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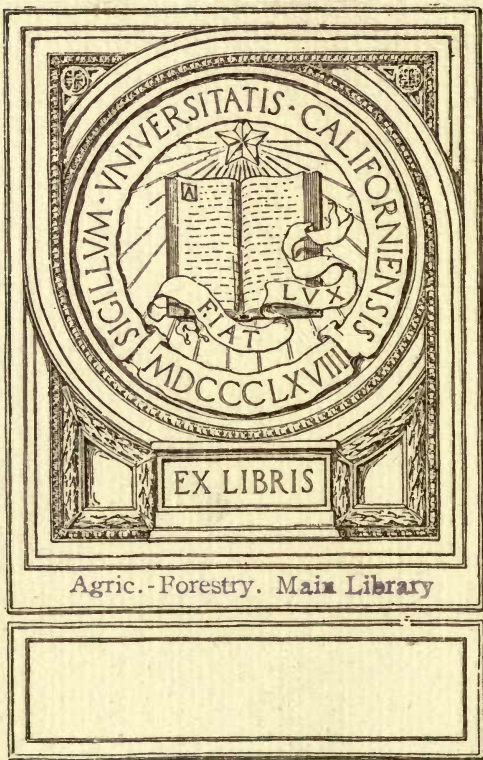
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ΦB 316 811

BUILDING ORDINANCE

YB 53444



Agric. - Forestry. Main Library

FOREWORD

Because of continued and urgent demand for ordinances affecting or relating to fire limits and the construction, alteration or repair of buildings in communities of thirty thousand persons and less and because a thorough canvass of the field has disclosed the fact that there are more than a thousand such cities in the United States without any building regulations, this hand book of ordinances has been compiled.

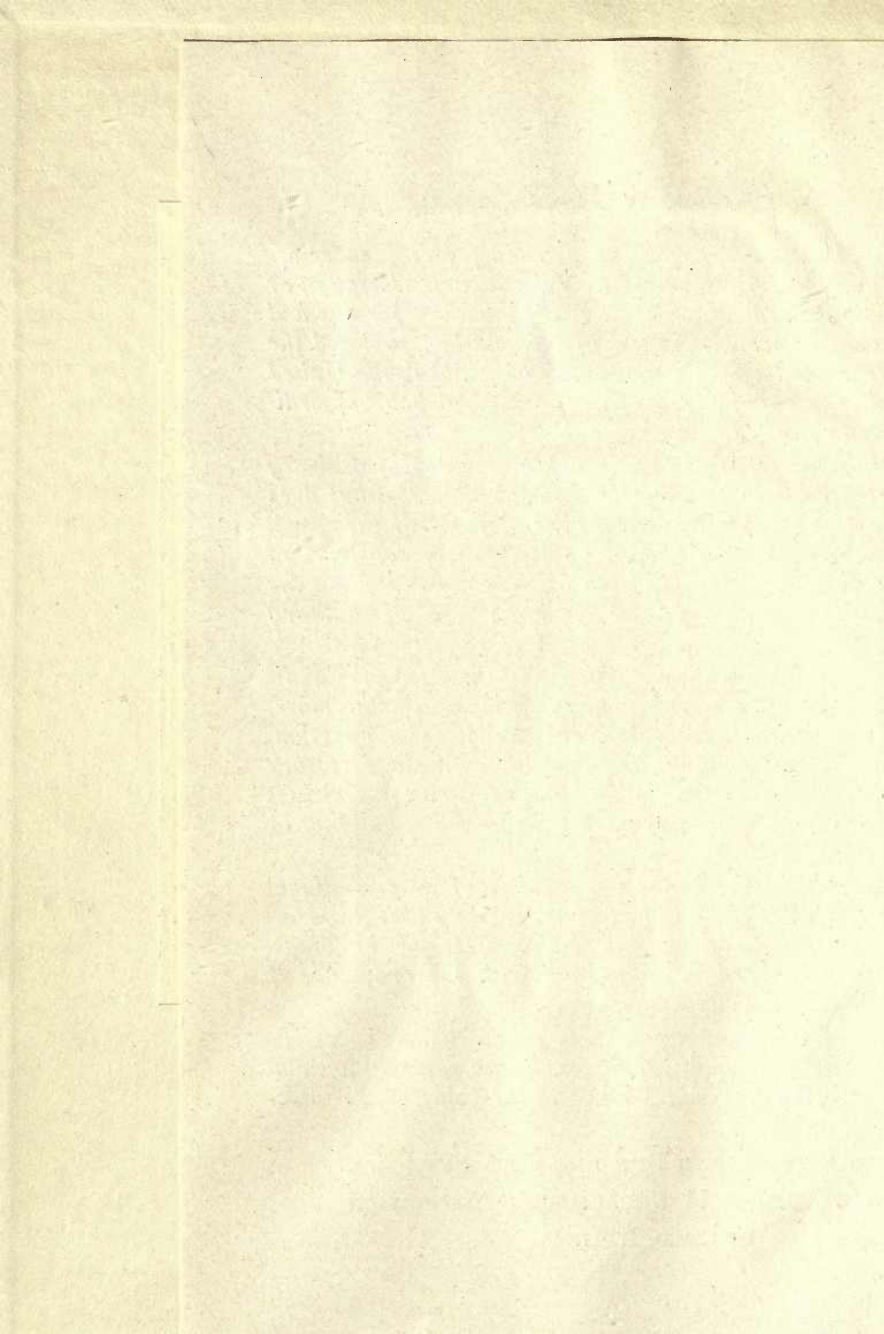
It is intended to serve as a reasonable regulation of ordinary building construction where congestion is not abnormal but does not constitute a building code in the general sense of the word. However, it should prove a reliable guide for safe construction legislation pending the natural growth of the community and the resultant economic and consequently larger use of building materials.

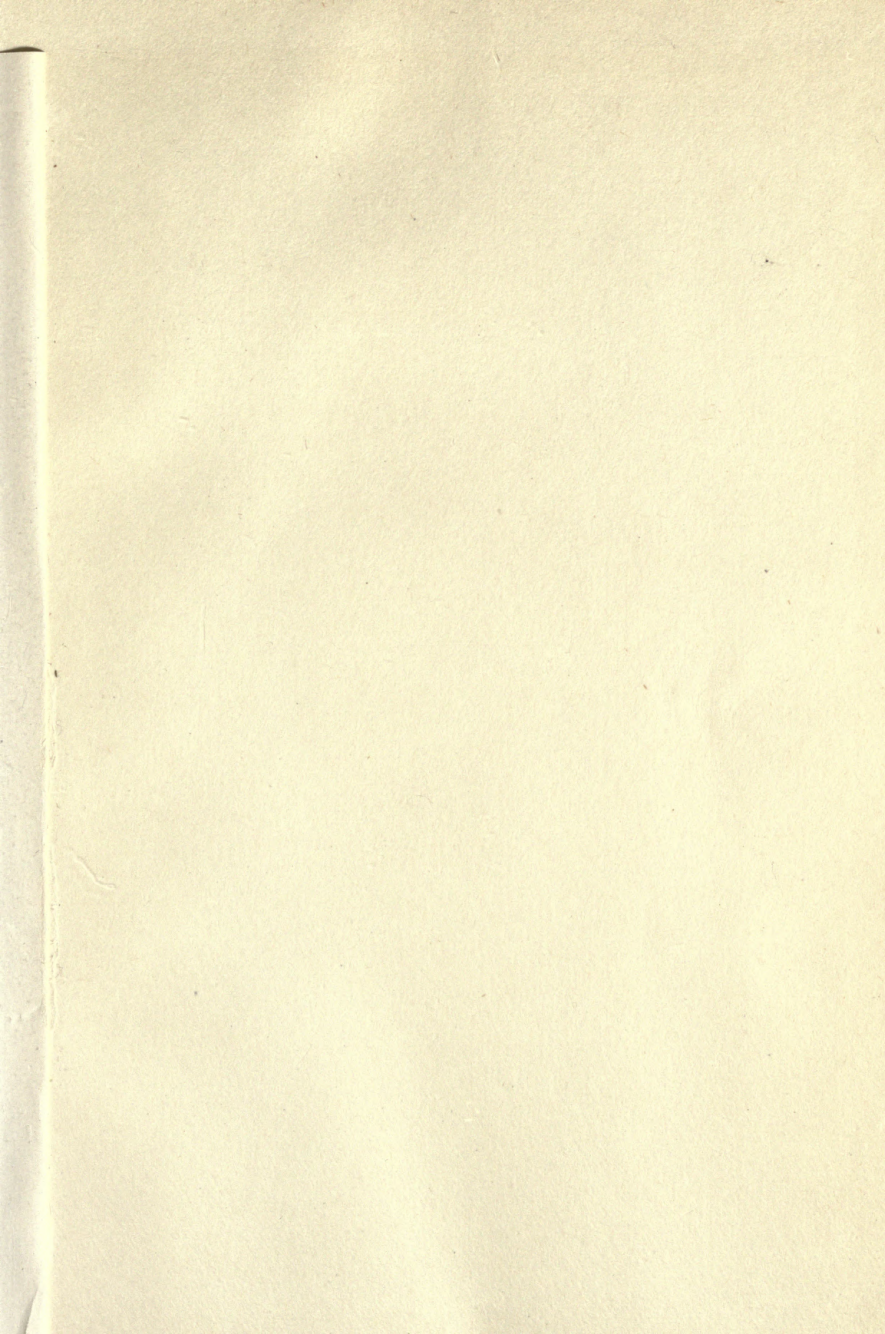
It will be found necessary, from time to time, to make additions and revisions to meet changing conditions. Furthermore, because it is impracticable to draft a code suitable for adoption, without change, by all communities, it will no doubt be necessary before adoption to make such changes and revisions as will best suit local conditions, and comply with existing state, building or housing laws.

The matter appearing in the appendix is of an educational and explanatory nature and will be found generally useful in connection with the construction and maintenance of buildings. These items may be used in connection with the ordinance if deemed advisable by the city authorities.

In presenting this work we wish to acknowledge the assistance of many Engineers and Architects, whose contribution and constructive criticism have added much to the value of the material herein.

ARCHITECTURAL AND BUILDING CODE SERVICE,
NATIONAL LUMBER MANUFACTURERS ASSOCIATION,
CHICAGO, ILLINOIS





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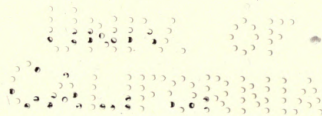
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National Lumber Manufacturers
Association,
Architectural and Building
Code Service.

BUILDING ORDINANCE

OF

THE CITY OF



TH 223
N23

In the compilation of ordinances containing such a number of interrelating subjects, it is inevitable that errors and inconsistencies occur. The Chief Building Inspector will welcome your service in bringing any errors to his attention.

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AN ORDINANCE PROVIDING FOR THE FIRE LIMITS
AND THE CONSTRUCTION AND EQUIP-
MENT OF BUILDINGS.

Be it ordained by the
of

of the
as follows:

PART I.
ADMINISTRATION.

SECTION 1. FIRE LIMITS. The following shall be and
hereby are declared to be the fire limits: Beginning at

Insert here boundary of the fire limits, which shall include the
business district, manufacturing sections, any mercantile section,
and any other congested building area regardless of occupancy.

to the point of beginning.

BUILDING ORDINANCE

SECTION 2. PERMIT REQUIRED. No wall, structure, building or part thereof, shall hereafter be built, enlarged, or altered, until a plan of the proposed work together with a statement of the materials to be used, shall have been submitted to the Chief Building Inspector or other designated official, who shall, if in accordance with the provisions herein contained, issue a permit for the proposed construction.

Structures hereafter erected without permit, or not in conformity with this ordinance, shall be removed.

No building shall be moved until a permit has been obtained from the designated official; and such official shall not issue such permit if in his judgment the proposed new location of the building would seriously increase the fire hazard of the surrounding buildings.

Building permits shall be issued upon payment of fees as follows: 25 cents for work costing \$100.00 or less, \$1.00 for work costing over \$100.00 and not to exceed \$1,000.00; for work costing more than \$1,000.00, \$1.00 for each \$1,000.00 or fraction thereof. Each building must have a separate permit.

Fees for permits for moving buildings or other objects that may obstruct the streets or sidewalks or spoil the use of machinery of any kind, shall be \$1.00 for each building or every object so moved.

Each building permit shall recite this section.

SECTION 3. DUTIES OF ENFORCING OFFICER.* The Chief Building Inspector is hereby authorized and empowered:

First: To enforce all ordinances relating to the construction, equipment, management and condition of all property within said city;

Second: To supervise the construction or reconstruction of all buildings;

* The enforcement of this ordinance is properly the duty of the Building Department. In a municipality not having such a department, the duties can most advantageously be performed by the Chief of the Fire Department.

Third: To report monthly to the Mayor or Council regarding the condition of the city on all matters pertaining to fire prevention.

SECTION 4. PENALTY FOR VIOLATIONS. Any and all persons who shall violate any of provisions of this ordinance or fail to comply therewith, or who shall violate or fail to comply with any order or regulation made thereunder; or who shall build in violation of any detailed statement of specifications or plans submitted and approved thereunder; or any certificate or permit issued thereunder; shall severally for each and every such violation and noncompliance respectively, forfeit and pay a penalty in the sum of twenty-five dollars. The imposition of one penalty for any violation of this ordinance shall not excuse the violation, or permit it to continue; and all such persons shall be required to correct or remedy such violations or defects within a reasonable time; and when not otherwise specified each ten days that prohibited conditions are maintained, shall constitute a separate offense.

The application of the above penalty shall not be held to prevent the enforced removal of prohibited conditions, as provided in Section 2 of this ordinance.

SECTION 5. CONFLICTING ORDINANCES REPEALED. All ordinances and parts of ordinances inconsistent herewith are hereby repealed.

SECTION 6. DATE OF EFFECT. This ordinance shall take effect and be in force from and after its passage and legal publication.

SECTION 7. DEFINITIONS.

Alley. Any public thoroughfare less than 30 feet, but not less than 16 feet in width. Any space less than 16 feet wide shall be termed a "Court."

Areaway. An open sub-surface space adjacent to a building for lighting or ventilating cellars or basements.

Basement. A story partly, but not more than one-half below the level of the curb.

Bearing Wall. A wall which supports any load other than its own weight.

Cellar. A story whose height is more than one-half below the level of the curb. It shall not be counted as a story in determining the height of the building.

Dead Load. The weight of the walls, framing, floors, roofs, tanks with their contents, and all permanent construction.

Division Wall. Any interior wall in a building.

Dwelling. A residence building, designed for, or used as, the home or residence of not more than two separate and distinct families.

Exterior Wall. Any outside wall, or vertical enclosure of a building, other than a party wall.

Fire Door. A door, frame, and sill which will successfully resist a fire for one hour in accordance with test specifications of the National Board of Fire Underwriters, and has been approved upon such test.

Fireproof Material. The term "Fireproof Material," as herein used, shall include only incombustible, fire and waterproofed materials that will withstand the action of conflagration without serious deformation. Plastering, unless of Portland cement mortar, shall not be considered as a fireproof covering. Cinder concrete shall not be used as fireproofing.

Fire Shutter. A shutter which will successfully resist a fire for one hour in accordance with test specifications of the National Board of Fire Underwriters and has been approved upon such test.

Fire Wall. The term "Fire Wall" indicates a wall subdividing a building for the purpose of restricting the spread of fire.

Fire Window. A window frame, sash, and glazing which will successfully resist a fire for one hour in accordance with test specifications of the National Board of Fire Underwriters, and has been approved upon such test. No single pane in a fire window shall exceed 720 square inches.

Foundation Wall. Any wall or pier built below the curb level or nearest tier of beams to that level.

Height of buildings or structures shall be measured from the curb level at the center of the front of the building to the top of the highest point of the roof, in case of flat roofs, and for pitched roofs, one-

half the height of the highest gable shall be taken as the highest point of the building. When the walls of a building or structure do not adjoin the street, then the average level of the ground adjoining the walls of the building or structure may be taken, instead of the street curb level, in measuring the height of such building or structure.

Incombustible. Materials or construction which will not ignite and burn when subjected to fire.

Live Load. All loads other than dead loads. All partitions which are subject to removal or rearrangement shall be considered as live load.

Party Wall. A wall used or adapted for joint service between two buildings.

Residence. Residence buildings shall be construed to mean and include all buildings in which sleeping accommodations (other than for janitor or watchman) are provided.

Shed. A roofed structure, open on one or more sides, which does not exceed 15 feet in height nor more than 500 square feet in area.

Skylight. Any cover or enclosure placed above roof openings for the admission of light.

Story. That part of any building comprised between any floor and the floor or roof next above. In case any floor or the combined area of floors at any one level extends over less than 20 per cent. of the horizontal area included within the outside walls at that level, the same shall not be considered as a floor for the purpose of determining story heights.

Street. Any public thoroughfare 30 feet or more in width.

Structure. Includes the terms building, appurtenance, wall, platform, staging, or flooring used for standing or seating purposes; a shed, fence, sign, or billboard on public or private property, or on, above or below a public highway.

PART II.

SPECIAL REQUIREMENTS.

SECTION 8. INCOMBUSTIBLE WALLS, CORNICES, AND ROOFS, REQUIRED WITHIN FIRE LIMITS. Every building hereafter erected or enlarged within the fire limits, shall be enclosed on all sides with walls constructed wholly of stone, brick, terra cotta, concrete, or other incombustible materials; and shall have the roof, including roof of dormer windows, covered with incombustible material.

SECTION 9. CORNICES, GUTTERS AND PROJECTIONS. On all buildings hereafter erected within the fire limits, the exterior cornices, inclusive of those on show windows shall be of some fireproof material and shall be secured to the wall with iron anchors.

All exterior wooden cornices within the fire limits that are now, or may hereafter become unsafe, shall be taken down and replaced, and shall be constructed of some fireproof material.

All exterior cornices or gutters of wood within the fire limits that may hereafter be damaged by fire to the extent of one-half shall be taken down and if replaced, shall be constructed of some fireproof material, but if not damaged to the extent of one-half, may be repaired with the kind of material of which they were originally constructed.

Cornices or gutters of wood shall not be permitted on any building within or without the fire limits, exceeding 55 feet in height.

When buildings permitting combustible cornices or gutters are erected in rows, the cornices and gutters shall be fire-stopped with incombustible material between each building.

SECTION 10. PERMISSIBLE WOODEN STRUCTURES WITHIN FIRE LIMITS. No frame or wooden structure shall hereafter be built within the fire limits as given herein, or as they may hereafter be established, except the following, and all roofs placed upon such buildings or structures shall have a fire-resistive covering:

- (a) Temporary one-story frame buildings for use of builders;
- (b) One-story sheds open on the long side, not over 15 feet high, with sides covered with incombustible material, and with an area not exceeding 500 square feet. A wooden fence shall not be used to form the back or side of such sheds;
- (c) Wooden fences not over 10 feet high;
- (d) Piazzas or balconies which do not exceed 8 feet in width and which do not extend more than 3 feet above the second story floor beams may be erected of wood on buildings other than frame buildings. On buildings in rows or connected buildings such piazzas or balconies may be built provided same are open on the front and have ends of incombustible material carried up above the roof and coped with incombustible material.
- (e) Bay windows when covered with incombustible material;
- (f) Small outhouses not exceeding 150 square feet in area and 8 feet in height;
- (g) Grain elevators, coal pockets, or ice houses shall be limited as prescribed in Section 24 of this Ordinance.

No frame building shall be moved from without to within the fire limits.

Wooden sheds or outhouses shall not be located within 5 feet of any lot line, nor less than 30 feet from any other building over one story high;

SECTION 11. REPAIRING FRAME BUILDINGS WITHIN FIRE LIMITS. Any existing frame building within the fire limits, which may hereafter be damaged by fire, or otherwise, to an amount greater than one-half of its present value, exclusive of the foundation, shall not be repaired or rebuilt, but shall be removed.

SECTION 12. BUILDINGS HAVING PROHIBITED OCCUPANCIES WITHIN FIRE LIMITS. No building shall be used for a public garage, coffee roaster, bakery, or dry cleaning establishment, within the fire limits, unless it be of fire-resistive construction.

SECTION 13. WALLS. All exterior, or division walls of buildings hereafter erected, shall be of sufficient thickness to support the load to be carried but in no case shall a brick, stone, concrete, or hollow block wall be less than 12 inches thick.

Walls, excepting party and fire walls, for all buildings other than dwellings, not exceeding five stories or 65 feet in height, shall have the upper two stories not less than 12 inches thick, increasing 4 inches in thickness for each two stories or fraction thereof below. For such buildings in excess of five stories, but not exceeding ten stories or 125 feet in height, the top story shall be not less than 12 inches thick, increasing 4 inches in thickness for each two stories or fraction thereof below. No two-story increment shall exceed 30 feet in height.

For all walls of buildings used as dwellings, the upper three stories shall be not less than 12 inches thick, increasing 4 inches in thickness for each three stories or fraction thereof below. No three-story increment shall exceed 45 feet in height.

Walls in skeleton* construction shall be of brick, stone or gravel concrete, or hard burned terra cotta. They shall be supported by girders at each story, shall be laid in Portland cement mortar, and shall be not less than 12 inches thick.

In all buildings, except dwellings, frame buildings, and skeleton construction, party walls and fire walls which serve as bearing walls on both sides, shall be not less than 16 inches thick in the upper two stories or upper 30 feet, increasing 4 inches in thickness for each two stories or fraction thereof below. All other fire walls shall be not less than 16 inches thick in the upper four stories or upper 50 feet, increasing 4 inches in thickness for each two stories or fraction thereof below. No two-story increment shall exceed 30 feet in height. Portland cement mortar only shall be used in such walls.

Reinforced stone or gravel† concrete walls with steel reinforcement running both horizontally and vertically and weighing not less

* NOTE.—See Section 27.

† NOTE.—Silicious gravel as a coarse aggregate for reinforced concrete or fireproofing should not be used in portions of a building liable to be subjected to fire.

than one-half pound per square foot of wall, may have a thickness 4 inches less than that prescribed for brick walls.

Stone walls shall be 4 inches thicker than required for brick walls.

BEARING POWER OF SOILS.

Rock	10 to 200	tons	per	sq.	ft.
Gravel, compacted	8 to 10	"	"	"	"
Sand, clean and compact	4 to 6	"	"	"	"
Clay on thick beds, always dry.....	4 to 6	"	"	"	"
Clay on thick beds, moderately dry...	2 to 4	"	"	"	"
Sand, clean and dry	2 to 4	"	"	"	"
Dry earth	1 to 2	"	"	"	"

All exterior and division or party walls over one story high, shall extend the full thickness of top story to at least 2 feet above the roof as a parapet and be properly coped, excepting walls which face on a street and are finished with incombustible cornices, gutters, or crown mouldings, excepting also the walls of detached private dwellings with peaked or hipped roofs. The parapet walls of warehouses and all manufacturing or commercial buildings shall extend 3 feet above the roof. Fire walls shall be continuous from foundation to 3 feet above roof level, and be coped, except in fire-resistive buildings fire walls need not be continuous in all stories nor need they extend above the roof if a tight joint be made between the roof construction and walls.

All walls and partitions in schools, hospitals and places of public assemblage, over one story high, and all walls and partitions in theaters, shall hereafter be built of brick, stone, hollow or solid blocks, or metal lath and Portland cement plaster on metal studding, or other equivalent incombustible construction.

The foundation walls of all buildings over two stories in height shall be 4 inches thicker from footing to grade than required for the remainder of the wall.

SECTION 14. WOODEN COLUMNS:

FORMULA FOR DETERMINING SAFE LOADS FOR
TIMBER COLUMNS. (Winslow Formula.)

$$\left. \begin{array}{l} \text{Unit Stress on Columns} \\ \text{Safe Load in Pounds, per} \\ \text{Square Inch of Column} \\ \text{Cross Section.} \\ \text{Cross Section in pounds} \\ \text{per square inch.} \end{array} \right\} = c \left\{ 1 - \frac{L}{80d} \right\}$$

c=Allowable working compressive strength of timber in pounds per square inch with the grain.

L=Unsupported length of post or column in inches.

d=Least dimension of post in inches.

SECTION 15. FLOOR LOADS:

TABLE OF ALLOWABLE LIVE LOADS ON FLOORS

Dwellings, tenements and flats	50 lbs.
Hotels, lodging houses, schools with fixed decks	60 lbs.
Office buildings above first floor	75 lbs.
Office buildings, first floor	120 lbs.
Churches, theaters, halls with fixed seats	90 lbs.
Dancing rooms, corridors and public hotels	120 lbs.
Drill rooms	150 lbs.
Stores, light manufacturing and storage	125 lbs.
Heavy manufacturing	175 lbs.
Heavy storage	200 lbs.

SECTION 16. ROOF COVERING. Every building hereafter erected within the fire limits shall have an incombustible roof covering, as prescribed in Section 21, and existing shingle roofs within the fire limits, if damaged more than 25 per cent, shall be renewed with incombustible roof covering, but if damaged less than 25 per cent, may be repaired with wooden shingles.

PART III.

MATERIALS.

SECTION 17. MASONRY CONSTRUCTION. The following unit compressive stresses (pounds per square inch) shall not be exceeded:

Kind of Mortar	Lime 1:3	Lime and Portland Cement $\frac{1}{2}:\frac{1}{2}:3$	Portland Cement
Standard common brick (crushing strength 1,800)	100	125	175
Hard or Select brick (crushing strength 3,000)	150	180	270
Rubble, well bonded	80	100	150
Hollow tile or concrete blocks, gross area			60

For any other type of masonry the unit stress shall be calculated on the basis of a factor of safety of 10 or more in accordance with standard practice.

SECTION 18. HOLLOW BUILDING BLOCKS. In buildings not more than 40 feet high, hollow tile or concrete blocks may be used for outside walls and inside bearing walls, as well as for non-bearing partitions. Such blocks (except for non-bearing partitions) shall have an ultimate compressive strength of not less than 700 pounds per sq. in. of gross area. In computing the gross area, no deduction shall be made for hollow spaces. See Note.

NOTE.—Hollow tile should be of shape and material especially suitable for outside walls and should have undergone tests to prove its fire and weather resisting qualities; such walls should be further protected with $\frac{3}{4}$ inch of cement plaster on the outside. Concrete blocks should be made of good coarse aggregate, with at least 15 per cent of good Portland cement, properly mixed, moulded, and cured. With fine sand more cement is necessary. Hollow tile or concrete blocks of inferior quality will often not withstand weather or fire and should not be used for outside or bearing walls.

The hollow spaces shall not exceed 55 per cent in the case of terra cotta or clay tile, or 33 per cent in the case of concrete blocks; except that in clay tile used in one-story buildings the hollow spaces shall not exceed 60 per cent. The absorption shall not exceed 12 per cent in 48 hours.

See Note 1.

Such walls shall be laid in Portland cement mortar. The thickness of such walls shall be the same as required for brick walls, but no such wall shall be higher than 15 times its thickness.

Brick facing may be considered as part of hollow tile or concrete block wall (or vice versa) if the two materials are properly bonded with header courses of brick not farther apart than every sixth course.

See Note 2.

REINFORCED CONCRETE CONSTRUCTION.

SECTION 19. DEFINITION. The term "reinforced concrete" in this Ordinance shall mean an approved concrete mixture in which steel is embedded in such a manner as to resist all tensile stresses and to add rigidity and strength to concrete in compression.

Reinforced concrete will be approved for all types of building construction, provided the design conforms with good engineering practice, as set forth in the report of the Joint Committee on Concrete and Reinforced Concrete as published by the American Society for Testing Materials. The construction shall meet the requirements of this Ordinance in all respects.

PLANS AND SPECIFICATIONS TO BE FILED.

The plans and specifications to be filed with the Chief Building Inspector shall be accompanied by stress computations and descriptions showing the general arrangement of the entire construction

NOTE 1.—A list of hollow tile which have been approved may be obtained from the Chief Building Inspector.

NOTE 2.—This requires a size of tile which will work out properly with the brick courses. A tile 12 inches high is not suitable for bonding with brick of the usual size.

in all important details, including the size, length, and points of bending of all reinforcement, the qualities, proportions, and methods of mixing the materials used in the concrete and the dead and live loads each floor is designed to carry.

All such plans and specifications shall be signed by the Architect, Engineer, Contractor or person applying for the permit. In no case shall the construction deviate from the approved plans and specifications except by written consent of the Chief Building Inspector.

Concrete for reinforced concrete construction shall consist of a medium wet mixture of one part of Portland cement to not more than six parts of aggregate, fine and coarse, in such proportions as to produce the greatest density.

Inspection. Every reinforced concrete building shall be erected under the constant supervision of a reputable and competent inspector, furnished by the Owner, Architect, or Engineer, and acceptable to the Chief Building Inspector.

SECTION 20. QUALITY OF STRUCTURAL TIMBER.

All timbers and wooden beams used in building shall be of good, sound material, free from rot, large and loose knots, shakes or any imperfections whereby the strength may be impaired and of such size and dimensions as the purposes for which such building is intended require.

SIZE OF TIMBERS.

Whenever the size of a timber is given in whole numbers such as 2x4, 2x6, 2x8, etc., standard commercial or nominal sizes are meant, but whenever the size is given as $1\frac{5}{8} \times 3\frac{5}{8}$, $1\frac{5}{8} \times 5\frac{5}{8}$, $1\frac{5}{8} \times 7\frac{1}{2}$, etc., actual sizes are meant. The allowable stresses permitted by this Ordinance are to be based on the actual size of the timbers used.

For timber four (4) inches by four (4) inches and larger, the size may be one-half ($\frac{1}{2}$) of an inch less for each dimension.

SECTION 21. ROOF COVERINGS. All buildings may be covered with such incombustible material as brick, concrete, tile or slate; or with tin, corrugated or galvanized iron with standing seam

or lap joints; or with not less than 5 ply built up roofing of felt, with pitch and gravel or slag surfaces or with built up asbestos roofing; or with other incombustible roofing approved by the National Board of Fire Underwriters.

Roofs with a slope of not more than 3 inches per foot horizontal, may be covered with a composition of felt, with pitch and gravel or slag surfaces.

The use of shingles or other forms of combustible roof coverings erected or altered, *within the fire limits*, is prohibited except as herein provided. In existing frame buildings within the fire limits, not more than 3 stories high, the shingle roofs may be repaired with shingles or other materials when not damaged more than 25 per cent.

A layer of approved deadening felt at least 1-16 inch thick shall be placed between metal roofing and the supporting woodwork.

The wooden planking or sheathing of roofs shall not in any case be extended across side or party walls.

All flashing shall be of metal properly incorporated with the roofing material.

The top and sides of dormer windows shall be protected the same as herein prescribed for the roof.

PART IV.

CLASSIFICATION OF CONSTRUCTION.

SECTION 22. SAFETY OF DESIGN. All parts of every building shall be designed to safely carry the loads to be imposed thereon, and shall in all other respects conform to good engineering practice.

SECTION 23. LIMITS OF HEIGHTS AND AREAS.

1. *Heights of Buildings.*

No building hereafter erected or altered except church spires, water towers, smoke stacks or chimneys, shall exceed 55 feet in height, unless it be of fire-resistive or Mill construction. Buildings of fire-resistive construction shall not exceed 125 feet in height and those of *Mill* construction shall not exceed 75 feet in height. Except as specified in Section 18, no building hereafter erected having walls of hollow terra cotta or concrete blocks shall exceed 40 feet in height.

Maximum height of frame buildings given under Section 24.

2. *Allowable Floor Areas.*

In every building of the character named in this section the maximum area of any floor between fire walls or exterior walls, either with or without a full automatic sprinkler equipment, shall be as follows:

Tenement houses, (non-fire resistive) 3,000 sq. ft.

All other Ordinary Construction.

	Without sprinklers	With sprinklers increase of 66 $\frac{2}{3}$ %
Fronting on		
One street	5,000 sq. ft.	8,333 sq. ft.
Two streets	6,000 sq. ft.	10,000 sq. ft.
Three or more streets	7,500 sq. ft.	12,500 sq. ft.

Mill Construction.

	Without sprinklers	With sprinklers increase of 100%
Fronting on		
One street	6,500 sq. ft.	13,000 sq. ft.
Two streets	8,000 sq. ft.	16,000 sq. ft.
Three or more streets	10,000 sq. ft.	20,000 sq. ft.

Fire-resistive Construction.

Buildings or structures used for public assemblages or in which

people may be housed for safety, punishment, observance or care, residence buildings, light and power stations and office buildings, shall not be restricted as to area when of fire-resistive construction.

Fire-resistive construction not exceeding 75 feet in height.

Fronting on	Without sprinkler	With sprinkler increase of 66 $\frac{2}{3}$ %
One street	10,000 sq. ft.	16,666 sq. ft.
Two streets	12,000 sq. ft.	20,000 sq. ft.
Three or more streets	15,000 sq. ft.	25,000 sq. ft.

Fire-resistive construction not exceeding 125 feet in height.

Fronting on	Without sprinkler	With sprinkler increase of 50%
One street	7,500 sq. ft.	11,250 sq. ft.
Two streets	10,000 sq. ft.	15,000 sq. ft.
Three or more streets	12,500 sq. ft.	18,750 sq. ft.

SECTION 24. FRAME CONSTRUCTION. A building having the exterior walls or portions thereof of wood; also a building with wooden framework veneered with brick, stone, terra cotta, or concrete, or covered with plaster, stucco, or sheet metal, shall be classed as a frame building.

No frame building hereafter erected or altered shall exceed two stories or 30 feet in height, except that private dwellings may be three stories or 40 feet high.

No frame building hereafter erected for any occupancy other than grain elevators, coal elevators and pockets, ice houses and exhibition buildings, shall cover a ground area exceeding the following: One-story building 7,500 square feet, two-story building 5,000 square feet. Buildings herein excepted shall be limited in area as prescribed for buildings of Ordinary Construction under Section 23 of this Ordinance.

In no case shall a frame building be erected within 5 feet of the side or rear lot line, nor within 10 feet of another building, unless the

space between the studs on such side be filled solidly with not less than $2\frac{1}{2}$ inches of brickwork or other incombustible material. See note.

In rows of frame houses, the dividing walls or partitions between houses shall be built of brick, terra cotta, concrete or other incombustible material; or they may be built with 4-inch studs, the spaces between them filled solidly with brickwork laid in mortar, or with other incombustible material. Such dividing partitions shall rest on masonry walls and shall extend to under side of roof boards. In rows of more than three houses every alternate division wall or partition shall be constructed of solid brickwork not less than 8 inches in thickness. These walls shall be solid, without openings and shall extend 2 feet above the roof and be coped.

Timber posts and girders or other approved supports may be used in cellars of frame buildings.

Outside the fire limits, when any building is to be erected of brick, stone, hollow block, or concrete that could under this ordinance be constructed of wood, the Chief Building Inspector is hereby authorized and directed to allow reasonable modifications of this Ordinance relating to brick buildings, in consideration of the use of incombustible material. Such modifications, however, shall not permit variations from the requirements of Sections 31, 38 and 40 of this Ordinance.

SECTION 25. ORDINARY CONSTRUCTION. A building having masonry walls, with floors and partitions of wooden joist and stud construction. The supporting posts and girders may be of wood, or of metal protected by at least 2 inches of metal lath and cement plaster or its equivalent. Where beams are supported by girders, the girders shall be anchored to the walls and fastened to each other by steel straps.

The ends of wood beams resting upon girders shall be abutted together, end to end, and strapped by steel straps of the same size

NOTE.—A greater distance than 10 feet between frame buildings is recommended and in order that this may be made practicable, building lots should be no less than 40 feet in width.

and distance apart, and in the same manner as the wall anchors, or they may be lapped and spiked together.

Each tier of beams running parallel to enclosing walls shall have approved 4-inch anchor straps dovetailed into the beams diagonally, crossing at least four beams.

No wooden floor or roof beam used in any building within the fire limits shall be less than $2\frac{5}{8}$ inches thick. The thickness of wooden beams shall not be less than $2\frac{5}{8}$ inches in any building where the floor load is greater than 60 pounds per square foot.

Every wooden beam, except header and tail beams, shall have bearing of at least 4 inches.

The ends of all wooden floor and roof beams, which rest on walls, shall be cut to a bevel of 3 inches in their depth.

Neither end of a floor or roof beam shall be supported on stud partitions, except in frame buildings.

All wooden floor and roof beams shall be properly braced with cross bridging. The distance between bridging or between bridging and bearing shall not exceed 8 feet. So far as possible knots or other imperfections shall be excluded from the bottom and top quarters of timber beams.

The ends of all floor, ceiling, or roof beams, entering a party or fire wall from opposite sides shall be separated by at least 8 inches of solid masonry; such separation may be obtained by corbeling the wall, or staggering the beams; or the beams may be supported by steel wall hangers. Where the beams are staggered so that a right angle mortar joint exists between the beams the separation may be reduced to six (6) inches. No wall shall be corbeled more than 2 inches for this purpose.

SECTION 26. MILL CONSTRUCTION.

Mill Construction. Mill or slow-burning construction consists of masonry walls and heavy timber interior construction, designed and arranged in such a manner as to prevent concealed spaces and to expose the least number of corners or projections of combustible material to fire. Such buildings should have each floor or room isolated by means of incombustible walls having automatic closing doors and other

cut-offs to prevent the rapid spread of fire and smoke. They should also be protected by standpipe, or a suitable automatic sprinkler installation.

WORKING UNIT STRESSES FOR STRUCTURAL TIMBERS IN DRY LOCATIONS

Species of Timber	BENDING		COMPRESSION	
	Stress in Extreme fiber Lbs. sq. in.	Hori- zontal Shear Stress Lbs. sq. in.	Parallel to grain "Short Columns" Lbs. sq. in.	Perpen- dicular to grain Lbs. sq. in.
Fir, Douglas				
Dense grade	1,600	100	1,200	350
Sound grade	1,300	85	700	300
Hemlock, Eastern	1,000	70	700	300
Hemlock, Western	1,300	75	900	300
Oak	1,400	125	900	400
Pine, Eastern White	900	80	700	250
Pine, Norway	1,100	85	800	300
Pine, Southern Yellow				
Dense Grade	1,600	125	1,200	350
Sound grade	1,300	85	900	300
Spruce	900	70	600	200
Tamarack	1,200	95	900	350

SECTION 27. FIRE-RESISTIVE CONSTRUCTION.

Fire-Resistive Construction includes buildings in which the structural parts, including lintels, are constructed of hard incombustible material such as stone, brick, fireproofed steel or iron, terra cotta or monolithic concrete. All other materials used in the construction and completion of such buildings, including the roof covering, shall be of incombustible materials, except as follows:

BUILDING ORDINANCE

1. Top flooring, with the necessary sleepers imbedded in concrete, except in public halls, corridors and toilet rooms.
2. Doors and windows and their trim, except doors and windows to stair and elevator shafts and in fire walls.
3. Room or office partitions; but no corridor, stair or elevator partition or enclosure shall be of combustible material.
4. Partitions which are not prescribed to be fire-resistive partitions shall be constructed as prescribed for fire-resistive partitions, except they need not rest on fireproof floors and the doors and windows and their frames and trim in such partitions may be of wood.

Skeleton Construction.

Skeleton Construction is a form of building construction wherein all external and internal loads and stresses are transmitted to the foundations by a rigidly connected framework of metal or reinforced concrete. The enclosing walls are supported by girders at each story.

The enclosing or panel walls if of brick, shall be not less than 12 inches thick, laid in cement mortar. When the vertical distance between supporting girders exceeds 15 feet the thickness of the wall shall be increased 4 inches for each 15 feet or fraction thereof that the said vertical distance exceeds 15 feet. Such walls shall be of brick, stone or gravel concrete, or hard burned terra cotta.

Terra cotta blocks faced with brick bonded in the manner prescribed in Section 18, may be used for walls of skeleton construction to a height of 125 feet.

PART V. EQUIPMENT.

SECTION 28. CHIMNEYS AND FIREPLACES. Except as herein provided, all chimneys in every building hereafter erected, altered or rebuilt shall be constructed of brick, stone or reinforced concrete. No masonry chimney shall have walls less than 8 inches thick unless it be lined on the inside with well burned terra cotta or fire clay

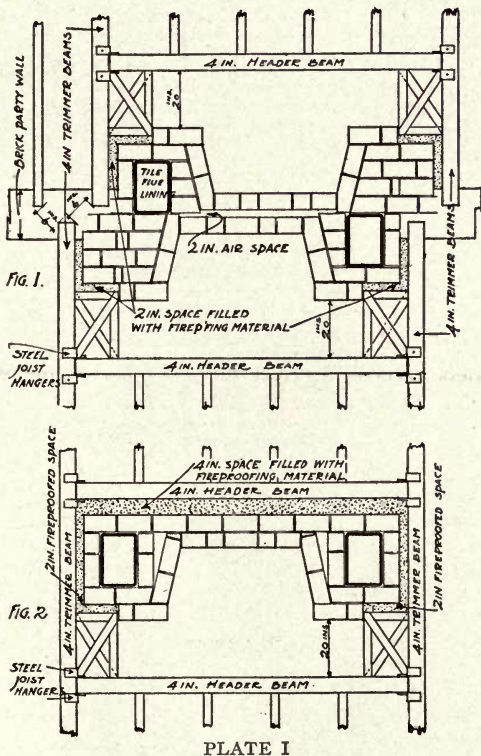


Fig. 1—Method of building two fireplaces back-to-back in a brick party wall to secure proper spacing between ends of floor joists. The space between backs can be filled if desired.

Fig. 2—Floor framing around a single fireplace. Note filling between framing and brickwork which serves both as insulator and fire-stop.

chimney tile set in Portland cement* mortar, in which case the wall shall be not less than 4 inches thick. The lining shall be continuous from the bottom of the flue to its extreme height.

Every smoke flue contained in a chimney hereafter erected shall have an area of at least 64 square inches, except that terra cotta flue linings 7 inches by 7 inches rectangular or 8-inch diameter inside dimensions, may be used.

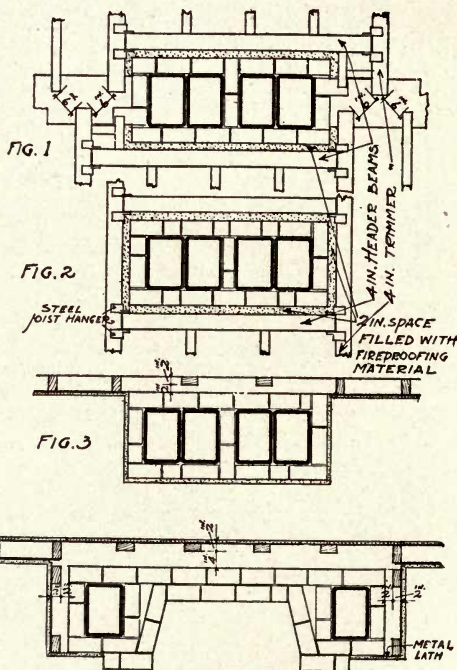


PLATE II
Solid Masonry. Brick with Flue Lining.

Fig. 1—Floor framing around chimney in a party wall to secure proper space between ends of floor joists.

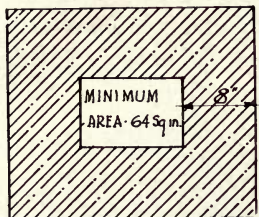
Fig. 2—Ordinary floor framing around a chimney. All timbers 2 inches clear of brickwork and space filled with fireproofing material.

Fig. 3—Stud partition across back of a chimney showing proper method of arranging studs.

Fig. 4—Stud partition across back of a fireplace and around the ends of the chimney breast, showing proper method of arranging studs.

*NOTE.—Portland cement mortar is superior to lime mortar in resisting the action of heat and flue gases. The latter disintegrates in time, and is liable to fall out of the joints, thus producing a hole through which fire is likely to originate.

No chimney shall be corbeled out more than 8 inches from a brick wall, and such corbeling shall consist of at least five courses of brick. No one course shall project more than $1\frac{1}{2}$ inches.

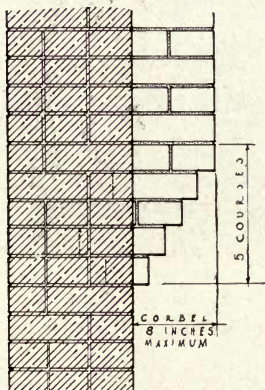


Solid Masonry.



Brick with Flue Lining.

CHIMNEYS. PLATE III



Brick Corbeled.

PLATE IV

Brick set on edge shall not be permitted in chimney construction. Chimneys of all low-pressure boilers, or furnaces, also the smoke flues for baker's ovens, large cooking ranges, large laundry stoves, and all flues used for similar purposes shall be at least 8 inches in thickness and be lined continuously on the inside with well-burned terra cotta or fire clay chimney tile set in Portland cement mortar. All such chimneys shall be capped with terra cotta, stone, concrete or cast iron.

The smoke flue of every high pressure steam boiler, and every appliance producing a corresponding temperature in a flue, if built of brick, stone, reinforced concrete or other approved masonry, shall have walls not less than 12 inches thick, and the inside 4 inches of such walls shall be firebrick, laid in Portland cement mortar for a distance of at least 25 feet from the point where the smoke connection of the boiler enters the flue.

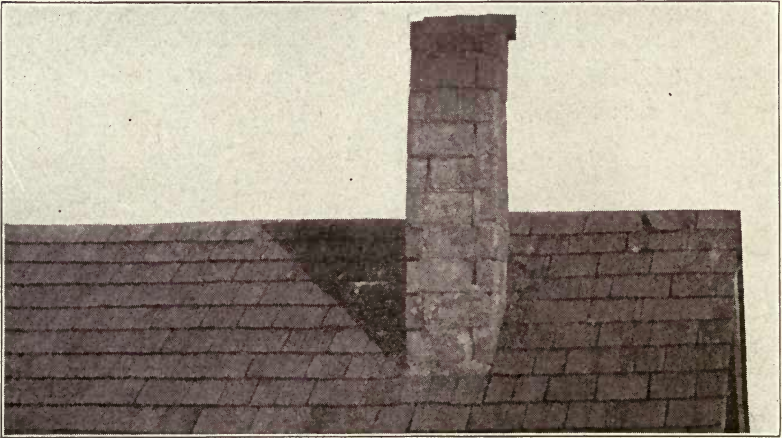


PLATE V

Chimney built with brick on edge and unlined. Roof is contact. Cracks in chimney under the roof, same as appear above it. The hazard is apparent.

All chimneys shall project at least 3 feet above the point of contact with a flat roof, or 2 feet above the ridge of a pitched roof.

Portland cement mortar only shall be used in the construction of chimneys their entire length.

No chimney in any building shall have wooden supports of any kind. Supports shall be incombustible and shall rest upon the ground or the foundation.

All chimneys which are dangerous from any cause shall be repaired and made safe, or taken down.

Metal smokestacks may be permitted for boilers, furnaces and similar apparatus where large hot fires are used, provided they have a clearance from all combustible material of not less than one-half the diameter of the stack, but not less than 15 inches unless the combustible material be properly guarded by loose fitting metal shields, in which case the distance shall be not less than 12 inches. Where such a stack passes through a roof, it shall be guarded by a galvanized iron ventilating thimble extending from at least 9 inches below the under-



PLATE VI

Chimney on wooden supports in a garret space. Walls one brick thick unlined.

side of the ceiling or roof beams to at least 9 inches above the roof, and the radius of the ventilating thimble shall be at least 18 inches greater than that of the smoke stack. Metal smoke stacks shall not be permitted to pass through floors.

The fireback of every fireplace hereafter erected shall be not less than 8 inches in thickness of solid brickwork, nor less than 12 inches of stone lined with firebrick. When a grate is set in a fireplace a lining of firebrick at least 2 inches in thickness shall be added to the firebrick; or soapstone, tile or cast iron may be used, if solidly backed with brick or concrete.

All flue-holes when not in use shall be closed with tight-fitting metal covers.

Ashes shall be kept in metal or other incombustible receptacles provided for the purpose. When the ash pit is located in a basement or cellar enclosing walls and cover shall consist of at least 4 inches of brick or concrete.

Flues to be Cleaned. All flues in every building shall be properly cleaned and all rubbish removed, and the flues left smooth on the inside upon the completion of the building. Once each year all flues shall be properly cleaned from top to bottom.

SECTION 29. VENT FLUES. Vent flues or ducts, for the removal of foul or vitiated air, in which the temperature of the air cannot exceed that of the rooms, shall be constructed of metal or other incombustible material, and shall not be placed nearer than 1 inch to any woodwork, and no such flue shall be used for any other purpose.

No gas, water heater, or any appliance burning gas shall be vented into any flue to which there is connected any appliance which burns fuel other than gas.

Every gas appliance which is provided with a vent outlet from the combustion chamber shall be carefully connected with a vent pipe which shall extend to and through the roof of the building.

Every such vent pipe shall have an internal area at least equal to the vent pipe outlet on such appliance and if built of galvanized iron shall have a sleeve extending to full length of the concealed portions of such pipe, so constructed with metal spacers that there shall be a clear air space of not less than $\frac{1}{4}$ inch all around and between such vent pipe sleeve and the exterior surfaces of every such sleeve shall be covered with 3 thicknesses of asbestos paper.

Any portion of such vent pipe which is not readily visible, any portion of such vent pipe erected in the attic space, and any portion of such vent pipe which comes within 3 inches of wood or wooden lath and plaster shall for the purpose of this section be deemed to be concealed.

SECTION 30. LIGHT, VENT AND DUMB-WAITER SHAFTS. In every building hereafter erected or altered, except frame

buildings, all walls or partitions forming interior light or vent shafts shall be built in accordance with the requirements for stair and elevator shafts in new buildings as specified in Section 31. Dumb-waiter enclosures, except those in dwellings shall be of fire-resistive construction, and shall be not less than 3 inches thick if constructed of brick hollow or solid partition blocks, or of steel studded and metal lath with $\frac{3}{4}$ inch of Portland cement plaster on each side; or a 2-inch solid metal lath and Portland cement plaster wall may be permitted, if securely anchored at each floor. The material and method of construction to be as specified for stair and elevator shafts in existing buildings in Section 31. Doors opening into such shafts shall either be small fire doors or solid wooden doors covered with metal.

The walls of all light and vent shafts hereafter erected shall extend not less than 3 feet above the roof level, except that when a shaft is covered by an incombustible ventilating skylight the walls need not extend more than 2 feet above the roof. Masonry walls shall be properly coped.

When metal louvres are used for ventilating purposes, the louvres or slats shall be riveted to the metal frame.

SECTION 31. STAIRWAY AND ELEVATOR SHAFTS.

In all buildings hereafter erected except private dwellings, which are used above the first floor for business purposes or for public assemblage, or for any purpose whatever if over three stories high, the stair shafts shall be separately and continuously enclosed by incombustible partitions. Elevator shafts in all buildings hereafter erected shall be enclosed in the same manner. The partitions shall be constructed of brick or other fireproof material approved by the Chief Building Inspector, and all mortar used in the construction shall be cement mortar. No such hollow partition shall be less than 6 inches thick, no brick partition less than 8 inches thick, and no other solid partition less than 4 inches thick.

Except as herein stated, the stair, elevator or hoistway shafts in all existing buildings over two stories high, of the class described in this

section, shall be separately enclosed by incombustible partitions as above specified; or the shafts may be enclosed by approved hollow or solid partition blocks not less than 3 inches thick, set in Portland cement mortar; or by 4-inch stud partitions, covered on each side with not less than $\frac{3}{4}$ inch of Portland cement plaster on metal lath. All lath used for such partitions shall be of galvanized steel weighing not less than 54 oz. per square yard. Wire lath shall be not less than No. 20 gauge, and sheet metal lath not less than No. 24 gauge. All such partitions erected in existing buildings shall be fire-stopped with incombustible material the full depth of the floor beams at each floor level.

All door openings in stair and elevator enclosures shall be protected by fire doors mounted with wrought iron or steel hardware, and shall be securely attached to the wall or partitions, or to substantial incombustible frames anchored thereto. If glass panels be used in such doors, they shall be of wired glass not exceeding one-third the area of door.

Doors opening into stairway shafts shall swing in the direction of exit travel, shall be self-closing, and shall be at least 36 inches wide.

The enclosure walls for all elevator shafts shall extend at least 3 feet above the roof, and at least three-fourths of the area shall be covered with a skylight constructed as specified in Section 33.

If in the opinion of the Chief Building Inspector it is necessary to preserve an open elevator or hoistway in an existing building, the floor openings through which it passes shall be equipped with automatically closing trap doors not less than $1\frac{1}{2}$ inches thick, made of two thicknesses of matched boards, covered on the under side with tin; the trap doors when closed shall extend beyond the openings on all sides. Such trap doors shall be protected by a substantial guard or gate, which shall be kept closed at all times except when in actual use.

Except in dwellings, no required stairway shall be less than 44 inches wide, and the total width of exit doorways leading therefrom shall at least be equal to the stairways which they serve.

The total width of stairway, interior and exterior, provided for the use of each floor and those above, shall be not less than 44 inches for the first 50 persons, and 12 inches for each additional 50 persons to be accommodated thereby. The stair treads shall be not less than $9\frac{1}{2}$ inches wide, and the risers not more than $7\frac{3}{4}$ inches high. Winders in such required stairways are prohibited. Every school, hospital and theater, over one story high shall have at least two stairways constructed entirely of incombustible material, located remote from each other and continuous from grade line to the topmost story.

All exit doors in schools, hospitals, churches, theaters and other places of public assemblage shall open outward and be of aggregate width as specified in a paragraph of this section.

SECTION 32. FLOOR LIGHTS. Except in dwellings, all openings hereafter made in floors for the transmission of light to floors below, when required to be covered, shall be covered with glass set in metal frames and bars. The glass shall be not less than $\frac{3}{4}$ inch in thickness, and if any glass measures more than 16 inches square there shall be a rigid wire mesh either in the glass or under it. If such openings are not covered over with glass they shall be protected by substantial railing not less than 3 feet high.

SECTION 33. SKYLIGHTS OVER STAIRWAY AND ELEVATOR SHAFTS. Where a stairway, elevator, or dumb-waiter shaft extends through the roof and is covered by a skylight, the skylight shall be constructed with incombustible frame and sash, glazed with ordinary thin glass, and shall be protected by a galvanized steel wire screen with a mesh not exceeding one inch, and the wire not smaller than No. 12 gage. The screen shall have metal supports and shall be placed not less than 6 inches above the skylight. Instead of a skylight, a window may be placed in the side of the shaft above the roof which is farthest removed from a property line. The window shall have incombustible frame and sash, and be glazed with thin glass.

SECTION 34. ROOF OPENINGS. All openings in roofs for the admission of light or air, other than those provided for in

Sections 30 and 33, shall have incombustible frames and sash glazed with wire glass; or ordinary glass may be used, if protected above and below by galvanized steel wire screens with a mesh not exceeding one inch, and the wire not smaller than No. 12 gage. The top screen shall be installed as specified in Section 32.

SECTION 35. AREAWAYS. All areaways shall be guarded with suitable railings, or be protected by incombustible covers or gratings. If gratings be used, they shall have a wire screen of not more than $\frac{1}{2}$ inch mesh securely attached to the underside. Areaways thus protected shall not project more than 4 feet beyond the building line.

SECTION 36. MOTION PICTURE MACHINES AND BOOTHS.

DEFINITION. By the term "Picture Machine" as used in this ordinance is meant any device used to project upon a surface moving pictures of any character which an audience is permitted to view.

CONSTRUCTION OF BOOTH. Every picture machine shall before being operated be installed in a booth or room, either constructed entirely of fireproof materials or rendered proof against fire by having its ceiling and walls protected with asbestos board $\frac{1}{4}$ inch thick covered with sheet iron not less than No. 26 B. & S. gauge. The floor may be of concrete, but if of combustible material must be protected with No. 20 B. & S. gauge sheet iron covered with rubber or cork matting.

The door shall, if of wood, be at least $\frac{3}{4}$ of an inch in thickness, clad with at least No. 28 gauge sheet metal. The door shall swing outward and close automatically, either by means of a spring on the outside or by a metal rope and weight.

Openings for the operator's view or for the projection of the picture shall in no case be larger than 12" x 12" and shall be provided with gravity doors of the same material as specified for the booth. Such doors shall be held open by fusible links and shall not be blocked or held open in any other manner.

Each booth or room shall be ventilated by a metal ventilating pipe not less than 12 inches in diameter, extending outside of the building. In a private assembly hall when the picture machine is operated only

occasionally and for short periods of time the ventilating pipe may be omitted.

SECTION 37. ELECTRICAL INSTALLATIONS. All electrical installations shall be in accordance with the National Electrical Code, and no installation of electrical equipment shall be made, except in conformity thereto.

SECTION 38. PLUMBING AND DRAIN REQUIREMENTS. The plumbing and drainage of all buildings, both public and private, shall be performed in accordance with special regulations of the Building and Health Departments.

PART VI. FIRE PREVENTION.

SECTION 39. FIRE STOPS. At each floor level, in all buildings hereafter erected, all stud walls, partitions, furrings and spaces between joists where they rest on division walls or partitions shall be fire-stopped in a manner to completely cut off communication by fire through concealed spaces to prevent drafts both vertical and horizontal. Such fire-stopping shall extend the full depth of the joist and at least 4 inches above each floor level. See Plate VII.

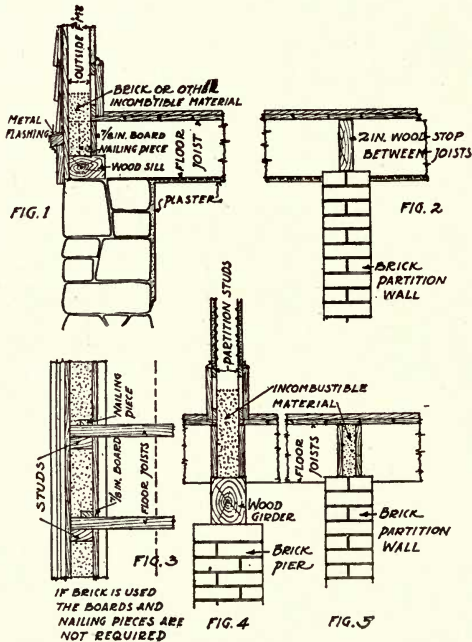


PLATE VII

Figs. 1 and 3—Elevation and plan showing fire-stopping of wall of frame building at line of sill and between studs and floor joists.

Fig. 2—Fire-stopping with timber cut between floor joists on top of brick partition.

Fig. 4—Fire-stopping of partition resting on wooden girder.

Fig. 5—Same as Fig. 2 except that incombustible compressible material between two boards is used instead of a timber.

For all walls furred with wood the masonry between the ends of wooden beams shall project the thickness of the furring beyond the inner face of the wall for the full depth of the beams; or a double course of masonry above and below the beams shall project the full thickness of the furring beyond the face of the wall. In cases where floor beams are parallel to the wall furred with wood, there shall be a space of not less than 2½ inches between such a wall and the nearest beam. This space shall be filled in solid with brickwork, or concrete, for the full depth of the floor beams. See Plate VIII.

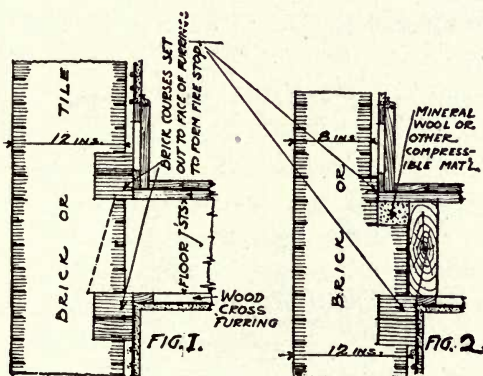


PLATE VIII

Studded-off Space. Where walls are studded-off, the space between the inside face of the wall and the studding at the floor level shall be fire-stopped with brickwork or other approved fireproof material. The beams directly over the studded-off space shall be deadened with not less than 6 inches of fireproof material, which shall be laid on boards cut in between the beams. The under side of such beams shall be protected by covering of metal lath, or plaster board, and plastered to a total thickness of ¾ inch.

When sliding doors are pocketed in partitions care shall be exercised to see that such pockets be completely fire-stopped at top and bottom.

The space between stair carriages shall be fire-stopped at least once in the middle portion of each run, and shall be fire-stopped by a header beam at top and bottom.

SECTION 40. WOODEN BEAMS SEPARATED FROM MASONRY CHIMNEYS. No wooden beams or joists shall be placed within 2 inches of the outside face of a chimney or flue, whether the same be for smoke, air or any other purpose.

No woodwork shall be within 4 inches of the back wall of any fireplace.

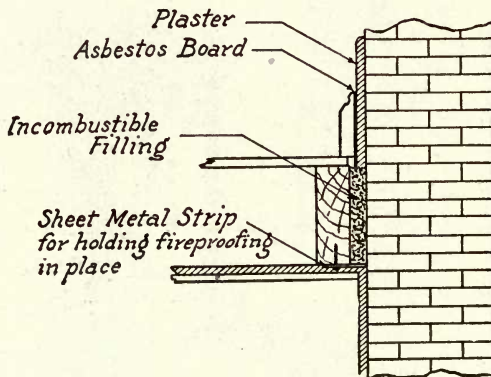


PLATE IX

Detail showing support for fire-stopping around chimney, and protection for woodwork placed next to plaster on chimney brickwork.

All spaces between the chimney and wooden beams shall be solidly filled with refuse mortar, loose cinders, or other incombustible material.

The header beam, carrying the tail beams of a floor, and supporting the trimmer arch in front of a fireplace, shall be not less than 20 inches from the chimney breast.

No wooden furring or studding shall be placed against any chimney; the plastering shall be directly on the masonry, or on metal lathing.

SECTION 41. PROTECTION OF WALL OPENINGS. No opening in an interior masonry wall shall exceed 8 feet by 10 feet. If the opening be in a party or fire wall, it shall have a standard automatic fire door on each side of the wall. If an opening in a fire wall is made to serve as an emergency or horizontal exit, it shall not exceed 48 square feet in area, and a self-closing fire door shall be substituted for one of the automatic fire doors. The total openings in a fire wall shall not exceed 25 per cent of the linear length of the wall.

Every building within the fire limits, except churches, dwellings, tenement houses, dormitories and lodging houses, shall have standard fire doors, shutters, or wired glass in incombustible frames and sash on every exterior opening above the first story, except when fronting on a street not less than 35 feet wide, or where no other building is within 35 feet of such opening. The wall of a building in the same plane as that in which the opening is situated, shall not be considered as coming within the intent of this rule. All openings in the side and rear walls of the first story, except show windows, shall be protected as prescribed in this section when within 35 feet of another building.

SECTION 42. EXITS REQUIRED. The term floor area as used in this section shall mean the entire floor space between exterior walls and fire walls.

In every building hereafter erected, except in private dwellings, each floor area above the first shall be provided with at least two means of egress remote from each other, one of which shall be an enclosed stairway as provided by Section 31, or a doorway in a fire wall leading to another floor area separately provided with adequate stairs or other independent means of exit. Such doorway serving as

an automatic and a self-closing fire door, as specified in Section 25.* No portion of any floor area shall be more than 100 feet from a place of egress. Elevators shall not be considered as a means of egress as specified in this section.†

SECTION 43. SMOKE PIPES. No smoke pipe shall be within 12 inches of any woodwork, or any wood framework and plaster partition or ceiling.

Where smoke pipes pass through a wood and plaster partition, they shall be guarded by galvanized iron ventilated thimbles at least 12 inches larger in diameter than the pipes, or by galvanized iron thimbles built in at least 8 inches of brick work or other incombustible material.

No smoke pipe shall pass through any floor, or a roof having wooden framework or covering, except as prescribed in Section 28.

SECTION 44. HOT AIR PIPES AND REGISTERS. All heater pipes from hot air furnaces where passing through combustible partitions, or floors, must be doubled tin pipes with at least 1 inch air space between them. Horizontal hot air pipes leading from furnace shall be not less than 6 inches from any woodwork, unless the woodwork be covered with loose fitting tin, or the pipe be covered with corrugated asbestos, in which latter cases the distance from the woodwork may be reduced to not less than 3 inches.

No hot air pipe shall be placed in a wooden stud partition or any

*HORIZONTAL EXIT.—As a means of rapid and safe egress from a burning building, the use of horizontal exits through a fire wall or a fire partition is strongly recommended. Such a partition shall be built of fireproof material not less than 3 inches thick, and be securely attached to the walls, floor and ceiling of the room which it sub-divides. It shall be provided with one or more self-closing fire doors, that is, doors which are kept closed by some automatic device. Such a partition would afford an area of quick refuge upon either side. Each area must be sufficient to accommodate all the people employed upon the floor, and must be provided with at least one independent exit to the street. As above indicated, a fire wall may be made to serve the same purpose. As a means of egress a doorway in such a partition or fire wall may be considered the equivalent of three times the same width of stairway.

†SMOKEPROOF TOWER.—The use of a smokeproof tower or stairway is also recommended as one of the best known means of safe escape from a burning building. At the same time it furnishes a protected position from which firemen can attack a fire on any floor. Such a tower is built entirely of incombustible materials, and has no direct openings into the interior of the building it serves. It is reached by a fireproof open-air balcony or interior open-air vestibule, thus effectually excluding smoke and fire from the tower. The entrance at each floor level is protected by a self-closing fire door.

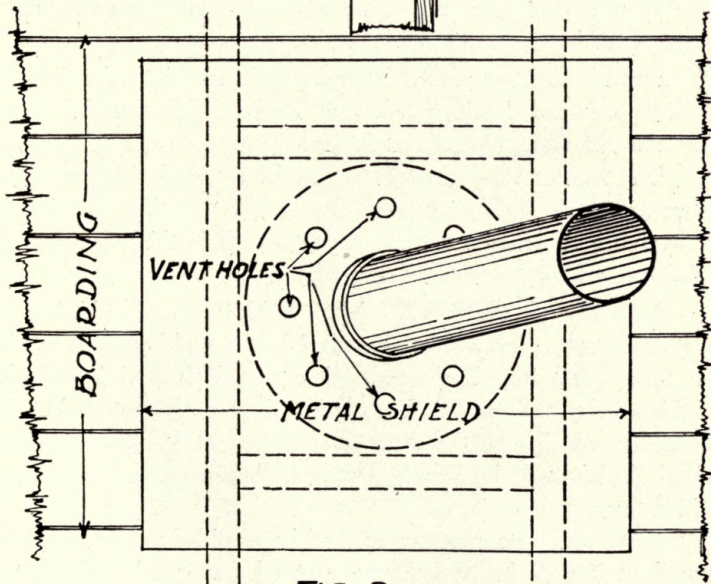
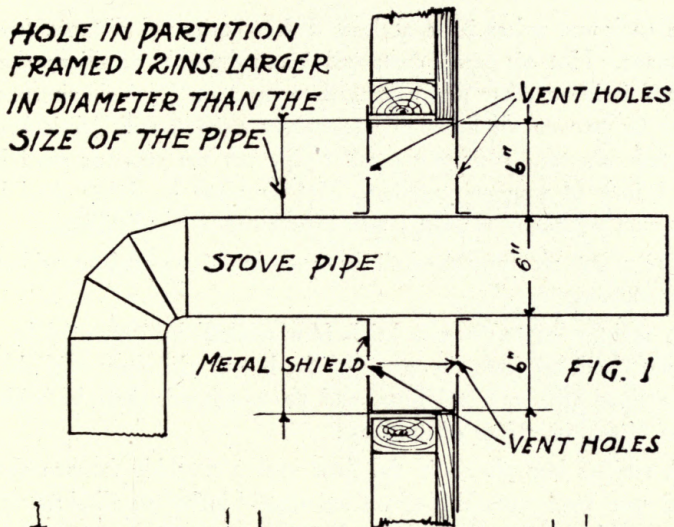


FIG. 2

PLATE X

Fig. 1. Sectional view of protection around a stovepipe passing through a wooden partition.

Fig. 2. Elevation of same device.

wooden enclosure unless it be at least 8 feet horizontal distance from the furnace. Hot air pipes contained in combustible partitions shall be placed inside another pipe arranged to maintain $\frac{1}{2}$ inch air space between the two on all sides, or be securely covered with $\frac{1}{2}$ inch of corrugated asbestos. Neither the outer pipe nor the covering shall be within 1 inch of wooden studding. Hot air pipes in closets shall be double, with a space of at least 1 inch between them on all sides.

Every hot air furnace shall have at least one register without valve or louvres.

A register located over a brick furnace shall be supported by a brick shaft built up from the cover of the hot-air chamber; said shaft shall be lined with a metal pipe, and no woodwork shall be within 3 inches of the outer face of the shaft.

A register box placed in the floor over a portable furnace shall have an open space around it of not less than 4 inches on all sides, and be supported by an incombustible border.

Hot air registers placed in any woodwork or combustible floors shall be surrounded with borders of incombustible material, not less than 2 inches wide, securely set in place.

The register boxes shall be of metal, and be double; the distance between the two shall be not less than 1 inch; or they may be single if covered with asbestos not less than $\frac{1}{8}$ inch in thickness, and if all woodwork within 2 inches be covered with tin.

SECTION 45. STOVES AND RANGES. No kitchen range or stove except as hereinafter prescribed in any building shall be placed less than 3 feet from any woodwork or wood framework and plaster partition, unless the woodwork or partition is properly protected by metal shields, in which case the distance shall be not less than 18 inches. Metal shields shall be loosely attached, thus preserving an air space behind them.

Hotel and restaurant ranges shall be provided with a metal hood, placed at least 9 inches below any wood framework and plaster or wooden ceiling, and have an individual pipe outlet connected with a

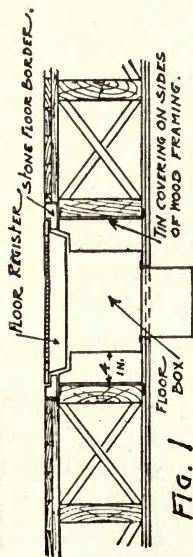
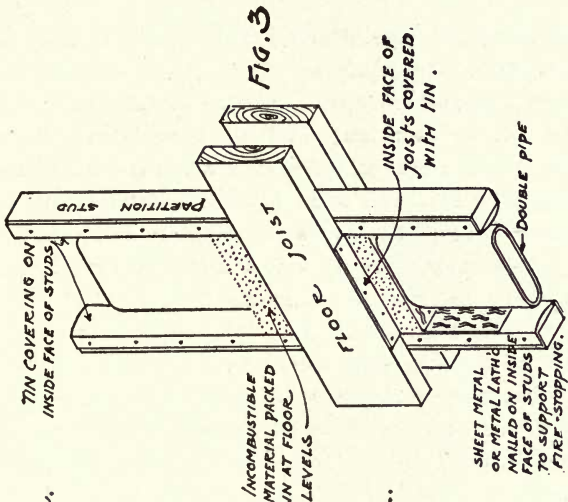


FIG. 1

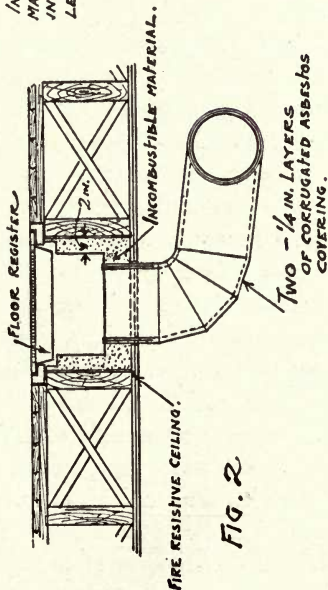


FIG. 2

PLATE XI

Fig. 1—Method of fire-stopping around floor register. Note register box extended to line of ceiling which simplifies installation.

Fig. 2—A more complete method of fire-stopping, and one well suited for existing buildings.

Fig. 3—Isometric sketch showing method of fire-stopping between floor joists around a hot air pipe carried up in a partition.

good brick flue. The pipe shall be protected by at least 1 inch of asbestos covering, or its equivalent.

Low pressure heating boilers, warm air furnaces and similar appliances where hot fires are used shall rest upon entirely incombustible foundations. Where stoves or ranges without legs are carried by wooden floor framing they shall rest upon 6-inch foundations built of incombustible materials supported within the thickness of the floor framing. Such foundations shall extend at least 6 inches on the sides and backs and 24 inches on the fronts of the heating appliances.

All stoves or ranges with legs shall be set on metal mats with $\frac{1}{4}$ -inch asbestos backing which shall extend at least 12 inches in front.

All ranges that are supported by legs and have no ash pan or gas burner nearer than one foot to the floor and on which such gas burners are separated from the floor by sheet metal, may rest directly on a combustible floor.

Where any gas or gasoline burning stove or range is placed against or nearer than six inches to any combustible partition or wall such wall shall be protected by a shield, if in the opinion of the Chief Building Inspector such a shield is necessary, and this shield shall be constructed and placed as prescribed by him.

Gasoline stoves shall always rest on the floor or a permanent foundation and never on boxes, shelves, or a temporary support and shall not be placed in close proximity to wooden shelves, cupboards or other inflammable material. Where the main burner grates are less than two feet above the floor the stove shall have an incombustible closed bottom or it shall rest on an incombustible floor.

SECTION 46. STEAM AND HOT WATER PIPES. No steam or hot water pipe shall be within 1 inch of any woodwork. Every steam or hot water pipe passing through combustible floors or ceilings, or wooden lath and plaster partitions, shall be protected by a metal tube 1 inch larger in diameter than the pipe and be provided with a metal cap. All wooden boxes, or casings enclosing steam or hot water heating pipes, or wooden covers to recesses in walls in which steam or hot water heating pipes are placed, shall be lined with metal.

SECTION 47. DRY ROOMS. No combustible material shall be permitted in the construction of any dry room hereafter erected in which a temperature of 125 degrees Fahr. or over may exist. If a

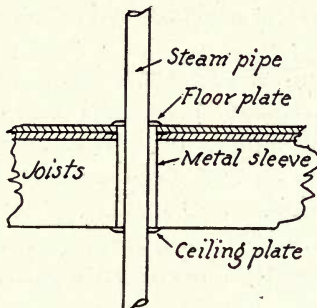


PLATE XII

Steam Pipe Protection Through Floor or Partition.

temperature under 125 degrees Fahr. is to be used, the dry room may be constructed of wood, but it shall be lined throughout with $\frac{1}{8}$ inch asbestos, covered with sheet metal.

If windows are placed in walls or ceilings of dry rooms they shall be of wired glass set in fixed incombustible sash and frames.

SECTION 48. HEATING FURNACES AND APPLIANCES. Any woodwork, wooden lath and plaster partition or ceiling within 4 feet of the sides or back, or 6 feet from the front of any heating boiler, furnace, bakery oven, coffee roaster, fire heated candy kettle, laundry stove, or other similar appliance, shall be covered with metal to a height of at least 4 feet above the floor. This covering shall extend the full length of the boiler, furnace, or heating appliance, and to at least 5 feet in front of it. Metal shields shall be loosely attached, thus preserving an air space behind them. In no case shall such combustible construction be permitted within 2 feet of the sides or back of the heating appliance, or 5 feet in front of same.

Heating boilers shall be encased on sides and top by an incombustible protective covering not less than $1\frac{1}{2}$ inches thick.

No wood or wood lath and plaster above a heating furnace or

boiler shall be closer than fifteen inches to the top of such furnace or boiler, and wood or wood lath and plaster within 24 inches of the top of such furnace or boiler shall be protected by a metal shield loosely attached. Shield to be at least 2 feet, in every direction, larger than furnace.

SECTION 49. OPEN FLAME HEATING DEVICES. All gas, gasoline, oil or charcoal burning stoves or heating devices shall be placed on iron stands at least 6 inches above combustible supports, unless the burners are at least 5 inches above the base, with metal guard plates 4 inches below the burners.

No open flame heating or lighting device shall be used in any room where gasoline or other volatile inflammable fluids are stored or handled.

SECTION 50. GAS PIPES AND APPLIANCES. Gas connections to stoves and similar heating devices shall be made by rigid metal pipes. For small portable gas heating devices, flexible metal or rubber tubing may be used when there is no valve or other shut-off on the device.

All outlets and risers shall be left capped until covered by fixtures.

After all piping is installed and all outlets capped, there shall be applied by the plumber in the presence of the Chief Building Inspector, a test with air to a pressure equal to a column of mercury 6 inches in height, and the same to stand for five minutes; only mercury gauge shall be used. No piping shall be covered, nor shall any fixture, gas heater or range be connected thereto until a card showing the approval of this test has been issued by the Chief Building Inspector.

GAS BRACKETS. All gas burners shall be placed at least twenty-eight (28) inches below any ceiling or woodwork, unless the same is properly protected by a shield, in which case the distance shall be not less than eighteen (18) inches. No gas burner shall be placed nearer than eight (8) inches to any window opening, and all swinging or folding gas brackets shall be provided with stops to prevent them from swinging nearer than six inches to walls or woodwork.

APPENDIX

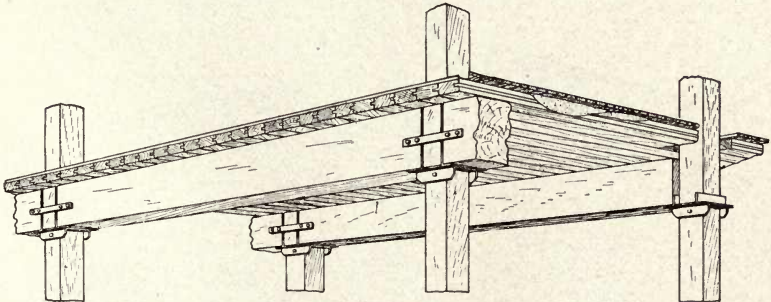
Because the references contained herein are of an educational and explanatory nature rather than in the ordinary line of Building Regulation, they are presented in this section to be used as suggestions for special legislation, and will be found generally useful in connection with the construction and maintenance of Buildings.

Mill Construction

The marked success of early heavy timber structures of the mill construction type led to the popular use of this form of construction in practically all kinds of large buildings. As its use developed, new problems arose which made necessary a departure from the original designs. This variation to suit the case in hand finally resulted in three general classes of framing, each commonly referred to by builders as mill construction. These classes have certain basic points in common, such as heavy timber, brick, stone, or concrete walls; stairways and elevators enclosed in fireproof shafts or towers; floors with no openings or with all openings protected by fireproof covers; each floor or room isolated by means of automatic fireproof doors or fire walls; windows protected by shutters or by the use of wire glass; sprinkler equipment, etc.

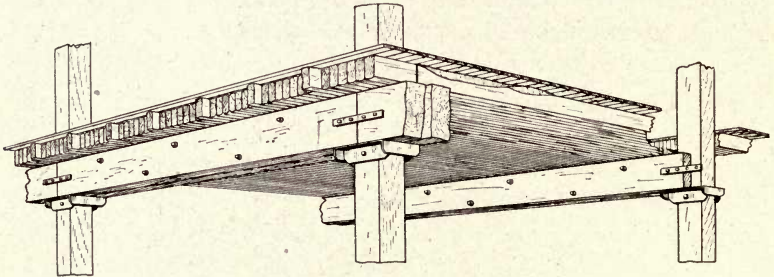
These three general types of framing may be classed as follows:

1. Floors of heavy plank laid flat upon large girders which are spaced from 8 to 11 feet on centers. These girders are supported by wood posts or columns spaced from 16 to 25 feet apart. This type is often referred to as "Standard Mill Construction."



Standard Mill Construction.

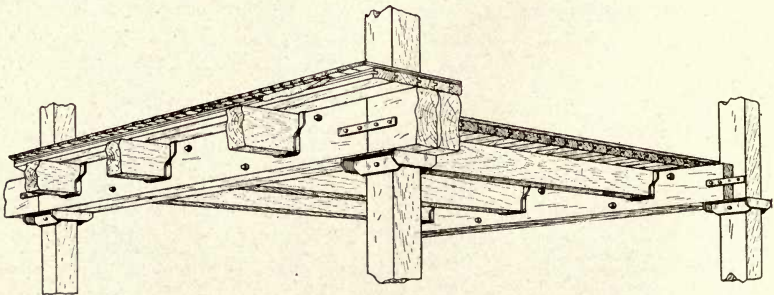
2. Floors of heavy plank laid on edge and supported by girders which are spaced from 12 to 18 feet on centers. These girders are supported by wood posts or columns spaced 16 feet or over apart, depending upon the design of the structure. This type is called "Mill Construction with Laminated Floors."



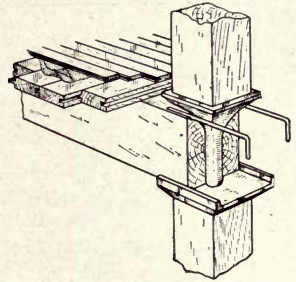
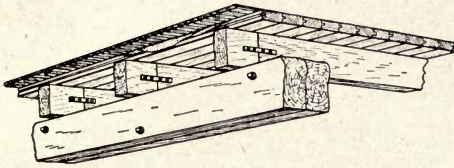
Mill Construction with Laminated Floors.

3. Floors of heavy plank laid flat upon large beams which are supported by girders spaced as far apart as the loading will allow. These girders are carried by wood posts or columns located as far apart as consistent with the general design of the building. A spacing of from 20 to 25 feet is not uncommon for columns in this class of framing where the loading is not excessive. This type is more generally known as "Semi-Mill Construction."

Each of these types is provided with a lighter top-floor to take the wear and give a finished surface.



Semi Mill Construction Beams in Hangers.

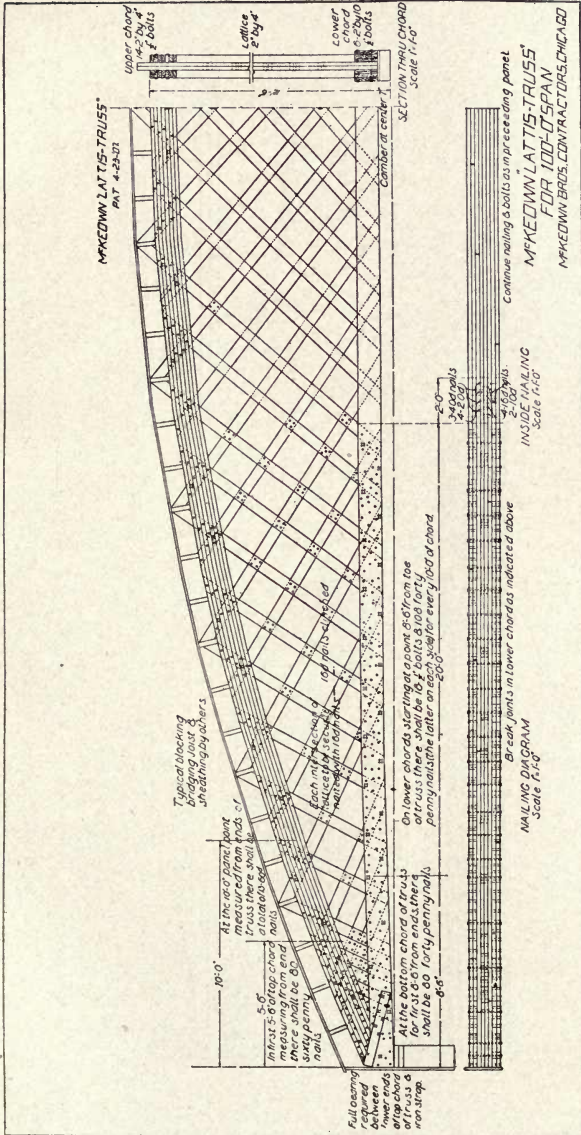


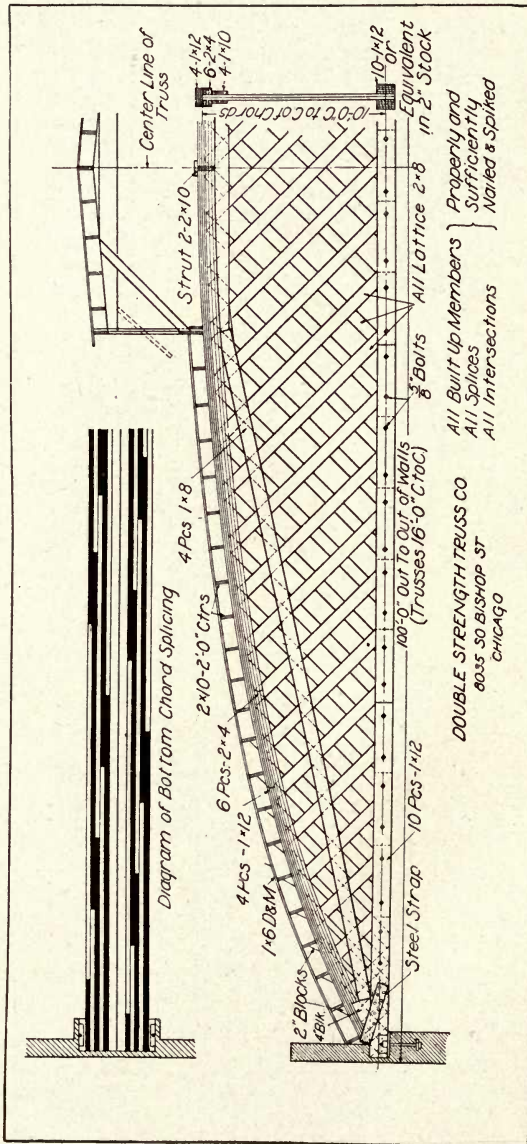
Semi-Mill Construction, Beams on Top of Girders. Use of Cast Iron Pintle Between Posts or Columns.

Wood Lattice Trusses

The wood lattice truss is a type of light roof truss which can be built easily, quickly, and at a low cost. The material can be obtained without delay and handled by local workmen who have not had specialized training. Although light in weight, it is strong and capable of being put into position without elaborate equipment. This truss will span all ordinary lengths between walls without the need of intermediate supports such as posts, columns, interior walls, or piers, providing clear floor space in the building.

These trusses are of two general types as shown in the illustrations. They may be of the parallel chord type, or may have a curved upper chord. The size of stock used in the upper and lower chords varies from 2 in. by 4 in. to 2 in. by 12 in., depending on the size and design of truss. The lattice members vary in size from 1 in. by 6 in. to 2 in. by 8 in. Ordinary lengths of material may be used.





A 100-Ft. Span "Double Strength Truss," Showing Support for Monitor.

This type of construction has been widely used in the following classes of buildings:

Armories	Gymnasiums
Army Recreation Buildings	Hangars
Assembly Halls	Ice Plants
Automobile Salesrooms	Laundries
Bakeries	Livery Barns
Banks	Locker Rooms
Barns	Lodge Halls
Billiard Rooms	Monument Works
Boiler Houses	Naval Station Buildings
Bowling Alleys	Offices
Brick Dryers	Packing Houses
Cantonment Buildings	Printing Shops
Car Shops	Railroad Buildings
Churches	Refrigeration Buildings
Club Houses	Riding Academies
Coliseums	Schools
Cooperages	Shipbuilding Plants
Court Houses	Shooting Galleries
Dairy Buildings	Skating Rinks
Dance Halls	Stables
Factories	Stair Works
Farm Buildings	Storage Buildings
Feed Stores	Stores
Foundries	Studios
Galvanizing Works	Turner Halls
Garages	Warehouses

Preservative Treatment of Timbers

All surfaces of wooden girders, beams or joists entering walls and surfaces butting each other or having bearing on posts or caps should be given two (2) brush applications of hot refined creosote.

If such buildings are unheated the ends of all wooden columns

shall be given two (2) brush applications of hot refined creosote and a piece of heavy tarred felt shall be used under the lower ends of basement and first floor columns.

The top and ends of the first floor joists, beams or girders in unheated buildings, shall be given two (2) brush applications of hot refined creosote.

Good Paints

The property owner should remember that it is a very good business proposition to keep buildings of all types well painted. By so doing, the value of the property is greatly increased. Application of good paint will prevent decay and if occasionally renewed will preserve wood almost indefinitely. Striking illustrations of the truth of this statement are afforded by the condition of those well painted, century-old buildings to be found throughout the United States. Moreover, paints not only decorate and preserve wood, but they make it more resistant to fire. For instance, prepared paints contain 80 to 70 per cent of non-combustible, metallic or mineral pigments, and may therefore be termed fire-resisting.

SPECIFICATIONS FOR DURABLE WOODEN SHINGLE ROOF

ROOF PITCH

Not less than one-fourth pitch.

RAFTERS

2 x 4s or 2 x 6s spaced not over 2 feet on centers. Size and spacing according to load; braced and nailed solid.

ROOF BOARDS

Good grades SIS strips, 1 x 4 in. or random widths, not over 8 in. wide, spaced 2 inches apart, nailed solid, using 8d nails.

SHINGLES

Best grade—not over 5 inches wide and no less than 5 shingles to 2 inches in thickness measured at the butts.

PREPARING SHINGLES

Shingles should be thoroughly wet before laying if not to be stained.

STAINING SHINGLES

Shingles must be dry before dipping. Dip in stain to at least 8 inches from butt.

EXPOSURE OF SHINGLES

Sixteen inch shingles one-third pitch or more, $4\frac{1}{2}$ inches to weather.
Less than one-third pitch, 4 inches to weather.

SHINGLE JOINTS

Break joints not less than $1\frac{1}{4}$ inches. No breaks to come directly over each other on any three consecutive courses, covering all nails.

LAYING SHINGLES

Lay first course 2-ply projecting 2 inches over crown mold and 1 inch projection at gables.

NAILS

$3\frac{1}{2}$ d or 4d galvanized cut iron nails. Two nails to each shingle.

WHAT "1/4 PITCH" MEANS

Assuming that a roof slopes equally from the ridge toward either plate, one-fourth of the total distance from outside of plate to outside of plate in the dimension for height of ridge from top plate if "one-fourth pitch" is desired. This actually gives a rise of six inches in one foot for the slope of the roof, i. e.:

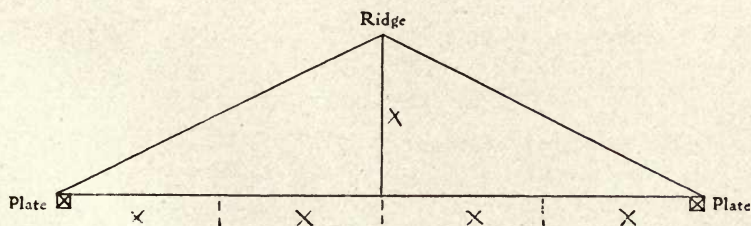


Diagram showing how to determine "1/4 pitch"

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MEMORANDUM

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