pounds per lineal foot of railing uniformly distributed along its length.

CHAPTER 36

PENTHOUSES AND ROOF STRUCTURES

**Penthouses
and Roof
Structures**

Sec. 3601. No penthouse or other projection above the roof shall exceed twenty-eight (28) feet in height above the roof when used as an enclosure for tanks or for elevators which run to the roof and in all other cases shall not extend more than twelve (12) feet in height above the roof. The aggregate area of all penthouses and other roof structures shall not exceed twenty (20) per cent of the area of the roof. No penthouse, bulkhead or any other similar projection above the roof shall be used for manufacturing, business, habitation, offices or storage, except that they shall be permitted to be used for the making of blue prints, photographic prints, for scientific observation, for summerhouses or for private dwellings.

Roof structures of Type I buildings shall be constructed with walls, floors and roof as required for the main portion of the building.

Walls of roof structures parallel to and within four (4) feet of the exterior walls of Type II or III buildings shall be constructed the same as the exterior wall of the story immediately below. Such wall shall project two (2) feet above the roof and two (2) feet beyond the sides of such roof structure, except that the side projection shall not be required when the adjoining side walls are of masonry. Walls other than those occurring within four (4) feet of an exterior wall on Type II or III buildings shall be of not less than one-hour fire-resistive construction. The restrictions of this paragraph shall not prohibit the placing of wood flagpoles or similar structures on the roof of any building.

**Towers
and
Spires**

Sec. 3602. Towers or spires when enclosed shall have exterior walls as required for the building to which they are attached. Towers not enclosed and which extend more than seventy-five (75) feet above grade shall have their framework constructed of iron, steel or reinforced concrete. No tower or spire shall occupy more than one-fourth (1/4) of the street frontage of any building to which it is attached and in no case shall the base area exceed sixteen hundred (1600) square feet unless conforming entirely to the Type of Construction requirements of the building to which it is attached and being limited in height as a main part of the building. If the area of the tower or spire exceeds one hundred (100) square feet at any horizontal cross section its supporting frame shall extend directly to the ground. The roof covering of spires shall be as required for the main roof of the rest of the structure.

Skeleton towers used as wireless masts and placed on the roof of any building shall be constructed entirely of incombustible materials when more than twenty-five feet in height and shall be directly supported on an incombustible framework to the ground. They shall be designed to withstand a wind load from any direction as specified in Section 2307 in addition to any other loads.

CHAPTER 37

Chimneys and Heating Apparatus

Chimneys

Sec. 3701. Chimneys shall be constructed in conformance with "A Standard Ordinance for Chimney Construction" recommended by the National Board of Fire Underwriters, Third Edition, revised 1927, except as specified in this Chapter.

The walls of all chimneys whether used for appliances using coal, coke, wood, gas or oil shall be built of brick, concrete, stone, hollow tile of clay or concrete or of concrete blocks; provided that a metal smokestack as specified in Section 3702 may be used.

Flue linings shall be made of fire clay or of other suitable refractory clays adapted to withstand reasonably high temperatures and flue gases and shall have a softening point not lower than nineteen hundred and ninety-four (1994) degrees Fahrenheit. Flue linings shall be not less than five-eighths (5/8) of an inch in thickness and shall be built in as the outer walls of the chimney are constructed. All joints and spaces between the masonry and lining shall be thoroughly slushed and grouted full as each course of masonry is laid. Cracked, broken or otherwise defective linings shall not be used. Flue linings shall start from a point not less than eight (8) inches below the center line of smoke pipe intakes or in the case of fireplaces from the apex of the smoke chamber and shall be continuous to a point not less than four (4) inches above the enclosing walls. Flue lining may be omitted in brick chimneys for residence buildings provided the walls of the chimneys are not less than eight (8) inches thick and that the inner course shall be of fire brick with a fire resistance equal to that required for flue linings.

The walls of brick chimneys shall be not less than three and three-fourths (3-3/4) inches thick and shall be lined except as provided above. All brick work shall be laid with full mortar joints and shall be struck smooth where exposed to the weather. No mortar lining shall be permitted.

Concrete chimneys cast in place shall be suitably reinforced vertically and horizontally. The walls shall be not less than three and three-fourths (3-3/4) inches thick and shall have a flue lining as specified in this Section; provided, that flue linings may be omitted in reinforced concrete chimneys for private dwellings when the walls of such chimneys are not less than six (6) inches thick.

Hollow blocks or building tile of clay or concrete shall not be used for the walls of an independent chimney but may be used for chimneys built in connection with exterior party walls of hollow units for buildings not exceeding three stories in height. The outer eight (8) inches of such a wall may serve as the outside wall of the chimney.

Chimneys shall extend at least three (3) feet above flat roofs and not less than two (2) feet above the ridge of gable and hip roofs or the high point of mansards irrespective of the distance of the chimney from such obstruction to draft.

Chimneys shall be built upon solid masonry or reinforced concrete foundations properly proportioned to carry the weight

Secs. 3701-3703

imposed without settlement or cracking. The chimney shall carry no load except its own weight and such load shall be transmitted to the foundation in such manner as to prevent the shearing or falling off of any part of the chimney. The footing for an exterior chimney shall start below the frost line.

Flues shall be built as nearly vertical as possible and in no case at an angle greater than thirty (30) degrees from the vertical.

When any single flue has an effective area exceeding two hundred (200) square inches the wall shall be not less than eight (8) inches thick and shall have flue lining as specified in this Section, except that when flues become too large for fire clay flue lining such flues shall be lined with fire brick for a distance at least twenty-five (25) feet from the point of intake.

There shall be but one connection to a flue irrespective of whether the fuel used be coal, coke, wood, oil or gas. Ordinary and low pressure heating devices burning solid fuels shall have a minimum effective flue area of not less than the following, and such area shall be provided by a flue having its short dimension not less than two-thirds (2/3) the long dimension.

Small special stoves and heaters.....	28 sq. inches
Stoves, ranges and room heaters	40 sq. inches
Fireplaces (at least 1/12 the fireplace opening)	50 sq. inches
Warm air furnaces, steam and hot water boilers	70 sq. inches

All flues to which large ranges, heating furnaces, boilers, automatic gas water heaters or fireplaces are to be connected shall be subjected to a smoke test before acceptance but the test shall not be made until the mortar has thoroughly seasoned. Such test shall be made by the mason contractor in the presence of the Building Inspector.

Smoke-stacks

Sec. 3702. Steel or iron smokestacks may be used in place of brick chimneys specified in Section 3701, in which case the thickness of the metal shall be not less than one-fourth (1/4) of an inch. Such stacks when used for manufacturing, for high pressure boilers, furnaces or other similar heating or manufacturing appliances shall be lined with fire brick for a distance of not less than twenty-five (25) feet from the place where the smoke pipe enters and shall be protected on the outside up to and through the roof of the building with eight (8) inches of masonry or a metal shield which provides an eight (8) inch ventilated air space between such shield and the steel or iron stack; provided, that a metal smokestack when located inside of a vent shaft having masonry enclosing walls not less than eight (8) inches thick and having an air space between the walls and the stack on all sides may have such masonry or metal shield protection omitted when placed outside of the building. All stacks shall be properly guyed when the height of the stack exceeds fifteen times its least diameter.

Smokestacks constructed of not less than number ten (10) U. S. Gauge steel, with either welded or riveted joints, may be mounted directly upon industrial, heating and/or power boilers which are designed to support the stack load. A clearance of not less than six (6) inches shall be maintained at all times around such smokestack and any inflammable material within

twelve (12) inches of such smokestack shall be protected by one-fourth ($\frac{1}{4}$) of an inch of asbestos covered by sheet metal.

Sec. 3703. Gas furnaces and individual gas room heaters **Gas Vents**
 may, in lieu of the chimney required in Section 3701, be provided with a vent of unglazed fire clay or concrete tile pipe not less than one-half ($\frac{1}{2}$) inch in thickness and having a sleeve or flange not more than twenty-four (24) inches apart and at every joint in such vent pipe. Such sleeves or flanges shall project at least three-fourths ($\frac{3}{4}$) of an inch beyond the outer surface of the joint and shall securely join the sections of such vent and all points shall be well cemented. The sleeves or flanges shall be securely attached to the portions of the building or structure adjoining such vents and act as a spacer to provide an air space around such vent, or such vent may be entirely enclosed in a galvanized iron pipe with such sleeves or flanges separating the outer pipe at least one-half ($\frac{1}{2}$) inch from the clay or concrete vent. The free flue area of a gas vent shall be not less than the area of all of the vent connections of all the appliances connected thereto and served by the vent at that point. Not more than three (3) appliances shall be connected to any such vent, except that the various units of a unit furnace may be combined and connected to one vent.

A single galvanized or copper bearing metal vent connection exposed to view in a room throughout its entire length may be used to connect the appliance to the vent. Such metal vent connection shall be not less in diameter than the connection on the appliance and shall be maintained not less than six (6) inches distant from any combustible portion of the building or the combustible material shall be protected by not less than one-hour fire-resistive construction as specified in Chapter 43. Every portion of a vent connection shall have a rise of not less than one-half ($\frac{1}{2}$) inch to the foot from the appliance to the chimney and the length of such connection shall be no greater than the height of the vent from the point at which the vent connection enters to the top of the vent.

Every vent shall extend in as nearly a vertical position as possible and be continuous from the gas appliance to the outside of the building and extend at least one (1) foot above the highest portion of the building or any adjoining building within fifteen (15) feet thereof. No gas vent in any part thereof shall be inclined more than thirty (30) degrees from the vertical.

Gas furnaces and automatic gas appliances shall not be connected in the same vent with any other appliance.

Sec. 3704. Patent chimneys **Patent Chimneys** may be used, except for fireplaces, when complying with the requirements of this Section.

All patent chimneys shall be constructed with a flue lining enclosed in a metal outer casing which is so arranged as to provide not less than a one (1) inch air space between the flue lining and the casing. The flue lining shall be made of fire clay or suitable refractory clays adopted to withstand reasonably high temperatures and flue gases, shall have a softening point not lower than nineteen hundred and ninety-four (1994) degrees Fahrenheit and shall be not less than one (1) inch in thickness.

Secs. 3704-3706

Such chimneys shall be built up from the floor level on which they are used and in no case shall a stove pipe enter the bottom of a patent chimney nor shall such chimneys be used for fire-places.

When such chimneys are erected on the outside of a building they shall be supported by a substantial iron bracket attached to the studs or framework of the building with through-bolts. When erected on the inside of a building such patent chimneys shall be provided with a smokeproof clean-out of approved design at or near the floor. The floor on which they are placed shall be protected by not less than eight (8) inches of masonry or terra cotta set on a one-fourth (1/4) inch metal plate. Partitions enclosing patent chimneys shall have an opening opposite the clean-out on the chimney for the purpose of cleaning the flue.

All patent chimneys shall be built plumb and without bends. All joints in such chimneys shall be made with cement mortar and the bands covering the joints shall be of not less than twenty-four (24) U. S. Gauge galvanized iron. All patent chimneys shall be braced every six (6) feet in their height by not less than sixteen (16) gauge wire secured to the chimney by locks or collars and extending in at least three directions.

Not more than two inlets for smoke pipes will be permitted in any patent chimney. When only one inlet is provided the flue shall be not less than six (6) inches in diameter and shall be not less than eight (8) inches in diameter where two inlets are provided.

All galvanized iron used for the casing of patent chimneys shall be of twenty-four (24) U. S. Gauge riveted together with rivets not more than three (3) inches apart or seamed and with such seams secured with rivets at the top and bottom of each section. There shall be not less than one (1) inch clearance between the chimney and the casing at all points and such casing shall be ventilated by not less than six (6) one (1) inch holes punched near the top of the chimney above the roof so as to permit the escape of hot air.

Smoke
Pipes
and
Thimbles

Sec. 3705. All smoke pipes shall be as short and straight as possible. Smoke pipes for furnaces, boilers or apparatus burning solid or liquid fuel shall be constructed of black iron of not less than twenty-four (24) U. S. Gauge or masonry and shall fit tightly into the chimney. Galvanized iron shall not be used.

Smoke pipes shall enter the side of chimneys through a fire clay or metal thimble or a flue-ring of masonry. The top of smoke pipe intakes shall be set not less than eighteen (18) inches below sheet metal ceilings, wood lath and plaster or exposed wood framing. Neither the intake pipe nor the thimble shall project into the flue. No wood-work shall be placed within six (6) inches of the thimble. When a smoke pipe enters a chimney breast through a studded off chimney partition the thimble shall be kept six (6) inches clear of all woodwork.

Fire-
places

Sec. 3706. All fireplace walls shall be not less than eight (8) inches thick and if built of stone or hollow units shall be not less than twelve (12) inches thick. The faces of all such minimum thickness walls exposed to fire shall be lined with

fire brick, soap stone, cast iron or other suitable fire-resistive material. When lined with four (4) inches of fire brick such lining may be included in the required minimum thickness. All fireplaces shall be connected to a regulation chimney as specified in Section 3701.

All fireplaces and chimney breasts shall have trimmer arches or other approved fire-resistive construction supporting hearths. The arches and hearths shall be not less than twenty (20) inches wide measured from the face of the chimney breast and not less than twelve (12) inches wider than the fireplace opening on each side. The arches shall be of brick, stone or hollow tile not less than four (4) inches thick. A flat stone or reinforced concrete slab may be used to carry the hearth instead of an arch if it be properly supported and a suitable fill provided between it and the hearth. Hearths shall be of brick, stone, tile or concrete. Wood centering under a trimmer arch shall be removed after the masonry has thoroughly set.

False fireplaces for gas or electrical heaters shall not be constructed in imitation of fireplaces unless complying with all the requirements for fireplaces and shall not be recessed into the wall more than six (6) inches in any case.

No heater burning solid or liquid fuel shall be placed in a fireplace which does not comply with the requirements of this Section. No such heaters shall be connected to a gas vent flue. No wood shall be placed within eight (8) inches of the jambs or within twelve (12) inches of the top or arch of any fireplace opening.

Sec. 3707. Warm air furnaces may be used for heating buildings not over three stories in height. Such furnaces shall be encased in a double metal shield with an air space between and shall be protected with at least three (3) inches of sand on top and shall rest on masonry or concrete floors. No wood partitions shall be built within seven (7) feet of the front or four (4) feet of the sides of the outer shield of such furnaces, but the distance to the partitions at the side may be reduced to two (2) feet if they are covered with sheet metal or metal lath and plaster. The distance from the top shield of such furnace to any ceiling or framing of wood above shall be not less than twenty-four (24) inches unless such wood ceiling or framing is protected with not less than one-hour fire-resistive construction.

Every furnace designed to burn solid or liquid fuel shall set upon a masonry floor or be placed on a bed of not less than four (4) inches of masonry and every portion thereof including the smoke pipe shall be at least two (2) feet from any combustible material or such combustible material shall be protected by a covering of number twenty-four (No. 24) U. S. Gauge galvanized iron furred with metal furring not less than one and one-half (1-1/2) inches from such combustible construction or shall be entirely covered by one-hour fire-resistive construction. Any such furnace set in brick shall be completely and tightly covered with at least four (4) inches of brick, concrete, tile, sand or a combination of such materials. Every such furnace shall be connected to a regulation chimney as specified in Section 8701.

**Warm
Air
Furnaces**

Every gas furnace other than single pipe floor furnaces shall be set in a furnace room upon a masonry floor or shall be set upon not less than two (2) inches of masonry. Every such furnace shall be vented into a regulation chimney as specified in Section 3701 or as provided in Section 3703.

An air supply shall be provided for every gas furnace. Such supply may be from the outside air into the furnace room, from the inside of the building into the furnace room or from either source direct to the furnace by means of cold air pipes or ducts constructed of metal or other incombustible material. Where the air supply is taken from the outside air one or more openings shall be provided into the furnace room, and such openings shall have a net area of not less than four hundred (400) square inches. No obstructions of any kind shall be placed over such ducts except a wire netting with openings not less than one-half (1/2) inch square.

The furnace room or rooms shall be located in the basement or cellar of any building having a gravity system and the least horizontal dimension of such room shall be six (6) feet. The floor of the furnace room shall be not less than seven (7) feet in the clear below the bottom of the lowest joists of any floor under which lateral heat pipes from the furnace or furnaces are taken and such floor shall be constructed of incombustible materials. An opening into such furnace room space not less than thirty inches by thirty-six inches (30"x36") shall be provided.

Low Pressure Steam Heating Plants

Sec. 3708. Steam hot water heating plants, for not more than fifteen (15) pounds pressure, and hot water heaters using solid or liquid fuel, shall rest upon masonry or reinforced concrete floors and shall be protected on the outside by asbestos. The clearance of wooden partitions, ceilings, and other combustible materials shall be the same as given for warm air furnaces.

Boilers

Sec. 3709. Large boilers for power or steam purposes or for generating high pressure steam shall be so located that no wood or other combustible material shall be less than five (5) feet from the top or sides or ten (10) feet from the front of such apparatus and all combustible material less than ten (10) feet from the top or sides or less than twenty (20) feet from the front shall be protected with at least four (4) inches of concrete, brick or other similar incombustible material and shall be well ventilated to prevent the temperature rising above one hundred and twenty-five (125) degrees Fahrenheit. Steel, cast iron or concrete columns adjacent to such boilers shall not be in direct contact with furnace settings but there shall be an open and unobstructed space at least four (4) inches wide for ventilation.

Stoves

Sec. 3710. All stoves used for heating, cooking or laundry purposes using solid or liquid fuel or gas shall have all combustible partitions in back of and extending not less than twelve (12) inches beyond each side of such stove protected by not less than one-hour fire-resistive construction as specified in Chapter 43. Such stoves shall be securely supported at least twelve (12) inches above any wood floors by metal supports and

there shall be a metal and asbestos pad at least three-eighths (3/8) of an inch thick below such stove extending at least six (6) inches beyond each side and at least twelve (12) inches in front of such stove. Such stoves shall not be placed nearer than six (6) inches to any combustible partition.

All such stoves shall be connected by a smoke pipe to a chimney meeting the requirements specified in Section 3701.

Sec. 3711. Gas ranges, domestic hot water heaters and hot plates shall be supported at least six (6) inches above any wood floor or other combustible material and where burners are not provided with a shield below, the wood or other combustible material shall be protected with a double metal shield and with a one (1) inch air space between or with a one-half (1/2) inch pad of metal and asbestos. Combustible partitions or walls in back of such ranges, domestic hot water heaters and hot plates shall be protected by one-fourth (1/4) of an inch of asbestos covered with a twenty-six (26) gauge metal covering or shall have not less than a one-hour fire-resistive protection as specified in Chapter 43. Wood ceilings or other combustible materials shall be at least three (3) feet above such installations. The oven of ranges and all water heaters shall be connected to a vent pipe meeting the requirements of Section 3703 or to a regulation chimney as specified in Section 3701.

**Gas
Ranges,
Domestic
Water
Heaters
and Hot
Plates**

Sec. 3712. Gas ranges for restaurants, bakeries or hotels shall be supported at least six (6) inches above any wood floor and if less than twelve (12) inches above the floor, the wood shall be protected by a metal shield or such ranges may rest on a steel and masonry support. Such ranges shall not be placed nearer to any wood partitions or other combustible material than six (6) inches and if nearer than twelve (12) inches, such partitions shall be protected with a metal or asbestos shield. The distance from any such range to any wood ceiling or other combustible material above shall not be less than twelve (12) inches; and if less than three (3) feet, the ceiling or combustible material above shall be protected with a double metal shield with one (1) inch air space between or with one (1) inch of metal lath and Portland cement plaster or one (1) inch of asbestos. Hood and ventilating flues from such ranges may be of sheet metal or masonry and if of sheet metal shall be protected from all wood or other combustible materials by four (4) inches of concrete, gypsum or terra cotta tile or an eight (8) inch air space and a metal shield. Such ventilating flues shall not be carried through wood floors or up combustible partitions unless protected by at least four (4) inches of masonry or concrete.

**Gas
Ranges
For Res-
taurants
and Hotels**

Sec. 3713. Stoves, furnaces and other heating or power apparatus in which oil burners are installed shall be constructed and erected as required for similar apparatus using solid fuel.

**Oil
Burners**

Oil burning apparatus using commercial fuel oil, furnace oil, diesel oil or other inflammable liquids shall be constructed and installed in compliance with the regulations of the National Board of Fire Underwriters for the Construction and Installation of Oil Burning Equipments and for the Storage and Use of Oil Fuels in Connection Therewith recommended by the National Fire Protection Association, Edition of 1928.

Secs. 3714-3715

**Other
Sources
of Heat**

Sec. 3714. Other sources of heat and flame not specifically mentioned herein shall be constructed and so protected as to prevent heating any wood or other combustible material used in the construction of floors, ceilings, partitions or other parts of a building to a temperature of over one hundred and twenty-five (125) degrees Fahrenheit, when in full operation, and shall be so constructed as not to be liable to undue corrosion or deterioration and not subject to accidental overturn or other disarrangement conducive to dangerous conditions.

**Warm Air
Ducts and
Appurtenances**

Sec. 3715. For gravity systems no leader heat pipes shall be over twenty (20) feet in length measured horizontal, except where a booster fan is installed when such length shall not exceed forty (40) feet. All such pipes under first floor joists shall have a uniform rise of at least one (1) inch per lineal foot of horizontal run. Warm air pipes and appurtenances serving first floor rooms shall have a minimum cross sectional area in square inches of not less than the cubic foot capacity of the room or rooms in which registers are located, divided by forty (40); provided, that no leader pipe shall have a net area less than thirty-eight (38) square inches. Risers and appurtenances serving floors above the first floor shall have a net area of not less than two-thirds ($2/3$) that required to serve the first floor.

Registers shall be located in or near the wall of the room nearest the furnace. No register shall be located in outside walls except in cases of absolute necessity. Where double registers are supplied by one leader pipe each register shall have a capacity of not less than two-thirds ($2/3$) the area of the leader pipe. When necessary to install appurtenances in an outside wall at least the weather side shall be covered with air-cell asbestos paper.

Ninety (90) degree bends in round pipe shall be made by not less than four (4) piece elbows. Sixty (60) degree bends shall be made by means of not less than three (3) piece elbows. All warm air pipes and fittings, cold air or recirculating pipes, ducts, boxes and fittings shall be made of bright tin or galvanized iron. All such appurtenances except leader heat pipes under the first floor shall be covered with two thicknesses of asbestos paper weighing at least eight (8) pounds to one hundred (100) square feet or with air-cell asbestos insulation or shall be double walled with a one-fourth ($1/4$) inch space between the inner and outer walls. Horizontal warm air pipes shall be kept at least three (3) inches from any combustible material or shall be protected with an asbestos shield and a one (1) inch air space. Air-cell asbestos paper not less than one-fourth ($1/4$) of an inch in thickness shall be securely cemented around all leader pipes.

All riser pipes shall be braced or held in place by means of metal strips securely fastened to the pipe and shall in no case be held in place by nailing diagonally through the corners of such pipe. No joint shall depend wholly upon solder to make it tight. All leader pipes shall be securely fastened in place by means of wires or metal strips.

In the installation of Y runs or branch runs the cross sec-

Secs. 3715-3716

tional area of the warm air pipe at the furnace shall equal in square inches the cubic contents of all the rooms served by such warm air pipe divided by forty (40). Sizes of branch runs shall be determined in the same manner on the basis of the room or rooms served. Branches from trunk lines shall be taken off in a generally horizontal plane at an angle not less than forty-five (45) degrees from the line of the pipe. Riser pipes shall not be taken off the top of the first floor register boxes.

Where warm air pipes and appurtenances are to be installed in a building the joists and studs shall be so arranged as to provide not less than fourteen (14) inches clear space in continuous horizontal runs and/or vertical risers from the gas furnace to the register served.

Sec. 3716. All incinerators shall have the enclosing walls of the fire boxes or combustion chamber of solid masonry or reinforced concrete not less than eight (8) inches in thickness where the horizontal area does not exceed fifteen (15) square feet and not less than twelve (12) inches in thickness where the combustion chamber is of greater area. The inner four (4) inches of such combustion chamber walls shall be of fire brick laid in fire clay or cement mortar, except that the walls surrounding the ash chamber below the fire grate need not be so lined. The inner walls of any combustion chamber shall not be offset in excess of one (1) inch for every three (3) inches of rise in the height of the wall unless supported by reinforced concrete or structural steel. **Incinerators**

Chimneys for every incinerator shall be as specified in Section 3701.

FIRE EXTINGUISHING APPARATUS

CHAPTER 38

**Automatic
Sprink-
lers;
Where Re-
quired**

Sec. 3801. Standard automatic sprinklers shall be installed as specified in this Chapter in the following places:

1. In the cellar of every building.
2. Under the roof above the stage, under the floor of the stage, under all fly and tie galleries, under the gridiron, in all dressing rooms, store rooms, property rooms, carpenter shops, paint shops, passageways and all other places back of the proscenium wall; a line of sprinklers shall be installed in the arch of the proscenium opening in front of every proscenium curtain in all Group A buildings; in all motion picture projection rooms or booths in all Group A, B and C buildings.

3. In all Group E buildings occupied wholly or in part as a planing mill, box factory, wood working establishment where lumber is made into a finished product and in which more than two power operated wood working machines exclusive of saws are used.

4. In all Group E buildings occupied wholly or in part as a mattress factory used to manufacture, assemble or renovate mattresses or stuffed furniture using cotton, silk floss, mohair or other like material for packing or stuffing.

5. In all Group E buildings used as film exchanges.

Exceptions: The above provisions shall not apply in the following places:

1. Automatic sprinklers shall not be required in the cellars of dwellings and/or apartment houses having four or less apartments, nor in the cellars of Group C, D, E, F, G and H buildings when the ceiling of such cellar or basement is three (3) feet or more above grade, nor when such cellars or basements have an area of fifteen hundred (1500) square feet or less.

2. The alarm valve required for a standard automatic sprinkler system shall not be required in the cellars of Group C, D, E, F, G and H buildings when the area of such cellar is less than three thousand (3000) square feet.

**Automatic
Sprinkler
Require-
ments**

Sec. 3802. Every automatic sprinkler system required by this Code shall comply in all respects with the regulations of the National Board of Fire Underwriters governing the installation of automatic sprinkler equipment, edition of 1925, where not contrary to the specific statements in this Chapter.

Exceptions: A single water supply equal to the primary supply required by such regulations may be accepted as complying with the requirements of this Code. In no case where a connection to a city water main constitutes the source of supply shall such connection be less than four (4) inches in diameter.

**Dry Stand-
pipes; Where
Required**

Sec. 3803. Every building three (3) or more stories in height shall be equipped with one (1) or more dry standpipes.

**Dry
Standpipe
Require-
ments**

Sec. 3804. Construction. Dry standpipes shall be of wrought iron or galvanized steel and together with fittings and connections shall be of sufficient strength to withstand three hundred (300) pounds of water pressure to the square inch

when ready for service, without leaking at the joints, valves or fittings.

Size. Dry standpipes shall not be less than four (4) inches in diameter for buildings five stories or less in height, five (5) inches in diameter for buildings six to ten stories inclusive in height and six (6) inches in diameter for all buildings more than ten stories in height.

Number Required. Every building three or more stories in height where the area of any floor above the second floor is ten thousand (10,000) square feet or less shall be equipped with not less than one (1) dry standpipe and an additional standpipe shall be installed for each additional ten thousand (10,000) square feet or fractional part thereof.

Location. Standpipes shall be located within stairway enclosures or as near such stairways as possible or shall be on the outside of, embedded within, or immediately inside of an exterior wall and within one (1) foot of an opening in a stairway enclosure or the balcony or vestibule of a smokeproof tower or an outside exit stairway.

Siamese Connections. All four (4) inch dry standpipes shall be equipped with a two-way Siamese fire department connection. All five (5) inch dry standpipes shall be equipped with a three-way Siamese fire department connection and all six (6) inch dry standpipes shall be equipped with a four (4) way Siamese fire department connection. All Siamese inlet connections shall be located on a street front of the building and not less than one (1) foot nor more than four (4) feet above the grade and shall be equipped with clapper-checks and substantial plugs. All Siamese inlet connections shall be recessed in the wall or otherwise substantially protected.

Outlets. All dry standpipes shall extend from the ground floor to and over the roof and shall be equipped with a two and one-half (2-1/2) inch outlet not more than four (4) feet above the floor level at each story. All dry standpipes shall be equipped with a two-way two and one-half (2-1/2) inch outlet above the roof. All outlets shall be equipped with gate-valves with substantial chains.

Threads. All hose in connection with such standpipe installations shall be uniform with that used by the local fire department.

Signs. An iron or bronze sign with raised letters at least one (1) inch in height shall be rigidly attached to the building adjacent to all Siamese connections and such sign shall read: "CONNECTION TO DRY STANDPIPE."

Sec. 3805. Every Group A, B and C building of any height and every Group D, E, F, G and H building three (3) or more stories in height shall be equipped with one (1) or more interior wet standpipes extending from the cellar or basement into the topmost story. **Wet Standpipes; Where Required**

Sec. 3806. Construction. Interior wet standpipes shall be constructed as required for dry standpipes. **Wet Standpipe Requirements**

Size. Interior wet standpipes shall have an internal diameter of not less than four (4) inches.

Exceptions: Interior wet standpipes for Group A, B and C buildings two stories or less in height may be reduced to a three (3) inch internal diameter.

Number Required. Wet standpipes shall be so located that any portion of the building can be reached therefrom with a hose not exceeding seventy-five (75) feet in length.

Location. The location of all interior wet standpipes shall be approved by the Building Inspector.

Siamese Connections. All interior wet standpipes shall be equipped with a Siamese fire department inlet connection located on the street front of the building and such connection shall have two (2) inlets for buildings five (5) stories or less in height, three (3) inlets for buildings six (6) to ten (10) stories inclusive in height, and four (4) inlets for buildings more than ten (10) stories in height.

Exceptions: Interior wet standpipes in Group A, B and C buildings two stories or less in height need not be equipped with such Siamese connections.

Outlets. All interior wet standpipes shall be equipped with a two and one-half (2 1/2) inch straightway composition gate-valve in each story including the basement or cellar of the building and located not less than one (1) foot nor more than five (5) feet above the floor. Gatevalves shall be equipped with a reducing fitting reducing from two and one-half (2 1/2) inches to one and one-half (1 1/2) inches.

Threads. All hose threads in connection with the installation of such standpipes, including valves and reducing fittings, shall be uniform with that used by the local fire department.

Signs. An iron or bronze sign with raised letters at least one (1) inch in height shall be rigidly attached to the building adjacent to all Siamese connections and shall read: "CONNECTION TO WET STANDPIPE."

Water Supplies. All interior wet standpipes shall be connected to a street water main of not less than four (4) inches in diameter or when the water pressure is insufficient to maintain twenty-five (25) pounds pressure at the highest hose outlet such standpipe shall be connected to a pressure tank, gravity tank or fire pump. Such supply shall be sufficient to furnish at least twenty-five (25) pounds pressure at the topmost hose outlet.

When more than one interior wet standpipe is required in the building, such standpipes shall be connected at their bases or at their tops by pipes of equal size. All supply mains shall be equipped with gatevalves and straightway check valves located adjacent to the source of supply.

Pressure and Gravity Tanks. Tanks shall have a capacity sufficient to furnish at least two hundred and fifty (250) gallons per minute for a period of not less than twenty (20) minutes. Such tanks shall be located so as to provide not less than twenty-five (25) pounds pressure at the topmost hose outlet for its entire supply. Discharge pipes from pressure tanks shall extend two (2) inches into and above the bottom of such tanks. All tanks shall be equipped with a manhole, ladder and platform, drain pipe, water and pressure gauges. Every pres-

sure tank shall be tested in place after installation and proved tight at a hydrostatic pressure fifty (50) per cent in excess of the working pressure required. Where such tanks are used for domestic purposes the supply pipe for such purposes shall be located at or above the center line of such tanks. Incombustible supports shall be provided for all such supply tanks and not less than a three (3) foot clearance shall be maintained between the top and bottom of all pressure tanks.

Fire Pumps. Fire pumps shall have a capacity of not less than two hundred and fifty (250) gallons per minute with a pressure of not less than twenty-five (25) pounds at the topmost hose outlet. The source of supply for such pumps shall be a street water main of not less than four (4) inch diameter or a well or cistern containing a one (1) hour supply. Such pumps shall be supplied with an adequate source of power and shall be automatic in operation.

Hose and Hose Reels. Each hose outlet of all interior wet standpipes shall be supplied with a hose not less than one and one-half (1-1/2) inches in diameter. Such hose shall be equipped with a suitable brass or bronze nozzle and shall be not over seventy-five (75) feet in length. An approved standard form of wall hose reel or rack shall be provided for the hose and shall be located so as to make the hose readily accessible at all times and shall be recessed in the walls or protected by suitable cabinets.

Sec. 3807. Basement pipe inlets shall be installed in the first floor of every store, warehouse or factory where there are cellars or basements under same, except where in such cellar or basements there is installed an automatic sprinkler system as specified by this Code, or where the cellars or basements are used for hanking purposes, safe deposit vaults or similar uses.

Basement Pipe Inlets

All basement pipe inlets shall be of cast iron, steel, brass or bronze with lids of cast brass or bronze and shall consist of a sleeve not less than eight (8) inches in diameter through the floor extending to and flush with the ceiling below and with a top flange, recessed with an inside shoulder, to receive the lid and flush with the finish floor surface. The lid shall be a solid casting and have a ring lift recessed in the top thereof, so as to be flush. The lid shall have the words "Fire Department Only." "Do Not Cover Up," cast in the top thereof. The lid shall be installed in such a manner as to readily permit its removal from the inlet.

The location of such basement pipe inlets shall be approved by the Building Inspector and shall be kept readily accessible at all times to the Fire Department.

CHAPTER 39.—STAGE VENTILATORS

Stage Ventilators Sec. 3901. There shall be one or more ventilators constructed of metal or other incombustible material near the center and above the highest part of the stage of every theatre, raised above the stage roof and having a total ventilating area equal to at least ten (10) per cent of the floor area within the stage walls. The entire equipment shall conform to the following requirements or their 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) Glass, if used in ventilators, 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 one hundred and sixty (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 Building Inspector.

(4) The fusible link and the cord must hold the doors closed against a force of at least thirty (30) pounds excess counter weight 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. Each stage ventilator shall be operated to an open and closed position at least once before each performance.

CHAPTER 40.—MOTION PICTURE MACHINE BOOTHS

Sec. 4001. Every motion picture machine using inflammable films, together with all electrical devices, rheostats, sewing machines and all films present in any Group A, B or C building, shall be enclosed in a booth large enough to permit the operator to walk freely on either side or in back of the machine and shall be not less than seven (7) feet high and have a floor area of not less than fifty (50) square feet to each motion picture machine in such booth.

**Motion
Picture
Machine
Booths .**

The floor of such booth shall be constructed of masonry or reinforced concrete or shall be covered with not less than two (2) inches of masonry. The walls and ceiling shall be of not less than one-hour fire-resistive construction as specified in Chapter 43.

The entrance to booth shall be equipped with a tight fitting self-closing fire door of Types 4, 5 or 6 as specified in Section 4304. Such door shall open outwardly and shall not be equipped with any latch. There shall be not more than eight (8) openings for operating machines and for observation, and each opening shall be not more than eighty (80) square inches in area. Each such opening, together with any fresh air inlets, shall be provided with a shutter of not less than fourteen (14) U. S. gauge sheet metal large enough to overlap at least one (1) inch on all sides of such opening and arranged to slide without binding and with the joint between the shutter and the wall to be smoke tight when shutter is down. These shutters shall be held normally open by means of a fine combustible cord fastened to a one hundred and sixty (160) degrees Fahrenheit fusible link (pieces of film shall not be used in place of fusible links), the whole so arranged that the shutters may be easily released and closed either by hand or automatically when released by the fusible link and shall be so designed as to effect a weight of not less than eight (8) pounds on each fusible link.

Every booth shall be equipped with a ventilating inlet not less than thirty (30) square inches in area placed near the floor on each of three sides and protected by wire netting. At the top of every booth there shall be at least a ten (10) inch diameter vent for each motion picture machine. Such vent shall be constructed of sheet metal not less than twenty-four (24) U. S. gauge and shall connect into a masonry flue or go directly through the roof and twelve (12) inches above, and shall be provided with an exhaust fan which will produce a complete change of air in the booth every ten (10) minutes. No wood or other combustible material shall be allowed to come within four (4) inches of the vent. There shall be not more than one elbow or change in direction of this metal vent in any attic space. No such vent shall pass through any occupied room unless encased in not less than four (4) inches of solid masonry.

All shelves, furniture and fixtures within the booth shall be constructed of metal or other incombustible material. Every motion picture machine shall be securely fastened to the floor to prevent overturning.

Sec. 4001

All films not in actual use shall be stored in metal cabinets or boxes constructed of galvanized iron or steel with metal partitions and shelves. Each such compartment shall not have a capacity in excess of ten (10) reels of film, and shall have tight self-closing doors of iron or steel. No solder shall be used in the construction of such metal boxes or cabinets.

CHAPTER 41—PROSCENIUM CURTAINS

Sec. 4101. Proscenium curtains shall be made of incombustible materials constructed and mounted so as to intercept hot gases, flame and smoke and to prevent glow from a severe fire on the stage showing on the auditorium side within a period of fifteen (15) minutes. The curtain shall be raised and lowered at least once before every performance and shall be lowered each evening at the close of the performance. The closing of the curtain from the full open position shall be effected in less than one (1) minute, but the last five (5) feet of travel shall require not less than five (5) seconds.

Proscenium Curtains; General Require- ments

Sec. 4102. The curtain shall be of not less fire-resistive qualities than as specified in this Section for a Class A Metal Curtain or a Class B Asbestos Cloth Curtain.

Curtain Cover- ings

Class A Metal Curtain. The metal curtain shall have its front or auditorium side covered with well fitted metal plates. The stage side shall be covered with insulating boards made of asbestos. Such insulating boards, if of asbestos, shall be at least three eighths (3/8) of an inch thick and weigh not less than two (2) pounds per square foot if solid, or not less than three-fourths (3/4) of an inch thick and weigh not less than one and three-fourths (1-3/4) pounds per square foot if of cellular construction. Other materials which have been proven the equivalent of the above specified asbestos boards in strength, fire resistance and insulating properties may be used in lieu thereof. The covering materials shall be firmly attached to the curtain frame and all joints and linings thoroughly cemented with a fire-resistive or furnace cement.

Class B. Asbestos Cloth Curtain. The asbestos cloth curtain shall have its framework covered on both sides with a metal reinforced close woven asbestos cloth, weighing not less than three and one-fourth (3-1/4) pounds per square yard. Marginal members of the frame shall have the cloth covering extended around them to form insulation of at least two thicknesses, or shall have other equivalent insulation.

The covering cloth shall have incorporated into the yarn before weaving, either monel metal, nickel, brass or other metal or alloy having not less strength at a temperature of seven-teen hundred (1700) degrees Fahrenheit and not less resistance to corrosion at ordinary temperatures. Asbestos cloth made of long fiber blue crocidolite asbestos may be used in place of chrysotile asbestos cloth of the same weight having wire reinforcement. The wires shall be either single or double but the tensile strength of wires in each strand of yarn shall be sufficient to support a load of not less than seven (7) pounds at ordinary temperatures, and the strength of the yarn with the wires shall be sufficient to support a load of twelve (12) pounds. The strength of the cloth in tension shall be not less than one hundred and eighty (180) pounds per inch of width of warp and eighty-five (85) pounds per inch of filling. The asbestos fiber of yarns may contain cotton or other combustible fiber not in excess of four (4) per cent of the weight of the asbestos. The total carbon content of the cloth shall not exceed two and one-half (2 1-2) per cent of the total weight of

the fiber. When required by the Building Inspector, a sample of cloth of sufficient size for testing shall be submitted.

The seams of the cloth shall have double rows of stitching of asbestos thread having metal wires of the same or greater strength than the yarns of the cloth.

The asbestos cloth curtain shall have the interior framework of tubes, structural shapes, bars or rods of steel with horizontal members spaced not more than eight (8) feet apart and the vertical members not more than twelve (12) feet apart. A positive separation of the curtain cloth on the two sides of not less than two (2) inches shall be provided. After erection the asbestos cloth shall be filled with a mineral paint having a silicate of soda binder, to which may be added casein in the proportion of not more than four (4) parts of casein to ten (10) parts of concentrated solution of sodium silicate. Any other paint which will completely fill the pores of the cloth and which shall be capable of withstanding fire without giving out more smoke than the above shall be permitted. The paint shall be applied hot and brushed well into the cloth so as to make it practically smoke tight.

Design of Curtain

Sec. 4103. The curtain shall have a rigid framework of steel or other suitable metal covered in either manner as specified in Section 4102. It shall have sufficient strength to resist a lateral pressure of at least ten (10) pounds per square foot of its area when in the closed position, with a factor of safety of not less than two (2) on the ultimate strength of the construction. The mounting and details shall be such as to insure ready and positive closure of the curtain when subjected to a pressure of five (5) pounds per square foot uniformly distributed over its entire surface.

The design strength of tension members and cloth shall be based on center deflections of not to exceed one-tenth (1/10) of the span. In no case shall the maximum deflection cause a permanent set or bend in the curtain structure nor shall it cause the curtain to rub against the wall at the edges of the proscenium opening.

The thickness of the curtain shall in no case be less than one one-hundred-twentieth (1/120) of its span. The width and height of the curtain shall be such that it shall overlap the sides and top of the proscenium opening at least nine (9) inches.

Provision shall be made for the expansion of the curtain and guides due to changes in temperature and an allowance of one-sixteenth (1/16) inch per foot of length of steel members shall be made for such purpose.

The curtain shall be guided throughout its travel by rigid steel guides. Such guides shall be securely bolted to the proscenium wall and designed to form a stop between the curtain and the wall, so as to prevent smoke and flame from passing around the edges of the curtain. Where the main members carry the stresses for lateral pressure on the curtain as suspension tension members, the guides shall be attached to the building to safely carry the reactions from these tension members. 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 of incombustible material not less than three (3) inches thick to form a seal against the floor.

Sec. 4104. The mechanism and devices for controlling the curtain shall be of simple design and shall be positive in operation. The opening of the curtain may be by hand, hydraulic or electric power. The closing for emergency or for automatic operation shall be the same as for ordinary operation and shall be by gravity obtained by counterbalancing the curtain with counter weights having not less than one (1) pound for each square foot of curtain.

**Operating
Equipment**

In addition to the regular operating control station which shall be on the stage floor there shall be three emergency control stations, one of which shall be on the stage. At least three quick acting, heat separating, release devices for automatically closing the curtain shall be provided. The location of the emergency control stations and the release devices shall meet with the approval of the Building Inspector.

For hydraulic machines operating the curtain, the water supply shall be taken from an elevated tank or from a suitable accumulator; supply for electric machines shall be fused independently of the house supply. All parts of the electric power supply shall be enclosed and well protected against fire.

All machines and hoisting gear shall be designed in accordance with the "Safety Code for Elevators, Dumbwaiters and Escalators" published by the American Society of Mechanical Engineers, July, 1925, as such requirements are specified for passenger elevators, machines and cables. Travel limit stops and room for over-travel shall be provided. Lifting cables shall be not less than one-half ($\frac{1}{2}$) inch in diameter.

Sec. 4105. The complete installation of every proscenium curtain shall be subjected to operating tests and any theatre in which such proscenium curtain is placed shall not be opened to public performances until after the proscenium curtain has been accepted and approved by the Building Inspector.

Tests

Sec. 4106. Curtains of other designs and materials than specified in this Chapter shall before acceptance be subjected to the standard fire test specified in Chapter 42 as applicable to non-bearing partitions, except that such test shall be continued only for a period of fifteen (15) minutes unless failure shall have occurred previously, and that the average temperature on the unexposed side of the test curtain shall not exceed two hundred and sixty (260) degrees Centigrade at ten (10) minutes nor three hundred and seventy-one (371) degrees Centigrade at fifteen (15) minutes after such test has been commenced. Also the unexposed face of the curtain shall not glow within the test period of fifteen (15) minutes nor shall there be any passage of smoke or flame through the curtain.

**New
Designs**

PART VIII

FIRE-RESISTIVE STANDARDS FOR FIRE PROTECTION

CHAPTER 42—GENERAL

Fire-Resistive Construction Defined

Sec. 4201. Building materials, systems, units and forms of construction as regulated by this Code shall be classified as "four-hour fire-resistive construction," "three-hour fire-resistive construction," "two-hour fire-resistive construction" and "one-hour fire-resistive construction," for fire-resistive purposes and protection. Materials, systems, units and forms of construction, in order to be classed as four-hour, three-hour, two-hour or one-hour fire-resistive construction shall meet the respective requirements for such rating as specified in the Tentative Specifications for Fire Tests of Building Construction and Materials, A. S. T. M. Designation C19-26, of the American Society for Testing Materials.

Any materials, systems, units or forms of construction which meet the requirements of the aforesaid Tentative Specifications shall be accepted as fire-resistive construction of the degree specified, if and when they shall be shown by an authoritative test conducted in accordance with all of the provisions of such aforesaid specifications, to possess such fire resistance.

Fire-Resistive Materials

Sec. 4202. The following materials, combinations of materials, systems and units shall be classed as fire-resistive materials:

- Brick
- Concrete brick, block or tile
- Gypsum block or tile
- Gypsum (plain or reinforced)
- Gypsum plaster board (or lath) and plaster.
- Hollow clay tile
- Metal
- Metal and asbestos
- Metal lath and plaster
- Portland cement concrete (plain or reinforced)
- Sand-lime brick

Fire-Resistive Construction

Sec. 4203. All fire-resistive construction of burned clay, concrete or gypsum units or other similar units shall be solidly bedded and laid in gypsum mortar, lime-cement mortar or cement mortar; provided, that gypsum units shall be laid in gypsum mortar only. All such units shall be thoroughly bonded together by broken joints in alternate courses or by sufficient metal ties or bonds.

All concrete, gunite, gypsum or similar protection for steel or iron structural members which is cast, poured or similarly applied shall be reinforced at the edges of such members in a sufficient manner to prevent cracking and disintegrating of such protection. All such applied fire protection materials shall be reinforced by metal rods, wire or mesh to

Sec. 4203

provide against cracking and disintegrating of the protecting material.

All plaster fire protection shall consist of gypsum mortar, Portland cement mortar or other equally fire-resistive material. Gypsum plaster only shall be used for plastering on gypsum units. Wherever plaster is used for fire protection purposes it shall be reinforced with a metal mesh or lath; provided, that where such plastering is placed on masonry or reinforced concrete such reinforcing may be omitted when the plastering is not more than one (1) inch thick. Gunite applied to masonry need not be reinforced and when properly bonded shall be considered a part of the required thickness.

CHAPTER 43—FIRE-RESISTIVE STANDARDS

Protection of
Structural
Parts

Sec. 4301. The thickness of fire-resistive materials for fire protection of structural parts shall be as shown in the following table for the respective degrees of fire protection shown. The figures shown shall be the net thickness of the protecting materials and shall not include any hollow space or spaces. The thickness of plaster protection shall be measured from the face of the plaster to the plane of the back surface of the metal or wire lath where such lath is used and shall include two-thirds (2/3) of the thickness of the gypsum plaster board (or lath) where such board (or lath) is used.

Sec. 4301

Minimum Protection of Structural Parts Based on Time Periods for Various Incombustible Insulating Materials

Structural Parts to Be Protected	Insulating Material Used	Minimum Thickness of Material in Inches for the Following Fire-Resistive Periods			
		4 hr.	3 hr.	2 hr.	1 hr.
Steel or Cast Iron Columns; Projecting Steel Beam and Girder Flanges; All Members of Primary Trusses	Grade A Concrete	3	2	1½	1
	Grade B Concrete	4	3	2	1½
	Gunitite	2½	1½	1	¾
	Brick of Clay, Shale, Concrete or Sand-Lime	4	4	2½	2½
	Clay Tile, or Clay Tile and Concrete	4	3	2	1½
	Solid Gypsum Blocks	4	3	2	1½
	Metal Lath and Gypsum or Portland Cement Plaster	3	2½	2	1
	Grade A Concrete	2½	1½	1	1
Webs of Steel Beams and Girders	Grade B Concrete	3½	2½	1½	1
	Gunitite	2	1	¾	¾
	Brick of Clay, Shale, Concrete or Sand-Lime	4	2½	2½	2½
	Clay Tile, or Clay Tile and Concrete	3	2	1½	¾
	Solid Gypsum Blocks	3	2	1½	1
	Metal Lath and Gypsum or Portland Cement Plaster	2½	2	1½	¾
	Grade A Concrete	2	1½	1	¾
	Grade B Concrete	2½	2	1½	1
Reinforced Concrete Columns, and the Soffits of Beams and Girders	Grade A Concrete	1½	1	¾	¾
Soffits of Joists, and Sides of Beams, and Girders of Reinforced Concrete	Grade B Concrete	2	1½	1	¾
Ceiling Protection of Roof members where incombustible slab not less than 2" thick is placed above; and protection for members of secondary trusses	Metal or Wire Lath and Gypsum or Cement Plaster, Concrete, Burned Clay Products or Gypsum	2	1½	1	¾
	Gunitite	1½	1	¾	¾
Reinforcement and Tie Rods in Floor and Roof Slabs	Grade A Concrete	1	1	¾	¾
	Grade B Concrete	1¼	1	1	¾
	Gypsum	1¼	1	1	¾

NOTE:

Grade A concrete shall mean concrete with a coarse aggregate of limestone, pumice, calcareous pebbles or trap rock.

Grade B concrete shall mean concrete with a coarse aggregate of granite, sandstone, chert pebbles or quartz.

For flat ceilings where the ceiling protection for beams, girders or slabs is suspended to form a free air space between the member and the protection, the protection thicknesses may be one-half ($1/2$) inch less than that required in the above table for flat ceiling protection, but no thickness shall be less than three-fourths ($3/4$) of an inch.

Soffit tile protecting beam and girder flanges shall be tied to the flange with steel or iron ties.

If the structural part is of iron or steel the thickness given in the foregoing table shall be measured outside of the extreme edges of the structural shapes, except that projecting edges of lugs and brackets shall be given a minimum protection of one (1) inch thickness. For reinforced concrete members, the thickness given in the foregoing table shall be outside of the reinforcement. For purposes of design the protection shall not be considered as carrying load except as permitted for tied columns in Section 2621.

Plaster protections of over one (1) inch in thickness shall have an additional layer of metal lath, wire or metal mesh embedded not more than three-fourths ($3/4$) of an inch from the surface and securely tied into the supporting members.

Wire of not less than number ten (No. 10) B. and S. gauge wound or tied around members at not more than a six (6) inch pitch, or wire or expanded metal mesh shall be placed and well embedded in all concrete and gunite protections.

Wire mesh or other forms of metal ties in concrete protections shall be held away from the structural members and embedded in the protection not less than three-fourths ($3/4$) of an inch from its outer surface at points of minimum thickness. Hollow tile or gypsum block protections shall have iron or steel ties embedded in each horizontal joint, or have outside iron or steel ties over each unit, the diameter of wire to be 0.18 inch, or of equivalent area in ties of other forms. Wire mesh, where used for tying protections, shall weigh not less than one and one-half ($1\frac{1}{2}$) pounds per square yard. Where metal lath or wire mesh is used as a plaster base or tie it shall weigh not less than two and two-tenths (2.2) pounds per square yard, and two and one-half or more meshes per inch or equivalent. Gypsum plaster board not less than three-eighths ($3/8$) of an inch thick and having not more than fifteen (15) per cent combustible material combined with the gypsum may be substituted for metal lath for resistance periods of not more than two (2) hours, provided the plaster is reinforced with metal or wire mesh weighing not less than one and one-half ($1\frac{1}{2}$) pounds per square yard, standing away from the board and secured to the supporting members, and two-thirds ($2/3$) of the thickness of the plasterboard may be considered as plaster.

Concrete aggregates whose mineral composition is unknown or undetermined shall for the application of these regulations be classed as Grade B aggregates.

Sec. 4302. Fire-resistive bearing and non-bearing walls and partitions shall be of not less than the thicknesses and construction specified in this Section, to be classed for the respective degrees of protection indicated.

Fire-Resistive Walls and Partitions

The structural requirements of the following masonry and reinforced concrete walls are specified in Chapters 24 and 29 for the specific location or use of the walls and all walls shall comply with those structural requirements as well as the fire-resistive limitations as specified in this Section.

The following tabulated thicknesses are minimum and shall not be broken into; provided that where combustible floor or partition members project into solid masonry or reinforced concrete walls or partitions the required effective thickness of wall shall be measured from two (2) inches back along the member from the end in the wall, to the opposite face of the wall. Where such members project into hollow walls and the space between the members and for not less than four (4) inches above and below them is filled solid with fire-resistive incombustible materials for the full thickness of the wall, or where such hollow walls are constructed of hollow units laid with cells horizontal (side construction) the required thickness shall be measured as specified for solid masonry walls in this paragraph. Where the hollow spaces are not thus filled or where hollow units are laid with cells vertical (end construction) the required effective thickness of wall shall be measured from the end of member in wall to the opposite face of wall.

Plaster, in order that it may be considered as adding to the fire resistance of walls and partitions shall be gypsum or Portland cement plaster applied to an average thickness of not less than one-half ($\frac{1}{2}$) of an inch on each side. Plaster over one (1) inch in thickness, as measured to the plaster base, shall have an additional layer of metal lath, wire or metal mesh embedded not more than three-fourths ($\frac{3}{4}$) of an inch from the surface and securely tied into the supporting members.

Gypsum plaster board (or lath) not less than three-eighths ($\frac{3}{8}$) of an inch in thickness and having not more than fifteen (15) per cent of combustible material combined with the gypsum may be substituted for metal lath for resistance periods of not more than two (2) hours, provided the plaster is reinforced with metal or wire mesh weighing not less than one and one-half pounds per square yard, standing away from the board (or lath) and secured to the supporting studs or joists. Two-thirds of the thickness of the plaster board (or lath) may be considered as plaster.

Gypsum plaster board (or lath) conforming to the specifications contained in the preceding paragraph may be substituted for metal lath and the reinforcement of the plaster omitted, provided that the joints of the plaster board (or lath) are covered with strips of metal fabric not less than three (3) inches in width and the plaster board (or lath) is plastered with not less than one-half ($\frac{1}{2}$) inch of fibered gypsum plaster containing not more than twenty (20) per cent by weight of silica.

Metal or wire lath shall weigh not less than two and two-tenths (2.2) pounds per square yard. Metal or wire mesh where used as ties in concrete shall weigh not less than one and one-

Rated Fire Resistance Periods for Various Walls and Partitions

MATERIAL	CONSTRUCTION	Minimum Finished Thickness face to face (including plaster where mentioned) in inches			
		4-hr.	3-hr.	2-hr.	1-hr.
Brick of Clay, Shale, Sand-Lime or Concrete, and Plain Concrete	Solid unplastered	8			4*
	Solid plastered	9		5*	
	Hollow (rowlock) unplastered	12	10	8	
	Hollow (rowlock) plastered	9			
Hollow Clay Tile Wall	End or side construction. One cell in wall thickness. Plastered				3*
	End or side construction. Two cells in 8-in. or less thickness. Unplastered	16	12		6* or 8
	End or side construction. Two cells in 8-in. or less thickness. Plastered	13	9	7*	
	End or side construction. Two cells in wall thickness. Unplastered			6	
Hollow Clay Tile A. S. T. M. Load Bearing	End or side construction. Two cells in wall thickness. Plastered			5*	
	End or side construction. Three cells in 8-in. or less thickness. Unplastered	12			
	End or side construction. Three cells in 8-in. or less thickness. Plastered one side		8½		
	End or side construction. Three cells in 8-in. or less thickness. Plastered	9			
Combination of Brick and A. S. T. M. Load-Bearing Tile	4-in brick and 4-in. tile plastered one side (tile side)	9			
Grade A—"Special" Hollow Concrete Block or Tile	One cell in 8-in. or less thickness. Plastered	12†	8	6	4*
	One cell in 8-in. or less thickness. Plastered	9†		5*	
Grade A and Grade B Hollow Concrete Block or Tile	One cell in 8-in. or less thickness. Unplastered	16	12	10	6* or 8
	One cell in 8-in. or less thickness. Plastered	13	11	7* or 9	7*
Solid Concrete	Reinforcement not less than 0.2% in each direction	6	5*	4*	2*
	Reinforcement not less than 0.2% in each direction	5* or 6	4*	3*	2*
Hollow Gypsum Blocks	Unplastered	6*	5*	4*	3*
	Plastered	5*	4*	4*	3*
Hollow Wall of Reinforced Gunite	Outer shell 2-in. thick for 10-in. wall and 1½ in. thick for 8-in. wall	10*	8*		
Solid Gypsum or Portland Cement Plaster	Incombustible studding with metal or wire lath				2*
Hollow Partition with Gypsum or Portland Cement Plaster or Gunite on Each Side	Incombustible studding with metal or wire lath. ¾ in. plaster on each side				3*
	Incombustible studding with metal or wire lath. 1 in. plaster on each side			4½*	
	Wood studs with metal or wire lath. Fire-stopped				3* or 5

*Indicates that such walls and partitions shall be used for non-bearing purposes only.

†This thickness to be given a four-hour rating only after an A. S. T. M.

half ($1\frac{1}{2}$) pounds per square yard. Where used as ties for plaster it shall weigh not less than two and two-tenths (2.2) pounds per square yard and have not less than two and one-half meshes per inch, or equivalent.

Wood studs for bearing partitions or walls shall be not less than the two inch by four inch (2"x4") nominal size and be spaced not more than sixteen (16) inches apart.

Note: The term "plastered" in following table shall mean walls plastered with not less than one-half ($\frac{1}{2}$) inch of gypsum or Portland cement plaster on each side of wall.

Sec. 4303. Fire-resistive floor construction shall be accepted for the following respective degrees of fire-resistive protection when constructed as specified in this Section. For the structural details of any floor construction, the particular details specified under Part VI of this Code shall govern.

Four-hour, three-hour and two-hour fire-resistive floors as specified in this Section shall be constructed entirely of incombustible materials.

(a) Four-hour fire-resistive floor construction shall consist of reinforced concrete and/or solid masonry slabs or arches not less than four (4) inches in thickness or shall consist of hollow masonry slabs or arches not less than four (4) inches in thickness with a top covering of not less than two (2) inches of solid masonry, or shall consist of steel joists protected with fire-resistive materials of the kind and thickness shown in the table in this Section. Except in the case of steel joisted construction, all reinforcing, tie rods and supporting structural members in such floors shall be protected with not less than four-hour fire-resistive construction as specified in Section 4301.

(b) Three-hour fire-resistive floor construction shall consist of reinforced concrete and/or solid masonry slabs or arches not less than three (3) inches in thickness or shall consist of hollow masonry slabs or arches not less than four (4) inches in thickness with a top covering of solid masonry not less than one and one-half ($1\frac{1}{2}$) inches in thickness, or shall consist of steel joists protected with fire-resistive materials of the kind and thickness shown in the table in this Section. Except in the case of steel joisted construction all reinforcing, tie rods and supporting structural members in such floor construction shall be protected with not less than three-hour fire-resistive construction as specified in Section 4301.

(c) Two-hour fire-resistive floor construction shall consist of reinforced concrete and/or solid masonry slabs or arches not less than two and one-half ($2\frac{1}{2}$) inches in thickness or shall consist of hollow masonry slabs or arches not less than three (3) inches in thickness with a top covering of not less than one (1) inch of solid masonry, or shall consist of steel joists protected with fire-resistive materials of the kind and thickness shown in the table in this Section. Except in the case of steel joisted construction all reinforcing, tie rods and supporting structural members in such floor construction shall be protected with not less than two-hour fire-resistive construction as specified in Section 4301.

(d) One-hour fire-resistive floor construction shall consist of reinforced concrete and/or solid masonry slabs or arches not less than two and one-half ($2\frac{1}{2}$) inches in thickness or shall consist

**Fire-Resistive
Floor
Construction**

Secs. 4303-4304

of hollow masonry slabs or arches not less than three (3) inches in thickness with all joints in such hollow unit construction thoroughly filled with cement or gypsum mortar or shall consist of steel joists protected with fire-resistive materials of the kinds and thickness shown in the table in this Section. Except in the case of steel joisted construction, all reinforcing, tie rods and supporting structural members shall be protected with not less than one-hour fire-resistive construction as specified in Section 4301; or.

Wood joisted construction with a double wood floor on top (the subfloor not less than three-fourths ($\frac{3}{4}$) of an inch thick, and the total thickness of the two layers not less than one and one-fourth ($1\frac{1}{4}$) inches thick) and with a fire-resistive ceiling, as shown in the table in this Section, securely fastened to or suspended from the under side of such joists.

All flat ceilings where the ceiling protection for beams, girders or slabs is suspended to form a free air space between the member and the protection, the protection thicknesses may be one-half ($\frac{1}{2}$) inch less than that required in the above table for flat ceiling protection, but no thickness shall be less than three-fourths ($\frac{3}{4}$) of an inch minimum protection of metal and wood joists based on time periods for various insulating materials.

**Minimum Protection for Metal and Wood Joists
Based on Time Periods for Various Insulating Materials**

Joists to be Protected	Insulating Material Used	Minimum thickness of material in inches for the following fire resistive periods			
		4-hr.	3-hr.	2-hr.	1-hr.
Ceiling protection of Steel Joists, where incombustible slab not less than $2\frac{1}{2}$ in. thick is placed above	Metal or wire lath and gypsum or Portland cement plaster, concrete, burned clay products or gypsum	2	$1\frac{1}{2}$	1	$\frac{3}{4}$
	Gunitite	$1\frac{1}{2}$	1	$\frac{3}{4}$	$\frac{3}{4}$
Ceiling Protection of Wood Joists with double floor on top	Metal or wire lath and gypsum or Portland cement plaster				$\frac{3}{4}$

**Fire
Doors,
Shutters
and
Windows**

Sec. 4304. (a) Fire-resistive Doors. One-hour fire-resistive doors shall be constructed as specified for one of the following types, 1, 2 or 3, or any door which will successfully pass the one-hour fire test specified in Section 4201, and all such doors to receive the one-hour rating, shall be hung in place as specified in this Section:

1. Tin-clad wood-core doors with the core made of three (3) plies of wood one (1) inch nominal in thickness and covered with sheet metal, the door to be constructed in accordance with the "Underwriters' Standard for Tin-Clad Fire Doors and Shutters," Edition of March, 1926, and July, 1927; reprinted, 1928.

2. Sheet metal doors constructed of two (2) sheets of not less than twenty-six (26) U. S. Gauge corrugated sheet metal, one sheet on each side of a structural steel frame, corrugations

vertical on one side and horizontal on the other and having not less than one-sixteenth ($1/16$) of an inch of asbestos placed in between the two metal sheets;

3. Sheet metal doors constructed of two (2) sheets of metal of not less than twenty-six (26) U. S. Gauge fastened to a structural steel frame in such manner as to leave a one (1) inch space in the panels, which space shall be filled with asbestos and with a one-eighth ($1/8$) inch asbestos covering on the stiles and structural steel frame.

Fire-resistive doors used for openings in stairway enclosures, smokeproof towers, corridors and passageways, moving picture booths, room partitions, exterior walls facing streets or more than twenty-five (25) feet from adjacent property lines and for "Ordinary Fire Separations" as specified in Section 503, shall be constructed as specified for one of the following types, 1, 2, 3, 4, 5 or 6 or any door which will provide equivalent protection against fire when hung in place as specified in this Section:

4. Tin-clad wood-core doors made of two (2) plies of wood one (1) inch nominal in thickness and covered with sheet metal, the door to be constructed in accordance with the "Underwriters' Standard for Tin-Clad Fire Doors and Shutters," Edition of March, 1926, and July, 1927; reprinted, 1928.

5. Sheet metal doors as specified in paragraph 3 above, but with one-fourth ($1/4$) of an inch of asbestos placed between the metal sheets in the panels and with no asbestos required on the stiles and structural frame;

6. Metal-clad doors which shall be wood panel doors with frame not less than one and three-fourths ($1\frac{3}{4}$) inches in thickness and with wood panels not less than three-fourths ($\frac{3}{4}$) of an inch in thickness, the whole door covered with not less than number twenty-six (No. 26) gauge metal. The panels of such doors shall fit into the frame not less than three-fourths ($\frac{3}{4}$) of an inch and all joints of metal shall be lapped and nailed tightly to the wood frame.

Metal shall in all cases be fastened to the wood or metal frame by nailing, bolting or riveting and no solder shall be used on any door except for filling of joints.

Glass panels of one-quarter ($1/4$) inch wire glass shall be permitted in any of the above doors except when such doors are used on openings in fire walls, fire division walls, all openings for the stage portion of any Group A building or for openings in "Special Fire Separations" as specified in Section 503. Such glass panels shall be not more than seven hundred and twenty (720) square inches in area, nor exceed fifty-four (54) inches in height or forty-eight (48) inches in width. Grooves not less than three-fourths ($\frac{3}{4}$) of an inch in depth and three-eighths ($3/8$) of an inch wide providing not less than five-eighths ($5/8$) of an inch of bearing for the glass shall be required.

Fire doors bearing the label of the Underwriters' Laboratories, Incorporated, shall be accepted as meeting the requirements of any of the above doors.

Hardware for sheet metal and tin-clad fire doors referred to in paragraphs No. 1, 2, 3 and 4, shall be made of good quality malleable iron not less than one-fourth ($1/4$) of an inch thick or of flat rolled structural steel not less than three-eighths ($3/8$)

Sec. 4304

of an inch thick; provided, that tubular steel track made of at least one-eighth ($\frac{1}{8}$) inch steel may be used. Sliding tracks shall be supported so that a wall fastening is directly opposite each door hanger when door is in a closed position. Hangers supporting doors shall be fastened to the door with not less than three (3) one-half ($\frac{1}{2}$) inch bolts extending through the door. Latches for fire doors shall be not less than two and one-half inches by three-eighths inch ($2\frac{1}{2} \times \frac{3}{8}$ "), and latch bars shall be not less than one and one-half inches by one-fourth inch ($1\frac{1}{2} \times \frac{1}{4}$ ").

Hardware for swinging hollow metal and metal-clad doors as referred to in paragraphs No. 5 and 6 shall be made as follows:

Hinges. For doors not exceeding eight (8) feet in height the hinges shall be of steel or bronze. If made of steel they may be either full, half surfaced, or butt hinges four and one-half inches by four and one-half inches ($4\frac{1}{2} \times 4\frac{1}{2}$ ") and not less than one-eighth ($\frac{1}{8}$) inch in thickness. If made of bronze they shall be butt hinges four and one-half by four and one-half inches ($4\frac{1}{2} \times 4\frac{1}{2}$ ") and not less than three-sixteenths ($\frac{3}{16}$) of an inch in thickness. When bronze hinges are used a steel stud and socket shall be provided at each hinge. The studs shall be attached to the rear jamb and shall engage a socket at least three-fourths ($\frac{3}{4}$) inch deep in the rear edge of the door.

Locks. Doors shall be provided with a mortise or unit lock which has a latch bolt with a throw of not less than three-fourths ($\frac{3}{4}$) of an inch.

When mounted in pairs the normally standing door shall have a push bolt at the top and at the bottom which has a throw of not less than three-fourths ($\frac{3}{4}$) of an inch.

Special locking devices shall be provided as required in Part III under occupancy, also as provided in Sections 3304, 3311 and 3315.

Astragals. Swinging fire doors mounted in pairs shall be provided with at least one astragal attached to one door and overlapping the opposite door at least three-fourths ($\frac{3}{4}$) of an inch. The above provision need not apply when the doors meet on a mullion.

Fire doors required by this Code shall be installed in the manner prescribed in the "Regulations of the National Board of Fire Underwriters for the Protection of Openings in Walls and Partitions Against Fire," recommended by the National Fire Protection Association, Edition of 1927.

All fire doors shall be so hung that when closed they will fit tightly into place against the wall or frame so as to prove an effective stop for fire and smoke. Space around fire doors necessary for their operation shall at all times be kept unobstructed and when deemed necessary by the Building Inspector a screen or railing protection shall be installed to insure no storing or placing of material against any fire door which would prevent its operation in case of emergency.

(b) **Fire-resistive Shutters.** One-hour fire-resistive shutters shall be constructed as specified for any one of the types of fire-resistive doors specified in part (a) of this Section.

(c) **One-hour Fire-resistive Windows.** One-hour fire-resistive windows shall have frames and sash of solid metal bars or hollow metal forms fabricated by pressing, welding or crimping together but not by the use of solder or other fusible alloy. All glass used in fire-resistive windows shall be wire glass and shall be not less than one-fourth ($\frac{1}{4}$) of an inch in thickness and no one light shall exceed seven hundred and twenty (720) square inches in area. Grooves three-fourths ($\frac{3}{4}$) of an inch in depth shall be provided and glass so arranged as to have not less than five-eighths ($\frac{5}{8}$) of an inch of bearing in hollow metal frames and with grooves not less than one-half ($\frac{1}{2}$) inch and with glass provided with not less than three-eighths ($\frac{3}{8}$) of an inch of bearing in windows of solid metal section. Continuous glazing angles shall be provided on the inside. Fire-resistive windows with hollow metal frames shall be limited to a maximum size of sixty (60) square feet with a six (6) foot maximum width and a ten (10) foot maximum height for double hung and counterbalanced windows and to a maximum size of seventy (70) square feet with a seven (7) foot maximum width and ten (10) foot maximum height for stationary windows. Solid metal section windows shall be limited to a maximum size of eighty-four (84) square feet in area with a maximum dimension in either direction of twelve (12) feet. Multiple section windows of these above sizes may be used when hollow metal or solid section mullions are provided. Hollow metal mullions shall be limited to a maximum length of twelve (12) feet and shall be used for non-bearing purposes only. Solid section mullions when used in lengths exceeding twelve (12) feet shall be fireproofed as required in Section 4301 in accordance with the fire-resistive construction of the building in which they are placed. Where fire-resistive windows are required by this Code, wood sash and plain glass may be substituted when protected as specified in Parts (a) and (b) of this Section.

Fire-resistive windows bearing the label of the Underwriters' Laboratories, Incorporated, shall be accepted as one-hour fire-resistive windows.

Sec. 4305. Roof coverings for all buildings shall be either "Fire Retardant" or "Ordinary" roofings as specifically required either by Location in Part IV, by Type of Construction in Part V or as specified in Sections 1109 and 1209. The roof covering shall be securely fastened to the supporting roof construction.

Roof Coverings

(a) **Fire Retardant Roofings.** "Fire Retardant" roofings shall be any roof covering which meets the requirements specified for any one of the following roofings, 1 to 13, inclusive, or shall be any roofing meeting the requirements of the Class A or B specifications of the Underwriters' Laboratories, Incorporated. Roofings bearing the label, and laid in the manner provided by the Underwriters' Laboratories, Inc., for Class A and B, may be accepted as meeting the requirements of this section for fire-retardant roofs.

1. Not less than two layers of prepared composition roofing, each layer weighing not less than thirty-two (32) pounds to the one-hundred-eight (108) square feet solidly mopped between with asphalt so that in no place shall layer touch layer, and

covered with a flood coat of asphalt in which there shall be embedded gravel, crushed brick, stone or other approved incombustible material to completely cover the surface.

2. Not less than four layers of asphalt saturated rag felt, each layer weighing not less than fourteen (14) pounds to the one-hundred (100) square feet solidly mopped between with asphalt so that in no place shall layer touch layer, and covered with a flood coat of asphalt in which there shall be embedded gravel, crushed brick or stone, or other approved incombustible material to completely cover the surface.

3. Not less than two layers of asphalt saturated rag felt, each layer weighing not less than fourteen (14) pounds to the one-hundred (100) square feet (or their equivalent in weight in one or more layers of asphalt saturated rag felt or prepared composition roofing) and either one layer of mineral surfaced prepared composition roofing weighing not less than eighty-two (82) pounds to the one-hundred-eight (108) square feet or one layer of smooth finished prepared composition roofing weighing not less than seventy-two (72) pounds to the one-hundred-eight (108) square feet. The said layers of felt and/or roofing mopped solidly between with asphalt so that in no place shall layer touch layer.

4. Not less than two layers of asphalt impregnated asbestos prepared roofing, the combined total weight of which shall be not less than seventy-four (74) pounds to the one-hundred-eight (108) square feet, mopped solidly between and surfaced with asphalt so that in no place shall layer touch layer.

5. One or more layers of asphalt saturated rag felt, the combined weight of which shall be not less than forty-five (45) pounds, to the one-hundred-eight (108) square feet over which there shall be laid two layers of asphalt impregnated asbestos roofing felt, each layer weighing not less than fourteen (14) pounds to the one-hundred-eight (108) square feet; or one layer of asphalt saturated prepared roofing weighing not less than ninety (90) pounds to the one-hundred-eight (108) square feet over which there shall be laid not less than one layer of asphalt impregnated asbestos roofing felt weighing not less than fourteen (14) pounds to the one-hundred-eight (108) square feet. The said layers of roofing and/or felt shall be mopped solidly between and surfaced with asphalt so that in no place shall layer touch layer.

6. Hydraulic compressed rigid shingles not less than one-eighth ($\frac{1}{8}$) inch thick, composed of Portland cement and asbestos fibers, laid over a layer of saturated felt weighing not less than fourteen (14) pounds to the one-hundred (100) square feet; or hydraulic compressed rigid sheets not less than seven thirty-seconds ($7/32$) inch 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.

7. Asphalt-saturated mineral surfaced prepared composition shingles laid so there shall be not less than two thicknesses at all places. The combined weight of such shingles shall not be less than one-hundred-ninety (190) pounds to the one-hundred (100) square feet of completed roof area.

8. Not less than two layers of asphalt saturated rag felt, each layer weighing not less than fourteen (14) pounds to the one-hundred (100) square feet (or their equivalent in weight in one or more layers of asphalt saturated rag felt or prepared composition roofing), and one layer of prepared composition roofing, either smooth finish or sanded on one side and weighing not less than fifty-two (52) pounds to the one-hundred-eight (108) square feet. The said layers of felt and/or roofing mopped solidly between so that in no place shall layer touch layer.

9. One layer of asphalt impregnated asbestos prepared roofing (built up at the factory of not less than three (3) plies of asphalt impregnated asbestos felt) and weighing not less than sixty-two (62) pounds to the one-hundred-eight (108) square feet; provided, that such roofing shall not be used on roofs which have a rise of less than three (3) inches to each twelve (12) inches of horizontal projection.

10. Concrete Slab or Concrete Tile. Concrete slab roofs shall be constructed as specified in Chapter 26 and need not be covered with any additional roof covering.

11. Metal Roof Covering. Metal roof covering may be of a corrugated, standing seam or flat type of not less than number twenty-six (26) U. S. Gauge metal. 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.

12. Slate. Each slate shingle shall be securely fastened to the supporting roof construction with copper nails or with copper nails and copper wire, with nails of such length as to provide not less than three-fourths ($\frac{3}{4}$) of an inch of penetration into the nailing strips or sheathing.

13. Clay Tile. Clay roof tile shall not absorb more than fifteen (15) per cent of the dry weight of the tile during a forty-eight (48) hour immersion test.

Roofing tile other than flat pan tile, with or without flanges, or flat shingle tile, or flat decorative tile, shall satisfy the following strength requirement: When supported on the turned down edges at points six (6) times each side of the center of the tile, giving four points of support and a span of twelve (12) inches, and loaded with a concentration at the center, the average breaking load per tile for five representative tile tested shall be not less than four hundred (400) pounds, and the breaking load for any individual tile tested shall be not less than three hundred fifty (350) pounds.

All clay roof tile without any projection lug shall be nailed and/or wired in place.

Copper nails and copper wire shall be used wherever nailing and wiring of tile is required in this sub-section; provided, that when roofs do not exceed a one-third ($1/3$) pitch galvanized iron nails may be used. Wire shall be not smaller than number fourteen (No. 14) B. and S. gauge. Nails shall in all

cases penetrate not less than three-fourths ($\frac{3}{4}$) of an inch after passing through the tile or other fastening device.

(b) **Ordinary Roofings.** "Ordinary" roof coverings shall be any roof covering which meets the requirements specified for the following roof coverings, 14 to 16, inclusive, or shall be any roofing meeting the Class C Specifications of the Underwriters' Laboratories, Incorporated, as of May, 1924.

14. Asphalt saturated mineral surfaced prepared composition roofing weighing not less than eighty-two (82) pounds to the one-hundred-eight (108) square feet or in shingle form cut from the same roofing.

15. Asphalt saturated prepared composition roofing weighing not less than fifty-two (52) pounds to the one-hundred-eight (108) square feet and shall be used on Group J buildings only.

16. Wood shingles used as roof covering shall be of clear vertical grain all-heart wood and shall be not less than five (5) shingles to two (2) inches in thickness at the butt (U. S. Government Standard) and shall be laid with the following exposures as compared to total length of shingle:

Total Length of Shingle	Permissible Exposed Length
16 in.	5 in.
18 in.	5½ in.
24 in.	7½ in.

All wood shingles shall be nailed firmly with copper, zinc, zinc-coated or commercially pure iron nails of at least twelve and one-half (12½) gauge and not less than one and one-fourth (1¼) inches long. Each shingle shall be nailed with at least two (2) nails driven substantially into the supporting roof construction.

PART IX

REGULATIONS FOR USE OR OCCUPANCY OF STREETS AND PROJECTIONS OVER PUBLIC PROPERTY

CHAPTER 44.—TEMPORARY USE OF STREETS DURING CONSTRUCTION

Sec. 4401. No building material or materials shall be placed upon the streets or sidewalks except as provided in this Chapter.

**Temporary
Use of
Streets
During
Construc-
tion**

Building materials required for use immediately or in connection with the construction of a building may be placed upon the street or sidewalk in front of the building in course of construction or alteration. The maximum width of such occupied space shall not exceed one-third (1/3) the width of the street, measured between curbs, and in no case shall the space within five (5) feet of the nearest rail of any railway tracks be occupied for building materials. The sidewalk space may be occupied for building construction purposes provided the owner or his agent constructs a temporary sidewalk not less than five (5) feet in width in the outer portion of the permissible occupied space, and such temporary sidewalk shall be protected on the building side by a tight fence not less than eight (8) feet in height.

In Fire Zone No. 1 and when the proposed building exceeds a height of two (2) stories in any part of the city, the owner or his agent shall construct, before any building is commenced, a temporary covered walk-way not less than five (5) feet wide, of sufficient strength to protect the public from falling materials during construction and such covered walk-way shall remain in place until the completion of all of the exterior portions of the building. When the area occupied by the sidewalk or temporary walk-way is to be excavated, such walk shall be made of boards not less than two (2) inches thick, designed to support a load of not less than one hundred and fifty (150) pounds per square foot, provided with suitable ramps at each end, and with hand rails on each side. The roof over such walk-way shall be the full width of the walk-way and of not less than two (2) layers of one (1) inch boards with joints broken, and shall be placed not less than ten (10) feet above the temporary walk-way. Whenever such roof is used for storing of materials a railing and foot board shall be so installed as to prevent the materials from spilling into the street.

Building materials may be placed in front of the property adjoining a building site under the same conditions as provided for the occupation of the street immediately in front of the building site, provided the written consent and waiver of

claim for damages against the City of.....
is obtained from the owner or owners of such adjoining property, and filed in the office of the Building Inspector.

No building material, fence, shed or any obstruction of

Sec. 4401

any kind shall be placed so as to obstruct free approach to any fire hydrant, lamp post, manhole, fire alarm box, or catch basin, or so as to interfere with the passage of water in the gutter.

Mortar or concrete may be prepared in the space permitted for storage of building materials; but shall be done in a mechanical mixer or in a tight box or on a tight mixing board, in such a manner that dripping or splashing is prevented. Pavements shall be well cleaned of all building materials at the completion of the construction of a building.

The covered walk-way shall be kept well lighted continuously between sunset and sunrise and the outer edge of the occupied space of the street or sidewalk shall have placed thereon red lights which shall be kept burning continuously between sunset and sunrise.

The street side of any barricade or fence and hand rails and sidewalks shall be kept reasonably smooth and in good repair while construction work is in progress or while such barricades, fences or walk-ways are placed on or over public property.

CHAPTER 45—PERMANENT OCCUPANCY OF PUBLIC PROPERTY

Sec. 4501. No portion of any building whatsoever nor any accessory thereto other than signs as provided in Ordinances Nos. 258 and 1961 shall project over the public street or sidewalk except as specified in this Section. **Permanent Occupancy of Public Property**

(a) Unroofed porches, balconies or oriel windows may extend not more than three (3) feet over public streets or sidewalks, but shall in no case be less than ten (10) feet in the clear above the sidewalk or street level immediately below.

(b) Movable awnings of combustible materials supported throughout on metal frames may extend over the sidewalk portion of a public street a distance equal to two-thirds (2/3) the width of the sidewalk space; provided, that every such awning frame shall be not less than seven feet and six inches (7'-6") above the sidewalk immediately below and that any fringe attached to such awning shall be not less than seven (7) feet from the sidewalk level immediately below.

(c) Cornices constructed of fire-resistive materials if more than ten (10) feet above the sidewalk may project over a public street not more than four (4) feet.

(d) A fixed awning or marquee projecting over the sidewalk shall conform to the following regulations:

(1) Such awning or marquee shall be supported entirely from the building.

(2) All combustible materials used in the construction of any fixed awning or marquee shall be protected by not less than one-hour fire-resistive construction as specified in Chapter 43.

(3) Such awning or marquee shall be at least eight (8) feet in the clear between the lowest point of any projection and the sidewalk immediately below and shall not occupy more than two-thirds (2/3) the width of the sidewalk, measured from the building, except that when such awning or marquee is twelve (12) feet in the clear above the sidewalk immediately below, it may extend the full width of the sidewalk for a distance of not more than fifteen (15) feet along the direction of the length of the street.

(4) Every awning or marquee shall be so located as not to interfere with the operation of any exterior standpipes, stairways or exits from the building and such location shall meet with the approval of the Building Inspector.

(5) The roof of any such awning or marquee shall be sloped to down-spouts which shall conduct any drainage under the sidewalk to the curb.

(e) Water tables, belt courses, sills, bases, columns, pilasters, capitals or other decorative features shall not project more than six (6) inches beyond any lot line.

(f) No part of any show window, store, front or show case except the sill, as provided in paragraph (e) of this Section, shall project beyond the property line. Doors in Fire Zones

Sec. 4501

No. 1 and 2 shall not project more than one (1) foot beyond the property line bordering a street and shall not project into any alley. Doors in buildings outside of Fire Zones No. 1 and 2 which swing over the street property line shall be maintained normally closed.

(g) The space below the sidewalk level may be used for any purpose not inconsistent with any other requirements of this or other Ordinances, but the occupation of this space may be

revoked by the City of.....at any time, and the owner of the building occupying such space shall be required to pay all costs attendant therewith.

(h) No projection whatsoever shall be allowed in alleys except a curb or buffer block extending not more than nine (9) inches from the face of the building and not more than nine (9) inches above the adjacent alley grade.

PART X
LEGISLATIVE

CHAPTER 46—LEGISLATIVE

Sec. 4601—If any section, sub-section, sentence, clause or phrase of this Ordinance is, for any reason held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this Ordinance. The.....

Validity

.....
hereby declares that it would have passed this Ordinance, and each section, sub-section, clause or phrase thereof, irrespective of the fact that any one or more sections, sub-sections, sentences, clauses and phrases be declared unconstitutional.

Sec 4602. The specifications, suggested ordinances and regulations which are mentioned by title and date of publication in various parts of this Ordinance are hereby declared to be a part of such Ordinance when not in conflict with a specific statement contained in the body of this Ordinance to the contrary. Copies of such specifications, ordinances and regulations shall be kept on file in the office of the City Clerk and in the office of the Building Inspector as file numbers.....

Appended Documents

.....
(See Appendix for list of above mentioned documents.)

Sec. 4603. Ordinance No.....and all ordinances amendatory thereto, and all ordinances or parts of ordinances in conflict with this Ordinance are hereby repealed.

Ordinances Repealed

Sec. 4604. This Ordinance shall be, and is hereby declared to be in full force and effect, from and after.....days from its date of final passage and approval.

Date Effective

PART XI
SPECIAL ORDINANCES
CHAPTER 47—PLASTERING

Sec. 4701 to 4721, inclusive. Complete plastering provisions. (See Appendix Chapter 47.)

Plastering Provisions

APPENDIX

This Appendix contains suggestions and explanatory matter with reference to various details in the body of the Code but is not to be considered as a legal part of the Code. This data is given to assist in proper operation and use of the Uniform Building Code.

The Conference plans to expand this Appendix in the future with many suggestions of what is good practice in building construction.

Refer to Sec. 101. The blank spaces in this section should be filled in by the individual city in adopting the Code with the proper names and titles. There are a number of other places in the Code where similar blank spaces occur which must also be filled in at the time of adopting the Code.

Refer to Sec. 201. At the end of this section it will be noted that the signature of the architect, engineer or designer responsible for the preparation of plans submitted for permit is required. Some states require all structural designs to be certificated by a licensed engineer and the proper change should be made at this point so that the Code, when adopted, will not conflict with the state law.

Refer to Sec. 202. It is advisable and recommended that the Building Inspector keep in a permanent file the plans for all large buildings, buildings involving complicated designs and buildings designed for future extensions or additions.

Refer to Sec. 203. Fees should ordinarily be paid to the Building Inspector when the form of government so permits in order that the building public may be most efficiently served.

Refer to Sec. 204. The form of general inspection as suggested in the first part of Section 204 has been found to operate very satisfactorily in many cities. A form of permit card posted on each job should be used to show by whom each successive inspection was made and to record the date of that inspection. General information such as permit number, names of owner and contractor and the location of the job should be included on such inspection card.

Special engineering supervision as provided in this Code is a necessary factor for greatest economy in building construction. It provides the safety necessary to the public where higher working stresses are allowed the various building materials. There is no building department sufficiently manned to properly inspect even the most important buildings and the inspection service required in Section 204 is more than paid for by granting increased working stresses in building materials.

Refer to Secs. 302, 303, 304. In order that the Code will not present a closed door to developments in building materials or methods of construction a means is provided in these three sections to permit their use when they are found safe and sufficient for their proposed use.

The Board of Examiners and Appeals serves not only as a board of judgment on new materials and devices but also

arbitrates any decision of the Building Inspector in matters affecting interpretations of the Code. It will be noted that no power is vested in the Board for amending the Code but that amendments must be made by the proper legislative authorities.

Through the provisions of these three sections the Code is given flexibility in operation, which has been found to be necessary in the operation of such a legal document.

The blank space in Section 304 should be filled in with the name of the person or body who is to appoint the Board of Examiners and Appeals.

Refer to Sec. 1502. The following suggestions are given as a guide for the detailed design and construction of reviewing stands.

Every reviewing stand shall be constructed with four inch by six inch (4"x6") girders running parallel to the front of such stand, spaced not more than six (6) feet apart, and supported at distances not exceeding six (6) feet apart by posts of not less than four inches by six inches (4"x6"). These posts shall be braced diagonally with one inch by six inch (1"x6") bracing, forming a continuous herringbone bracing, the full length of such stand for each vertical six (6) feet of such posts. The girders at the top of the posts shall be braced with braces not less than four inches by four inches (4"x4") at right angles to the joists above the girders. Every post or brace shall be thoroughly secured to a foot plate, which shall be of sound wood not less than two inches by six inches (2"x6") in cross section laid solidly on the ground at right angles to the front of the stand and forming the base for each line of posts. There shall be joists resting on the girders of not less than two inches by eight inches (2"x8") cross section. Such joists shall be spaced not exceeding forty (40) inches apart and two inch (2") plank shall be used for the seats and steps. Braces shall be provided whenever necessary to make a solid, substantial structure, which shall be safe under any possible emergency. All timbers forming the framing shall be thoroughly spiked together. There shall be a level stringer of two inches by six inches (2"x6") cross section at the bottom of each line of posts, parallel to the stand; also a horizontal piece of two inches by six inches (2"x6") cross section the full length of the stand, and at right angles to same for every row of posts, and every six (6) feet of vertical height thereof. All timbers used in the construction of reviewing stands shall be sound (no secondhand or broken lumber permitted). Wherever the stand, or a portion thereof, extends over an excavation, the posts shall be extended to the bottom of said excavation and shall be braced with horizontal braces as hereinbefore provided.

Refer to Sec. 1601. It is impossible to include the districting requirements for each city so that provision is made in this section to incorporate by reference a separate ordinance outlining the limits of the various fire zones.

The following principles may be utilized in outlining the fire zones.

Fire Zone No. 1 should contain the general retail business portion of the city and the more highly congested areas.

Fire Zone No. 2 should include the area lying immediately beyond and adjacent to Fire Zone No. 1 and extensions of the retail district along main thoroughfares. By design-

nating the areas along principal crosstown thoroughfares; barriers will be set up for proper protection of the city in the event of a general conflagration.

Fire Zone No. 3 should comprise the general residential areas and all of the territory not included in Fire Zones No. 1, 2 and 4.

Fire Zone No. 4 should include the general commercial and industrial areas.

Refer to Sec. 1802. In the event that a zoning ordinance or other special ordinance provides height limits, it will be necessary to note in the ordinance of adoption that such regulations shall not be repealed in adopting this Code. Another means of providing against any possible conflict is to revise Section 1802 so as to include the maximum height limit.

Refer to Sec. 2204.

Minimum Foundation Requirements Shall Be as Set Forth in the Following Table:

TABLE
Minimum Foundation Requirements for Type V Buildings

Number of Stories	Thickness of Foundation Wall in Inches		Width of Footing in Inches	Thickness of Footing in Inches	Depth of Foundation Below Natural Surface of Ground and Finish Grade in Inches
	Concrete	Unit Masonry			
1	6	6	14	6	12
2	8	8	16	6	18
3	10	10	18	6	30

Refer to Sec. 2301.

WEIGHTS OF BUILDING MATERIALS

	Lbs. Per Cu. Ft.
Brick, Pressed	150
Brick, Common	125
Brick, Common, laid 3/8" joints	120
Brick, Soft, laid 3/8" joints	100
Cinders, dry, bituminous, in bulk	45
Concrete—	
Cinder, structural	110
Stone or gravel	144
Concrete Building Tile, 60% solid	87
Concrete Building Tile, 55% solid	79
Slag (blast furnace)	130
Cast Iron	450
Earth—	
Common loam, dry and loose	76
Clay and gravel, dry and loose	100
Common earth, dry, and packed	100
Wet mud	120
Glass	157
Granite	170
Gravel, dry	120
Granite Masonry, dressed	165
Granite Masonry, rubble	155

Limestone Masonry, dressed	162
Marble Masonry, dressed	170
Mortar, hard, cement	135
Mortar, hard, lime	105

Lbs. Per
Sq. Ft.

Partitions—

2"x4" studs, wood lath, 5/8" plaster, both sides.....	16
2"x4" studs, plaster board, 5/8" plaster, both sides.....	16
Channel studs, metal lath, cement plaster, solid 2" thick	20
Plaster on hollow clay tile (one side)	5
2" Hollow Clay Tile	13
3" Hollow Clay Tile	16
4" Hollow Clay Tile	18
5" Hollow Clay Tile	20
6" Hollow Clay Tile	25
8" Hollow Clay Tile	30
12" Hollow Clay Tile	45
Plaster on plaster block partitions (one side).....	5
2" Plaster Blocks	7
2½" Plaster Blocks	8.5
3" Plaster Blocks	9.5
3½" Plaster Blocks	10.5
4" Plaster Blocks	12
5" Plaster Blocks	15
6" Plaster Blocks	18
8" Plaster Blocks	22

Ceilings—

Wood, lath and plaster	8
Metal lath and plaster suspended	10

Roofings—

Wood shingles	3
Slate 3/16"	7
Slate ¼"	10
Tile and clay shingles	11 to 14
Roman tile, clay	12
Spanish tile, clay	19
Ludowici tile, Spanish	10
Tile roof laid in mortar, add.....	10
Copper (if no weight is specified)	1½
Tin	1
Corrugated iron	2
Tar and gravel	6
Prepared composition	1

Lbs. Per
Cu. Ft.

Sand, dry	100
Sand, wet	120

Lbs. Per
Sq. Ft.

Skylights, metal covered, wire glass	5
--	---

Lbs. Per
Cu. Ft.

Steel	490
Terra Cotta, filled with brickwork	120
Terra Cotta, Dennison interlock tile, laid.....	65

INTERNATIONAL CODE COUNCIL®

Timber—

Fir, dry 32

Fir, wet 44

Oak 46

Water, fresh at 60 degrees Fahrenheit 62½

Refer to Sec. 2302. The live loads specified herein are intended to include a sufficient allowance to cover the effect of impact. In the case of special occupancies involving unusual impacts provision should be made by increasing the loads herein specified.

The view has been expressed that buildings designed for low live loads will be too flexible and that vibration due to dynamic loads, particularly in theater balconies and similar places, may seriously alarm the occupants. Several cases are reported of buildings which have required alterations for this reason. There is no evidence, however, that vibration indicates dangerous conditions. A well-built structure may be flexible; and the absence of vibration does not necessarily prove that a building is safe. Two structures may be equal in strength, but may differ in stiffness, particularly if one is of cantilever type.

When it is desirable for any reason to avoid vibration or undue deflection, care should be taken to that end by designing for greater live loads or by using more braces. Safety considerations, however, on which code requirements are based, do not justify live-load assumptions greater than those given herein.

Refer to Sec. 2311. The following provisions are suggested for inclusion in the Code by cities located within an area subject to earthquake shocks. The design of buildings for earthquake shocks is a moot question but the following provisions will provide adequate additional strength when applied in the design of buildings or structures.

Sec. 2311 (a) LATERAL BRACING.

Every building and every portion thereof, except Type IV and V buildings and all one story buildings which are less than twenty (20) feet in height shall be designed and constructed with bracing to resist the stresses produced by lateral forces as provided in this Section. The stresses shall be calculated as the effects of a force applied horizontally at each floor or roof level above the foundation, such force to be proportional to the total dead plus live load of the building above any given plane and shall be considered as concentrated at such floor or roof level. Where the design live load specified in Section 2304 for a particular building or portion thereof is fifty (50) pounds per square foot or less, such live load may be disregarded in the computation of the lateral forces required by this Section. The full value of all live loads specified in Section 2304 more than fifty (50) pounds per square foot shall be used in such computation. The force shall be assumed to come from a direction at right angles to any elevation of the building.

All bracing systems shall be located symmetrically about the center of mass of the building and shall be of sufficient extent and detail to safely move the whole mass of the building. No system can be used which provides only for a small assumed movement of the foundation, or for only a small assumed amplitude of vibration or movement. The stresses to be provided for

must be those which would be produced if the structure were subject to an unlimited translation under the shear specified in paragraphs one and two of this Section.

The factors to be employed to fix the lateral force shall vary with the character of the foundation material and shall be as follows:

1. When the foundation rests upon material upon which a load of two (2) or more tons per square foot is allowed, the horizontal force to be applied at any plane shall be assumed as seven and one-half per cent ($7\frac{1}{2}\%$) of the total dead load plus the live load of the building above that plane.

2. When the foundation rests upon material upon which a load of less than two (2) tons per square foot is allowed, the horizontal force to be applied at any plane shall be assumed as ten per cent (10%) of the total dead load plus the live load of the building above that plane. All buildings on pile foundations shall be included in this class.

Where the design of a Type I or II building includes isolated footings, such footings shall be completely interconnected in two directions approximately at right angles to each other. Each such interconnecting member shall be capable of transmitting either by tension or compression the above seven and one-half per cent ($7\frac{1}{2}\%$) or ten per cent (10%) of vertical load of the heavier only of the two footings it connects. The minimum gross size of each such member shall be twelve inches by twelve inches ($12" \times 12"$) and shall be reinforced with not less than the minimum reinforcement specified in Section 2621.

With each set of plans filed, a brief statement of the following items shall be included:

- (a) A summation of the dead and live load of the building, floor by floor, which was used in figuring the shears for which the building is designed.

- (b) A brief description of the bracing system used, the manner in which the designer expects such system to act, and a clear statement of any assumptions used. Assumption as to location of all points of counterflexure in members must be stated.

- (c) Sample calculation of a typical bent.

Stresses in structural steel due to earthquake forces combined with other forces shall not exceed by more than fifty per cent (50%) the allowable working stresses specified in Section 2702 and 2710, except that rivets may be stressed to fourteen thousand (14,000) pounds per square inch in tension. Tension and/or shear in brick walls and piers shall not exceed forty (40) pounds per square inch of net cross sectional area. The allowable unit shear in reinforced concrete walls eight (8) inches or more in thickness shall not exceed four hundredths (0.04) of the ultimate compressive strength of the concrete. Stresses in all other materials shall not exceed by more than thirty-three and one-third per cent ($33\frac{1}{3}\%$) the allowable working stresses permitted in this Code.

(b) BONDING AND TYING.

All buildings shall be firmly bonded and tied together as to their parts and each one as a whole in such manner that the structure will act as a unit.

All veneer finish, cornices and ornamental details shall be bonded in the structure so as to form an integral part of it. This applies to the interior as well as to the exterior of the building.

Bearing walls and other walls of unit masonry construction shall be tied together at the level of each floor line from outside to outside of the structure by continuous iron rods or other bonds of continuous strength and they shall be tied to all vertical partition walls wherever practicable.

Refer to Sec. 2502—2d Paragraph. It is the intention of the writers of this Code to limit the actual size of any member to the dressed size specified in American Lumber Standards for lumber sawed rough to corresponding nominal dimensions. Care must be used in interpreting American Lumber Standards, however, as the condition of seasoning of the lumber at the time it is measured will have some effect on the results.

For example, a piece of 2x12 Douglas fir when sawn green from the tree will measure 2"x12". If surfaced immediately to A. L. S. dressed sizes of $1\frac{3}{4}$ x11 $\frac{1}{2}$ and then allowed to season until the moisture content is in equilibrium with the air, shrinkage will take place; in extreme cases this may amount to 4 per cent of either dimension and the piece may be 1/16" less than the dressed size in thickness and/or $\frac{1}{2}$ " less than the dressed size in width.

If, however, the dressed piece when measured is still green, or if it has been allowed to season before dressing, it should measure the full dressed size shown in American Lumber Standards.

In either event it is safe to use the net section of the A. L. S. dressed size for figuring load carrying capacity of the piece since the allowable unit stresses in Chapter 25 are based on the strength of unseasoned (or green) lumber. Seasoning causes shrinkage and consequent reduction of net cross section, but it also results in increasing the strength of the lumber and such increase usually more than offsets any loss in net section of member.

Refer to Sec. 2503 (e). It is common practice on the Pacific Coast to use No. 1 Common Dimension for floor joists. Theoretically no allowable unit stress can be consistently recommended for this grade since rules for Yard Lumber (under which No. 1 Common Dimension is graded) do not contain any limiting provisions for Slope of Grain.

Nevertheless, in actual practice, it is found that a large percentage of No. 1 Common Dimension would conform under structural grading rules, insofar as slope of grain is concerned, to "Common Structural" basic provisions. A knowledge of the type of lumber customarily received in any city is necessary before the Building Inspector can intelligently form his own judgment as to what unit stress value to assign to the respective commercial grades of Yard Lumber.

Working values for horizontal shear are maximum values. The maximum unit horizontal shear at any point in a beam is $\frac{3}{2}$ of the average unit shear obtained by dividing the total shear at that point by the area of the cross section. To get the total safe shearing stress at any cross section, the area of the

cross section should be multiplied by $\frac{2}{3}$ the maximum allowable horizontal shear. To obtain the required area to carry any given shear, the total shear should be divided by $\frac{2}{3}$ the maximum allowable unit shear.

Recognition of all loads in designing for loads concentrated near a support, or for moving loads, gives a calculated shearing stress higher than is actually developed.

(a) For concentrated loading, in calculating the shear at one end of a beam, the loads between that end and the nearer quarter point, or between that end and a point distant three times the depth of the beam from it, whichever would be the lesser distance from the support, may be considered as acting at that point.

(b) For moving loads, as on highway bridges or railway stringers, in computing the shear at one end it is safe to ignore the wheel loads between that end and the nearer quarter point, or between that end and a point three times the depth of the beam or stringer from it, whichever would be the lesser distance from the support, when the balance of the span is assumed to be loaded so as to give a maximum shear stress.

Straight grained wood has greater resistance to tension than to any other kind of stress. It has been found, however, practically impossible to design joints that will develop anywhere near the full tensile strength.

Working values may be safely used without allowance for impact up to impact of 100 per cent of loads figured. The ability of timbers to support loads is very dependent on the duration of the stress. Tests have demonstrated that the load required to break timbers in several years is about $\frac{9}{16}$ of that required to break them as in ordinary tests. When the time is shortened still further, as in impact loading, the load required to break a timber is correspondingly increased. Approximately, this increase is 10 per cent, when the time is reduced to $\frac{1}{10}$ of the previous time.

The factor of safety at a given working stress varies materially with the duration of the stress. At the recommended working stresses, the average timber in buildings has a factor of safety of 6 on impact loadings, *4 under five-minute loads and $2\frac{1}{4}$ under long-time loading, with a minimum factor of safety of 2 on 75 per cent of the pieces under long-time loading, while about one piece in 100, of very light weight and with maximum defects for the grade, would be expected to break at $1\frac{1}{2}$ times the recommended stress under loading of approximately 10 years duration. The factor of safety on new timbers in bridge work is about $\frac{1}{2}$ greater than the above values.

Where this building code is used by cities using species of lumber in addition to those for which working stresses are given herein, care should be exercised to provide for those other species and give the allowable unit stresses for them. Such information can be secured by communicating with the National Lumber Manufacturers' Association, Transportation Building, Washington, D. C.

*If impact stresses are neglected when less than 100 per cent of the live load producing them the factor of safety for such loads would be reduced from 5 to a minimum of 3.

Refer to Sec. 2504. In former Editions of this Building Code Tables were incorporated showing the safe loads in pounds per square inch of cross section area of square and rectangular timber columns. The values given in these tables were determined by solving the Forest Products Laboratory formula given in Section 2504.

The tables given in former editions of this Code were incomplete insofar as certain species of lumber were concerned and rather than extend those tables in this edition they have been omitted. Such tables for all species can be obtained upon request from the National Manufacturers' Association, Transportation Building, Washington, D. C.

Refer to Sec. 2511. The following provisions are recommended for inclusion in the Code in territories subject to termite attack. These recommendations have been made by Dr. T. E. Snyder, Entomologist, Bureau of Entomology, U. S. Department of Agriculture.

Sec. 2511. (a) Timber to be used in contact with the earth shall be thoroughly impregnated by a standard pressure process with coal tar creosote or other approved preservative except as provided in Section 2204 (2). Timber should be completely framed before treatment whenever possible, but when cutting after treatment is unavoidable, the cut surfaces shall be thoroughly coated with coal tar creosote or other approved preservative.

(b) Wood not impregnated with an approved preservative shall not be placed in contact with the earth or within twelve (12) inches thereof, excepting posts over a concrete floor as provided in Section 2505 (a) and, in certain minor buildings, as provided in Section 2204 (2).

(c) Masonry foundations and footings shall be laid in Portland cement mortar. Foundations built up of masonry units, whether hollow or solid, shall be capped below woodwork with at least one (1) inch of Portland cement mortar, cement and slate or other approved seal.

(d) In cities where buildings are subject to termite attack a termite shield shall be provided, continuing completely around the surface of the foundation below the woodwork of the building on both the inside and outside surfaces. Such shield may be formed of a strip of non-corrodable metal firmly inserted in the surface of the masonry, or between the foundation and the wood, with the projecting edge bent downward at an angle of forty-five (45) degrees, and extending horizontally at least two (2) inches from the face of the foundation.

(e) Floor sleepers or joists, embedded in masonry or concrete or laid on concrete which is in contact with the earth, shall be impregnated with an approved preservative.

(f) Untreated wooden posts or columns supported by concrete floors must rest upon a metal or concrete footing projecting at least two (2) inches above the finished floor.

Refer to Sec. 2601. The requirements in Chapter 26 are based upon the recommendations of the "Joint Committee." The water-cement ratio method of proportioning concrete as outlined in Section 2606 is based upon a wide range of tests and experiences and has been found to be the best method of proportioning concrete. It should be noted, however, that the actual strength of the concrete is the ultimate measure to be used in design.

Refer to Sec. 2701. The requirements for steel construction incorporated in Chapter 27 follow the recommended practice of the American Institute of Steel Construction.

The inspection and tests noted in Section 2701 should not necessarily be required where the mill tests of the steel may be readily obtained.

Refer to Sec. 4602. The following list includes all of the documents included in the Uniform Building Code in the order in which they occur:

1. Suggested Ordinance Regulating the Use, Handling, Storage and Sale of Flammable Liquids and the Products Thereof, adopted by the National Fire Protection Association, May, 1926; reprint of 1929.

2. Tentative Methods of Testing Brick, A. S. T. M. Designation C67-28T of the American Society for Testing Materials.

3. Standard Specifications for Building Brick, A. S. T. M. Designation C62-29 of the American Society for Testing Materials.

4. Tentative Specifications for Sand-Lime Building Brick, A. S. T. M. Designation C73-28T of the American Society for Testing Materials.

5. Tentative Specifications for Concrete Building Brick, A. S. T. M. Designation C55-28T of the American Society for Testing Materials.

6. Standard Specifications for Tests of Concrete Block or Tile, Serial Designation P-1A-29 of the American Concrete Institute.

7. Underwriters' Laboratories' Standard for Hollow Concrete Building Units, February 21, 1929.

8. Standard Specifications for Gypsum Partition Tile or Block, A. S. T. M. Designation C52-27 of the American Society for Testing Materials.

9. Standard Specifications for Gypsum and Calcined Gypsum, A. S. T. M. Designations C22-25 and C23-22, respectively, of the American Society for Testing Materials.

10. Standard Specifications and Tests for Hollow Burned-Clay Load-Bearing Wall Tile, A. S. T. M. Designation C34-37 of the American Society for Testing Materials.

11. Standard Specifications for Quicklime for Structural Purposes, A. S. T. M. Designation C5-26 of the American Society for Testing Materials.

29. Safety Code for Elevators of the American Engineering Standards Committee, published July, 1925.

30. Tentative Specifications for Fire Tests of Building Construction and Materials, A. S. T. M. Designation C19-26T of the American Society for Testing Materials.

31. Underwriters' Standard for Tin-Clad Fire Doors and Shutters, Edition of March, 1926, and July, 1927; reprinted 1928.

32. Regulations of the National Board of Fire Underwriters for the Protection of Openings in Walls and Partitions Against Fire, Recommended by the National Fire Protection Association, Edition of 1927.

33. Specifications for Class C roof coverings of the Underwriters' Laboratories, Inc.

Refer to Chapter 47. The following provisions are recommended for inclusion in the Code where complete plastering provisions are desired.

CHAPTER 47—PLASTERING—INTERIOR AND EXTERIOR

General

Sec. 4701. It shall be unlawful for any person to do or cause to be done any lathing or plastering, or any alteration of lathing or plastering in or upon any building or structure unless such lathing or plastering is done in the manner and of the materials hereafter specified in this Section, and in addition thereto, whenever plastering is required for fire protection it shall also comply with the provisions of Chapters 42 and 43.

The Building Inspector, upon notification from the permit holder or his agent, shall make the following inspections of lathing and plastering 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. After all lathing, interior and exterior, is in place and all plastering materials are on the job.

2. Seven (7) to ten (10) days after exterior walls have received second coat of stucco. The exact time of the second inspection shall be at the discretion of the Building Inspector.

3. Final inspection of finished interior and exterior plastering.

Tests. The Building Inspector or his deputy is hereby authorized to make or cause to be made tests of plastering materials or lathing, and may require a complete analysis of samples of completed plastering or stucco. In case of dispute as to the thickness of the plastering, authority is given the Building Inspector or his deputy to make holes in the wall for the purpose of determining the thickness of the plaster. Such holes are not to be made unless it is necessary and are to be made only in the presence of the plastering contractor or the permit holder.

Sec. 4702. Wood lath shall be equal to No. 1 grade Douglas fir, spruce, cedar, redwood, pine or western hemlock, and shall be reasonably clear, evenly manufactured and free from

Wood
Lath

12. Standard Specifications for Hydrated Lime for Structural Purposes, A. S. T. M. Designation C6-24 of the American Society for Testing Materials.

13. Standard Specifications and Tests for Portland Cement, A. S. T. M. Designation C9-26 of the American Society for Testing Materials.

14. Standard Method of Test for Organic Impurities in Sands for Concrete, A. S. T. M. Designation C40-27 of the American Society for Testing Materials.

15. Report of the Joint Committee for Concrete and Reinforced Concrete as of August, 1924.

16. American Lumber Standards as set forth in "Simplified Practice Recommendations, R16-29" of the United States Department of Commerce, July 1, 1929.

17. Standard Specifications for Billet-Steel Concrete Reinforcement Bars of Structural, Intermediate or Hard Grade, A. S. T. M. Designation A15-14 of the American Society for Testing Materials.

18. Standard Specifications for Rail Steel Concrete Reinforcement Bars, A. S. T. M. Designation A16-14 of the American Society for Testing Materials.

19. Standard Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement, A. S. T. M. Designation A82-27 of the American Society for Testing Materials.

20. Standard Methods of Making and Storing Specimens of Concrete in the Field, A. S. T. M. Designation C31-27 of the American Society for Testing Materials.

21. Standard Methods of Making Compression Tests of Concrete, A. S. T. M. Designation C39-27 of the American Society for Testing Materials.

22. Standard Specifications for Structural Steel for Buildings, A. S. T. M. Designation A9-29 of the American Society for Testing Materials.

23. Standard Specifications for Steel Castings, A. S. T. M. Designation A27-24 of the American Society for Testing Materials.

24. Standard Specifications for Gray Iron Castings, A. S. T. M. Designation A48-29 of the American Society for Testing Materials.

25. American Welding Society Bulletin No. 2, published December, 1921.

26. A Standard Ordinance for Chimney Construction Recommended by the National Board of Fire Underwriters, Third Edition, Revised 1927.

27. Regulations for the Construction and Installation of Oil Burning Equipments and for the Storage and Use of Oil Fuels in Connection Therewith, Recommended by the National Fire Protection Association, Edition of 1928.

28. Regulations for the Installation of Sprinkler Equipments, Recommended by the National Fire Protection Association, Edition of 1928.

detrimental defects. A few wormholes, small pitch pockets, well set or firm knots not more than three-fourths ($\frac{3}{4}$) inch in diameter and not bunched, and wane not more than one-third the thickness, width or length and not in combination with any other defect shall be permitted in wood lath. Wood lath shall measure not less than five-sixteenths ($\frac{5}{16}$) inch nor more than three-eighths ($\frac{3}{8}$) inch in thickness, not less than one and three-eighths ($1\frac{3}{8}$) inches nor more than one and five-eighths ($1\frac{5}{8}$) inches in width, and not more than one-fourth ($\frac{1}{4}$) inch less than four (4) feet in length. Each lath shall be nailed with 3d fine blued nails to a stud, joist or other support at each end thereof and at points not more than sixteen (16) inches apart along the length of such lath. Nails shall be driven full length. For lime plaster laths shall be spaced not less than three-eighths ($\frac{3}{8}$) inch and not more than one-half ($\frac{1}{2}$) inch apart, and for gypsum plaster not less than one-quarter ($\frac{1}{4}$) inch and not more than three-eighths ($\frac{3}{8}$) inch apart. Joints at the ends of laths shall be broken at least every eighth lath and not less than six (6) laths shall constitute a break. Studs, joists, or other supports for lathing shall be spaced at not to exceed sixteen (16) inches on center. No vertical or diagonal lathing or crooked or warped lath shall be used.

Approximately eight (8) hours before being nailed in place such lath shall be thoroughly soaked and kept damp until plaster is applied thereto.

It shall be unlawful to apply any interior wood lath until all exterior wall covering has been applied. All coves, bull noses and interior angles shall receive strip of metal lath for reinforcement at least four (4) inches in width and weighing not less than two and two-tenths (2.2) pounds per square yard before any plastering is applied. A four (4) inch strip shall also be used where masonry and wood join.

Sec. 4703. Wherever plaster lath is used it shall be composed of gypsum, wood and manila fibre, or of other similar materials; provided, that not less than eighty-five per cent (85%) by weight of such composition shall be of incombustible material.

Gypsum Plaster Lath

Such plaster lath shall be not less than three-eighths ($\frac{3}{8}$) inch in thickness and shall be spaced one-quarter ($\frac{1}{4}$) inch apart horizontally and vertically and each joint broken.

On wood joists, furring strips, studding or other wood supports the plaster lath shall be securely fastened by means of nails of sufficient length to extend at least three-fourths ($\frac{3}{4}$) inch into the joists, furring strips, studding or other supports. Such nails shall be spaced or driven not more than six (6) inches apart in one direction and sixteen (16) inches apart in the opposite direction. Where the furring strips, studs or other supports are of metal the plaster lath shall be securely fastened to the same with galvanized iron wire of not less than sixteen (16) W. & M. gauge or with twenty (20) U. S. gauge metal clips spaced the same as required for nails. All wire nails used for fastening plaster lath shall be at least number thirteen (13) W. & M. gauge with flat heads not less than three-eighths ($\frac{3}{8}$) inch in diameter.

Fibre Board Lath

Sec. 4704. Any fibre board lath or other similar board lath which is equivalent to plaster board lath in strength, durability and bond may be used as a base for backing for plastering provided the type of such board lath shall have first been approved by the Building Inspector and all such board lath shall conform strictly to the type so approved.

Such approved board lath may be used wherever wood lath is permitted but shall not be used in substitution for plaster board lath or metal lath wherever such plaster board lath or metal lath are specifically required.

When fibre board lath is used it shall be applied in conformity with the provisions of Section 4703 for plaster board lath.

Metal Lath

Sec. 4705. 1. Interior Metal Lath. Interior metal lath shall be either ingot iron, rust-resisting alloy, galvanized or coated with an approved preservative material. Metal lath used on walls and ceilings shall be of a weight not less than that shown in the following table:

Spacing of Supports	Weight per square yard in pounds	
	For Walls	For Ceilings
12"	2.5	2.75
16"	2.75	3.4

Metal lath shall be lapped at least one (1) inch and shall be tied at joints in at least one place between supports. The tie wire used to attach and tie metal lath shall be not less than eighteen (18) W. & M. gauge. Metal lath shall be secured to wood studs with not less than 4d wire nails driven to at least seven-eighths ($\frac{7}{8}$) inch penetration and the remaining portion of the nail bent up to engage at least one strand of fabric and must be bent in such a manner as to not break the strands.

Metal lath when applied to metal supports shall be fastened thereto with not smaller than eighteen (18) W. & M. gauge galvanized annealed wire or by metal clips of equivalent strength.

2. Exterior Metal Lath. Exterior metal lath shall weigh not less than three and four-tenths (3.4) pounds per square yard, and shall be galvanized, rust-resisting alloy, ingot iron or double coated with an approved preservative material. Such dip shall be alkali-resisting and shall be lime and acid proof. Metal lath shall be lapped not less than one (1) inch at each joint and shall be kept not less than one-quarter ($\frac{1}{4}$) inch away from all backing and supports by galvanized or blued furring nails, galvanized metal furring clips or other equivalent means of furring; provided, that when self-furring metal lath is used such furring nails, clips or other equivalent means of furring shall not be required. All metal shall be held in place by means of galvanized or blued nails not smaller than 4d in size or by means of galvanized staples not less than one (1) inch in length made of not

smaller than fourteen (14) W. & M. gauge wire, or by any other approved method of equivalent strength.

Nails for holding metal lath in place shall be driven to approximately three-fourths ($\frac{3}{4}$) penetration and bent over one or more strands or its equivalent of such metal lath. Staples, furring nails, furring clips, or other methods of fastening metal lath shall develop a strength equivalent to the nails hereinbefore specified in this Section. No fastening of any kind for metal lath shall be cracked, broken or otherwise defective.

Metal lath shall be nailed or stapled to wood studs, joists or other supports or tied to metal supports at points not to exceed six (6) inches on center along such studs, joists or other supports.

Sec. 4706. Each suspended ceiling and each portion thereof shall be constructed and supported as hereinafter in this Section provided.

Suspended Ceilings

The main runners or other supports for any suspended ceiling shall consist of steel channels, steel angles or steel tees, not smaller than one (1) inch in vertical depth when in place and weighing not less than four hundred forty-two (442) pounds per one thousand (1000) linear feet, or other structural members of equivalent strength.

Such main runners or other supports shall be spaced at not more than four (4) feet on centers and shall be supported by galvanized steel wire hangers not smaller than eight (8) W. & M. gauge spaced at not more than four (4) feet on center. Such wire hangers shall be securely fastened to the structural framing, masonry or concrete with approved metal clips or approved bolts and nuts, or such wire hangers shall be embedded in such structural framing, masonry or concrete. Such wire hangers shall be secured to such main runners or other supports by wrapping each such wire hanger a full turn around the main runner or other support and twisting such wire hanger together over the top edge of the main runner or other support so as to develop the full strength of the wire.

The under side of such main runners or other supports shall be cross furred with steel channels which shall be not less than three-fourths ($\frac{3}{4}$) inch in vertical depth when in place and shall weigh not less than two hundred seventy-six (276) pounds per one thousand (1000) linear feet, and which shall be spaced at not more than twelve (12) inches on center. Each such three-quarter ($\frac{3}{4}$) inch channel shall be fastened to each main runner or other support directly above same by means of not smaller than sixteen (16) W. & M. gauge galvanized annealed wire wrapped around both members with a double turn and twisted securely together. Each main runner and cross furring channel shall be straight and true and shall be maintained in that condition until the finished ceiling has been applied. Any metal lath applied to such three-quarter ($\frac{3}{4}$) inch channels shall be of the quality and weight and shall be applied in the manner specified in Section 4705 for metal lath applied to metal supports.

Nothing contained in this Section shall be deemed or construed to prohibit the use of any other material or method of

construction for any suspended ceiling in the event that such other material or method of construction is the equivalent of the material or method of construction hereinabove specified; and in the further event that such other material or method of construction shall have been first approved by the Building Inspector.

Each suspended ceiling, and each portion thereof, shall be constructed so as to be capable of sustaining a live load of not less than ten (10) pounds per square foot, in addition to all dead loads, without any deflection, settlement or distortion which will materially affect the strength, durability or safety thereof.

Whenever in the opinion of the Building Inspector any suspended ceiling or any portion thereof is not capable of sustaining such live and dead loads as hereinabove in this Section required the Building Inspector may require the owner, contractor, sub-contractor or other person constructing or causing to be constructed the suspended ceiling or any portion thereof, to test or cause to be tested such suspended ceiling, or any portion thereof, with a load test of not less than twenty (20) pounds per square foot, and it shall be unlawful for any such owner, contractor, sub-contractor or other person to fail, refuse or neglect to make such load test within the time specified.

The load test hereinabove provided for may also be required on any altered or reconstructed portion of any existing suspended ceiling.

Sand Lime

Sec. 4707. All sand used for making plaster for any building or structure shall be clean, sharp, abrasive sand and shall not contain more than three per cent (3%) by weight of deleterious matter such as clay, loam and/or silt. In the test for organic matter the sodium hydroxide solution shall not be darker in color than the color indicated in the Standard Method of Test for Organic Impurities in Sands for Concrete, A. S. T. M. Designation C40-27 of the American Society for Testing Materials.

All the sand shall pass a No. 4 sieve and not more than eighty per cent (80%) and not less than sixty per cent (60%) shall pass a No. 20 mesh sieve, and not more than thirty-five per cent (35%) and not less than fifteen per cent (15%) shall pass a No. 40 mesh sieve. All remaining on the No. 4 sieve shall be considered gravel.

The sand shall be of such quality that when mixed in the proportion of one part Portland cement to two parts of sand the mortar shall develop a tensile strength of not less than two hundred ten (210) pounds per square inch at the age of ten (10) days.

Plaster

Sec. 4708. All lime used for making plaster shall be first-grade lump lime which shall be in the form of hydrated lime or lime putty. Such lime putty shall be made by thoroughly slaking such lump lime with water and such slaked lime shall be run through a No. 16 screen and shall be allowed to stand for not less than fourteen (14) days thereafter before being used in the making of any such plaster.

Sec. 4709. Any metal reinforcing material, woven wire netting, expanded metal fabric or welded wire fabric used for exterior stucco or for any interior or exterior plaster reinforcing shall be galvanized or coated with an approved preservative material, which coating shall be alkali resisting and shall be lime and acid proof. Plaster reinforcing shall be furred and fastened in place in the same manner as required herein for metal lath and shall have a mesh not exceeding two (2) inches in width and four (4) inches in length and each such mesh shall have an area of not more than six (6) square inches. Such metal reinforcing material, woven wire netting, expanded metal fabric or welded wire fabric shall weigh not less than one and five-tenths (1.5) pounds per square yard. When woven wire netting is used it shall be not less than sixteen (16) W. & M. gauge wire; provided, however, that a wire netting composed of eighteen (18) W. & M. gauge wire woven with a one (1) inch mesh and weighing not less than one and six-tenths (1.6) pounds per square yard may be used. All plaster reinforcing covered by this Section shall be lapped not less than two (2) inches.

**Plaster
Rein-
forcing**

Sec. 4710. Keene's cement must be delivered in the manufacturer's original container. All Keene's cement shall develop a tensile strength of not less than four hundred (400) pounds per square inch at the age of fourteen (14) days, and shall not show a combined water content of more than two per cent (2%).

**Keene's
Cement**

Sec. 4711. All Portland cement used for making plaster shall conform to the Standard Specifications and Tests for Portland Cement (A. S. T. M. Designation C9-26) of the American Society for Testing Materials. The Building Inspector may require tests of cement used, when in his judgment the cement does not comply with this ordinance.

**Portland
Cement**

Sec. 4712. In all cases where plastering or stucco is applied to the exterior of a wood frame building such wood frame shall be covered with a substantial waterproof paper as hereinafter described in this Section.

**Water-
proof
Paper
and
Metal
Flashing**

Wherever in this Section waterproof building paper is required, a substantial waterproof paper weighing not less than fourteen (14) pounds per one hundred (100) square feet and which successfully passes a fifty (50) pound Mullen test, shall be used.

Wherever such paper is used it shall be applied so as to readily-shed water and care must be exercised in the application of such paper. All corners and returns shall be carefully shingled with such paper and there shall be no holes or breaks in the paper. Horizontal joints shall be lapped not less than two (2) inches and vertical joints not less than six (6) inches beyond the stud on the weather side, except sheet lath, which shall be lapped not less than four (4) inches, and such paper shall be nailed to the backing with wire nails of not less than eleven (11) W. & M. gauge having a flat head of not less than three-eighths (3/8) inch in diameter. Such paper shall be nailed to the structural backing at points spaced at not more than twelve (12) inches on center vertically and sixteen (16) inches on center horizontally.

Provided, that any reinforced waterproof paper which is reinforced with metal in the process of manufacture, such reinforcement being in accordance with requirements of Section 4709 for plaster reinforcing, shall be lapped not less than two (2) inches horizontally and four (4) inches vertically.

Where sheathing or similar backing is not used an eighteen (18) W. & M. gauge or larger wire stretched taut horizontally across the stud frame at not more than six (6) inches on center vertically shall be securely fastened in place before the paper is applied; provided, that where such paper is fastened to the metal reinforcing in such a manner as not to affect the waterproofing qualities of such paper the wire need not be installed. Where the building is sheathed with wood, fibre board or plaster board sheathing the waterproof paper shall be applied on the outside of such wood, fibre board or plaster board sheathing.

All exterior openings exposed to the weather shall be thoroughly and effectively flashed with metal flashing in such a manner as to make them waterproof. All copings and parapet walls shall be thoroughly flashed with metal in a manner approved by the Building Inspector. Wherever metal flashing is required it shall consist of not less than sixteen (16) ounce copper or twenty-six (26) gauge galvanized iron or lead coated or asphaltum dipped metal not less than twenty-six (26) gauge, such coating or dipping to be rust-resisting.

Exterior Hand Plastering or Stucco

Sec. 4713. Except when applied to tile, masonry or concrete, all exterior hand plastering or stucco shall be three (3) coat work and shall be reinforced with metal lath or metal plaster reinforcing as specified in Sections 4705 and 4709.

First Coat. The first coat shall consist of one part of Portland cement to not more than three and one-half parts of sand by volume, to which may be added slaked or hydrated lime or approved brands of diatomaceous silica in an amount not to exceed ten per cent (10%) by volume of cement; provided, that when approved waterproofing materials or compounds are used no hydrated or slaked lime shall be used.

The first coat shall be well forced through all spaces or openings in the metal reinforcing so as to form a good mechanical key and to solidly fill any space between such plaster reinforcing and backing. The first coat shall be thoroughly scored, combed or scratched in two directions at approximately right angles to each other in such a manner as to cause furrows or channels in such first coat, in order to provide a good mechanical bond to receive the second coat of plaster or stucco.

The first coat of plaster shall be kept moist during the first twenty-four (24) hours after it has been applied so that at the end of the period of wetting the plaster will show a thoroughly set and hard condition. The first coat shall have been applied for at least seven (7) days before second coat is applied thereto.

Every first coat of exterior plaster or stucco shall have a minimum thickness of not less than three-eighths ($\frac{3}{8}$) inch measured from the face of the backing. When plaster is applied to tile, masonry or concrete such tile, masonry or concrete

shall be thoroughly washed and cleaned before any plaster is applied thereto.

Second Coat. The second coat of exterior plaster or stucco shall consist of one part of Portland cement to not more than three and one-half parts of sand by volume, to which may be added approved waterproofing or fattening compounds as provided for the first coat.

The second coat of plaster shall be applied and rodded and shall be water floated. The second coat shall have a minimum thickness of not less than three-eighths ($\frac{3}{8}$) inch measured from the face of the first coat of plaster. This coat must be kept wet as prescribed for the first coat.

The second coat shall stand for at least ten (10) days before the third coat is applied.

Third Coat. The third or finish coat of exterior plaster or stucco shall be composed of any material or materials approved by the Building Inspector and shall have a minimum thickness of not less than one-eighth ($\frac{1}{8}$) inch measured from the face of the second coat.

The total thickness of the three coats of stucco shall be not less than seven-eighths ($\frac{7}{8}$) inch in any place measured from the backing; provided, that on three (3) story buildings where sheathing is required, such sheathing may be omitted, provided the stucco is not less than one and one-fourth ($1\frac{1}{4}$) inches in thickness and provided the reinforcement used shall be expanded metal weighing not less than four and five-tenths (4.5) pounds per square yard or welded wire fabric weighing not less than four and three-tenths (4.3) pounds per square yard.

Where corner beads are used on the exterior such corner beads shall be designed as exterior corner beads, shall be the full thickness of the required plaster and shall have metal lath attached thereto forming a cornerite.

Rodded Wall. A wall shall be said to be rodded when a five (5) foot straight edge placed upon the surface of the plaster in any position shall not show more than one-fourth ($\frac{1}{4}$) inch variation in the surface of the plaster at any point along the five (5) foot length of the straight edge. This permissible variation shall not be deemed to affect the thickness of the plaster as required but such plaster shall be the full required thickness at any point.

Sec. 4714. Pneumatically placed stucco shall be deemed to 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 such conveyor and deposited by the air pressure in its place of final repose.

**Pneumat-
ically
Placed
Stucco**

Rebound as applied to pneumatically placed stucco shall be defined as material ejected from the nozzle against a surface from which it rebounds and falls.

Sand used for pneumatically applied stucco shall comply with the requirements for sand for reinforced concrete construction as provided in Section 4707, provided, that the grading may vary from that required for concrete.

Rebound gathered up and screened may be used as sand in

the mixture but shall not constitute more than twenty-five per cent (25%) of the total sand contained in any one batch.

Pneumatically applied stucco shall contain not less than one sack of cement to each five (5) cubic feet of sand or gravel used.

Hydrated lime or other approved materials in an amount not to exceed ten per cent (10%) of the volume of the cement may be added to the mixture.

Pneumatically applied stucco shall be applied in not less than two (2) coats to a total minimum thickness of seven-eighths ($\frac{7}{8}$) inch.

Not less than seven (7) days shall elapse between the application of the first and second coats, during which time the first coat shall be sprayed with water and properly cured.

The second coat shall be rodged as provided for the second coat of hand applied stucco. No third coat will be required over the second coat of pneumatically applied stucco.

On buildings where sheathing is required, such sheathing may be omitted provided the frame is covered with not less than one (1) inch of pneumatically applied stucco reinforced by expanded metal weighing not less than four and five-tenths (4.5) pounds per square yard, or welded wire fabric weighing not less than four and three-tenths (4.3) pounds per square yard. Such pneumatically applied stucco shall be applied in the manner hereinabove specified.

Interior Plastering

Sec. 4715. Number of Coats Required. Plastering with lime mortar shall be three-coat work when applied over metal lath, plaster lath or fibre board, and may be two-coat work when applied over wood lath.

Plastering with gypsum or hardwall plaster shall be three-coat work when applied over metal lath, and not less than two-coat work when applied over wood lath, plaster lath or fibre board.

Plastering with cement mortar shall be three-coat work when applied over metal lath, expanded metal or wire mesh.

Cement plaster shall not be applied over gypsum lath, wood lath or fibre board unless such gypsum lath, wood lath or fibre board shall be first covered with a waterproofing paper and metal reinforcing as required for exterior plastering.

In no case will a brush coat be accepted as a third or finish coat where three-coat work is required.

All plaster staff work shall have lugs of pure fibre and plaster of Paris, and shall be securely installed and fastened into place in a manner approved by the Building Inspector.

Plastering With Lime Mortar

Sec. 4716. First Coat. Lime mortar for first coat of interior plastering shall be mixed one part lime to not more than two and one-half parts of sand by volume. Each cubic yard of lime mortar shall contain not less than two hundred (200) pounds of Keene's cement. To each cubic yard of lime mortar used for first or scratch coat there shall be added not less than four (4) pounds of manila fibre, or loose hair, the same to be distributed thoroughly throughout the mortar.

The first coat of mortar applied over metal or plaster lath or fibre board shall be well scored so as to form a good mechanical key. The first coat over metal or plaster lath or fibre board shall be thoroughly set and dry before second coat is applied. The first coat shall completely embed and cover all of the lath.

Second Coat. The second coat of lime mortar shall be mixed one part of lime to not more than three parts of sand by volume and shall contain not less than one hundred (100) pounds of Keene's cement in each cubic yard of mortar. To this shall be added not less than four (4) pounds of manila fibre, or loose hair. The second coat of lime mortar shall be rodded to a straight surface.

The minimum thickness of the two coats of lime mortar shall be not less than three-fourths ($\frac{3}{4}$) inch including the lath. The second coat of lime mortar shall be thoroughly set and dry before the third or finish coat is applied.

Third or Finish Coat. The third or finish coat may consist of one of the following:

1. A white coat mixed one part gypsum plaster or plaster of Paris to not more than one part of lime putty. Such white coat shall thoroughly cover all brown mortar surfaces and shall be troweled smoothly with a steel trowel, and must be free from blemishes.

2. A sand finish consisting of one part gypsum plaster to not more than three parts of sand. Such sand finish shall thoroughly cover all brown mortar surfaces and may be left in any texture desired.

3. Any approved brand of interior stucco which shall cover all brown mortar surfaces.

Portland cement shall not be permitted for the third or finish coat over lime or gypsum brown mortar, nor shall any Portland cement be used over lime or gypsum mortar surfaces.

Lime mortar when applied over wood lath shall be mixed and applied as required for the brown coat and finish coat of lime mortar over metal lath, plaster lath or fibre board, except that the brown coat shall be mixed one part lime to not more than two and one-half parts of sand. It shall contain not less than two hundred (200) pounds of Keene's cement in each cubic yard of mortar. To the brown coat shall be added at least four (4) pounds of manila fibre or loose hair.

Sec. 4717. Hardwall or gypsum plaster applied over wood lath, plaster lath or fibre board shall be not less than three-eighths ($\frac{3}{8}$) inch measured from the outer face of the lath.

The first or brown coat shall be mixed of one part of gypsum or hardwall plaster of an approved brand to not more than two parts of sand by volume. The first or brown coat shall have a minimum thickness of not less than one-fourth ($\frac{1}{4}$) inch measured from the outer face of the lath or board.

The first or brown coat shall be thoroughly set and shall be free from dry sets, sweat-outs, buckles or other harmful defects before the second or finish coat is applied.

Hardw
or
Gypsu
Plaster

The second or finish coat shall consist of one of the following:

1. Any approved brand of interior stucco, which may be applied over a brown mortar surface that is still green.
2. A white coat consisting of one part gypsum plaster to not more than an equal amount of lime putty thoroughly gauged together which shall be applied in the same manner as specified for white or putty coat over lime mortar.
3. A sand finish consisting of one part of gypsum plaster mixed with not more than two parts of sand. This may be applied over a brown mortar base while it is still green.

The second or finish coat of plaster applied over wood or plaster lath or fibre board shall be of sufficient thickness to bring the total minimum thickness of plaster measured from the outer face of the lath to not less than three-eighths ($\frac{3}{8}$) inch.

In no case shall a white coat or putty coat be applied over any other than a thoroughly dry brown mortar base.

**Plaster
Over
Metal
Lath**

Sec. 4718. Interior hardwall or gypsum plaster over metal lath must be at least three-coat work with a minimum thickness of not less than three-fourths ($\frac{3}{4}$) inch, lath included, measured from the outer face of metal lath supports.

The first or scratch coat shall consist of one part of an approved brand of gypsum plaster to not more than two parts of sand by volume, and shall be thoroughly mixed in a manner so as not to damage the setting qualities of the plaster. This coat shall be scored so as to provide a good key for the second or brown coat.

The first or scratch coat shall be thoroughly set and dry before the brown coat is applied.

The second coat or brown coat of gypsum plaster shall be mixed one part of approved gypsum plaster to not more than two and one-half parts of sand by volume and shall be brought to a straight surface.

The third or finish coat shall be mixed and applied in the same manner as specified for the third coat over lime mortar, with the same time as required between second and third coats of lime mortar.

**Interior
Plaster
Over
Masonry**

Sec. 4719. Interior hardwall or gypsum plaster over gypsum block, brick, clay tile or concrete, if thicker than a wash or brush coat, shall be not less than two-coat work.

Such two-coat plaster work shall have a minimum thickness of three-eighths ($\frac{3}{8}$) inch over unit masonry or one-fourth ($\frac{1}{4}$) inch over monolithic concrete, except where plaster is used for fire-resistive purposes, in which case the minimum thickness shall be one-half ($\frac{1}{2}$) inch.

For application on brick, gypsum block or clay tile, gypsum plaster shall be mixed in the proportion of one part of gypsum plaster to not more than two and one-half parts of sand by volume.

When applied to concrete where moisture would affect the plaster, gypsum plaster shall be applied over a waterproofing coat of approved plaster bond, or bond plaster.

The finished coat shall not be applied until the first coat is thoroughly set and nearly dry, except when a putty coat finish is used, in which case the base shall be absolutely dry.

Concrete surfaces which are to be plastered shall be rough. If the required degree of roughness is not procured by using rough forms, the surface shall be hacked. Before plastering, all concrete surfaces shall be cleaned and all dust and loose particles removed. Grease, oil or efflorescence if present, shall be washed off with a solution of one part of commercial muriatic acid to four parts of water and the surface then washed again with clean water.

Sec. 4720. Except where otherwise specified for fire retardant walls and ceilings, interior cement plaster shall be applied over plaster reinforcing as required for exterior plastering.

**Interior
Cement
Plaster**

All interior cement plaster shall be three-coat work. The first two coats shall be mixed and applied with the same materials and in the same manner as required for the first two coats of exterior work.

The third or finish coat of interior cement plastering may be of the same materials, mixed and applied in the same manner as required for the third coat of gypsum plaster over metal lath or as required for the third coat of exterior stucco.

Sec. 4721. All staff shall be thoroughly soaked before sticking. All lugs shall be of pure fibre and plaster of Paris. Excelsior shall not be used for lugs. In all cases where staff is heavy, auxiliary fastenings shall be used and such fastenings shall be not less than the equivalent of fourteen (14) gauge copper wire, shall in all cases be of sufficient strength to securely fasten the staff to the support, and shall be rust-resisting.

**Staff
Work**

Suggestions for Inspectors.

1. Remember always that you represent the City. A city is made up of all the people living therein and your actions should be governed accordingly.

2. Be particular at the beginning of a job. An erroneous method is more easily corrected the first time it is practiced than after it has been in use. The reputation of being slack or "easy," though it may be attained in a few days, is hard to overcome.

3. Be friendly with everyone on the job, but familiar with no one. Familiarity dulls the edge of the Inspector's authority.

4. Give orders to foremen, superintendents or contractor only. That rule does not apply to things of minor importance, such as the correction of form alignment, dirt in the bottom of forms for concrete, or other routine every-day occurrences. In such things it is proper for the Inspector to

call the defect to the attention of the workmen responsible for that particular part of the job.

5. Do not waste workmen's time by talking to them.

6. Don't argue. Refer disputed questions to the Chief Inspector, and, until you have an answer from him, use your own judgment. Be sure that your judgment is so cool, fair and impartial and your knowledge of the work so thorough, that you command respect and obedience.

7. Do not try to magnify your own importance by telling outsiders of the errors you have corrected or the "crooked work" you have uncovered. The quality of the completed product will measure your ability.

8. Realize the importance of your work. The lives of many people are dependent in a large measure on the faithful performance of your duty. Consider your duties seriously and others will do likewise.

INDEX

NOTE: 1. The following abbreviations are used in this index:

- A. S. T. M.—American Society for Testing Materials
- A. S. A.—American Standards Association
- A. W. S.—American Welding Society
- A. C. I.—American Concrete Institute
- A. L. S.—American Lumber Standards published by Bureau of Standards
July, 1929
- J. C.—Joint Committee on Reinforced Concrete
- N. B. F. U.—National Board of Fire Underwriters
- N. F. P. A.—National Fire Protection Association
- Und. Lab.—Underwriters' Laboratories, Inc.

2. For index by Parts, Chapters and Sections in numerical order see pages (a) to (k) in front of book.

	Section
A—occupancies	601
ABBREVIATIONS	
In concrete design	2612
In masonry construction	2410
In steel design	2702, 2703, 2704
In wood construction	2504
ACCESSORY BUILDINGS	1501
ACT—HOUSING	
For Group H buildings	1303, 1305
For Group I buildings	1403, 1405
ADDITIONS	
To buildings	104
To existing masonry walls	2941
ADJOINING BUILDINGS	
Foundation—to be protected when	2801
See LOCATION ON PROPERTY	
ADMINISTRATION BUILDINGS (PUBLIC)	
Seating more than 3500	601
Seating from 500 to 3500	701
Seating less than 500	801
ADMINISTRATIVE (see Part I for complete details)	101
Appeals—required when	303
Approval required—by Building Inspector, when	302
Board of Examiners and Appeals	304
Bond—for registered inspector	204
Building classified by Building Inspector, when	501
Building Inspector acts as secretary	304
Building Inspector—definition of	401
Certificates required	205, 206
Condemnation—proceedings for	301
Inspection of buildings	204
Inspector approves plans when	202
Powers and duties of Building Inspector	301
Records kept by Building Inspector	203
Registered Inspector—duties of	204
ADOPTION OF ORDINANCE—WHEN	4004
AGGREGATES	
For concrete	2604 (b)
For fire-resistive purposes—classed how	4301
Moisture content of	2608
Proportions in concrete	2607
AIR	
Supply for buildings (see VENTILATION)	
AIR INTAKES	
For furnaces	3707
For motion picture machine booths	4001
For private garages	1506
AIR SPACE	
Around timber in masonry	2506
In wood construction—to be divided	2510
Limited in concrete blocks	2403
Under flooring—to be divided	1810
AISLES	
As access to stairway	3313
For Group A buildings	604 (f), 604 (l)
For Group B buildings	704 (e), 704 (k)
For Group J buildings	1504 (b)

ALARM VALVE—AUTOMATIC SPRINKLERS	3801
ALLEY	
Definition of	401
ALLOWABLE WORKING STRESSES (see WORKING STRESSES ALLOWABLE)	
ALTERATION	
Definition of	401
Limited how	104
When in Fire Zone No. 1	1602
When in Fire Zone No. 2	1603
When in Fire Zone No. 4	1605
ALTERNATE MATERIALS AND CONSTRUCTION	
Board of Examiners and Appeals	304
Deposit required	303
May be approved by Building Inspector, when	302
May be used, when	304
AMERICAN CONCRETE INSTITUTE—Specifications	
For hollow concrete block or tile	2406
AMERICAN LUMBER STANDARDS	
For wood	2501
AMERICAN SOCIETY FOR TESTING MATERIALS—Specifications	
Brick	2402
Brick, concrete	2404
Brick, sand lime	2403
Cast iron	2701
Cast steel	2701
Cement, Portland	2409, 2604
Fire test standard	4201
Gypsum	2407
Gypsum block or tile	2407
Hollow clay tile	2408
Hydrated lime	2409
Quicklime	2409
Reinforcing steel for concrete	2604
Structural steel	2701
AMERICAN STANDARDS ASSOCIATION	
Pressentum curtain-operating mechanism	4104
AMERICAN WELDING SOCIETY	
Welding Requirements	2710
AMUSEMENT PARK STRUCTURES (see GROUP J)	
Construction—special	1509
Light and ventilation	1505
Special loads	1502
ANCHORAGE	
Definition of—for reinforced concrete	2603
For masonry construction	2901, 2940
For wood construction (see WOOD)	
ANCHORS	
For beams and girders	2506
For facing—attachment of	2931
For fire-resistive materials	4301
For joists	2506
For masonry construction	2901, 2940
For masonry veneer to wood frame	2205 (d)
For panel and enclosure walls	2930
For reinforcing in concrete	2619
For roof framing	2508
For seats—required	604 (g), 704 (f)
For steel joists	2714 (d)
For stud walls and partitions	2507
For trusses	2509
For veneer—attachment of	2926
For walls	2910
For wood columns	2505
APARTMENT	
Definition of	401
APARTMENT HOUSE	
Classed as	1301
Definition of	401
APPEAL	
Board acts, how	304
From decision of Building Inspector, when	302
Method of making	303
APPENDAGES	
General regulations	4501
APPENDED DOCUMENTS	4602

APPLICATION

For permit—details required	201
Of Code to buildings and/or structures	102
Required for demolishing	104 (a)
To additional stories	104 (a)
To additions	104 (b)
To alterations or repairs	104 (c)
To changed use or occupancy	104 (c)
To existing buildings	104
To increased floor area	104 (c)
To major alterations and repairs	104 (a)
To minor alterations and repairs	104 (d)
To roofing repairs or removal	104 (d)
To structural alterations or repairs	104 (d)

APPROVAL

After final inspection	206
For new materials	302, 304
For storage of materials in street	4401
Of chimneys	3701
Of plans for permit	202
Of proscenium curtain after test	4105
Of Registered Inspector	204
Of welding operator	2710

APPROVED

Definition of	401
---------------------	-----

ARCHES

In fireplace construction	3706
In floor construction	1810
In solid masonry	2906
Over proscenium opening	602, 3801

ARCHITECT

Name required on plans	201
------------------------------	-----

ARC WELDS (see WELD)

For steel joists	2714
General requirements	2710

AREA

Allowable (see OCCUPANCY, FIRE ZONES and TYPE OF BUILDING)	
Definition of	401

ARMORIES

Seating more than 3500	601
Seating from 500 to 3500	701
Seating less than 500	801

ARTIFICIAL STONE

Requirements for	2924
------------------------	------

ASBESTOS

As roofing material	4305
For fire doors	4304
For heating equipment	3710, 3711, 3712
For proscenium curtains	4102
For warm air ducts	3715

ASHLAR—STONE FACING

	2931
--	------

ASPHALT

Paper on exterior walls	2205
In roof coverings	4305

ASSEMBLAGE—PLACES OF (see AUDITORIUMS)**ASSUMPTIONS**

For live loads used in design	2304, 2305
For reinforced concrete design	2611

ASYLUMS (see GROUP D)

	901
--	-----

ATTIC

Access to—required	3205
Story—definition of	401
Subdivision required in frame buildings	2208 (h), 2510

AUDITORIUMS

Seating more than 3500	601
Seating from 500 to 3500	701
Seating less than 500	801

AUTOMATIC SPRINKLERS

Design and installation	3802
Where required	3801

AWNINGS

Fixed—regulations for	4501 (d)
Movable—regulations for	4501 (b)

B—occupancies	701
BALCONY	
Exits from Group A buildings	604 (d)
Exits from Group B buildings	704 (c)
Exterior—construction of	3501
For smokeproof towers	3315
May project, how	4501 (a)
BALUSTRADES	
Must resist horizontal thrust	3501
On balconies for smokeproof towers	3315
Required for stairways—when	3305
When measuring stair clear width	3307
BARRICADES—Construction	1602 (f), 4401
BARS	
For concrete reinforcing (see REINFORCED CONCRETE)	
Prohibited over openings	604 (l), 704 (k)
BASEMENT	
Definition of	401
Protection of ceiling when	2010
Sprinkling of—when required	3801
Walls and floors—design of	2310
BASEMENT PIPE INLETS	
Design and installation	3807
Where required	3807
BAY WINDOW	
Construction of	3501
Definition of	401
May project—how	4501 (a)
BEAMS	
As Tees in reinforced concrete	2614 (d)
Design conditions—reinforced concrete (see REINFORCED CONCRETE)	
Ends cut on bevel	2506 (d)
Fireproofing of	4301
Of reinforced concrete	2614
Of wood in heavy timber construction	1908, 1910, 2506
BEARING PARTITIONS	
Masonry	2936
Wood frame	2507
BEARING PLATES	
For steel joists	2714 (d)
For wood beams and girders	2506
For wood columns	2505
BEARING WALL	
Definition of	401
Of hollow masonry—construction	2909
Of reinforced concrete—construction	2916
Of solid masonry—construction	2903
Of stone—construction	2921
BELT COURSES—May project	4501 (e)
BENDING MOMENTS—for Reinforced Concrete	2615, 2616, 2620, 2622
BLOCKS—CONCRETE (see CONCRETE BLOCKS)	
BOARD OF EXAMINERS AND APPEALS	
Appointed how	304
Consists of	304
Hear appeal, when	303
BOILER	
General requirements	3709
Room for (see BOILER ROOM—CONSTRUCTION)	
Smoke pipes for	3705
Smokestacks for	3702
BOILER ROOM—CONSTRUCTION	
For Group A buildings	608
For Group B buildings	708
For Group C buildings	808
For Group D buildings	908
For Group E buildings	1008
For Group H buildings	1308
BOLTS	
May be used, when	2709
On doors	604 (i), 704 (h), 904
Used in erection	2718 (b)
BOND	
Allowable stresses—concrete	2613
Assumptions for—concrete	2611
For additions to masonry walls	2841

For computations of—concrete	2619
For concrete surfaces	2600 (h)
For faced walls	2931
For hollow masonry construction	2910
For solid masonry construction	2904
For stone walls	2922
For veneer	2926
BOXES—THEATRE	
For Group A buildings	604 (h)
For Group B buildings	704 (g)
BRACING	
For patent chimneys	3704
For reinforced concrete forms	2510
For smokestacks	3702
For steel construction during erection	2711 (c), 2718 (a)
For stud walls and partitions	2507
For underpinning	2205
For wood trusses	2509
BRICK—CLAY	
Definition of	2402
Fire-resistive rating of	4301, 4302
Grades of	2402
Tests for determining grade	2402
Walls of (see WALLS)	
Working stresses—brick masonry	2410
BRICK—CONCRETE	
Fire-resistive rating of	4301, 4302
Quality and tests	2404
Walls of (see WALLS)	
Working stresses—masonry of	2410
BRICK—SAND LIME	
Fire-resistive rating of	4301, 4302
Quality and tests	2403
Walls of (see WALLS)	
Working stresses—masonry of	2410
BRIDGING	
For concrete joists	3102
For steel joists	2714 (c)
For wood joists	2506 (k)
BUILDING CODE	
Adopted when	4604
Application of	104
Enforced by	301
Purpose of	102
Scope of	103
Title of	101
BUILDING INSPECTOR	
Acts as secretary	304
Approves structural frame	204
Approves registered inspector, when	204
Approves welding operator when	2710 (d)
Certifies floor loads, when	2309
Classifies buildings, when	501
Definition of	401
Issues permit, when	202
May approve alternate construction or materials	302
May enter premises	301
May reject permit, when	202
May require registered inspector	204
May require tests	302, 2401
May stop work	301
Opinion necessary for change	1602 (c), 1604, 1605 (c)
Powers and duties of	301
Record of permits required	203
Shall issue Certificate of Compliance, when	205
Shall make inspections, when	201
Shall require reports	204
Special permit issued when	1602 (f)
BUILDING INSPECTOR AUTHORIZATION REQUIRED	
Before changing plans	202
For changes of use or occupancy	104 (h)
For removal of existing safeguards	105
For structural alterations	104 (d), 202

BUILDINGS

Change of use, when	207
Classified by type of construction	1702
Classified by use or occupancy	501, 503
Definition of	401
Regulated by fire zones	1602 to 1605 incl.
Require registered inspector, when	204
To be condemned	301
To be occupied, when	206
To conform to Code, when	101

BUILDING MATERIALS

May be stored—how	4101
-------------------------	------

BUILT UP TIMBERS

2506 (b)

BUTTRESSED WALLS—Construction of

2903 (d)

C—occupancies

801

CEDAR

Mudsills	2201, 2205
Piling	2803
Working stresses	2503, 2501

CEILINGS

Fire-resistive required—for furnaces	3707
Fire-resistive required—in Type III buildings	2010
For fire protection purposes	4301
Minimum height of (see STORY)	

CELLAR

Definition of	101
Protection of ceiling, when	2010
Sprinkling of—when required	3801

CELL BLOCKS—JAILS

Construction of	909
-----------------------	-----

CEMENT—PORTLAND (see PORTLAND CEMENT)**CERTIFICATE**

Of Compliance—issued by Building Inspector	205
Of Occupancy—for change of use	207
Of Occupancy—issued to owner	206
Of Registration—for Registered Inspector	204

CERTIFICATE OF COMPLIANCE

Required when	205
---------------------	-----

CERTIFICATE OF OCCUPANCY

Issued by	206
Required when	206

CHANGE OF OCCUPANCY

Certificate required for	207
--------------------------------	-----

CHASES (see RECESSES)**CHIMNEYS**

Firestopping around	2207 (f), 2510
General requirements	3701
Patent type	3704
Wood frame—spaced from	2207

CHURCHES

Seating more than 3500	601
Seating 500 to 3500	701
Seating 500 or less	801

CITY

Adopted this Code, when	4604
Clerk—files appended documents	4802
Council orders repairs, when	301
Grants permission for storage in streets	4401
Levies penalties, when	305
Permits use of space under sidewalks	4501 (g)
Requires bond of registered inspector	204
Requires permit, when	201

CLASSIFICATION

Of fire-resistive construction (see Chapters 42 and 43)	
Of occupancies	501, 503
Of Types of Construction	1701, 1702

CLASSIFICATION OF BUILDINGS

By fire zones	1602-1605, incl.
By occupancy	503
By type of construction	1702

CLAY ROOF TILE

4305

CLAY TILE—HOLLOW

Bearing walls or (see HOLLOW MASONRY)	
For fire division walls	2934
For fire-resistive construction	4301, 4302
For fire walls	2933
For panel walls	2939
For partitions—bearing	2936
For partitions—non bearing	2937

CLEAN OUT

For concrete forms	2610 (a)
For patent chimneys	3704

CLEARANCE

Around reinforcing in concrete	2610 (d)
Around smoke pipes	3705
Around smoke stack	3702
Around stoves and heaters	3710, 3711
Around timber in masonry	2506
Around warm air furnaces	3707
For swelling of wood floor	1910
Of wood framing	2207
Under first floor joists	2207

CLUBS

Seating more than 3500	601
Seating 500 to 3500	701
Seating 500 or less	801

COLD STORAGE (see GROUP G)**COLUMNS**

Capital—defined	2603
Composite—design	2621 (f)
Fireproofing of	4301
Heavy timber	1908
Masonry	2905, 2912
Mill construction	1908
Project beyond property line—when	4501 (e)
Reinforced concrete	2621
Reinforced concrete—definition of	2603
Structural steel—allowable stresses	2702
Wood—allowable stresses	2504
Wood—framing details	1908, 2505

COMBINED STRESSES

Concrete	2621
Masonry	2411
Steel	2702
Wood	2503

COMBUSTIBLE GOODS—Sales and Storage (see GROUP F)**COMBUSTIBLE MATERIALS**

Prohibited in Fire Zone No. 1	1602 (i)
Regulated in Type I buildings	1816
Regulated in Type II buildings	1916
Regulated in Type III buildings	2016
Regulated in Type IV buildings	2116
Regulated in Type V buildings	2211

COMMUNICATING OPENINGS

Through fire separations	503
--------------------------	-----

COMPLIANCE—CERTIFICATE OF

	205
--	-----

COMPOSITION ROOFINGS

	4305
--	------

COMPUTATIONS—may be required

	201
--	-----

CONCENTRATED LOADS

Required to be distributed on masonry	2411
---------------------------------------	------

Special requirements for	2303
--------------------------	------

CONCRETE

Blocks of (see CONCRETE BLOCKS)	
Brick—quality and design	2404
Definition of	2603
Design of—when reinforced	2602
Fire-resistive classification (see Chapter 43)	4301, 4302
For roofs—slab or tile	4305
Piles	2803 (c)
Plain—quality and design	2405
Reinforced—definition of	2603
Reinforced—design of (see Chapter 26)	2602
Tests—for reinforced concrete	2605, 2613
Transporting and placing	2609
Walls—plain	2901-2906, incl.
Walls—reinforced	2914

Working stresses of	2110, 2613
Working stresses—masonry units	2410
CONCRETE BLOCKS	
For fire division walls	2934
For fire-resistive construction	4302
For fire walls	2933
For masonry walls (see HOLLOW MASONRY)	
For panel walls	2939
For partitions—bearing	2936
For partitions—non-bearing	2937
Quality and design of	2404, 2406
CONDEMNATION	
By Building Inspector, when	301
Work ordered by City, when	301
CONNECTIONS	
Between fresh and hardened concrete	2609 (h)
Between wood and masonry	2506
For structural steel	2708
For additions to masonry walls	2941
In wood framing	2501, 2505
CONSTRUCTION	
Fire Zone No. 1	1602
Fire Zone No. 2	1603
Fire Zone No. 3	1604
Fire Zone No. 4	1605
For Group A buildings	602, 609
For Group B buildings	702, 709
For Group C buildings	802, 809
For Group D buildings	902, 909
For Group E buildings	1002, 1009
For Group F buildings	1102, 1109
For Group G buildings	1202, 1209
For Group H buildings	1302, 1309
For Group I buildings	1402, 1409
For Group J buildings	1502, 1509
For types of (see TYPES OF CONSTRUCTION)	
Lights required	4401
Temporary buildings and structures	4401
Temporary use of streets allowed during	4401
CONSTRUCTION JOINTS—IN CONCRETE	2610 (g)
CONSTRUCTION MATERIAL	
Allowed in streets, when	4401
Load to be provided for, when	2718
CONTENTS BY PARTS, CHAPTERS AND SECTIONS (see pages a to j inclusive)	
CONVENTS	1301
CORBELING	
Of hollow masonry	2907
Of incinerator walls	3716
Of reinforced concrete	2914
Of solid masonry	2901
CORNICES (see TYPE OF BUILDING)	4501
COST OF BUILDINGS—for permits	201, 202
COVERINGS	
For exteriors of frame buildings	2206
For fire protection	4301
For patent chimneys	8704
For roofs	4805
For warm air ducts	8715
For wood doors—when	4304
CROSS AISLES IN BALCONIES	
Of Group A buildings	604 (f)
Of Group B buildings	704 (e)
CURB	
Allowed in alley—when	4501 (h)
For skylights—constructed how	8402
CURTAIN	
For proscenium opening (see PROSCENIUM CURTAIN)	
Wall—masonry—definition of	401
CURTAIN WALL	
Definition of	401
Hollow masonry—construction of	2909
Reinforced concrete—construction of	2916
Solid masonry—construction of	2903
D—occupancies	901

DANCE HALLS

Seating more than 3500	601
Seating from 500 to 3500	701
Seating less than 500	801

DANGEROUS BUSINESS (see GROUP E)

901

DEAD LOAD

Definition of	401, 2301
---------------------	-----------

DECORATIVE FEATURES—may project how

4501 (c)

DETAILED REGULATIONS

Bays and balconies	3501
Chimneys and heating apparatus	3701-3716 incl.
Doors, windows and skylights	3401, 3402
Fire extinguishing apparatus	3701-3716, incl.
Floor construction	3101-3105, incl.
Enclosure of vertical openings	3001-3003, incl.
Excavations, footings and foundations	2801-2803, incl.
Motion picture machine booths	4001
Penthouses and roof structures	3601
Proscenium curtains	4101-4106, incl.
Roof construction and covering	3201-3206, incl.
Stage ventilators	3901
Stairs, ramps and smokeproof towers	3301-3316, incl.
Walls and partitions	2901-2941 incl.

DEFINITIONS

Of certain words	401, 2603
Of fire-resistive construction	4201
Of Group A buildings	601
Of Group B buildings	701
Of Group C buildings	801
Of Group D buildings	901
Of Group E buildings	1001
Of Group F buildings	1101
Of Group G buildings	1201
Of Group H buildings	1301
Of Group I buildings	1401
Of Group J buildings	1501
Of terms in concrete regulations	2603
Of Type I buildings	1801
Of Type II buildings	1901
Of Type III buildings	2001
Of Type IV buildings	2101
Of Type V buildings	2201

DEMOLISH—BUILDING

Required when	104 (a), 301
---------------------	--------------

DEPTH OF FOUNDATIONS

Affects excavations when	2801
Governed by frost line	2938
Governed by soil conditions	2802

DESIGN

General	2302 (b)
Live loads for (see Chapter 23)	
Must be approved by Building Inspector	202
Of footings and foundations (see Chapter 28)	2306 (4)
Of masonry materials	2401
Of proscenium curtains	4101-4104, incl.
Of reinforced concrete	2602
Of structural steel	2701
Of walls	2901-2941, incl.
Of wood	2501

DIVISION

Of attic space	2510 (h)
Of floor area (see maximum area requirements under OCCUPANCY)	
Of buildings for fire protection	503

DOCUMENTS—Subject and Reference

Appended, as part of Code	4602
Brick tests—A. S. T. M.—C67-28T	2402, 2403, 2404
Brick—A. S. T. M.—C62-29	2402
Brick, concrete—A. S. T. M.—C55-28T	2404
Brick, sand lime—A. S. T. M.—Q73 28T	2403
Cast iron—A. S. T. M.—A48-29	2701
Cast steel—A. S. T. M.—A27-24	2701
Chimneys—N. B. F. U. Standard Ordinance for Chimney Construction 1927	3713
Clay tile—A. S. T. M.—C34-27	2408
Cold-drawn steel wire—A. S. T. M.—A82-27	2604

Concrete block or tile—A. C. I.—P-1A-29.....	2406
Concrete cylinder tests—A. S. T. M.—C39-27.....	2605
Concrete, testing of—A. S. T. M.—C39-27.....	2613
Fire doors, hanging of—N. F. P. A.—Protection of Openings in Walls and Partitions Against Fire, Edition of 1927.....	4304
Fire Doors—Und. Lab.—Standard for Tin-Clad Fire Doors and Shutters, Edition of March, 1926, and July, 1927.....	4304
Fire tests—A. S. T. M.—C19-26T.....	4201
Gypsum—A. S. T. M.—C22-25 and C23-22.....	2407
Gypsum, structural—J. C.—August 1924.....	2410
Gypsum tile—A. S. T. M.—C52-27.....	2407
Hydrated lime—A. S. T. M.—O6-24.....	2409
Inflammable liquids—N. F. P. A.....	1008
Oil burners—N. B. F. U.—regulations for oil burning equipment, 1928.....	3717
On file with City Clerk.....	4602
Portland cement—A. S. T. M.—O9-26.....	2409
Proscenium curtains—A. S. A.—Safety Code for Elevators, published July, 1925.....	4104
Quicklime—A. S. T. M.—C5-26.....	2409
Rail steel reinforcing—A. S. T. M.—A16-14.....	2604
Sands, organic impurities in—A. S. T. M.—C40-27.....	
Roofs, Class C coverings—Und. Lab.....	4505
Sprinklers—N. B. F. U.—Automatic Sprinkler Equipment, Edition 1928.....	3802
Structural, intermediate or hard-grade reinforcing—A. S. T. M.— A15-14.....	2604
Structural steel—A. S. T. M.—A9-29.....	2701
Welding—A. W. S.—Bulletin No. 2, December, 1921.....	2710
Wood—A. L. S.—R16-29—July 1, 1929.....	2503
DOORS	
Construction—for one-hour rating.....	4304
Fire-resistive—classification of.....	4304
Fire-resistive—design of.....	4304
Fire-resistive—shall be hung how.....	4304
Fire-resistive—when required (see under OCCUPANCY, FIRE ZONES and TYPE OF BUILDING).....	3002, 3003
For enclosure walls of vertical openings.....	503
For fire separations.....	604 (i)
For Group A buildings.....	704 (b)
For Group B buildings.....	004
For Group D buildings.....	3311
For horizontal exits.....	4001
For motion picture machine booths.....	3315
For smokeproof towers.....	3901
For stage ventilators.....	3401
General requirements.....	4501 (f)
May not project over public property, when.....	2510 (e)
Pocketed in wood partitions.....	1801
DORMITORIES	
DOWNSPOUT	
For marqueises.....	4501 (d)
For roofs—general.....	3206
DRAINAGE FILL	
DRAWINGS	
Required for permit.....	201
Shall include what.....	201
DRESSING ROOMS	
Exits from.....	604 (e)
Fire protection of.....	607
Location of.....	602
DRIFTING	
Not permitted, when.....	2716 (b)
DRY CLEANING PLANTS	
Classified as.....	1001
Inflammable liquids regulated.....	1008
Open flame prohibited.....	1008
Steam fire extinguishing apparatus.....	1008
Ventilation of.....	1008
DRY STANDPIPES (see STANDPIPES)	
DUCTS	
For warm air furnaces.....	3715
For ventilation of motion picture booths.....	4001
DUTIES	
Of Board of Examiners and Appeals.....	301
Of Building Inspector (see BUILDING INSPECTOR).....	301

DWELLING	
Definition of	401
Hollow masonry walls for	2909
In Group I Occupancy	1401
Solid masonry walls for	2003 (c)
When constructed on roof	1409
E—OCCUPANCIES	1091
EARTH PRESSURE	
Calculations for	2310
EARTHQUAKES—Provisions for	2311
ECCENTRIC LOADS	
In masonry construction	2411
Steel	2703
EFFECTIVE	
Date of Ordinance	4604
EGRESS (see STAIRS)	
ELECTRIC WELDING (see WELD)	
ELEVATOR SHAFTS (see VERTICAL OPENINGS)	
EMERGENCY	
Controls for proscenium curtain	4104
Exits for—Group A buildings	604
Exits for—Group B buildings	704
Exits for—Group C buildings	804
For stage ventilators	3901
Release for picture booth openings	4001
Signs for exits	604, 607, 3312
ENCLOSURE OF VERTICAL OPENINGS (see OCCUPANCY and TYPE OF BUILDING)	
For elevators	3002
For stairs and ramps	3002, 3308
Miscellaneous openings	3003
When required	3001
When smokeproof tower	3315
When through special fire separation	503 (b)
ENCLOSURE WALLS	
Construction of	2039
Definition of	401
ENGINEER—STRUCTURAL	
Name required on plans	301
ENGINEERING REGULATIONS—quality and design of the materials of construction	
Live and dead loads	2301-2311, incl.
Masonry (quality and design)	2401-2411, incl.
Reinforced concrete (quality and design)	2601-2622, incl.
Steel and iron (quality and design)	2701-2718, incl.
Wood (quality and design)	2501-2511, incl.
ENGINEERING SUPERVISION	
Required when	204
ERECTION	
Of concrete forms	2610
Of masonry walls	2901, 2940
Of new buildings	201
Of structural steel	2718
Of wireless masts	3602
Of wood construction	2505-2510, incl.
EXCAVATIONS	
General details for	2801
Water to be removed from, when	2609 (c)
EXHAUST VENTILATION	
For automobile storage	1005
For dry cleaning establishments	1008
For motion picture machine booths	4001
EXISTING BUILDING	
Application of Code to	104
Definition of	401
EXISTING WALLS	
Extensions of	2941
EXIT LIGHTS	
For Group A buildings	604 (j)
For Group B buildings	704 (i)
General requirements	3306, 3312
EXITS, ETC.	
General requirements	3301
Group A buildings	604
Group B buildings	704

Group O buildings	804
Group D buildings	904
Group E buildings	1004
Group F buildings	1104
Group G buildings	1204
Group H buildings	1304
Group I buildings	1404
Group J buildings	1504
EXPANSION	
Provision for	2715
Rollers for	2702 (h)
EXPLANATION OF TERMS	
General	401
Of reinforced concrete	2803
EXPLOSIVES—STORAGE	1001
EXTERIOR OPENINGS—PROTECTION REQUIRED WHEN	
Because of location in Fire Zone	1602, 1603
Because of location on property (see OCCUPANCY GROUP)	
Because of Type of Construction (see TYPE OF BUILDING)	
EXTERIOR WALLS—Requirements for	
Construction of (see LOCATION ON PROPERTY or TYPE OF BUILDING)	
Construction when in Fire Zone No. 2	1603 (a)
Construction of openings (see Particular OCCUPANCY GROUP, TYPE OF CONSTRUCTION or FIRE ZONE)	
F—occupancies	1201
FACED WALLS (see WALLS)	
FACTORIES	
Moderately hazardous (see GROUP F)	1101
Non-hazardous (see GROUP G)	1201
FAMILY	
Definition of	401
FEES	
Additional fee required—when	305
Doubled—when	203
For building permits	203
Record required of	203
FENCES	
Classed as	1501
For construction purposes	1602, 4401
FILLED GROUND	2802
FILL UNDER FLOOR	1810
FILM EXCHANGES	
Classed as	1001
Sprinklers required for	3801
FILMS—INFLAMMABLE	
Storage and use of	4001
FINAL INSPECTION	
Certificate of Compliance required when	205
Made when	206
Required when	204
FINES—FOR VIOLATIONS	305
FIRE	
Classification of materials for resistance to (see Chapter 43)	
Extinguishing apparatus (see FIRE EXTINGUISHING APPARATUS)	
Separations required—for certain occupancies	503
Standards for resistance of (see Chapters 42 and 43)	
Standards	4201
Walls—hollow masonry	2933
Walls—solid masonry	2932
FIRE CLAY	
For flue lining	3701
For incinerator combustion chamber	3710
For patent chimneys	3704
FIRE CUT	
Required for timbers	2506
FIRE DAMAGE	
Causes condemnation—when	104, 301
Repairs allowed—when	104 (a)
FIRE DEPARTMENT	
Access to basement pipe inlets	3807
FIRE DIVISION WALL	
Construction of	2934
Definition of	401

FIRE EXTINGUISHING APPARATUS

Automatic sprinklers—requirements for	3802
Automatic sprinklers—where required	3801
Basement pipe inlets—where required	3807
Dry standpipes—requirements	3804
Dry standpipes—where required	3803
For Group A buildings	007
For Group B buildings	707
For Group C buildings	807
For Group D buildings	907
For Group E buildings	1007
For Group F buildings	1107
For Group G buildings	1207
For Group H buildings	1307
For Group I buildings	1407
For Group J buildings	1507
Wet standpipes—requirements	3808
Wet standpipes—where required	3805

FIRE LIMITS

.....	1801
-------	------

FIREPLACES—CONSTRUCTION OF

.....	3706
-------	------

FIREPROOFING (see TYPE OF BUILDING)

Requirements—detailed	4301
-----------------------------	------

FIREPROOF PASSAGEWAYS

For Group A buildings	604
For Group B buildings	704
For smokeproof towers	3315

FIRE PUMPS

For wet standpipe supply	3806
--------------------------------	------

FIRE-RESISTIVE

Construction	4203
Construction defined	4201
Doors, windows and shutters	4304
Floor construction	4303
Inspection of plaster protection—when	204
Materials	4202
Materials, tests for	4201
Protection of structural parts	4301
Roof coverings	4305
Standards—specifications for	4201
Walls	4302

FIRE-RESISTIVE BUILDINGS (see TYPE I BUILDINGS).....1801-1816, incl.**FIRE-RESISTIVE STANDARDS**

For doors and shutters	4304
For floor construction	4303
For protection of structural parts	4301
For roof coverings	4305
For walls and partitions	4302
For windows	4304

FIRE-RESISTIVE STANDARDS FOR FIRE PROTECTION

General requirements	4201-4203, incl.
Standards—detailed	4301-4305, incl.

FIRE SEPARATIONS

Required when	503
---------------------	-----

FIRE STATIONS

.....	1101
-------	------

FIRESTOPPING

Between wood sleepers	1810
For wood frame construction	2607, 2510
In Type III buildings	2011, 2016
In Type V buildings	2205, 2208

FIRE WALL

Construction—hollow masonry	2933
Construction—solid masonry	2932
Definition of	401
May apply as fire separation when	503

FIRE ZONES

Definition of	1601
Doors may not project—when	4501 (f)
Requirements for Fire Zone No. 1	1602
Requirements for Fire Zone No. 2	1603
Requirements for Fire Zone No. 3	1604
Requirements for Fire Zone No. 4	1605

FLAG POLES

.....	3601
-------	------

FLAME—OPEN

Prohibited when	1008
-----------------------	------

FLASHING	
Waterproof paper and metal	4712
FLAT SLAB—General requirements	2620
FLOOR AREA	
Definition of	401
Limited (see OCCUPANCY and FIRE ZONES)	
FLOOR CONSTRUCTION	
Concrete	3102
Fire protection—of certain floors	4301
Fire-resistive—classification of	4303
For fire-resistive construction	4303
General (see TYPE OF BUILDING)	3101
Mill construction	3104
Motion picture machine booths	4001
Stages	606, 609
Steel joist	3103
Under warm air furnaces	3707
Wood joist	3105
FLOOR FILL—Required when	1810
FLOOR LEVELS	
Determine sprinkler requirements—when	3801
For Group A buildings	602, 603, 604
For Group B buildings	702, 703, 704
For Group E buildings	1004
FLOOR LOADS	
Assumed live	2304
Definitions of	2301
Reductions allowed	2306
Required to be posted	2308
Special considerations	2303
FLOOR OPENINGS	
Enclosures of—when required (see VERTICAL OPENINGS—ENCLOSURE OF)	
In stages—construction of	606
FLOOR PROTECTION	
For wood joisted floor	4301
Over heating plants	3707, 3708
Over ranges	3711, 3712
Required in Type III buildings	2010
Under stoves	3710
FLUES	
Area required	3701
Lining for chimneys	3701
Lining for smokestacks	3702
FLY GALLERIES	
Construction of	609
FOOTINGS	
Concrete—design of	2622
Design of—general	2306, 2802
FORMS—for concrete construction	2610
May be removed—when	2610 (b)
FOUNDATION	
Concrete—design of	2622
Construction allowed (see TYPE OF BUILDING)	
Definition of	401
Design of	2306, 2802
Excavations for	2801
Footing design—isolated	2306, 2802
For retaining wall	2310
Inspection required for Type V buildings	204
Liability of adjoining property	2801
May be omitted—when	2204
May project beyond property line—when	4501 (g)
Openings in walls for ventilation	2204
Owner's liability for	2801
Piling for	2803
Soil bearing allowed	2802
Stepped—when	2204
Thickness of walls for Type V buildings	2204
Walls of	2038
FRAME BUILDINGS (see TYPE V BUILDINGS)	2201
FRAME INSPECTION	
Required when	204
FRAMING	
Around chimneys	2207
Of wood construction (see WOOD)	

FRAMEWORK—OF BUILDING (see TYPE OF BUILDING)**FRONT OF LOT**

Definition of 401

FRONTAGE CONSENT REQUIRED

For storage of building materials 4401

FROST

Depth of foundations for 2938

Protection of concrete from 2609 (g)

FURNACES—WARM AIR

Ducts and appurtenances for 3715

General requirements 3707

Intake required for 3707

FURRING

Not allowed near chimney 2507 (h)

Of stucco reinforcement 2205 (c)

Requirements in wood frame construction 2510 (b)

FUSIBLE LINKS

For automatic sprinkler systems 9802

For doors—automobile ramp enclosures 1006

For fire doors 3401

For horizontal exits, when 3311

For motion picture machine booths 4001

For proscenium curtains 4104

For stage ventilators 3901

For vents supplying air back stage 605

G—occupancies

..... 1201

GALVANIZED IRON

Casing for patent chimneys 3704

Used for roof 4305

Used as siding 2105, 2205 (e)

GARAGE

Classified how 1001

Construction limited 1009

Definition of 401

Detailed requirements (see GROUP E)

Private—classified as 1501

Private—definition of 401

Private—limited how 1509

GRAND STANDS

..... 1501, 1502

GAS

Furnaces 3707

Heaters 3711

Hot plates 3711

Ranges—domestic 3711

Ranges—large 3712

Shut-offs required (see GAS SERVICE—SHUT OFF)

Vents—general requirements 3703

GAS CUTTING

How performed 2716 (z)

GASOLINE SERVICE STATIONS (see GROUP E)

Construction prohibited 1009

GAS SERVICE—SHUT-OFF REQUIRED

For Group A buildings 609

For Group B buildings 708

For Group D buildings 908

GIRDERS

Concrete (construction joints) 2610

Fireproofing of 4301

Loads reduced when 2306

Steel 2704

Wood 2207, 2500

GRADE

Definition of 401

GRADES OF

Brick 2402, 2403, 2404

Hollow clay or concrete building units 2400, 2408

GRADIENTS—allowed

For automobile storage 1004

For ramps 3310

In Group A buildings 602, 604

In Group B buildings 704

GRAVITY TANKS

For oil burning equipment 3713

For wet standpipe supply 3800

GREENHOUSE

Roof to be constructed—how	3402
----------------------------------	------

GRIDIRONS

Construction of	609
-----------------------	-----

GROUP A OCCUPANCY

Area	602
Boxes	604 (h)
Chimney and heating apparatus	605
Construction	602
Defined	601
Doors and gates	604 (l)
Enclosure of vertical openings	606
Existing buildings—classified when	609
Exit courts	604 (b)
Exit lights	604 (j)
Fire extinguishing apparatus	607
Height	602
Light and ventilation	605
Location on property	603
Mixed occupancies—separations for	610
Moving picture machine booths	4001
Obstructions	604 (l)
Occupancies included	601
Protection of exterior openings	603
Running tracks—construction permitted	609
Seats	604 (g)
Smokeproof tower	604 (k)
Special hazards	608
Stairs and exits	604
Stage construction	609

GROUP B OCCUPANCY

Area	702
Boxes	704 (g)
Chimneys and heating apparatus	708
Construction	702
Defined	701
Doors and gates	704 (h)
Enclosure of vertical openings	706
Exit lights	704 (i)
Fire extinguishing apparatus	707
Height	602
Inflammable liquids prohibited	708
Light and ventilation	705
Location on property	703
Main entrance	703, 704 (a)
Mixed occupancies—separation from	710
Motion picture machine booths	4001
Obstructions	704 (k)
Occupancies included	701
Protection of exterior openings	703
Running tracks—construction	709
Seating capacity may be increased, when	702 (a)
Seats	704 (f)
Smokeproof tower	704 (j)
Special construction requirements	702 (b), 709
Special hazards	708
Stairs and exits	704
When located on second floor	704 (k)

GROUP C OCCUPANCY

Area	802
Chimneys and heating apparatus	808
Construction	802
Definition of	801
Enclosure of vertical openings	806
Fire extinguishing apparatus	807
Height	802
Light and ventilation	805
Location on property	803
Main exit located where	803
Mixed occupancies—separation from	810
Motion picture machine booths	4001
Occupancies included	801
Protection of exterior openings	803
Running tracks—construction of	809

Special construction	802 (b),	809
Special hazards		808
GROUP D OCCUPANCY		
Area		902
Chimneys and heating apparatus		908
Construction		902
Definition of		901
Enclosure of vertical openings		906
Fire extinguishing apparatus		907
Height		902
Inflammable liquids—storage regulated		908
Jails—special construction		809
Light and ventilation		905
Location on property		903
Mixed occupancies—separation from		910
Motion picture machine booths		4001
Occupancies included		901
Protection of exterior openings		903
Ramps required, when		904
Self-releasing latches or panic bolts, when		904
Special construction	902 (b),	909
Special hazards		908
Stairs and exits		904
GROUP E OCCUPANCY		
Area		1002
Automobile ramps		1004
Chimneys and heating apparatus		1008
Construction		1002
Definition of		1001
Dry cleaning—special construction		1008
Enclosure of vertical openings		1006
Fire extinguishing apparatus		1007
Height		1002
Inflammable liquids—regulated		1008
Light, ventilation and sanitation		1005
Location on property		1003
Mixed occupancies—separation from		1010
Occupancies included		1001
Prohibited in Fire Zone No. 1	1602 (j)	
Prohibited in Fire Zone No. 3	1603 (g)	
Protection of exterior openings		1003
Special construction		1000
Special hazards		1008
Stairs and exits		1004
GROUP F OCCUPANCY		
Area		1102
Chimneys and heating apparatus		1108
Construction		1102
Definition of		1101
Enclosure of vertical openings		1106
Fire extinguishing apparatus		1107
Height		1102
Inflammable liquids—regulated		1108
Light ventilation and sanitation		1105
Location on property		1103
Mixed occupancies—separation from		1110
Occupancies included		1101
Protection of exterior openings		1103
Special construction		1109
Special hazards		1108
Stairs and exits		1104
GROUP G OCCUPANCY		
Area		1202
Chimneys and heating apparatus		1208
Construction		1202
Definition of		1201
Enclosure of vertical openings		1206
Fire extinguishing apparatus		1207
Height		1202
Inflammable liquids—regulated		1208
Light, ventilation and sanitation		1205
Location on property		1203
Mixed occupancy—separation from		1210
Occupancies included		1201

Protection of exterior openings	1203
Special construction	1209
Special hazards	1208
Stairs and exits	1204
GROUP H OCCUPANCY	
Area	1302
Chimneys and heating apparatus	1308
Construction	1302
Definition of	1301
Enclosure of vertical openings	1306
Fire extinguishing apparatus	1307
Height	1302
Housing requirements	1303
Inflammable liquids—regulated	1308
Light, ventilation and sanitation	1305
Location on property	1303
Mixed occupancies—separation from	1310
Occupancies included	1301
Protection of exterior openings	1303
Special construction	1309
Special hazards	1308
Stairs and exits	1304
GROUP I OCCUPANCY	
Area	1402
Chimneys and heating apparatus	1408
Construction	1402
Definition of (dwellings)	1401
Dwellings when on roof	1409
Enclosure of vertical openings	1406
Fire extinguishing apparatus	1407
Height	1402
Housing requirements	1403, 1405
Inflammable liquids—regulated	1408
Light, ventilation and sanitation	1405
Location on property	1403
Mixed occupancies—separation from	1410
Protection of exterior openings	1403
Special hazards	1408
Stairs and exits	1404
GROUP J OCCUPANCY	
Aisles	1504 (b)
Area	1502
Automobile storage—limited	1509
Chimneys and heating apparatus	1508
Construction, height and area allowable	1502
Definition of	1501
Enclosure of vertical openings	1506
Fire extinguishing apparatus	1507
Height	1502
Inflammable liquids—regulated	1508
Light and ventilation	1505
Location on property	1503
Mixed occupancies—separation from	1510
Occupancies included	1501
Protection of exterior openings	1503
Seats	1504 (b)
Special construction—amusement structures	1509
Special hazards	1508
Stairs and exits	1504
GUEST	
Definition of	401
GUEST ROOM	
Definition of	401
GUNITE (also see Pneumatically Placed Shicco)	
As exterior covering for frame construction	2205, 4714
Definition of	2603
Enclosure and panel walls	2939
Fire-resistive standards	4301, 4302
Increasing thickness of existing walls	2041
Partitions — non-bearing	2037
Tests of	2613
CUTTERS—to be kept free of obstructions—when	4401
GYMNASIUMS—Special Construction	
For Group A buildings	609
For Group B buildings	709

For Group G buildings	809
GYPSUM	
Blocks for fire-resistive construction	4302
Fire-resistive classification	4301, 4302 4303
Partitions—non-bearing	2937
Plaster for fire-resistive purposes	4301, 4302
Plaster lath	4301, 4302
Quality and design	2407
Slabs	3103
Working stresses	2410
H—occupancies	1301
HANGERS REQUIRED	
For joists	2506 (i)
HAZARDOUS OCCUPANCIES	
Highly hazardous (see GROUP E)	1001
Moderately hazardous (see GROUP F)	1101
Non-hazardous (see GROUP G)	1201
HEADER—in frame construction	
Joists—support required	2506 (i)
Over opening in stud partitions	2507 (g)
HEATERS	
General requirements	3714
Using gas for fuel	3711
Using solid or liquid fuel	3708
HEATING PLANTS—LOW PRESSURE STEAM	3708
HEAVY TIMBER CONSTRUCTION (see TYPE II BUILDINGS) 1901-1910, incl.	
HEIGHT	
Additional for roof structures	3601
Adjoining building affects vents	3703
Affects stairways required	3309
Definition of	401
For awnings	4501 (b)
For Group A Occupancy	602
For Group B Occupancy	702
For Group C Occupancy	802
For Group D Occupancy	902
For Group E Occupancy	1002
For Group F Occupancy	1102
For Group G Occupancy	1202
For Group H Occupancy	1302
For Group I Occupancy	1402
For Group J Occupancy	1502
For marquees above sidewalk	4501 (d)
For permanent projections over property line	4501
For Type I Buildings (Fire-resistive)	1802
For Type II Buildings (Heavy Timber)	1902
For Type III Buildings (Ordinary Masonry)	2002, 2006
For Type IV Buildings (Metal Frame)	2102
For Type V Buildings (Wood Frame)	2202
Of masonry walls (see WALLS)	
Of veneer	2927
Towers or spires	3602
HOLLOW CLAY TILE	
Fire-resistive classification	4301, 4302
Quality and design	2408
Walls (see WALLS)	
Working stresses	2410
HOLLOW CONCRETE BLOCK OR TILE	
Quality and design	2408
Walls (see WALLS)	
Working stresses	2410
HOLLOW MASONRY WALLS (see WALLS)	
HORIZONTAL EXITS	
General requirements	3311
Signs for	3312
Substitute for stairways when	3309
HOSE	
As equipment for wet standpipe	3806
Used in fire tests	4201
HOSE CONNECTIONS	
To dry standpipes	3804
To wet standpipes	3806
HOSPITALS	901
HOTEL	
Classified how	1301

Definition of	401
Detailed requirements (see GROUP H)	
HOT PLATES—USING GAS	3711
HOUSES OF CORRECTION	901
HOUSING ACT (see ACT—HOUSING)	
I—occupancies	1401
ICE PLANTS	1201
ILLUMINATED SIGNS—AT EXITS	
General	3312
Of Group A buildings	604 (j)
Of Group B buildings	701 (i)
INCINERATORS	
Chimneys for	3701
Construction of	3716
INCLINES (see GRADIENTS)	
INFLAMMABLE LIQUIDS—Regulated	
In Group A buildings	608
In Group B buildings	708
In Group C buildings	808
In Group D buildings	908
In Group E buildings	1008
In Group F buildings	1108
In Group G buildings	1208
In Group H buildings	1308
In Group I buildings	1408
In Group J buildings	1508
Storage for heating purposes	3713
INNER COURT WALLS (see TYPE OF BUILDING)	
INSPECTION	
Final—required when	204
For change of occupancy	207
Of concrete units by Underwriters' Laboratories	2406
Of fire doors by Underwriters' Laboratories	4304
Of plans	202
Of plastering	4701
Of registered inspector	204
Of roofing by Underwriters' Laboratories	4305
Of windows by Underwriters' Laboratories	4304
Required when	204
INSULATION MATERIAL	
Regulations for	2016, 2211
INTERIOR TRIM	
For Type I buildings	1816
For Type II buildings	1916
INTERIOR WALL	
Definition of	401
INTERPRETATION OF CODE	
By Board of Appeals	304
By Building Inspector	302
IRON	
Cast—allowable working stresses	2702
Cast columns—painted, when	2717 (d)
Cast — specifications for	2701
Galvanized — for exterior walls	2105, 2205
Galvanized — for roofs	1109, 1209, 4305
J—occupancies	1501
JAILS	901
JOINT COMMITTEE	2410
JOIST HANGERS	2506 (i)
JOISTS	
Concrete	3102
Fireproofing of	4301, 4303
Steel	2714, 3103
Steel—tests required when	2714 (g)
Wood	2207, 2506
KEENE'S CEMENT	
Specifications for	4710
LOADERS	
As access to roof space	3205
LAITANCE	
Definition of	2603
LAMINATED FLOORS	1910
LANDING OF STAIRS	3307, 3308

LATH	
Fibre board	4704
Gypsum	4301, 4302, 4703
Metal (see METAL LATH)	
Wood (see COMBUSTIBLE MATERIALS)	
LEGISLATIVE	4601-4604, incl.
LIBRARIES	
Seating more than 3500	801
Seating from 500 to 3500	701
Seating less than 500	801
LIFE OF PERMIT	305
LIGHT—Requirements for	
During construction	4401
For exit signs	3310
For Group A buildings	605
For Group B buildings	705
For Group C buildings	805
For Group D buildings	905
For Group E buildings	1005
For Group F buildings	1105
For Group G buildings	1205
For Group H buildings	1305
For Group I buildings	1405
For Group J buildings	1505
For stairways and exits	3306
LIME	
Proportions for mortar	2409
Specifications for	2409, 4708
LINING	
Of chimneys	3701
Of existing walls	2941
Of patent chimneys	3704
Of smokestacks	3702
LINTEL	
Definition of	401
Fireproofing omitted when	1809 (a-2), 1909 (a-2)
Special construction	2906, 2913, 2918
LIQUIDS (see INFLAMMABLE LIQUIDS)	
LIVE LOADS	
Concentrations of	2303
Definition of	401, 2301
For roofs	2305
Reductions allowed	2306
Required to be posted	2308
Special considerations	2303
Units—for certain occupancies	2304
LOADING PLATFORMS	
May be of wood — when	1814, 1914, 2014
LOADS (see LIVE AND DEAD LOADS)	
During construction	2718
For retaining wall design	2310
Piles—bearing power of	2803
Soil—bearing capacity of	2802
LOBBIES IN THEATRES	
Obstructions	604 (1)
Size required	604 (a)
LOCATION IN FIRE ZONES—Requirements for	
Fire Zone No. 1	1602
Fire Zone No. 2	1603
Fire Zone No. 3	1604
Fire Zone No. 4	1605
LOCATION ON PROPERTY—Requirements for	
General requirements	504
Group A buildings	603
Group B buildings	703
Group C buildings	803
Group D buildings	903
Group E buildings	1003
Group F buildings	1103
Group G buildings	1203
Group H buildings	1303
Group I buildings	1403
Group J buildings	1503
LODGES	
Seating more than 3500	601

Seating from 500 to 3500	701
Seating less than 500	801
LODGING HOUSE	1301
LONG COLUMNS	
Reinforced concrete	2621 (h)
LOT LINES (see LOCATION ON PROPERTY)	
LUMBER (see WOOD)	2501
MAINTENANCE	
Of buildings or structures	105
Of present safety devices	105
Requires authority from Building Inspector	105
MARQUESSES (see TYPE OF BUILDING)	4501 (d)
MASONRY	
Definition of	401, 2401
Materials classified	2101
Quality and design (see Chapter 24)	
Tests required	2101
Walls and partitions (see WALLS)	
MASONRY VENEER	
For masonry walls	2924
Over wood frame	2205 (d)
MATTRESS FACTORIES	1001
MEASUREMENT OF HEIGHTS	
Of buildings (see definition of HEIGHT)	401
MECHANICAL VENTILATION (see VENTILATION)	
METAL	
As lath (see METAL LATH)	
As roof covering	4305
Exterior wall covering	2105, 2205
For enclosing patent chimneys	3701
Frames with wire glass	4304
Gas vents of	3703
Required for doors—when	4304
Smokestacks of	3702
METAL FRAME BUILDINGS (see TYPE IV BUILDINGS)	2101-2116, incl.
METAL LATH	
For fire-resistive construction	4301, 4302, 4303
For floor construction	3103
For exterior and interior plastering	4705
For partitions	2937, 4302
For stucco reinforcing	2205
METHODS OF CALCULATIONS	2302, 4705
MEZZANINE OR MEZZANINE FLOOR	
Construction for Type I buildings	1816
Construction for Type II buildings	1916
Definition of	401
MILL CONSTRUCTION (see TYPE II BUILDINGS)	
MINIMUM REQUIREMENTS	
For classification of type of construction	1702
For fire protection of structural parts	4301, 4302, 4303
Purpose of Code	201
MIX	
For masonry mortars	2100
For reinforced concrete	2609 (a)
MIXED OCCUPANCIES	
Separations required	503
MONASTERIES	1301
MORTAR	
For masonry construction	2400
For reinforced concrete	2603
May be mixed in street—how	4401
MOTION PICTURE MACHINE BOOTHS	
Construction and design	4001
For Group A buildings	608
For Group B buildings	708
For Group C buildings	808
For Group D buildings	908
Sprinkler requirements	3501
MOVING—OF BUILDINGS	
When in Fire Zone No. 1	1602
When in Fire Zone No. 2	1603
When in Fire Zone No. 4	1605
Permit required for	201

MOVING PICTURE THEATRES

No stage	701
Seating 1,000 or more or with more than 5 ft. stage	601

MUDSILL

Required when	2204, 2205
---------------------	------------

MUSEUMS

Seating more than 3500	601
Seating 500 to 3500	701
Seating less than 500	801

NATIONAL BOARD OF FIRE UNDERWRITERS

Ordinance for chimney construction	3701
Installation of automatic sprinklers	3802
Oil burner equipment	3713
Protection of openings	4304

NATIONAL FIRE PROTECTION ASSOCIATION

Oil burner equipment	3713
Protection of openings, against fire	4304
Use, handling, storage and sale of inflammable liquids	1008

NEW METHODS

.....	204
-------	-----

NIGHT LIGHTS—for stairs and exits

.....	3306
-------	------

NON-BEARING WALL

Definition of	401
Hollow masonry—construction	2909
Reinforced concrete—construction	2916
Solid masonry—construction	2903
Stone—construction	2021

NOTICES

For inspections by Building Inspector	204
Of appeals	303
Of approval required	204
Of condemnation	301
Of registered inspector	204
Of violations	301

NURSERIES

.....	901
-------	-----

OBSTRUCTIONS—PROHIBITED

As locks on doors	3304
At fire doors	4304
At horizontal exits	3311
In Group A buildings	604 (l)
In Group B buildings	704 (k)
In Group D buildings	904
In gutter—when	4401
In stage ventilators	3901
In stairway enclosures	3308

OCCUPANCY

Certificate of	208
Change in use	502
Classified by Building Inspector, when	501
Classified how	501, 503
Definition of	401
Existing buildings classified how	502
Group A	601
Group B	701
Group C	801
Group D	901
Group E	1001
Group F	1101
Group G	1201
Group H	1301
Group I	1401
Group J	1501
Mixed	503
Permanent—of public property	4501
Separations required	503
Temporary—allowed for construction purposes	4401
When not specifically mentioned in Code	501

OFFICE BUILDINGS

.....	1101
-------	------

OIL

Burners—general requirements	3713
Protection against saturating wood floors	1009
Storage of	1001, 1008

OLD PEOPLE'S HOMES

.....	1301
-------	------

OPENINGS

Exterior—to be protected when (see LOCATION ON PROPERTY and	
---	--

FIRE ZONES)

Vertical—to be protected when (see VERTICAL OPENINGS—ENCLOSURE OF)

ORDINANCE

Adopted when	4604
Repealed by this ordinance	4603

ORDINARY MASONRY BUILDINGS (see TYPE III BUILDINGS) 2001-2016, incl.**ORIEL WINDOW**

Construction of	3501
Definition of	401

ORPHANAGES

.....	901
-------	-----

OVERCROWDING PROHIBITED

In Group A buildings	604 (l)
In Group B buildings	701 (k)
Where moveable seats are used	2308

OVERLOADS OF FLOORS—not permitted 2308**OVERTURNING MOMENT**

For wind calculations	2307
-----------------------------	------

OWNER

Employs registered inspector—when	204
May occupy sidewalk space—when	4401, 4501
Occupies building—when	206
Permits storage of materials in street—when	4401
Required to post signs	2308
Required to repair buildings—when	301
Responsibility of, when adjoining	2801

PAINTING

Of cast iron, when	2717
Of structural steel	2717

PAINT SHOPS

.....	1001
-------	------

PAINT STORAGE

.....	1001
-------	------

PANEL WALL

Construction of	2930
Definition of	401

PANIC BOLTS—Required when

For smokeproof towers	3315
For stairway enclosures	3304
In Group A buildings	604 (i)
In Group B buildings	704 (h)
In Group C buildings	804
In Group D buildings	904

PAPER

Tests for	2205
Waterproof—required when	2205

PARAPET WALL

Construction of	2935
Definition of	401
For Type I buildings	1807
For Type II buildings	1905, 1907
For Type III buildings	2005, 2007
Required, when	2935

PARTITIONS

Bearing—combustible	2507
Bearing—incombustible	2006, 2936
Fire resistance—classification of	4302
For frame construction	2507
General (see TYPE OF BUILDING)	
Non-bearing—incombustible	2937

PARTY WALL

Definition of	401
May function as fire wall—when	2932, 2933

PASSAGEWAYS

For Group A buildings—with exits	604
For Group B buildings—with exits	703, 704
For smokeproof towers	3315
Required for stairways, when	3313
To be sprinklered—when	3801

PASSENGER STATIONS

Seating more than 3500	601
Seating 500 to 3500	701
Seating less than 500	801

PATENT CHIMNEYS

.....	3704
-------	------

PEDESTAL

Concrete—definition of	2603
Concrete—design of	2622 (h)

PENALTIES AND VIOLATIONS

Provided by Code	305
PENTHOUSE	
For stairways—required when	3303
For Type I buildings	1815
For Type II buildings	1915
For Type III buildings	2016
For Type IV buildings	2115
For Type V buildings	2211
General requirements	3601
PERMIT	
Application for	201
Does not permit violation	305
Expires when	305
Fees doubled—when	203
Fees for	203
For alteration	201
For change of occupancy	207, 2309
For demolishing	201
For moving	201
For new buildings or structures	201
For storage of construction materials in street	4401
For temporary buildings	1602, 4401
For use or occupancy	206
Not valid—when	305
Plans required for	201
When required	201
PERSON	
Definition of	401
PETROLEUM STORAGE	1001
PHOTOGRAPHY	
Roof structures allowed for	3601
Special skylight construction for	3402
PIERS	
Hollow masonry	2912
Reinforced concrete	2917
Solid masonry	2905
PILES	
General requirements	2803
PIN-RAILS	
Construction of	609
PINS	
Allowable stresses	2702
General requirements	2713
PLAIN CONCRETE	
Definition of	2405
Quality and design	2405
Walls (see WALLS)	
Working stresses	2410
PLANING MILLS	1001
PLANS	
Approved by Building Inspector	202
Required for permit when	201
Show water-cement ratio, when	2606
PLASTER AND PLASTERING	
As stucco (exterior)	2205, 4713, 4714
Cement, when not to be used	4715
Fire-resistive, classification of	4301, 4302
Inspection of	204, 4701
Materials for fire-resistive construction	4203
Over fibre board (interior)	4715
Over masonry (interior)	4719
Over metal lath (interior)	4715, 4718
Over wood lath (interior)	4715
Over plaster lath (interior)	4715
Pneumatically placed (exterior or interior)	4714
Reinforcing for	4700
Sand	4707
Staff	4721
With cement (interior)	4720
With hardwall gypsum (interior)	4717
With lime mortar (interior)	4716
PLASTERBOARD—GYPSUM	
For fire resistance—ceilings	4301
For fire resistance—partitions	4302

PLATE	
In bearing partitions	2507 (a)
Sill (see MUDDSILL)	
PLATE GIRDERS	2704
PLUMBING	
Structural steel	2718
PNEUMATICALLY PLACED STUCCO	
Definition and method of placing	4714
POLICE STATIONS	1101
PORCHES (see TYPE OF BUILDING)	
May project—when	4501 (a)
PORTLAND CEMENT	
Definition of	2603
In masonry mortar	2409
Specifications for	2604 (a), 4711
Storage of	2604 (e)
POWER PLANTS	1201
PRESSURE TANKS	
For wet standpipe supply	3805
PRINTING PLANTS	1101
PRISONS	901
PRIVATE GARAGE (see GARAGE)	
PROJECTIONS FROM BUILDING (see TYPE OF BUILDING)	
Awnings	4501 (b)
Bays and balconies	3501
Below sidewalk	4501 (g)
Cornices, marquees etc.	4501
In alleys—when	4501 (h)
Permanent (allowed over public property)	4501
PROPERTY ROOMS, GROUP A BUILDINGS (see STORE ROOMS)	
PROSCENIUM	
Curtain—construction of	4101, 4102
Curtain required	602 (b), 702 (b)
Curtain—tests	4105
Sprinkling of opening required	607, 3801
Wall	602 (b), 702 (b)
Wall openings allowed	602 (b), 702 (b)
PROSCENIUM CURTAIN	
Asbestos cloth—type of	4102
Automatic controls for	4104
Coverings for	4102
Design of	4103
Frame of	4103
General requirements	4101
Metal—type of	4102
New designs of	4106
Operation of	4104
Operation—required when	4101
Required where (see GROUP A and GROUP B)	
Tests of	4105
PUBLIC GARAGES	
Definition of	401
In Group E Occupancy	1001
Ramps for	1004
Special construction	1001
Separations required	503, 1505
Ventilation required	1005
Fiberglass	4605
PUMPING PLANTS	1201
PUMPS	
For oil burning equipment	3713
For part of oil storage equipment	1008
For wet standpipe supply	3806
PURPOSE	
Of Code	102
QUALITY AND DESIGN OF THE MATERIALS OF CONSTRUCTION	
Masonry	2401-2411, incl.
Reinforced concrete	2601-2622, incl.
Steel and iron	2701-2718, incl.
Wood	2501-2511, incl.
RAFTERS—WOOD	2506 (c), 2508
RAILWAY STATIONS—Passenger	601, 701, 801

RAMPS	
Automobile—enclosure for	1006
Construction of	3310
For automobile storage	1004
For hospitals and sanitariums	904
For temporary walk-way	4401
Substituted for stairways, when	3310
RANGE HOODS	3712
RANGES—GAS	
Domestic	3711
For restaurants and hotels	3712
RECESSES	
In fire walls	2932
In hollow masonry	2913
In reinforced concrete	2913
In solid masonry	2906
In stone	2923
Not allowed—when	4302
REDUCTION OF LIVE LOADS	2306
REDWOOD	
Mudsills	2204, 2205
Piles	2803
Working stresses	2503, 2504
REFORMATORIES	901
REGISTERED INSPECTOR	
Defined	204
Duties of	204
Required when	204
Shall inspect concrete forms	2609 (b)
Termination of duties, when	205
REGISTERS	
Equipped with fusible links—when	605
For warm air ducts	3715
REGISTRATION—CERTIFICATE OF	
Fee for	204
Issued by Building Inspector	204
REGULATIONS FOR USE OR OCCUPANCY OF STREETS AND PRO- JECTIONS OVER PUBLIC PROPERTY (see Part IX)	
Permanent occupancy	4501
Temporary occupancy	4401
REINFORCED CONCRETE	
Anchorage of reinforcement	2619
Assumptions for design	2611
Bond and anchorage	2619
Bonding—of concrete	2609
Columns—composite	2621 (f)
Columns—design of	2621
Columns—long	2621 (h)
Computations—flexural	2614
Concrete—quality of	2606
Consistency—of mix	2607
Construction joints	2610
Curing	2609
Definitions—of certain words	2603
Depositing in cold weather	2609
Design—assumptions for	2611
Design—formulas for fully restrained conditions	2616
Design—formulas for general conditions	2615
Design—general	2603
Design—non-uniform conditions	2617
Diagonal tension	2618
Fireproofing of (see TYPE OF BUILDING)	4301
Flat slab—design and construction	2620
Footings—design of	2622
Forms—cleaning of	2609
Forms—construction of	2610
Materials—specifications of	2604
Materials—tests of	2605
Mixing—of concrete	2609
Notation—for formulas used	2612
Placing—of concrete	2609
Proportions—control of	2608
Proportions of mix	2606, 2607
Quality of materials	2601, 2694

Reinforcement—allowable stresses	2613
Reinforcement—placing of	2610
Shear and diagonal tension	2618
Stresses—maximum allowable	2613
Tests of materials	2605
Walls of (see WALLS)	
Web reinforcement—design of	2618
REINFORCEMENT	
Effective area of	2608
For columns—reinforced concrete	2621
For flat slab—reinforced concrete	2620
For slabs—reinforced concrete	2614 (d)
For stucco	4709, 2205 (c)
For T-beams—reinforced concrete	2614 (d)
For web (diagonal tension)—concrete	2618
Negative—definition of	2605
Of fire protection	4203, 4301
Placing—in reinforced concrete	2610
Positive—definition of	2603
Protection of	2610 (f)
Ratio—definition of	2603
Specifications for	2604 (d)
Splices of	2610 (e)
Stresses—allowable working	2613
REPAIR	
Applied to change of use	104, 301, 502
Definition of	401
Of existing buildings	104
REPEALED—ORDINANCES	
4603	
REPORTS—Required	
Of Board of Examiners and Appeals	304
Of fees collected by Building Inspector	203
Of registered inspector	204
Of tests of concrete	2605
Of tests of structural steel	2701
RESISTING MOMENT—DEAD LOAD	
For wind calculations	2307
RESTAURANTS	
1101	
RETAIL STORES	
1101	
RETAINING WALL	
Definition of	401
Design of	2310
Used as foundation walls for Type V buildings	2204
REQUIREMENTS BASED ON LOCATION IN FIRE ZONES (see Part IV)	
Fire zones defined	1601
For Fire Zone No. 1	1602
For Fire Zone No. 2	1603
For Fire Zone No. 3	1604
For Fire Zone No. 4	1605
REQUIREMENTS BASED ON OCCUPANCY	
Classification of all buildings	501- 503, incl.
For Group A buildings (large assemblage)	601- 610, incl.
For Group B buildings (medium assemblage)	701- 710, incl.
For Group C buildings (small assemblage)	801- 810, incl.
For Group D buildings (hospitals and detention)	901- 910, incl.
For Group E buildings (highly hazardous)	1001-1010, incl.
For Group F buildings (moderately hazardous)	1101-1110, incl.
For Group G buildings (non-hazardous)	1201-1210, incl.
For Group H buildings (residential)	1301-1310, incl.
For Group I buildings (dwellings)	1401-1410, incl.
For Group J buildings (accessory)	1501-1510, incl.
REQUIREMENTS BASED ON TYPES OF CONSTRUCTION	
Classification of buildings	1701, 1702
Type I buildings (fire-resistive)	1801-1816, incl.
Type II buildings (heavy timber construction)	1901-1916, incl.
Type III buildings (ordinary masonry)	2001-2016, incl.
Type IV buildings (metal frame)	2101-2116, incl.
Type V buildings (wood frame)	2201-2211, incl.
REVIEWING STANDS	
1501	
Permitted in Fire Zone No. 1, when	1602 (f)
RIBBON—In Frame Construction	
2506 (h)	
RIGGING LOFT	
600	
RISE OF STAIR	
3302, 3307	

RISERS	
For dry standpipes	3804
For stairways	3307
For warm air furnaces	3715
For wet standpipes	3806
RIVETS	
Construction details	2711
General	2709
Holes—to be deducted when	2707
In connections	2708
In erection work	2718
To be driven how	2716 (g)
Working stresses for	2702
ROLLING SHUTTERS—Prohibited Where	3304
ROOF CONSTRUCTION (see TYPE OF BUILDING)	3201
Access to roof	3808
Access to roof space	3205
Construction and design	3202, 3203
Covering of	3204, 4305
Divided how	2510 (h)
Of marquee	4501 (d)
ROOFING (see TYPE OF BUILDING)	
Classified—all types	4305
Exceptions	1109, 1209
Fire-retardant—details for	4305 (a)
Ordinary—details for	4305 (b)
ROOF STRUCTURES	
Building requirements (see PENTHOUSE)	
General requirements	3601
Includes what	3601
RUBBLE MASONRY	2919-2923, incl.
RUNNING TRACKS (see GYMNASIUMS)	
RUN OF STAIRS	
Number of risers limited	3307
Variation in rise and tread not permitted	3302
SALES ROOMS	
For combustible goods	1101
For incombustible goods	1201
SAND	
For concrete—specifications	2604
For mortar	2409
SAND LIME BRICK—(see BRICK—SAND LIME)	
SANITARIUMS	901
SCHOOLS	801
SCOPE	
Of Code	103
SCUTTLE	
Access to roof space	3205
Access to roof—when required	3303
SEATING CAPACITY	
Definition of	401
Of Group A buildings	601
Of Group B buildings	701, 702
Of Group C buildings	801
Required to be posted, when	2308
SEATS	
For Group A buildings	604 (g)
For Group B buildings	704 (f)
For Group J buildings	1504 (b)
Number of—to be posted when	2308
SELF-CLOSING DOOR	
For attic partitions	2510 (h)
For automobile ramp enclosures	1006
For fire doors	3401
For horizontal exits	3311
For motion picture machine booths	4001
For ramp enclosures	3310
For smokeproof towers	3315
For stairway enclosures	3304
SERVICE STATIONS—GASOLINE (see GASOLINE SERVICE STATIONS)	
SHALL	
Definition of	401
SHAFT	
Construction—general	3003

Construction of enclosing walls	3002
Definition of	401
Required to be enclosed—when (see TYPE OF BUILDING)	3001
Special requirements (see occupancy GROUPS and TYPES OF BUILDING)	
SHEAR	
In reinforced concrete—allowable stresses	2613
In reinforced concrete—design of	2618
In structural steel	2702
In wood	2503
SHEATHING	2205
SHINGLES OR SHAKES	
As roof covering	4305
As siding	2205 (b)
SHOW WINDOWS	
In Type I buildings	1818
In Type II buildings	1916
Part may project over property line	4501 (f)
SHUTTERS	
For fire-resistive construction	4304 (b)
For motion picture machine booths	4001
Required for stage vent ducts	605
Rolling—prohibited where	3304
SIAMSE CONNECTIONS	
For dry standpipes	3804
For wet standpipes	3806
SIDEWALKS	
Glass lights in	3402
Live load for design of	2304
Bailing required around—when	3402
Required to be protected when	4401
Space under—may be occupied when	4501 (g)
SIGNS	
For basement pipe inlets	3807
For dry standpipes	3804
For exit—Group A	604 (j)
For exit—Group B	704 (i)
For gas shut-off—Group A	608
For gas shut-off—Group B	708
For gas shut-off—Group D	908
For live load—required	2308
For seating capacity—required	2308
For stairs	3312
For wet standpipes	3806
For skylights	3402
SLAB	
Design—reinforced concrete (see REINFORCED CONCRETE)	
Gypsum	2410 (d)
Minimum thickness—for fire-resistive purposes	4303
Minimum thickness—for floors	3102, 3103
Minimum thickness—for roofs	3202
Reinforced concrete	2614, 2620
SLATE	
For roof covering	4305
In foundations	2511 (c)
SLEEPERS—WOOD	
To be divided—how	1810
SMOKE	
Curtain to be tight for	4103
Pipes for	3705
Stacks for	3702
Test for chimney	3707
SMOKE PIPES	3705
SMOKEPROOF TOWER—REQUIRED	
Construction and design	3315
For Group A buildings	604 (k)
For Group B buildings	704 (j)
For Group C buildings	804
For Group D buildings	904
For Group E buildings	1004
For Group F buildings	1104
For Group G buildings	1204
For Group H buildings	1304
Where and when	3315
SMOKE VENTS—Over Stage	3901

SOIL		
Bearing allowable	2802	
Retaining walls for	2310,	2938
Tests required	2802	
SOLID MASONRY (see MASONRY)		
Definition of	401,	2401
SOLIO MASONRY WALLS (see WALLS)		
SPECIAL PERMIT		
For occupancy	206	
For temporary buildings	1602	
SPECIFICATIONS		
For brick	2402	
For cast iron	2701	
For cast steel	2701	
For concrete block or tile	2406	
For concrete brick	2404	
For fire tests	4201	
For gypsum	2407	
For hollow clay tile	2408	
For lime	2409	
For reinforcing steel	2604 (d)	
For Portland cement	2604	
For sand-lime brick	2408	
For structural steel	2701	
For tests of concrete cylinders	2605,	2613
May be required for permit	201	
SPIRES (see TOWERS)		
SPLICES		
Reinforcing steel	2610 (e)	
Structural steel	2706	
SPRINKLERS—AUTOMATIC (see AUTOMATIC SPRINKLERS)		
STAIRS		
Access and arrangement	3303,	3313
Access to roof	3303	
Application to building—general (see occupancy GROUP and TYPE OF BUILDING)		
Design—general	3302	
Doors—leading to	3304	
Enclosures for	3308	
Exceptions	3314	
Firestopping (wood frame construction)	2510 (d)	
Horizontal exits—affect number required	3309	
In smokeproof tower	3315	
Intermediate landings	3302,	3307
Lighting	3306	
Locks—if provided	3304	
May terminate at second floor—when	3303	
Maximum separation	3303	
Number required (see also GROUP A, B or C)	3309	
Number required—may be reduced when	3303,	3309
Obstructions prohibited	3304,	3308
Outside of building	3316	
Passageways required	3303,	3313
Railings	3305	
Ramps—may be substituted	3310	
Requirements—detailed	3307	
Requirements—general	3301,	3302
Rise and tread	3302,	3307
Signs required	3303,	3312
Ventilation of enclosure	3308	
Width—minimum	3307	
Winders—permitted when	3302	
STADIUMS		1501
STAGE		
Certain uses prohibited	602	
Construction—Group A	602	
Exits from	604 (e)	
Floor openings in	606	
Limited—Group B	701	
Overhead construction	609	
Separated from auditorium by wall	682	
Special construction	602,	609
Sprinklers required	607,	3801
Standpipes required	607	
Switchboard protection	609	

Ventilation of	407
STAMPED PLANS TO BE KEPT ON BUILDINGS.....	202
STANDPIPES	
Dry standpipes—design and construction.....	8801
Dry standpipes—where required.....	3803
Wet standpipes—design and construction.....	3800
Wet standpipes—where required.....	3805
STEAM HEATING PLANTS—Low Pressure.....	3708
STEEL—STRUCTURAL	
Beams and girders.....	2704
Bolts	2709
Burning torch—used when.....	2716 (i)
Cast—allowable stresses for	2702
Cast—properly annealed.....	2716 (e)
Combined stresses	2702
Connections in	2708
Construction details	2711
Design	2701
Eccentric loads	2703
Erection of	2718
Expansion	2715
Fireproofing of (see TYPE OF BUILDING).....	4301
Gas Cutting	2716 (i)
Joists—design of	2714
Lattice—design of	2712
Net sections—in computations.....	2701
Quality	2701
Painting of	2717
Pins	2713
Plumbing of frame.....	2718
Rivets	2709 (g), 2716
Splices—compression	2708
Tension members—net section.....	2707
Tests of	2701
Thickness of—minimum	2705
To be painted, when.....	2717
Trusses—design of	2711
Welded connections	2710
Working stresses—allowable	2702, 2710
Workmanship	2710
STIFFENERS	2704 (e)
STIRRUPS REQUIRED	2506 (i)
STONE	
Facing of	2928
Quality and design	2410 (f)
Veneer of	2924
Walls of (see WALLS)	
STORAGE	
Combustible goods	1101
Incombustible goods	1201
STORAGE OF INFLAMMABLES	1001, 1008
STORAGE OF MATERIALS IN STREETS.....	4401
STORES—RETAIL AND WHOLESALE.....	1101
STOREROOMS—GROUP A BUILDINGS	
Fire protection of.....	607
Inflammable liquids—storage regulated.....	608
Location of	602 (b)
STORY	
Definition of	401
STOVES	
Chimneys for	3701, 3704
General requirements	3710
STREET	
Definition of	401
May be used for storage, when.....	4401
STRENGTH OF MATERIALS (see QUALITY AND DESIGN OF THE MATERIALS OF CONSTRUCTION)	
STRESSES—OF MATERIALS OF CONSTRUCTION (see WORKING STRESSES—ALLOWABLE)	
Increase allowed—masonry.....	2411
Increase allowed—steel and iron.....	2702
Increase allowed—wood	2503
STRUCTURAL FRAMEWORK (see TYPE OF BUILDING)	

STUCCO	
General requirements	2205 (c)
Inspection of	204
STUD FRAME CONSTRUCTION	2507
STUDS—Minimum Size	2507
SUSPENDED CEILINGS	
For fire protection	4301
Method of hanging	4706
Required to support load	4301, 4706
TANKS	
For oil burning equipment	3713
For storage of inflammable liquids	1008
For wet standpipe supply	3806
Roof structures for	3601
TEE BEAMS IN REINFORCED CONCRETE	2614
TEMPORARY BUILDINGS	
Permitted during construction	1602, 4401
Permitted, when	1602 (f), 1603 (f)
TEMPORARY PARTITIONS	
For Type I buildings	1806
For Type III buildings	2006
TENANT'S RESPONSIBILITY	2308
TERMITES	2511
TESTS	
For brick	2402, 2403, 2404
For cast iron	2701
For cast steel	2701
For chimneys	3701
For clay tile	4505
For concrete	2605, 2613
For concrete aggregates	2604 (b)
For dry standpipes	3804
For fire-resistive ratings of materials	4201
For metal reinforcement	2604 (d)
For new materials and devices	302, 303
For pile—safe bearing	2803 (d)
For Portland cement	2804 (a)
For proscenium curtains	4101, 4105
For sprinkler systems	3802
For stage ventilators	3901
For structural steel	2701
For wet standpipes	3806
For wood	2503
Of masonry materials	2401
Of steel joists, when	2714 (g)
THEATRES	
Major	601
Moving picture	601, 701
THIMBLES IN CHIMNEYS	3705
TIE RODS	
Fireproofing of	4301
In floor construction—fireproofing required	4303
Proportioned—how	2711
Required when—Type I buildings	1810
TILE	
Of clay (see CLAY TILE)	
Of concrete (see CONCRETE BLOCKS)	
Of gypsum (see GYPSUM)	
TIMBER (see WOOD)	
TITLE	
Of Code	191
Reference—"this Code"	191
TOILETS REQUIRED	
For Group E buildings	1005
For Group F buildings	1105
For Group G buildings	1205
For Group H buildings	1305
TOWERS (see TYPE OF BUILDING)	
General requirements	3602
Wind pressure	2307
TREADS OF STAIRS	3302 3307
TRIM	
For Type I buildings	1816 (3)
For Type II buildings	1916 (3)

TRIMMER ARCHES—FOR FIREPLACES	3706
TRUSSES	
Fireproofing of	4301
Steel frame	2711 (a)
Wood framing	2509
TYPES OF CONSTRUCTION	
Classified how	1701
Classification of buildings	1702
TYPE I or TYPE I BUILDINGS	
Area allowable	1803
Bays and balconies	1814, 3501
Combustible materials regulated	1816
Cornices	1814
Definition of	1801
Design—general	1808
Doors and windows	1813, 3401
Drainage fill	1811
Enclosure of vertical openings	1807
Exterior openings—protection required	1813
Fireproofing—floor construction	1810
Fireproofing—may be omitted, when	1209, 1809
Fireproofing—of structural frame	1809
Floor construction	1810
Foundations	1804
Height allowable	1802
Marqueses	1814
Mezzanine floors	1816
Parapet wall—required when	1807
Partitions, interior	1806
Partitions, temporary	1806
Penthouses	1815, 3601
Projections from buildings	1814
Roof construction	1809, 1811, 1816
Roof structures	1815, 3601
Shafts—construction of	1807
Show windows	1816
Skylights	1815, 3402
Stairs	1812
Structural framework	1808
Structural members, fireproofing of	1809
Trim	1816
Vertical openings enclosure of	1807
Walls—exterior and inner court	1805
Windows and doors	1813, 3501
Wood platforms—permitted when	1814
TYPE II OR TYPE II BUILDINGS	
Area allowable	1903
Bays and balconies	1914, 3501
Combustible materials—regulated	1914, 1916
Cornices	1914, 4501
Definition of	1901
Doors and windows	1913, 3401
Exterior openings—protection of	1913
Fireproofing—may be omitted when	1909
Floor construction	1910
Foundations	1904
Height allowable	1902
Marqueses	1914, 4501
Mezzanine floors	1916
Parapet walls	1905, 1907
Penthouses	1915, 3601
Partitions	1906
Projections from building	1914
Roof construction	1909, 1911
Show windows	1916
Skylights	1915, 3402
Stair construction	1912
Structural framework	1908
Structural members—fireproofing of	1909
Towers and spires	1902, 3602
Trim	1916
Vertical openings—enclosure of	1907
Walls—exterior and inner court	1905
Walls—parapet	1905, 1907
Windows and doors	1913, 3401

TYPE III OR TYPE III BUILDINGS

Area allowable	2003
Attic space—divided how	2011
Basement—special construction	2010
Bays and balconies	2014, 3501
Combustible materials regulated	2014, 2016
Cornices	2014, 4501
Definition of	2001
Doors and windows	2013, 3401
Fireproofing—may be omitted when	2009
Fireproofing structural members	2009
Floor construction	2010
Foundations	2001
Height allowable	2002
Insulating materials—placed how	2016
Marquises	2014, 4501
Parapet walls	2007
Partitions	2006
Partitions—temporary	2009
Penthouses	2015, 3601
Projections from buildings	2014
Roof construction	2011
Skylights	2015, 3402
Stair construction	2012
Structural framework	2008
Towers and spires	2002, 3602
Vertical openings, enclosure of	1807
Walls—exterior and inner court	2005
Walls—parapet	2007
When 4 stories or more in height	2006, 2010
Windows and doors	2013, 3401

TYPE IV OR TYPE IV BUILDINGS

Area allowable	2103
Combustible materials—regulated	2114, 2116
Definition of	2101
Doors and windows	2113, 3401
Fireproofing structural members	2109
Floor construction	2110
Foundations	2104
Height allowable	2102
Partitions	2106
Penthouses	2115, 3601
Projections from the building	2114, 3501, 4501
Roof construction	2111
Skylights	2115, 3402
Stair construction	2112
Structural framework	2108
Towers and spires	2102, 3602
Vertical openings—enclosure of	2107
Walls—exterior	2105
Windows and doors	2113, 3401

TYPE V OR TYPE V BUILDINGS

Area allowable	2203
Attic spaces—divided how	2208
Ceiling construction	2208
Definition of	2201
Design—general requirements	2211
Floor construction	2207
Foundations	2204
Foundations—ventilating openings	2204, 2205
Foundation walls	2204
Height allowable	2202
Insulating materials—regulated	2211
Partitions—interior	2206
Roof construction	2208
Roof covering	2209
Towers and spires	2202, 3602
Ventilation under first floor	2204, 2205
Vertical openings—enclosure of	2210
Wall coverings (siding, stucco, veneer, etc.)	2205
Walls—exterior	2205

UNDERPINNING—

Required, when	2801
----------------	------

UNDERTAKING PARLORS

1101

UNDERWRITERS' LABORATORIES, INC.—Inspection service

On doors	4304
On hollow concrete building units.....	2406
On roofings	4305
On windows	4304
UNIT STRESSES (see WORKING STRESSES)	
UNLAWFUL TO OCCUPY—When.....	206, 301
VACATE	
Required, when.....	301
VALIDITY—OF THIS ORDINANCE	4601
VALUE	
Definition of	401
VENEER	
Definition of	401
Walls of (see WALLS)	
VENTILATION	
As air supply for warm air furnace	3707
For Group A buildings.....	605
For Group B buildings.....	705
For Group C buildings.....	805
For Group D buildings.....	905
For Group E buildings.....	1005
For Group F buildings.....	1105
For Group G buildings.....	1205
For Group H buildings.....	1305
For Group I buildings.....	1405
For Group J buildings.....	1505
For stairway enclosures.....	3308
In dry cleaning establishments.....	1008
In motion picture machine booths.....	4001
In private garages.....	1505
Over stage	3901
Under first floor of Type V buildings.....	2204, 2205
VENTS	
For dry cleaning plants.....	1009
For gas	3703
For motion picture machine booths.....	4001
For private garages	1505
For public garages	1005
Intake for warm air furnaces.....	3707
VENT SHAFTS (see VERTICAL OPENINGS)	
VERTICAL OPENINGS—ENCLOSURE OF	
For ducts and chutes.....	3003
For Group A buildings.....	606
For Group B buildings.....	706
For Group C buildings.....	806
For Group D buildings.....	906
For Group E buildings.....	1006
For Group F buildings.....	1106
For Group G buildings.....	1206
For Group H buildings.....	1306
For Group I buildings.....	1406
For Group J buildings.....	1506
For Type I buildings.....	1807
For Type II buildings.....	1907
For Type III buildings.....	2007
For Type IV buildings.....	2107
For Type V buildings.....	2210
General requirements	3002
VIOLATIONS AND PENALTIES	
Provided in this Code.....	305
WALLS	
Anchoring of	2940
Are bearing partitions when.....	2936
As foundations—general requirements.....	2938
Buttressed—design of	2903 (d)
Construction required (see OCCUPANCY GROUP and TYPE OF BUILDING)	
Definition of	401
Extension of use when existing.....	2941
Faced—bond for	2931
Faced—quality of material.....	2928
Faced—thickness of	2930
Faced—working stresses	2929
Fire division—solid and hollow masonry.....	2934

Fire—hollow masonry	2933
Fire-resistive construction	4302
Fire—solid masonry	2932
General design (see Chapter 29)	
Hollow masonry—beam supports	2911
Hollow masonry—bearing partitions	2936
Hollow masonry—bond	2910
Hollow masonry—chases and recesses	2913
Hollow masonry—fire-resistive classification	4302
Hollow masonry—fire walls	2933, 2934
Hollow masonry—general provisions	2907
Hollow masonry—panel and enclosure	2930
Hollow masonry—piers	2912
Hollow masonry—thickness of exterior	2909
Hollow masonry—working stresses	2908
Of bays and oriel windows	3501
Of motion picture machine booths	4001
Of roof structures	3601
Of smokeproof towers	3315
Of stairway enclosures	3308
Of vertical openings	3002
Panel and enclosure	2939
Parapet—general requirements	2935
Reinforced concrete—chases and recesses	2916
Reinforced concrete—general provisions	2914
Reinforced concrete—piers	2917
Reinforced concrete—thickness of exterior	2916
Reinforced concrete—working stresses	2915
Solid masonry—bearing partitions	2936
Solid masonry—bond	2904
Solid masonry—chases and recesses	2906
Solid masonry—fire-resistive classification	4302
Solid masonry—fire walls	2932, 2934
Solid masonry—foundation walls	2938
Solid masonry—general provisions	2901
Solid masonry—panel and enclosure	2939
Solid masonry—piers	2905
Solid masonry—thickness of exterior	2903
Solid masonry—working stresses	2902
Stone—bond	2922
Stone—chases and recesses	2923
Stone—lateral support and thickness	2921
Stone—quality of material	2919
Stone—working stresses	2920
Veneered—allowable height of	2927
Veneered—attachment of	2926
Veneered—quality of material	2924
Veneered—working stresses	2925
WATER	
Removal from excavations, when	2609
Requirements for concrete	2604 (c)
Retaining walls—design of	2310
Supply for automatic sprinkler system	3802
Supply for wet standpipes	3806
WATER-CEMENT RATIO	
Consistency required	2607
Control of proportions	2608
Requirements for use	2606
WATER-CLOSET	
For Group E buildings	1005
For Group F buildings	1105
For Group G buildings	1205
For Group H buildings	1305
WATER PRESSURE	
In wet standpipes	3806
Walls to resist—design of	2310
WEATHER—AFFECTS CONCRETE CONSTRUCTION—How	3009 (g)
WEATHERBOARDING	2205
WEIGHTS OF BUILDING MATERIALS	
(See Appendix—Refer to Section 2301)	
WELD	
Connection—stresses allowed	2710
Electric spot	2710 (e)
Electrode wire for	2710 (c)

For steel joists.....	2714
In erection—allowed when.....	2718 (d)
Samples required by Building Inspector.....	2710 (d)
WET STANDPIPES (see STANDPIPES)	
WIDTH	
Of corridors	3311
Of entrance doors	604, 704
Of passageways from courts—Group A buildings.....	604 (b)
Of passageways from smokeproof towers.....	3315
Of stair landings	3307
Of stairs	3307
Of stair treads	3302, 3307
Of street allowed for storage.....	4401
WIND	
For roof design	2305
In erection—to be provided for.....	2718 (b)
Pressure for vertical surfaces.....	2307
Steel—increased stresses for.....	2702
Wood—increased stresses for.....	2503
WINDOWS	
General requirements	3401
Fire-resistive—design of	4304 (c)
For Group A buildings.....	603, 605
For Group B buildings.....	703, 705
For Group C buildings.....	803, 805
For Group D buildings.....	903, 905
For Group E buildings.....	1003, 1005
For Group F buildings.....	1103, 1105
For Group G buildings.....	1203, 1205
For Group H buildings.....	1303, 1305
For Group I buildings.....	1403, 1405
For Group J buildings.....	1503
In Fire Zone No. 1.....	1602 (g)
In Type I buildings.....	1813
In Type II buildings.....	1913
In Type III buildings.....	2013
In Type IV buildings.....	2113
WIND PRESSURE	
Design requirements	2307
Steel stresses may be increased for.....	2702
Wood stresses may be increased for.....	2503
WIRE	
For proscenium curtain reinforcing.....	4102
For stucco reinforcing	2205
For tying roofing materials.....	4305
Ties for fire-resistive materials.....	4301
WIRE GLASS	
In fire-resistive doors.....	4304 (a)
In fire-resistive windows.....	4304 (c)
In skylights—when	3402
Required by location (see LOCATION ON PROPERTY, FIRE ZONES DOORS AND WINDOWS)	
WIRE LATH (see METAL LATH)	
WIRE MESH REQUIRED	
For skylights—when	3402
For stage ventilators—when.....	3901
Over gypsum plaster lath—when.....	4301, 4302
WIRELESS	
Masts for—design	3002
WHOLESALE STORES	
.....	1101
WOOD	
Allowable stresses tabulated—columns.....	2504
Allowable stresses tabulated—flexure.....	2503
Beams and joists—may be cut, when.....	2506 (b)
Built up members.....	2508 (b)
Columns—allowable unit stresses.....	2504
Firestops—required	2510
General requirements	2501
Horizontal members—framing details.....	2506
Plaster lath	4702
Partitions—framing details	2507
Piles of	2803 (b)
Required sizes—determination of.....	2502
Roof framing	2508

Separation required between members.....	2500 (d),	4302
Shingles—for exterior walls		2205
Shingles—for roofs		4305
Siding		2205
Sand partitions—may be cut, how.....	2507 (f)	
Stud walls—framing details.....		2507
Trusses		2500
Unit stresses—allowable	2508,	2504
Unit stresses—may be increased, when.....		2503
Use—conditions defined		2503
Vertical members—framing details.....		2505
Walls of	1905,	2205
Weatherboarding		2205
WOOD FRAME BUILDINGS (see TYPE V BUILDINGS).....	2201-2211	incl.
WOODWORKING FACTORIES		1001
WORDS—Special Meaning of		
For reinforced concrete		2603
General		401
WORKING STRESSES—ALLOWABLE		
Cast iron		272
Cloth— asbestos curtain		4102
Masonry construction		2410
May be increased—masonry construction.....		2411
Piles		2803
Reinforced concrete		2613
Soil		2802
Steel	2702,	2710
Wood	2503,	2504
WORKMANSHIP		
Inspection of		204
Structural steel		2716
WORKSHOPS		
In Group A buildings	602,	607
Moderately hazardous		1101
Non-hazardous		1201
YARD		
Definition of.....		401