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Federal Housing Administration

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MINIMUM CONSTRUCTION REQUIREMENTS

FOR

NEW DWELLINGS

LOCATED IN THE
NORTHERN CALIFORNIA DISTRICT

REVISED OCTOBER 15, 1938

FEDERAL HOUSING ADMINISTRATION
SAN FRANCISCO, CALIFORNIA
MINIMUM CONSTRUCTION REQUIREMENTS
FOR
NEW DWELLINGS
LOCATED IN NORTHERN CALIFORNIA DISTRICT
THE SAN FRANCISCO INSURING OFFICE

INTRODUCTION

1. The requirements contained herein provide a Minimum Standard of Construction and shall apply to all new construction on which the mortgage is insured by the Federal Housing Administration. They are considered necessary to produce a well-constructed dwelling which will serve as sound security for a long-term mortgage loan. Since these requirements are essentially minimum, they are not to be built down to but form a basis from which to build up. This Administration will recognize and give credit to all construction that exceeds these Minimum Construction Requirements.

2. The Federal Housing Administration has used the recommendations of the National Bureau of Standards, U. S. Department of Commerce; the Forest Products Laboratory, U. S. Department of Agriculture; and the Public Health Service, U. S. Treasury Department as a basis for these requirements.

3. No attempt has been made to make these Minimum Construction Requirements comply with local building code regulations because of the variation, generally, in building code requirements. However, strict compliance with the Uniform Building Code of the Pacific Coast Building Officials' Conference and the local building code requirements and sanitary regulations will be required in all cases where such requirements and regulations provide for a higher standard than these minimum requirements. The highest requirement, whether in the local building codes and regulations, the Uniform Building Code of the Pacific Coast Building Officials' Conference, these Minimum Construction Requirements, or the plans and specifications, shall govern.

NOTE.—These requirements do not eliminate the necessity of providing complete specifications in connection with new construction.

4. When special or unforeseen conditions such as water conditions in excavation arise during construction, which require additional precautions, the Chief Architectural Supervisor of the San Francisco Insuring Office may require extra work necessary to correct these conditions before the mortgage is endorsed for insurance.

SPECIAL NOTE.—If such conditions arise and the Construction Contract makes no provision for the performance by the Contractor of the required necessary work, the Mortgagor shall require the Contractor to perform such necessary work, adjusting the contract price if necessary.

5. The requirements contained herein apply only to conventional types of construction. Plans and specifications calling for methods of construction at variance with but equal to these Minimum Construction Requirements must be approved by the Chief Architectural
Supervisor of the San Francisco Insuring Office, and it is preferred that they be prepared by a competent architect licensed to practice in the State of California.

6. The substitution of materials equal to or better than those called for in the requirements or in the specifications will be permitted when the intent and objectives of these requirements are attained by such substitution.

7. Dwellings of special types, such as prefabricated houses, will be treated as special cases and each individual property will be considered on its own merits.

EXCAVATION

1. Excavation for all foundations shall extend to solid ground. If, upon excavation, other than solid ground is encountered, the footings shall be redesigned and details of same shall be submitted to the San Francisco Insuring Office of the Federal Housing Administration for approval.

2. Depth of excavation for foundations and piers shall be as provided by local building code regulations, and in the absence of a specific regulation, they shall be carried below natural grade, or finish grade if lower than natural grade, at least 8 inches for 1-story, 12 inches for 2-story, and 16 inches for 3-story structures.

3. In localities where severe freezing occurs, excavation shall be carried below the frost line.

4. All debris, such as stumps, roots, vegetation, and wood scraps, occurring within the building area shall be removed. The ground level shall be at least 18 inches from the bottoms of floor joists and at least 12 inches where pressure-treated lumber, grade-marked Foundation Grade Redwood, concrete joists, or metal-floor construction is used. (See "Termite Prevention", Paragraph 1 (b).)

5. Rough and finished grading shall be brought to levels shown on the drawings. Finish grade shall slope to drain away from the building at least 5 feet except where there is provided adjoining the building, paving or protected areaway to divert surface water from the building. All backfilling adjacent to the building shall be placed in layers approximately 12 inches in thickness. Each layer shall be puddled and tamped before additional layers are placed.

6. Where the entire space under the structure is below finish grade, satisfactory provisions shall be made to keep the area dry.

MASONRY

A. General.

1. Concrete walls, footings, and slabs—mixture shall be as follows:

(a) For plain concrete—1 part portland cement, 7 parts aggregate consisting of clean, sharp, and properly proportioned sand and gravel or crushed stone.

(b) For reinforced concrete—1 part portland cement, 6 parts of clean, sound, uniformly graded sand and crushed rock or gravel, of which not less than 45% nor more than 55% shall pass through a 1/4-inch mesh screen.

(c) Water content shall be not more than 7 gallons of water per bag of cement.
(d) The aggregate shall be clean and free from loam and other foreign matter.
(e) All poured concrete shall be properly cured.

NOTE.—In dry weather forms shall be left in place and concrete kept continuously wet for 7 days. In cold weather due precautions shall be taken to prevent freezing.

2. Sand.—Bank sand shall not be used, either in concrete or in mortar unless the proportion of portland cement is increased as may be required by the Chief Architectural Supervisor.

3. Mortar.—Mortar used for all masonry (except adobe) below grade shall be a cement mortar mixture of 1 part portland cement, 3 parts sand. Not more than 15% of the cement may be replaced by an equal volume of lime hydrate or screened lime putty.

4. Mortar for all other masonry work (except adobe) shall contain at least 1 part portland cement, ½ part lime putty to 4 ½ parts sand, by volume, or shall be an approved prepared mortar mixed and used according to manufacturer's directions. If lime is not used, the mix shall be 1 part portland cement to 3 parts sand.

5. Retempering of mortar will not be permitted.

6. Floor finish.—Topping, except for integral finish, shall be 1 part portland cement and 3 parts sand.

7. Masonry walls shall be constructed of hard-burned brick, stone, poured concrete, thoroughly cured concrete units, or hard-burned structural clay tile. The use of other masonry materials, including less hard-burned brick and structural clay tile, adobe units, second-hand brick, and masonry veneer materials less than 4 inches thick must be approved by the Chief Architectural Supervisor of the San Francisco Insuring Office.

B. Footings.

1. All footings shall be designed to distribute sufficiently the superimposed load to the particular type of soil upon which they bear.

2. All footings shall be of concrete, level in each run, and may be stepped on sloping sites. Unless approved otherwise, height of steps shall not exceed 2 feet. (See detail.)

3. Where soil conditions prevent sharp cut trenches for footings, side forms shall be used. Forms shall be removed before building is closed in.

4. The minimum dimensions of footings shall be as follows:

   (a) Under trench walls and basement foundation walls: thickness 8 inches; width, at least 8 inches wider than the wall above.

   (b) Under 1-story dwellings containing no basement: 6 inches thick, 3-inch projection on each side of wall.

   (c) Under piers, columns, posts, and bearing partitions: thickness at least 8 inches; area designed to equalize and bear the load.

   (d) Under chimneys: 12 inches thick; 6-inch projection on all sides.

   (e) Under retaining walls: thickness twice the projection, but in no case less than 8 inches; width, at least 50 percent wider than the thickness of the wall at the top of the footing.
5. Footings and foundation walls may be combined provided the minimum dimensions herein required are not decreased and that the line of action of the load falls within the middle third of the section.

6. Footing drain tile, where used, shall be covered with 12 inches of porous material such as gravel, etc., with provision for draining water away from the building by connecting tile to dry well, sewer, or by other means.

C. Foundations.

1. In no case shall the foundation wall thickness be less than that of the wall supported.

2. Tops and bottoms of foundations shall be level.

3. On sloping sites, foundation walls may be stepped provided each step on the top of the wall overlaps the step on the bottom by a distance not less than the average depth of wall.

4. Foundation walls supporting masonry walls shall be not less than 12 inches thick nor less than 4 inches thicker than the wall supported.

5. Foundation walls of poured concrete supporting wood frame structures may be 6 inches thick not over 3 feet high for one-story structures and 8 inches thick not over 7 feet high for two-story structures.

6. Foundation walls supporting masonry veneered wood frame walls shall be increased the full thickness of the veneer and in no case shall the foundation wall thickness be less than 10 inches for its full height. A bearing ledge shall be provided for the veneer at least 1 inch below the bottom of the wood sill.

7. In all other cases the foundation wall thickness shall be not less than 12 inches if of masonry, or not less than 10 inches if of poured concrete.

8. Where foundation walls are built of hollow units, a continuous concrete grade beam not less than 8 by 12 inches shall be installed for bearing under the first floor joists. Beam shall be reinforced with not less than four $\frac{3}{8}$-inch bars.

Note.—Foundation walls and basement bearing partitions, when constructed of structural clay tile, shall have all corners and intersections of partitions with foundation walls constructed of vertical cell corner blocks, or of solid brick. All openings shall have jambs constructed of vertical cell blocks, or solid brick.

When foundation walls are constructed of vertical cell masonry blocks, the sill of all window openings shall be constructed of solid masonry units or solid masonry materials.

9. Pilasters not less than 4 by 16 inches shall be constructed to form piers under the ends of all girders framing into 8-inch-thick foundation walls built of masonry units and poured concrete walls less than 8 inches in thickness and shall be bonded into the wall. Pier construction shall be as follows:

(a) When the foundation walls are of hollow concrete block construction, the top 8 inches of the pier shall be of solid masonry material.

(b) When the foundation walls are of structural clay tile, the pier shall be constructed of brick extending from footing to girder.
10. Foundation walls and piers supporting frame construction shall extend not less than 6 inches above the adjoining finish grade and, except as permitted under “Wood Framing; B. Exterior Walls”, Paragraph 10, shall extend to sill directly under floor joists.

11. Post piers shall be of concrete and shall be of the following minimum size: 12 inches square at the bottom and 8 inches square at the top. Top shall project at least 6 inches above ground. (See detail.)

12. Earth fills under floors or porches in connection with buildings shall be retained by adequate concrete walls.

13. Retaining walls and foundations acting as retaining walls shall be designed as such and shall be adequately reinforced. Nonbearing retaining walls not over 5 feet high and not exceeding 8 feet in length between lateral supports may be of plain concrete 6 inches thick on top, increasing 1 inch in thickness for each foot of height.

14. All masonry chimneys shall have foundations of masonry or concrete which shall rest on solid ground, shall extend below the level of footing of main foundation walls adjoining the area where the chimney is located, and where chimneys occur in outside walls or inside bearing walls the footing shall be bonded with the wall footing.

15. For building sites on adobe, filled ground, or other unstable soil, where it is impracticable to excavate foundation trenches to stable bearing soil, foundations shall be adequately reinforced with continuous steel and, if conditions require, shall be underpinned with concrete or masonry piers to firm, stable bearing.

16. A continuous reinforced concrete slab resting directly upon the ground, with curtain walls of adequate thickness and depth extending sufficiently above and into the ground to protect against dampness and erosion, may be used on firm, reasonably level and well-drained soil. The preparation of the slab bed and the construction and dampproofing of the slab shall be subject to approval by the Chief Architectural Supervisor.

17. An opening of not less than 18 by 24 inches shall be provided to each space under wood or metal floor construction and under concrete slabs where piping, duct work, etc., requiring periodic inspection or repair are located.

18. Openings shall be installed in the foundations or exterior walls below the first floor to provide cross-ventilation in all unexcavated spaces in every building in which the floor is of timber or metal construction. The ventilating area of the opening shall equal 1 square foot for each 15 lineal feet of exterior wall or major fraction thereof, with one opening of at least 1 square foot area within 5 feet of each corner of the exterior walls. Openings shall be covered with copper or galvanized-iron screen of not more than ¼-inch mesh. Openings will not be required to be placed in the front wall if adequate cross-ventilation is provided otherwise.

19. Foundations for exterior stairs, areaways, and porches shall be adequately bonded or anchored to main walls.

D. Exterior Masonry Walls.

1. Masonry, concrete, and adobe structures shall be designed and constructed to provide adequate and effective resistance to lateral forces, in conformity with a structural design based on a sound engineering analysis.
2. Exterior masonry walls of other than solid reinforced concrete shall be not less than 8 inches thick in the upper story and not less than 12 inches thick in other stories. Walls shall be capped at top of each story with a continuous adequately reinforced concrete belt course into which joists shall be anchored. (See “Wood Framing: A. Floors, Ceilings, and Roofs”, Paragraph 10.) Wall plate for rafters shall be anchored by bolts spaced not more than 4 feet o. c.

3. If masonry walls are faced with brick or stone or other masonry materials, the total wall thickness shall be not less than 10 inches.

4. Where veneer is applied to masonry walls, bond shall be obtained by the use of headers or approved noncorrodible metal ties.

5. Proper provision shall be made for adequate bonding and anchoring together of all intersecting concrete and masonry walls.

6. At least 4 inches of solid masonry construction or other suitable material securely anchored to masonry walls shall be provided for bearing under all floor joists framing into masonry walls.

7. Masonry veneer applied to wood frame walls shall have a nominal thickness of not less than 4 inches and a height not more than 35 feet, and veneer shall be anchored to the wood frame with approved noncorrodible metal ties spaced vertically 12 inches or less for brick and at each course for stone, and not more than 16 inches o. c. horizontally. Hot dipped galvanized 30-penny nails will be acceptable as anchors for brick. The use of veneer, other than 4 inches of brick, must be approved by the Chief Architectural Supervisor. In all cases, the wood construction shall be covered with waterproof building paper or asphalt saturated felt.

8. Joints between masonry units shall be not over 3/8 inch thick. All masonry joints in walls built of solid units shall be filled solid. All outside and exposed inside joints on the surface of the walls shall be flush, weathered, or tooled unless approved otherwise by the Chief Architectural Supervisor.

9. All parapet walls shall be capped with corrosion resisting sheet metal, concrete, terra cotta, tile, or stone coping.

10. Supporting lintels or properly designed masonry arches which will adequately support the loads will be required in the heads of all openings in masonry and masonry veneered walls.

11. In masonry buildings, all exterior walls above basement which are to be plastered on the inside, shall have a damp-proof coating under the plaster, or shall be furred.

12. The Chief Architectural Supervisor may require the employment by owner or builder, of an experienced and licensed structural engineer, architect, or properly qualified inspector to check the installation of form work, reinforced steel or structural steel, and to give constant supervision to the installation of unit masonry or poured concrete construction, in connection with all work seriously affecting structural safety. Such structural engineer, architect, or inspector shall deliver to the San Francisco Insuring Office adequate reports and shall certify as to compliance with drawings and specifications, building code, and Federal Housing Administration requirements.
E. Chimneys.

1. Chimneys shall be lined throughout with fire-clay flue lining, except that in chimneys having solid brick walls 8 inches or more thick, the flue lining may be omitted. Minimum flue sizes for heating plants, 8½ by 8½ inches; fireplaces, 8½ by 13 inches. Circular flues of equivalent effective area will be acceptable.

2. Flues for all gas-fired unit heaters shall be constructed of masonry or of not less than 20-gauge noncorroding sheet metal with an area not less than 32 square inches, properly insulated with asbestos or other acceptable fireproofing material; or may be terra cotta "patent" flues or approved rigid asbestos-cement composition and shall extend through the roof. Vents for gas-burning hot water heaters shall not be connected to kitchen flues, but may be connected into a gas-fired furnace flue provided the connection is below the breeching of the house heating unit.

3. Chimneys for oil-burning installations shall be faced on the inside with fire brick from bottom of inlet to such height as may be required by the Chief Architectural Supervisor. In no case will the required height be more than 8 feet.

4. In chimneys containing three or more flues, each group of two flues shall be separated from the other single or groups of two flues by brick withes not less than 3½ inches wide. Where two flues are grouped without withes, the joints in the respective flue linings shall be staggered.

5. Every masonry or concrete chimney and every fireplace shall be adequately reinforced and anchored to the structure. (See detail.)

6. In lieu of specific structural design, every chimney shall be reinforced vertically with at least 6 one-half-inch round bars, placed before concrete is poured, hooked into foundations and extending unbroken the full height of the chimney and hooked into the concrete cap slab. When a chimney is reduced to 900 square inches in plan area, only 4 vertical bars are required to be extended above the smoke chamber. Horizontal ties of ¼-inch round bars, carried continuously around the chimney, outside the vertical bars and 2 inches from the outside face, shall be spaced approximately 24 inches apart and imbedded in mortar joints. (See detail.)

7. Every chimney which is entirely or partly outside an exterior wall shall be anchored to the floor joists at every floor level and to the roof construction. Anchorage at each level shall be at least two ½-inch steel bars or straps, cast into a reinforced concrete slab covering the full cross-sectional area of the chimney and extending 3 feet into or over the floor or roof construction and bolted to or hooked over the joists or roof rafters. Concrete slabs at anchorage levels and chimney top shall be not less than 5 inches in thickness; shall extend beneath all hearths and cover the full cross-sectional area of the chimney, exclusive of flues, stucco, or outside 4 inches, if walls are 8 inches thick; and shall be reinforced with not less than ¾-inch round bars spaced 6 inches on centers both ways. (See detail.)

8. All fireplaces shall have hearths supported on fireproof construction. (See detail.) Hearths shall project at least 20 inches, measured from the chimney breast, and the width shall be not less than the width of the fireplace opening plus 20 inches.
9. Open fireplaces shall be constructed with smoke chambers and throats and shall be lined with fire brick or other materials approved by the Chief Architectural Supervisor. The depth of the fireplace shall be approximately one-half the width of the opening. The effective area of the flue shall be not less than \( \frac{1}{10} \) of the area of the fireplace opening. When an ash dump is provided, ashes shall empty into an enclosed chamber of fireproof material provided with a metal clean-out door. (See detail.)

10. Chimneys shall be properly flashed to make joints with walls and roofs weathertight.

11. All chimneys shall extend not less than 2 feet above the highest ridge.

F. Cement Floors, Driveways, and Walks.

1. Garage, terrace, and porch floors, walks, and driveways, if of concrete construction, shall have a minimum thickness of \( 3\frac{1}{2} \) inches and shall be properly surfaced and shall have a hard finish. Slabs shall be laid on a bed (2 inch minimum thickness) of gravel, crushed rock, or other approved material. At least the bottom step of exterior wood stairs or basement stairs shall be of concrete or masonry on a concrete slab, with footings carried down to firm soil.

2. Terrace and porch floor slabs, when supported on trench walls or foundations, shall be adequately anchored to the main foundation wall.

3. Garage floors shall have an approved expansion joint between the driveway slab and the concrete apron at the garage door. Driveways over 30 feet in length shall have expansion joints not more than 30 feet o. c.

4. All outside brick steps shall be of hard-burned brick or approved paving brick. Common “salmon” or soft brick will not be accepted for treads, platforms, terraces, or for exterior use.

5. Exposed concrete and masonry floors and steps supported on wood construction shall rest on an adequate membrane flashed up on all intersecting walls so as to prevent moisture penetrating to woodwork or under the structure.

6. Basement or cellar floor slabs may be 3-inch concrete finished monolithic. Where floor drains occur, floor shall slope slightly to drain.

7. All openings in basement floors shall have covers which shall be flush with the finish floor.

8. When the heating plant is located above the basement, the floor area where the heating plant is located shall be finished with concrete 3 inches thick, or with other noncombustible material. Chamfer tops of floor joists when concrete is used on wood construction, or set floor joists down to allow for slab construction on top of the subfloor.

9. Tile floors supported on wood construction shall have concrete underfloor not less than 2 inches thick. Slabs under shower baths shall be adequately waterproofed. When boarding supporting the underfloor is let down between the joists, chamfer tops of joists.

10. All downspouts or leaders emptying on grade shall have splash blocks constructed of concrete or other approved material so placed as to carry the rain water at least 3 feet from the building.
DAMPROOFING

1. Cellar, basement, and furnace pit shall be constructed to be dry, and when they occur in localities where dampness exists or water penetration impends, shall have walls and floors waterproofed.

2. In cases where subsurface water exists under pressure, walls below grade, and floors shall be adequately designed, reinforced, and constructed to be watertight.

3. Basement wood floors over concrete slabs shall be adequately protected against dampness and rot. The following or equivalent methods will be approved:

   \[(a)\] Slabs shall be dampproofed by mopping with asphaltic compound or by other means approved by the Chief Architectural Supervisor of the San Francisco Insuring Office. Preservative-treated wood sleepers, \(1\frac{3}{16}\) inches square and 16 inches o. c. shall be anchored to the slab.

   \[\text{Note.} - \text{Subfloor laid thereon shall be of treated lumber. (See "Termite Prevention", Paragraph 1 (b) for lumber-treating requirements.)}\]

   \[(b)\] Finished flooring shall have edges oiled or otherwise satisfactorily primed and shall be laid directly on concrete slab in a full bed of hot asphaltic compound.

ADOBE CONSTRUCTION

1. General provisions governing masonry walls shall apply to adobe brick walls, except as otherwise herein provided.

2. Adobe walls shall be constructed of approved units in conformity with detailed designs and under competent supervision.

3. Adobe brick in exterior walls shall be rendered water-resisting by mixing asphalt emulsion with the aggregate or by other approved treatment applied to individual units or shall be protected with \(\frac{3}{4}\) inch of cement plaster reinforced with 16 gauge 2-inch or 18 gauge 1-inch mesh, galvanized after fabrication, applied over approved waterproofing or waterproof building paper. Brick shall be thoroughly cured.

4. Brick samples taken from the job shall be tested in compression and shear and for absorption, by an approved engineering laboratory. Such tests shall be at the sole expense of the applicant, and copies of reports shall be sent direct to the San Francisco Insuring Office by the testing laboratory.

5. Adobe brick shall show an ultimate strength of at least 350 pounds per square inch in compression and 40 pounds per square inch in shear. Designed working stresses shall not exceed the following in pounds per square inch:

   \[
   \begin{align*}
   \text{Compression} & : 35; \quad \text{Shear} : 4 \text{ pounds}; \quad \text{Tension} : \text{zero}. \\
   \end{align*}
   \]

6. Adobe structures shall not exceed 2 stories in height. Height of adobe walls shall not exceed 10 times their thickness and shall not be less than the following thickness:

   \[
   \begin{align*}
   \text{Exterior} & : \text{Top story, 18 inches; lower story, 2 feet.} \\
   \text{Interior} & : \text{Top story, 12 inches; lower story, 18 inches.} \\
   \end{align*}
   \]
7. Mortar for adobe walls may be similar in composition to the adobe brick. Time shall be allowed in laying up for equalizing of settlement and drying of mortar. Laying shall be done in uniform stages throughout the structure.

8. Footings for adobe walls shall be specifically designed and proportioned with relation to actual bearing capacity of the soil at the site. (See Masonry B. Footings.) Weight of walls shall be assumed as 100 pounds per cubic foot. Footings shall be reinforced with not less than two 3/8-inch round bars.

9. Foundation walls shall be of concrete to a height of at least 6 inches above finished grade and thick enough to provide full bearing for the wall plus at least a 3-inch bearing for first floor slab or redwood sill bolted 6 feet o.c. for joists. (See Masonry C. Foundations.)

10. Adobe walls shall be positively bonded to concrete bearing surfaces and shall be capped at each story height with concrete at least 6 inches thick, the full width of the wall, reinforced with at least two 3/8-inch round bars embedded at least 3 inches in the concrete. Walls shall be allowed to settle before caps are placed.

11. Plates for fastening roof and ceiling construction to wall caps shall be bolted to the concrete caps not more than four feet on centers with 1 1/2-inch by 8-inch bolts.

12. Interior partitions of stud construction may be used. Such, if bearing partitions, must be on continuous concrete foundations. All stud partitions in contact with adobe walls shall be anchored thereto with not less than three perforated galvanized strap anchors with hooked ends embedded in the adobe wall at least ten inches.

13. All timber and woodwork in contact with adobe construction or concrete below the first floor shall be protected as required under "Termite Prevention", Paragraph 1 (b). All other wood construction and wood work may be brush or spray-treated.

14. All lintels exceeding a clear span of 4 feet shall be of steel or reinforced concrete.

15. There shall be no pipes or chases in walls, except for reinforcing steel unless walls are thickened accordingly. Water and drainage pipes shall not be chased into walls unless adobe is thoroughly stabilized (see Paragraph 3 above). Unstabilized walls shall be protected by overhanging roofs.

16. One-story dwellings of simple straightforward design and generally rectangular plan, not exceeding 800 square feet of floor area inside of the exterior walls may be built without subjection to structural analysis provided the following additional requirements are met:

(a) The aggregate widths of openings in each length of wall shall not exceed 35% of the length of the wall and no pier nor section of wall less than 3 feet long between openings shall be considered as wall section. Niches and recesses in walls shall be considered as openings.

(b) The height of any adobe brick wall above foundation shall not exceed 9 feet. Gable ends shall be wood frame construction or may be of adobe not less than 12 inches thick capped with concrete and reinforced vertically as provided for walls in Paragraphs (d) and (e) following.

(c) The length of any wall between abutting cross walls shall not exceed 25 lineal feet unless such wall is given satis-
factory additional support by buttresses or thickening of the wall.

(d) Each adobe wall shall be reinforced with 3/8-inch round steel bars running continuously from footing to wall cap, placed at each corner, at each side of each window and door opening and not over six feet apart on each side of the wall with bars staggered on opposite sides of wall. Ends of bars shall be anchored and cast into footing and wall cap.

(e) Concrete wall cap shall be 8 inches thick full width of wall, and reinforced with two 3/8-inch round steel bars 1 inch from the top surface and two similar bars 1 inch from the bottom surface. Bars shall be laid and tied as called for under Paragraph 10 above.

(f) Roof rafters or ceiling joists shall be solidly diagonally sheathed.

(g) Roof rafters and ceiling joists shall be securely spiked to wall plate, and where possible spiked together.

STRUCTURAL STEEL AND IRON

1. All structural steel and iron shall be so designed as to comply with the requirements of the local building code. When no local regulations exist, the requirements of the Uniform Building Code shall apply.

2. Connections shall be riveted, bolted, or welded, and shall be so designed as to fully develop the strength of the structural members. Bearings of steel beams and girders on masonry walls shall extend at least 4 inches into the wall, and shall be solidly bedded in portland cement mortar. Bearing plates shall be designed to carry the load and shall have a minimum thickness of 7/8 inch.

3. All steel or cast iron columns shall have flanged bases and caps. Loose shims between column caps and beams or girders will not be acceptable. Bases of columns shall be securely anchored by anchor bolts, or by embedding in concrete.

LUMBER

1. All softwood lumber shall bear the official grade-mark and symbol of the Association recognized in the trade as covering the particular species. All grade marking shall be done under the supervision of:

(a) The manufacturers’ association responsible for the grading standards for the species involved; or

(b) An inspection bureau recognized and authorized by the manufacturers’ association responsible for the grading standards, to grade according to such rules.

This requirement shall not apply to millwork or interior finish. (The word “softwood”, as used herein, shall be interpreted to include Douglas Fir, White Fir, Tidewater Red Cypress, Western Larch, West Coast Hemlock, California Redwood, Cedar, Eastern Hemlock, Sitka Spruce, Engelmann Spruce, Eastern Spruce, Southern Yellow Pine, Ponderosa Pine, Sugar Pine, Idaho White Pine, Northern White Pine, Norway Pine.)
2. No framing lumber of lower quality than No. 1 Dimension (Common) shall be used for joists, sills, girders, rafters, purlins, plates, and collar beams. Foundation sills and all timber in contact with masonry or concrete shall be of foundation grade redwood or adequately protected against termites or fungi. (See “Termite Prevention”, Paragraph 1(b).)

3. Framing lumber for studs, bridging, and bracing shall be No. 2 Dimension (Common) and better.

4. Subflooring, sheathing, and roof boarding for one-story dwellings without basements shall be No. 3 Common and better boards, except that board lumber of the following species of wood may be No. 4 Common and better: White Fir, Engelmann Spruce, Eastern Spruce, Ponderosa Pine, Sugar Pine, Idaho White Pine, Northern White Pine.

5. In all other cases, subflooring, sheathing, roof boarding, shingle lath, etc., shall be No. 2 Common and better boards.

Note.—Board lumber No. 3 Common of woods comparable to No. 2 Common grade in the other softwoods will be acceptable, such as: White Fir, Engelmann Spruce, Eastern Spruce, Ponderosa Pine, Sugar Pine, Idaho White Pine, Northern White Pine, Norway Pine, Western Larch.

6. All lumber shall be dry and well seasoned.

Note.—The Chief Architectural Supervisor will require that wood framing constructed of wet or green lumber be allowed to dry out thoroughly and that any structural defects thus appearing be corrected before proceeding with the plastering.

7. All rough lumber dimensions given under “Wood Framing” below are nominal sizes. Finished dimensions of all lumber shall comply with the American Lumber Standards.

WOOD FRAMING

Note.—In all cases, regardless of location, where the structural strength of framing members is definitely impaired by cutting, drilling, or by inherent defects, such members shall be replaced or reinforced as required by the Chief Architectural Supervisor of the San Francisco Insuring Office.

A. Floors, Ceilings, and Roofs.

1. Splicing of structural wood framing members between bearing points or supports will not be permitted. All joints of solid wood girders and outside members of built-up girders shall be made over pier or column supports.

2. All wood floor and roof framing construction shall be kept at least 2 inches away from the chimney masonry, except when 8 inches of masonry is used outside the flue lining, in which case the framing may be built flush with the chimney masonry. The 2-inch space between the chimney masonry and the floor framing shall be filled with fire-resistant material to form a fire stop.

Note.—In no case shall wood framing members bear on the masonry of chimneys, except on piers which are built integral with the chimney masonry.

3. Girders may be steel beams, reinforced concrete, solid wood, or built-up wood.

4. Wood posts, when used as columns in basements, shall bear on a cement base which shall extend not less than 2 inches above the finished floor. This base shall bear directly on the post footing. A sheet of non-corrodible sheet metal, Foundation Grade Redwood or pressure-treated wood sill 2 inches thick shall separate the post from the cement base.
5. The distance between supports under wood girders shall not exceed the following:

(a) 4 by 4 girder, 1 story: carrying partition, 3 feet; not carrying partition, 5 feet.
(b) 4 by 6 girder, 1 story: carrying partition, 5 feet; not carrying partition, 7 feet.
(c) 6 by 8-inch girder, 1 story: not over 8 feet; 1½ and 2 story: not over 7 feet.
(d) 6 by 10-inch girder, 1 story: not over 9 feet; 1½ and 2 story: not over 8 feet.

**NOTES.**—The above spans are based on a minimum fiber stress of 1,200 pounds. When the allowable fiber stress of the species of wood used is other than 1,200 pounds, spans shall not exceed those determined by established engineering practice.

If the total of the spans of joists framing into the girder on both sides exceeds 24 feet 2 inches, or if loads are concentrated, the size and span of the girder shall be determined by established engineering practice.

For all buildings, the girders shall be large enough to carry all floor and roof loads, including concentrated loads due to bearing partitions coming on them. Girders or foundation walls shall be placed under all bearing partitions.

6. Floor joists shall be doubled under all nonbearing partitions which run parallel to the floor joists and shall be separated by 1 inch less than the partition thickness and blocked between at 4-foot intervals.

7. Where floor joists frame into the side of wood girders, the joists shall be supported on metal joist hangers or on a bearing strip or ledger board on the side of the girders. Size of ledger shall be at least 2 by 3 inches. A notch in the end of the joist shall be not more than ¼ of the joist depth.

8. All joists shall have a minimum bearing of 2 inches, except when supported on a let-in ribbon board, lapped full width of adjoining studs and securely nailed thereto.

9. Ends of floor joists framing into masonry walls shall have not less than 4-inch bearing and shall have at least a 3-inch bevel or fire cut. In cases where the ends of the floor joists frame into the masonry walls, the ends of the joists shall receive a good brush coat of creosote for a distance of at least 4 inches from the masonry.

10. Each end of every fourth joist whether continuous or lapped in wood floor and wood ceiling construction framing into masonry walls shall have a ¾ inch metal joist anchor not less than 3 feet long with a 10-inch T head embedded in the wall not less than 4 inches from the farther face and with end turned down 2 inches and anchored to the side of the joist. Where joists are generally parallel to a masonry wall a similar anchor shall be similarly embedded in the wall every 6 feet and be carried back through or over the fourth joist with joists blocked solidly between, at each anchor and at the ends.

11. Headers and trimmers shall be doubled except that headers 4 feet or less in length may be of single thickness provided the header is supported on not less than 2 x 3 inch ledger boards and header is secured by spikes driven through one thickness of the trimmers into the ends of the header. Headers receiving more than 4 tail beams shall have ends supported in metal joist hangers.
12. Ends of lapped joists shall rest on girders or on bearing partitions and shall be securely nailed to plate and to each other.

13. Where a story is framed out over the wall below and the floor joists run parallel to the supporting wall, the supporting members of the overhang shall carry back a distance at least 15 inches more than the overhang and frame into doubled floor joists. The maximum projection of such overhang shall be 4 feet. Where framing is at right angle to the supporting wall, the joists shall extend continuous in one piece to form the overhang.

Note.—This construction shall also apply to all projections carrying floor or roof loads which are not supported directly by a foundation.

14. Floor (including attic floor) and flat roof joists shall be bridged with 2 by 3 inch bridging at intervals not to exceed 8 feet and double-nailed at each end. Joists over bearings, and at ends framing into masonry walls, shall be solidly blocked for full depth of joists. Metal bridging may be used when approved by the Chief Architectural Supervisor of the San Francisco Insuring Office.

15. Maximum spans for all wood floor joists shall be as listed in the following table. The spans are figured for a maximum deflection of 1/360th of the span, based on a total live and dead load of 50 pounds per square foot, uniformly distributed. The species of wood are grouped according to the allowable working stresses recommended by the Forest Products Laboratory, Madison, Wisconsin.

### Maximum spans for floor joists

[Assumed live load, 40 pounds per square foot; dead load, 10 pounds per square foot]

<table>
<thead>
<tr>
<th>Lumber size</th>
<th>Spacing, center to center</th>
<th>Minimum fiber stress, 1,200 pounds</th>
<th>Minimum fiber stress, 1,000 pounds</th>
<th>Minimum fiber stress, less than 1,000 pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>inches</td>
<td>Maximum clear span (No. 1 Dimension)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal</td>
<td>Actual</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 by 6</td>
<td>15% by 5%</td>
<td>12</td>
<td>10 1</td>
<td>8 6</td>
</tr>
<tr>
<td>2 by 8</td>
<td>15% by 7%</td>
<td>12</td>
<td>12 1</td>
<td>11 4</td>
</tr>
<tr>
<td>2 by 10</td>
<td>15% by 9%</td>
<td>12</td>
<td>16 3</td>
<td>14 4</td>
</tr>
<tr>
<td>2 by 12</td>
<td>15% by 11%</td>
<td>12</td>
<td>18 5</td>
<td>17 3</td>
</tr>
<tr>
<td>2 by 14</td>
<td>15% by 13%</td>
<td>12</td>
<td>21 5</td>
<td>20 1</td>
</tr>
</tbody>
</table>

Note.—Where the spacing of floor joists exceeds 16 inches o. c., or where the allowable fiber stress of the species of wood used is in excess of 1,200 pounds, the size and span of the joists shall be determined on the same basis as used for this table.
16. The cutting of floor joists to facilitate the installation of piping and duct work will be permitted with the following limitations:

(a) The top or bottom edges of joists may be notched or bored in any part of the section within three times the beam depth from either support. Such notches or holes shall not exceed \( \frac{1}{5} \) the depth of the beam.

(b) Where notches or holes are made in other portions of the beam, the net remaining depth of beam shall be used in determining the bending strength.

(c) Where location of pipes necessitates passing through the joists, holes shall be drilled to receive the pipes. The diameter of the holes shall be not more than \( \frac{1}{8} \) inch greater than the outside diameter of the pipe and in no case greater than 2\( \frac{1}{2} \) inches. The edge of the holes shall not be located nearer than 2 inches from the top or bottom edge of the joist.

17. All floor joists shall be covered with 1-inch subflooring not more than 8 inches in width. All subfloors shall be laid diagonally and ends shall be cut over and parallel to the joists, and nailed to each joist with three 8-penny nails for 8 inch boards and two 8-penny nails for 6-inch boards.

Note.—End-matched (T. & G.) boards may be used for subflooring provided no two adjoining boards break joints over the same joist space, and each board shall bear on at least two joists.

18. All subflooring shall be covered with building paper or deadening felt before laying the finish floor.

19. Single floors not less than \( \frac{15}{16} \) inch in thickness may be used when specially approved by the Chief Architectural Supervisor of the San Francisco Insuring Office.

20. In rooms having coverings of linoleum or composition or rubber tile, a single floor of 1 by 4 inch T. and G. flooring properly sanded may be used, or if a subfloor is used, it shall be covered with not less than 3\( \frac{1}{8} \) inch T. and G. flooring properly sanded, or by 3\( \frac{1}{8} \)-inch plywood or compressed fiber board.

21. Ceiling joists shall be not less than 2 by 4's—16 inches O. C., for a maximum span of 10 feet. For longer spans increase to size required for rafters. (See table following.) Ceiling joists shall be double-nailed to plates, but where serving as ties for the rafters shall be double-nailed to the rafters. Where the roof space above ceiling joists is unfinished but is used for storage space, or if the space is suitable for finishing into future habitable rooms, the spans for the ceiling joists shall be figured the same as for floor joists.

22. Collar beams of 1 by 6's or 2 by 4's shall be installed on at least each alternate pair of roof rafters and shall be double-nailed to the rafters.

23. Where ceiling joists serve as collar beams and occur above the midpoint of the rafter, adequate provision shall be made for tying the lower end of the rafter to the floor construction. Where the installation of this tie is not possible because of structural conditions, the rafter size shall be increased sufficiently to support the roof load without thrust or undue bending in the lower end and the size of the collar beams shall be not less than the rafters.
24. Maximum spans for wood roof rafters shall be as listed in the following table, and are based on a total live and dead load of 26 pounds per square foot, uniformly distributed, and shall apply to wood and asphalt shingle roofs. (The live load is considered as acting normal to the roof surface.)

**Maximum clear span for rafters**

[Assumed total live and dead load, 26 pounds per square foot]

(Clear span shall mean the distance measured from plate to ridge, except where rafters are braced)

[For roof with a minimum slope of 4 to 12]

<table>
<thead>
<tr>
<th>Lumber size</th>
<th>Spacing center to center</th>
<th>Maximum clear span (No. 1 Dimension)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum fiber stress, 1,200 pounds</td>
<td>Minimum fiber stress, 1,000 pounds</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>2 by 4</td>
<td>1 3/4 by 3/4</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>2 to 6</td>
<td>1 5/8 by 5/8</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>2 by 8</td>
<td>1 3/4 by 7/4</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>

**Note.—Where the allowable fiber stress of the species of wood used is in excess of 1,200 pounds, increased spans will be permitted provided they are determined on the same basis as used for this table.**

(a) Rafters for slate, tile, or asbestos-cement (rigid) shingle roofs shall be of sufficient size to carry the load, but in no case less than 2 by 6's—16 inches o. c.

**Note.—Rafters on roofs with slopes less than 4 to 12 shall be figured same as floor joists.**

(b) When snow loads become a factor, roofs shall be designed to carry snow loads. Each pair of rafters shall be adequately tied together at the plate line.

(c) Rafters of roofs with slopes of less than 4 to 12 shall be designed for a live load of at least 30 pounds per square foot.

25. Rafters shall be securely spiked to the wall plate. Opposing rafters shall be framed directly opposite each other at the ridge. There shall be a ridge board at all ridges and one valley rafter at all valleys. The depth of the ridge board and valley rafter shall be not
less than the cut end of the abutting rafters. Valley rafters shall be not less than 2 inches thick.

26. Roof joists in flat roof construction shall be spaced not more than 24 inches o. c. Each joist shall be securely spiked to studding of exterior walls and supported on a 1 by 6 or 2 by 4 ribbon spiked to inner face of studding, except that each alternate joist may be supported on a ribbon only if securely spiked to a header of same size as joist cut between and spiked to adjacent studs, or is provided with at least 3 square inch bearing surface on the supporting ribbon.

(a) In flat roof construction where the ceiling joists are hung from roof joists, the spans for the roof joists shall be the same as for floor joists. Spacing shall not exceed 16 inches o. c. Ceiling joists shall be 2 by 4’s of same spacing as roof joists and shall be supported from the roof joists with 1 by 4 hangers, spaced not more than 6 feet o. c. and securely nailed to sides of the roof and ceiling joists.

(b) The following are minimum requirements in connection with flat roofs when joists are set level and roof pitch is obtained by blocking up:

- Blocking materials shall be not less than 2 by 4 inches with struts not more than 4 feet on centers, resting directly on joists, staggered so as to provide even distribution of roof load. The rafters forming the roof pitch shall be spaced not more than 24 inches on centers.

27. All openings in roof construction for dormer windows where there are no supporting partitions shall be framed double.

28. Requirements for headers and trimmers for roof framing around chimneys shall be same as required for floors except that for a sloping roof where headers are less than 4 feet in length and the chimney is either at the ridge or the eaves, the trimmers may be single.

29. Roof rafters shall be covered with 1 inch roof sheathing not more than 8 inches in width, laid closed for tile, slate, asbestos-cement or asphalt shingles; or 1 inch by 4 inch shingle lath for wood shingle roof, spaced according to shingle exposure but not to exceed 9 inches o. c. All roof sheathing and shingle lath shall be securely nailed to rafters at each bearing.

Note.—End-matched (T. & G.) boards may be used for roof sheathing provided no two adjoining boards break joints over the same rafter space, and each board shall bear on at least two rafters.

30. The framing of “false-front” roof construction shall be designed for actual loads. Framing members supporting concentrated loads shall be figured accordingly. Girders and trussing of framing members shall be provided to carry the loads to the outside walls or bearing partitions. These in turn shall be designed to carry the loads supported.

31. An adequate opening for access into each roof space shall be installed to allow for inspection and repair.

B. Exterior Walls.

1. Wood stud walls shall have corner posts built-up using two 2 by 4’s with a third 2 by 4 arranged to form interior lathing corner. (See details.)
2. Studs shall be not less than 2 by 4's spaced not more than 16 inches o. c. For 3-story construction, the lower story shall have 2 by 6 studding.

3. All window and door openings shall have studs doubled at jambs. The outer stud shall extend from sole plate to cap plate. The cripple or inner stud shall be cut to receive the lintel or header over the opening and shall extend in one piece from lintel or header to bearing, except that at windows the sill plate shall be cut into the inner stud. Lintels or headers over all openings shall be doubled and shall set on edge.

4. Spans for lintels or headers shall not exceed the following for the sizes given:

<table>
<thead>
<tr>
<th>Size of lintel</th>
<th>Supporting 1 story only</th>
<th>Supporting roof and ceiling only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two 2 by 6's</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Two 2 by 8's</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Two 2 by 10's</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

5. Lintels for other conditions including 2- and 3-story construction shall be designed to carry the actual loads.

6. In lieu of lintels, trussed construction may be used.

7. Sill construction.—See detail sheet for acceptable types of sill construction. Other approved methods of sill construction may be used but they must be fully detailed on the drawings submitted with the application.

8. All sills shall be bolted to the foundation walls with 1/2-inch by 8-inch bolts which are bedded firmly in the masonry wall and spaced not more than 6 feet apart.

9. All sills and girders on top of foundation walls shall be levelled and thoroughly bedded in cement mortar.

10. In wood framed structures underpinning not less than 14 inches long may be used between sill and joist-bearing plate, when such underpinning is not less in size than the studding of the story above, or if exceeding 4 feet in length not less in size than the studding required for an additional story. All such underpinning shall be effectively and continuously braced in the plane of the wall from end to end thereof and with knee bracing at right angles to the wall, spaced not over 6 feet on centers, extending from sill plate to joists and to girders. (See details.)

11. Plates shall be not less than 2 by 4's doubled and shall lap at joints and at corners. Cut the top member of the plate at all intersecting partitions to permit partition plate to lap and tie to exterior wall plate. All such laps shall be double-spiked.

12. All exterior walls where masonry veneer is used shall be sheathed diagonally at approximately 45 degrees and each board shall be triple-nailed to each stud or bearing post. The sheathing shall extend in opposite directions on each side adjoining at the corner and corner bracing will not be required.

13. In all cases, except where diagonal wood sheathing is used, the corners and each 25 lineal feet of exterior wall and each principal interior partition shall be braced diagonally at approximately 45
degrees with 1 by 4 inch brace let into the face of the studs, extending continuously from sole to cap plate and double-nailed at each bearing. (See details.) In lieu of each continuous brace, 2 by 4 strut bracing cut in diagonally in each direction and fitted between studding and nailed at each end with two 16-penny nails, may be used. Where angle of cut-in bracing is greater than 40 degrees from horizontal, thrust block shall be nailed to stud faces at each end of each section of bracing. Such thrust blocks shall be \( \frac{3}{8} \) inch thick, same width as studs and at least 12 inches long, nailed with at least four 8-penny nails. Such bracing shall start at least one stud space from each corner or opening. Horizontal thrust-blocks 2 inches thick shall be installed at upper and lower ends of each line of bracing and spiked to sole and cap plates with four 16-penny nails.

14. Wood sheathing boards where required shall be applied and double-nailed at each stud or bearing point. Jointing shall occur over the center of and parallel to the studs. Space between boards shall not exceed one inch.

Note.—End-matched (T. & G.) boards may be used for sheathing provided no two adjoining boards break joints over the same stud space, and each board shall bear on at least two studs.

15. Wherever wood sheathing is required, composition board sheathing, approved by the Chief Architectural Supervisor, may be used, provided the frame is braced as described in Paragraph 13 above.

16. Where shingles are applied over other than wood sheathing boards, 1 by 2 inch nailing strips nailed to the studs over the building paper, and spaced according to the shingle exposure shall be installed.

17. All exterior finish applied to wood stud walls shall be backed up with waterproof building paper or not less than 14-pound saturated asphalt felt and shall be lapped at least 4 inches at all joints and on flashing around all openings and at corners.

18. All exterior openings in wood frame walls shall be adequately flashed top and sides with strips of reinforced waterproof paper or saturated asphalt felt or not less than 26-gauge galvanized iron installed behind exterior trim. Unless jambs are housed into sills pitching out, 26-gauge galvanized iron pans projecting and properly designed to drain beyond exterior wall surface shall be placed under corners of sills. (See detail.) Flashing for bull-nose stucco finish shall be of 26-gauge galvanized iron turned into plaster groove of frame and wide enough to cover joint with rough framing.

19. All metal windows shall have full sill or metal jamb flashing extending across entire sill and turned down over exterior building paper. Windows shall be set in mastic caulking compound. (See details.)

C. Interior Partitions.

1. All partition studs shall be 2 by 4's spaced 16 inches o. c. set the 4-inch way, except around closets, chimneys, and nonbearing partitions containing no openings, where studs may be framed flat. Non-bearing partitions may be 2 by 3 inch studs spaced 16 inches o. c.

2. All openings in interior partitions shall have jambs and head double-framed same as required for exterior openings.
3. The cap plates of all bearing partitions shall be doubled. All partition plates shall lap at all intersecting partitions and at outside walls, and shall be double-spiked.

4. Where nonbearing partitions run parallel to the second floor joists, a lathing member shall be placed above the partition plate and shall be wide enough to provide nailing surface for ceiling lath.

5. Bearing partitions shall be braced as required for exterior walls. (See B. Exterior Walls, Paragraph 13.)

6. No stud shall be cut more than half its depth to receive piping and duct work. Studs notched more than 1 inch shall be reinforced with 1/8 by 1 1/2 inch metal straps, or studs may be furred with 2-inch material. If more depth is required, the partition studs shall be increased or furred accordingly.

7. Corners for all rooms shall be framed solid for lath or other interior finish. All backing for lath shall be 2 inches thick.

8. All interior partitions connecting to masonry walls shall have the end stud anchored to the masonry with not less than three 1/2-inch bolts in each story height.

MISCELLANEOUS

1. Connections between posts and beams and girders shall be subject to the approval of the Chief Architectural Supervisor of the San Francisco Insuring Office. Bracing shall be installed as required.

2. Where the running of piping and duct work necessitates the cutting of plates, joists and studs, proper provision, acceptable to the San Francisco Insuring Office, shall be made for tying together and supporting all structural members affected by such cutting.

3. Main stairways shall have not less than 6 feet 6 inches clear headroom measured vertically from the front edge of the tread.

4. Stair winder treads, measured not more than 14 inches and not less than 12 inches from newel or handrail on inside of turn, shall have the same width as treads on the straight runs. At no point more than 6 inches from a newel or handrail shall there be an unprotected drop exceeding the height of one riser.

5. Caulking will be required around all exterior openings in masonry or masonry veneer walls and at other intersections of wood and masonry where considered necessary to make weathertight.

6. Fire stops, full width of studding, shall be provided in all stud walls at floor and at ceiling and midway between floor and ceiling, which shall cut off completely all openings between stories. Approved masonry or 2-inch thick wood blocks cut in solidly, or other approved methods will be acceptable.

NOTE.—Attention is called to Section 2526, Uniform Building Code, for full particulars as to fire stopping.

7. Partitions between living units of multiple dwellings shall be so constructed and effectively treated as to deaden the transmission of sound. This will not be required in partitions between closets, storage spaces, garages, or similar areas. If living units of multiple dwellings are separated by floors, the floors and ceilings between should be similarly treated.
8. Channel rustic, bevel siding, and similar weatherboarding shall be effectively weatherstopped at all corners and door and window openings.

9. When ceiling is applied directly to roof rafters below the normal ceiling height, approved insulation shall be applied to or between the rafters.

TERMITE PREVENTION

1. When protection against infestation by termites is required, it shall be attained by the following means which are listed in the order of their desirability.

(a) Continuous corrosion-resisting sheet metal termite shields with tight seams or soldered joints (see detail); or

(b) Lumber treated with wood preservatives for all wood construction in contact with foundation walls and all first-floor framing. The following methods of treating lumber with preservatives are acceptable, listed in the order of their preference:
   (1) Full-cell or empty-cell (vacuum-pressure) process.
   (2) Hot-and-cold bath process.
   The chemicals used as preservatives in both methods must be those which have withstood actual tests over a period of years and the methods of treatment shall be approved by the Chief Architectural Supervisor of the San Francisco Insuring Office.

Note.—Brush coat, spraying or dipping methods of treatment will not be acceptable, in lieu of the above.

2. In localities where, in the opinion of the San Francisco Insuring Office, full protection is necessary, protection shall be obtained by both (a) and one of the methods under (b) as listed in Paragraph 1 above.

3. Where termite protection is not required, all framing lumber, except Foundation Grade Redwood, within 6 inches of foundations or exterior masonry walls shall be treated with coal-tar creosote or other approved chemical applied by spraying, brushing, or dipping.

ROOF COVERINGS

1. Tile, slate, and asbestos-cement roofs shall be installed according to the manufacturer's directions and securely attached to the roof structure.

2. Before applying the roof covering, roof sheathing shall be covered with asphalt saturated roofing felt of the following weight:

(a) Not less than 30 pounds per square for tile, asbestos-cement shingle or slate roofs.

(b) Not less than 30 pounds per square for asphalt shingles where less than double thickness occurs at any point.

(c) Not less than 15 pounds per square for asphalt shingles where double thickness is obtained at all points.

Note.—No felt will be required where triple thickness asphalt shingles is obtained at all points.
3. Asphalt shingles shall bear Fire Underwriters' Class "C" label, and shall be of the following minimum weight:

- Square butt strip shingles: 210 lbs. per square.
- Individual shingles: 250 lbs. per square.
- Hexagon strip shingles: 165 lbs. per square.

Note.—The minimum pitch for asphalt shingle roofs shall be 4 inches in 12 inches. A double starting row shall be used on shingle installations.

4. When slate is installed, exposure shall not exceed the following:

- 14-inch slate—not over 5\(\frac{1}{2}\) inches to the weather.
- 16-inch slate—not over 6\(\frac{1}{2}\) inches to the weather.
- 18-inch slate—not over 7\(\frac{1}{2}\) inches to the weather.

5. Asbestos-cement shingles and tiles shall be applied with exposure as recommended by the manufacturers.

6. Membrane asphalt and tar and gravel coverings for flat roofs shall be applied according to manufacturer's directions and shall carry the regular manufacturer's guarantee for the type of roof used and shall be not less than a dry sheet and 2 layers of 15-pound asphalt saturated felt, each course lapped 4 inches and mopped solid, and an 85-pound mineral surfaced cap sheet lapped 4 inches and mopped; or, a dry sheet and 4 layers of 15-pound asphalt saturated felt lapped and mopped solid, and a gravel surface.

7. Wood shingles shall be edge-grain all heart-wood tapered shingles, minimum thickness, 5 butts in 2 inches.

8. Wood shingle exposure to the weather shall not exceed the following:

<table>
<thead>
<tr>
<th>Maximum wood-shingle exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roof shingle exposure (in inches)</td>
</tr>
<tr>
<td>Pitch of roof</td>
</tr>
<tr>
<td>Rise Run 16 18 24 30</td>
</tr>
<tr>
<td>3 to 5</td>
</tr>
<tr>
<td>Over 5</td>
</tr>
</tbody>
</table>

1. Exposed course shall be face-nailed.

Note.—A double starting row shall be used on all shingle installations. Roofing felt shall not be used under wood shingles, unless an air space is provided by 1-inch strips nailed to the rafters over the felt, and spaced according to shingle exposure.

9. Noncorrodible nails shall be used for applying wood shingles and shakes.

10. Other types of roof covering such as split wood shakes, sheet metal, canvas, etc., may be used when the type and weight of the material and method of application are approved by the Chief Architectural Supervisor of the San Francisco Insuring Office.

**SHEET METAL**

1. All built-in flashings and counter-flashings over heads of openings, around chimneys, at intersections of roofs and walls, valleys, hips, ridges, and at horizontal and vertical intersections of stucco with other material shall be of corrosion-resisting metal.
2. All metals other than copper, lead, and zinc shall be painted both sides before installation.

NOTE.—For valleys in connection with asphalt shingle roofs, two thicknesses of mineral-surfaced roll-roofing material cut from rolls weighing not less than 85 lbs. per square, may be used. Strips shall be not less than 18 inches wide.

3. The weight or gauge of sheet metal depends on the use to which it is put. The following minimums shall apply:
   
   (a) Copper: flashing, 12 ounces; gutters and leaders, 16 ounces.
   
   (b) Tin: 40-pound block tin coating.
   
   (c) Galvanized sheet metal: 26-gauge sheets with 1.3 ounce zinc coating per square foot.
   
   (d) Zinc: As recommended by manufacturers.
   
   (e) Lead: Sheet lead, 4 pounds per square foot.

4. Flashing and counter-flashing at parapet walls in connection with flat roofs may be of same material as roof coverings. All flat roofs shall have a 45 degree cant strip at all roof intersections with parapet and vertical walls. Minimum width of face of cant strip shall be 2 1/4 inches.

5. All chimneys shall have counter-flashing built in on all sides in contact with the building.

6. Where gutters and leaders are installed, they shall be of corrosion-resisting metals. Wood gutters will be acceptable if inside surface is properly protected by two coats of pitch or three coats lead and oil and all joints are covered with noncorrodible sheet metal and securely tacked. Crickets and saddles shall be covered with corrosion-resisting sheet metal.

LATHING

1. Wood lath shall be 5/16 inch thick No. 1 lath, spaced not less than 1/4 inch nor more than 3/8 inch apart, nailed at each bearing, and joints shall be broken every 8th lath. The extending of the lath continuous behind intersecting partitions and walls will not be acceptable.

2. Metal lath shall be not less than the following:

   (a) Expanded metal lath (painted or galvanized)—
      (1) For stud walls, studs 16 inches o. c. or less: 2.5 pounds per square yard.
      (2) For ceilings, joist spacing up to 20 inches: 3.4 pounds per square yard, or flat ribbed metal lath 2.75 pounds per square yard.
      (3) For exterior stucco: 3.4 pounds per square yard.

   (b) Woven galvanized wire lath, No. 18 gauge wire, weight 3.2 pounds per square yard.

   (c) Paper backed galvanized wire lath: Maximum wire spacing 2 inches o. c.
      (1) For interior plaster: Weight 2.3 pounds per square yard.
      (2) For exterior stucco: Weight 3.1 pounds per square yard.
(d) **Stucco Mesh:** Welded or woven wire hexagonal mesh fabric galvanized after fabrication will be acceptable when sheathing is not used, if the mesh is applied over *reinforced* waterproof building paper or over 18-gauge galvanized wire spaced 6 inches o. c., stretched taut horizontally, and which is first covered with waterproof building paper or 14-pound asphalt saturated felt. Gauge and mesh sizes shall be as follows:

1. No. 16 gauge wire: 2-inch mesh maximum.
2. No. 17 gauge wire: 1¾-inch mesh maximum.
3. No. 18 gauge wire: 1-inch mesh maximum.

Metal lath furring strips at least 4 inches wide shall be applied around all openings and over corners as furring under stucco mesh.

3. All interior external angle corners shall have galvanized iron corner beads or be reinforced with galvanized metal lath, and all intersections of walls at corners and of walls with ceilings shall be lathed with galvanized metal lath corner strips not less than 6 inches wide—3 inches on each surface.

4. Where metal lath is used as a base for cement stucco, the lath shall be held at least ¾ inch away from waterproof building paper and sheathing by use of furring nails or self-furring lath.

5. The size of insulating fibre board lath shall be 18 by 48 inches and gypsum board lath shall be 16 by 48 inches. Board lath shall be applied according to manufacturer’s directions.

### INTERIOR PLASTER

1. All interior plaster work when applied to lath base shall be 3-coat work and shall have a minimum thickness of ½ inch over the lath base.

*Note:* Work which provides for the scratch coat and brown coat to be applied as separate coats, but in one operation, shall be considered 3-coat work.

2. The scratch or first coat may be omitted when plaster is applied directly to masonry.

3. All plaster shall be mixed and applied exactly according to manufacturer’s directions. Wood lath shall be well soaked and allowed to swell before scratch coat is applied.

4. All lime used for plastering shall be thoroughly slaked and screened.

5. If hydrated lime or patent plasters are used, they shall be mixed and applied according to manufacturer’s directions.

6. All plaster ceilings shall be level. All walls and corners shall be plumb and straight.

7. All plaster for walls and ceilings of shower stalls and where showers occur over bath tubs shall be as required for exterior stucco work.

8. Backing for wainscot tile shall be cement plaster applied on metal lath weighing at least 3.2 pounds per square yard.

*Note:* Solid planking at least ¾ inch thick, well nailed to the face of studs and covered with waterproof building paper and galvanized mesh may be used in lieu of the cement plaster backing.
EXTERIOR STUCCO

NOTE.—See "Lathing", for application of stucco reinforcement.

1. Stucco shall have a base of portland cement or other approved material and when applied over other than masonry shall be 3-coat work.

2. First and second coats shall be composed of 1 part portland cement, 3 parts sand and hydrated lime equal to 10 percent of cement by volume. First coat shall be applied to a minimum thickness of \( \frac{3}{8} \) inch and scratched in both directions. Keep damp for at least three days, then allow to dry. After scratch coat is dry, moisten surface thoroughly and evenly and immediately apply the second coat to at least \( \frac{1}{2} \) inch thickness (\( \frac{3}{8} \) inch over solid sheathing), and rod straight and true in every direction. Keep second coat damp for at least three days and then allow to dry thoroughly.

3. Third coat shall be as required for first coat, or an approved brand of prepared stucco, trowel-applied to bring total thickness to not less than \( \frac{7}{8} \) inch, (\( \frac{3}{4} \) inch over solid sheathing and waterproof building paper).

4. At least 10 days shall elapse between applications of coats unless exterior stucco is applied over solid sheathing and waterproof building paper.

5. Exterior stucco applied to wood lath will not be acceptable.

PAINTING

1. All millwork shall receive prime coat before or immediately after installation. All surfaces of millwork which are installed before plastering shall be primed before installation. Exterior work shall be primed immediately after erection. When wood siding is used, seal ends before erection.

2. All nail holes, cracks, etc., shall be puttied full and smooth. Putty shall be applied after the priming coats on surfaces which are to be painted or enameled. Putty shall be tinted to match woodwork on all stained and varnished finishes.

3. All exterior woodwork shall receive not less than 3 coats of paint including the prime coat, except wood shingles and half-timber work which may receive 2 coats of stain or penetrating oil.

4. Certain woods such as cedar, cypress, redwood, etc., may be left unpainted if approved by the San Francisco Insuring Office.

5. All masonry and concrete walls to be painted shall receive 2 coats of paint especially prepared for painting masonry or concrete surfaces.

6. Where varnish is used for exterior, the varnish shall be a good grade of spar varnish.

7. All exterior and interior structural iron work, and ornamental iron work if to be painted, shall have at least one coat of paint in addition to shop coat. Paint shall be lead and oil, graphite, or any specially prepared paint which is recommended by the manufacturers for painting iron work.

8. All interior trim and all sash shall be stained, painted, or waxed.
9. The following types of interior finish give in a general way the minimum which will be acceptable:

(a) Wood, if painted or enameled: 3 coats.
(b) Wood, if stained:
   (1) Stain and one coat of varnish.
   (2) Stain and one coat of wax.
(c) Natural wood, unstained:
   (1) Open grain wood: 1 coat filler, 2 coats varnish.
   (2) Close grain wood: 2 coats varnish.
   (3) 2 coats wax.
(d) Floors:
   (1) 2 coats wax or wax stain.
   (2) 1 coat filler, 1 coat shellac, 1 coat wax.
   (3) 1 coat filler, 1 coat varnish, 1 coat wax.
   (4) 1 coat filler, 1 coat lacquer, 1 coat wax.
   (5) 2 coats floor paint (enamel), 1 coat wax.
   (6) Cement: 2 coats floor paint (enamel), 1 coat wax.
(e) Walls and ceilings if decorated:
   (1) 1 coat of size, 2 coats paint with oil or varnish base.
   (2) 1 coat of size, wall covering (paper, etc.).
   (3) 1 coat of size and 1 coat of cold water paint.

10. The above requirements for exterior and interior finish may be modified when specially prepared materials are used as recommended by the manufacturers and are approved by the Chief Architectural Supervisor.

PLUMBING

1. The installation of all plumbing work shall comply with all requirements of the applicable local code and with State regulations. Where no local or State regulations exist, the requirements contained in “Recommended Minimum Requirements for Plumbing”, published by the National Bureau of Standards, shall apply.

   NOTE.—Where public sewer and water supply systems are not available, the San Francisco Insuring Office should be consulted as to the Property Standards requirements covering installation of private water supply and sewage disposal systems.

2. No rough plumbing work shall be concealed until it has been inspected and has received its initial test by the plumbing inspector. After completion of the structure and after final plumbing tests have been made, evidence showing approval by the local plumbing inspector will be required.

3. All materials shall be new sound stock of quality and weight specified.

4. In localities subject to freezing temperatures, all pipes located in exterior walls or otherwise exposed above ground, shall be thoroughly insulated against freezing. All pipes in the ground shall be buried below frost line.

5. When dry wells are provided for leader drainage, they shall be located at least 8 feet from the building wall.

6. Domestic hot water heater with a tank of not less than 15-gallon capacity, or equivalent “instantaneous” heater shall be installed for each minimum family unit. The capacity shall be increased at
least 5 gallons for each additional bedroom and at least 10 gallons for each additional bathroom. If individual storage tank is used, a suitable floor stand shall be provided, or if hung from the ceiling, metal hangers shall be provided.

7. All gas-fired water heaters shall be vented.

8. All piping, except drain lines and soil pipes, when located under concrete slabs on the ground, shall be installed to permit access for inspection and repair: Drain and soil lines shall have cleanouts at each turn of the pipe.

9. All soil pipes within and to a point at least 3 feet outside the building shall be of cast iron with caulked lead joints.

HEATING

1. The installation of the heating system shall comply with all rules and regulations of the National Board of Fire Underwriters and with all applicable local laws and ordinances pertaining thereto. Strict compliance with all such regulations is essential and any work not conforming to those requirements shall be corrected before the mortgage is endorsed for insurance.

2. Printed instructions regularly furnished by the heating equipment manufacturer shall be obtained and the installation shall comply with those instructions provided they conform with local regulations.

3. All gas-fired heating appliances shall be vented.

4. All equipment and materials shall be of standard stock, new and unused, and in sound condition and shall be installed by experienced workmen familiar with the installation of the type of heating system to be used.

5. The heating system shall be of such capacity that under normal operation it will produce and maintain a temperature of not less than 70 degrees Fahrenheit within all habitable rooms when the outdoor temperature is 30 degrees above zero Fahrenheit.

ELECTRICAL WORK

A. General.

1. The installation of all electrical work including equipment shall comply with all laws applying to electrical installations in effect in the local community, or with the regulations of the National Electrical Code in the absence of such laws, with the Electrical Safety Orders of the Industrial Accident Commission of California, and with the regulations of the electric utility company.

2. After completion of the work, evidence shall be furnished showing compliance with such laws and regulations.

3. All materials used shall be new and shall conform to the standards established by the Underwriters' Laboratories, Inc.

4. All convenience outlets shall be of the duplex type. At least 2 outlets shall be provided in the living room and at least one in each of the other habitable rooms, bathroom, and service porch.

5. Outlets and switches shall be in easily accessible locations.

6. Key-sockets and pull-chain socket bracket fixtures, without switches, shall not be located within reaching distance of plumbing fixtures, heating, or gas appliances.
B. Service.
1. Wires from the outside service connection to the distribution panel shall be No. 8 gauge or larger.

C. Branch Circuits.
1. Minimum wire size shall be No. 14 gauge. Where the distance from the distribution panel to the outlets is great, or where any outlet or series of outlets on a circuit is likely to cause an excessive load, No. 12 gauge wire or a size adequate for the load to be carried shall be installed.
2. All convenience outlets located in kitchen, pantry, breakfast room, dining room, and laundry shall be wired with not smaller than No. 12 gauge wire.

D. Appliance Circuits.
1. Where electric ranges, heaters, oil burners, stokers, or other "heavy duty" equipment is to be installed, wire shall be of adequate size for the load to be carried, with no reduction in size between the appliance and the distribution panel, and not less than as specified in the following table:

<table>
<thead>
<tr>
<th>Kind of appliance</th>
<th>Number of wires</th>
<th>Minimum size of wire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>3</td>
<td>No. 8</td>
</tr>
<tr>
<td>Heater</td>
<td>2</td>
<td>No. 10</td>
</tr>
<tr>
<td>Oil burner or stoker</td>
<td>2</td>
<td>No. 12</td>
</tr>
<tr>
<td>Other small motors</td>
<td>2</td>
<td>No. 12</td>
</tr>
</tbody>
</table>

GENERAL
1. No further minimum requirements will be applied to such items as interior trim, flooring, tile work, etc. The choice of such materials will be left to the owner, architect, or builder. It is understood that the material and workmanship shall be of standard equal to the best practices for the type and kind of building being erected.
2. It must be thoroughly understood that the valuation and tentative rating of the property are based on the provisions of the specifications and drawings together with these Minimum Construction Requirements and the conditions of the commitment, and that any deviation from their provisions without first obtaining approval from the San Francisco Insuring Office of the Federal Housing Administration might affect the amount of loan committed on or affect the term of the mortgage and the final property rating.
These details indicate the methods of construction most generally used. Construction at variance with that indicated by these details will be acceptable when approved by the chief architectural supervisor of the San Francisco insuring office.
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