

SECTION**25.0.0 Wood Frame Construction****25.1.0 Minimum General Standards**

Except as otherwise provided in this code, the principles set forth in the current United States Department of Agriculture "Wood Handbook", prepared by the Forest Products Laboratory, Forest Research Forest Service, shall govern the design of wood construction, copies of which are on file with the Village Clerk.

Except as otherwise provided in this code, all wood structural members shall be of sufficient size and strength to carry their imposed loads safely without exceeding the allowable working stresses for timber as set forth in the current National Design Specifications Edition, of the National Forest Products Association, copies of which are on file with the Village Clerk.

All structural lumber for timber construction and unusual wood frame construction shall be officially grade marked unless other evidence as to its grade or quality is furnished to and approved by the Building Commissioner

25.2.0 Sill Plates and Sole Plates

Wood frame construction shall be securely anchored to sill or sole plates set in cement grout on cement foundations or masonry bearing walls. Plates shall be bolted to foundation work with steel anchor bolts one-half inch (1/2") in diameter, extending ten inches (10") into concrete or sixteen inches (16") into masonry, spaced not more than four feet zero inches (4' 0") on centers.

Plates shall be bolted to masonry bearing walls at the second floor level, (or higher), with hot-dipped galvanized steel anchor bolts of three-eighths inch (3/8") in diameter, extending twelve inches (12") into masonry and spaced not more than four feet zero inches (4' 0") on centers. Plates shall be of nominal two-inch (2") thickness and six inches (6") width.

Nuts and washers shall be required on all foundation bolts, fully drawn up, after grouting under plate.

25.3.0 Wall Framework

Walls shall be framed with nominal 2 x 4 (2" x 4"), edge-set studs, 1' 4" o.c., with triple-studs at corners and double studs at jambs of openings and under concentrated loads from beams. A double 2' x 4" top plate shall be provided at the top of non-load bearing wall frames. Fire stopping of 2" x 4" blocking shall be provided at each floor or ceiling level where balloon framing is used. Wood framing of exterior walls shall be diagonally braced at each corner of each wall section. Diagonal bracing may consist of diagonal sheathing of 1" x 8" wood boards, full-height sheet of structural plywood (water-resistant glue) 1/2" thick and 4'0"wide, brick veneer, diagonal wood blocking securely nailed between studs from bottom plate to top plate, or 1" x 4" continuous diagonal wood ribbon let in on either the exterior or interior face of studs and extending from bottom plate to top plate. Diagonal bracing shall be located as near corners as position of wall openings will permit. This does not exclude the use of materials of equal structural characteristics.

25.4.0 Wall Opening Headers

At all openings (more than 20-inches wide) in walls, a header composed of two, 2-inch nominal thick wood edge beams, supported directly on wood studs at each end, shall be provided as follows:

2, 2" x 6" members	4' 6" maximum opening
2, 2" x 8" members	7' 0" maximum opening

2, 2" x 10" members	10' 0" maximum opening
2, 2" x 12" members	14' 0" maximum opening
3, 2" x 12" members	16' 0" maximum opening
2, 2" x 14" members	17' 0" maximum opening
3, 2" x 14" members	20' 0" maximum opening

25.4.1 Composite Beams

A composite beam of two (2) two-inch (2") thick nominal wood members and one-quarter inch (1/4") thick steel member (all of the same height) shall be considered equivalent to a triple wood beam of the same height. For concentrated loads bearing over openings, the header or beam over the opening shall be individually designed to carry the total supported load.

25.5.0 Floor Framework

Floors shall be framed with nominal 2" thick joists spaced 1' 4" o.c., with double joists under partitions which run parallel with joists and with double joists at both sides of openings (more than 20-inches wide). Headers which support more than two tail beams at the ends of openings shall be double headers. Except for balloon framing systems, headers equal to joist size shall be provided where floor joists terminate at exterior framed walls and at the termination of overhanging structure. The following maximum spans are permitted for single floor joists except where reduced spans are required to support specific loads:

2" x 6" joists	8' 0" span
2" x 8" joists	11' 0" span
2" x 10" joists	14' 6" span
2" x 12" joists	18' 0" span
2" x 14" joists	21' 0" span

The maximum allowable span for 2" x 10" at 16" o.c. floor joists may be increased to 15' 4", provided stress grade lumber with an extreme fiber in bending stress in excess of 1,200 psi is specified and used. **(Ord. #658, 10/16/78)**

Floor joists shall be bridged with 1" x 3" diagonal bridging in continuous rows spaced not more than eight feet (8' 0") apart. Floor joists shall not be notched in the middle half of the span and shall not be notched more than one-sixth (1/6) of the depth where necessary for support on concealed wood bearing strips, which shall be 2 inch (2") thick lumber. Joists hangers of 16 gauge galvanized steel may be used for support of floor joists at header beams.

25.6.0 Ceiling Framework

Ceilings which are not supported on the underside of floor joists, roof rafters, or roof trusses, shall be framed with nominal two-inch (2") thick joists spaced one foot four inches (1' 4") on centers. The following maximum spans are permitted and limited attic storage loading capacity shall be provided for where any part of the attic area exceeds four feet zero inches (4' 0") in height.

<u>Size of Joist</u>	<u>Limited Attic Storage</u>	<u>No Attic Storage Possible</u>
2" x 4" joists	Not Permitted	8' 6"
2" x 6" joists	9' 6"	12' 6"
2" x 8" joists	13' 0"	17' 0"
2" x 10" joists	17' 0"	21' 0" *
2" x 12" joists	21' 0" *	21' 0" *

* = Maximum allowable span for two-inch (2") ceiling joists

Ceiling joists shall be bridged once, (at mid-span), with 1" x 3" diagonal bridging, if over 14' 0" long with no attic storage possible, or if over 10' 0" long with limited attic storage

25.7.0 Roof Framework

Roof shall be framed with nominal two-inch (2") thick rafters spaced one foot four inches (1' 4") on centers. The following maximum spans (horizontal run dimensions) are permitted:

Slopes less than 3-1/2 to 12

	<u>Supporting Ceiling</u>	<u>Not Supporting Ceiling</u>	<u>Slopes 3-1/2 to 12 or more</u>
2" x 4" rafters	Not permitted	Not permitted	6' 6"
2" x 6" rafters	8' 6"	9' 6"	10' 6"
2" x 8" rafters	12' 0"	13' 0"	14' 0"
2" x 10" rafters	15' 6"	17' 0"	18' 6"
2" x 12" rafters	19' 0"	20' 6"	21' 0"

On roofs pitched 3-1/2" per foot or more, collar beams of 1" x 6" or 2" x 4" size shall be installed on every third pair of joists, centered below the ridge a distance of one-fourth of the roof rise. Where rafters are not parallel to ceiling joists, 2" x 6" continuous stringers shall be provided on every third pair of rafters, located immediately above ceiling joists. Hip rafters and ridge poles shall be one nominal size larger in depth than the required size of the longest rafter supported and shall be doubled if they form a space frame to support the rafters. Valley rafters shall be double and shall be one nominal size in depth than the required size of the longest rafter supported. Rafters over 10'0" long and sloped less than 3 inches per foot shall be bridged once (at mid-span) with 1" x 3" diagonal bridging. Walls or structural beams shall provide support for roof systems at a point within twelve inches (12") of the intersection of ceiling joists with rafters. Other structural systems shall be specifically designed and analyzed for the required loading conditions by a registered Structural Engineer, and shall be submitted for review and acceptance by the Building Commissioner. Roof framing systems which project beyond exterior walls by more than 2' 6" shall be anchored to the supporting systems by 16 gauge galvanized steel straps 1-1/2" wide x 18" long, nailed to the side of each rafter and extended down (and nailed) to the supporting wall construction.

25.8.0 Roof Trusses

Roof trusses used in conjunction with wood framing shall be built of nominal two-inch (2") thick lumber, not less than four inches (4") wide, properly connected with plywood or metal connectors designed to develop the full strength of members connected.

Except as otherwise provided herein, trusses shall be spaced one foot four inches (1' 4") on centers. Lumber used in roof trusses shall be stress graded and marked at not less than twelve hundred pounds per square inch (1200 psi), by a recognized lumber grading agency. Each member shall not exceed a truss-action stress of five hundred pounds per square inch (500 psi) compression, nor six hundred pounds per square inch (600 psi) tension as shown by stress diagrams (submitted with drawings) based on fifty pounds per square foot (50 psi) combined live and dead loading on a horizontal projection. The drawings shall show an accurately scaled and dimensioned elevation of each size of truss required.

Double trusses shall be provided at locations where hip rafters or jack rafters are required to form the required roof shape. Sawn-off trusses shall not be permitted to form changes in the roof shape. Concentrated loading or bearing shall be permitted only at connection points of trusses unless provision is made to transfer said loads to connection points. Regardless of loading or stress limitations, member spans (horizontal run dimensions between truss connection points) shall not exceed the following:

Top Chord Spans

	<u>Slopes less than 3-1/2:12</u>	<u>Slopes 3-1/2:12 or Greater</u>	<u>Bottom Chord Spans</u>
2" x 4" members	Not permitted	6' 0"	8' 0"
2" x 6" members	8' 0"	9' 0"	11' 6"
2" x 8" members	11' 0"	12' 6"	15' 6"

Roof truss spacing may be increased to a maximum of two feet zero inches (2' 0") on centers, provided that roof sheathing of not less than three-quarters of an inch (3/4") thick plywood (water-resistant glue) is used, and provided ceiling (if any) is not less than five-eighths inch (5/8") sheetrock. Member spans for roof trusses spaced over one foot four inches (1' 4") up to two feet zero inches (2' 0") shall not exceed the following:

Top Chord Spans

	<u>Slopes less than 3-1/2:12</u>	<u>Slopes 3-1/2:12 or Greater</u>	<u>Bottom Chord Spans</u>
2" x 4" members	Not permitted	5' 0"	6' 6"
2" x 6" members	6' 6"	7' 6"	9' 6"
2" x 8" members	9' 0"	10' 6"	13' 0"

25.9.0 Sheathing and Subflooring

25.9.1 Wall Sheathing

Wall sheathing shall be nominal 1 x 8 (1" x 8") lumber, 1/2" thick structural plywood (water-resistant glue), 1/2" thick fiberboard sheathing or other recognized sheathing material of not less than 1/2" thickness acceptable to the Building Commissioner. Gypsum sheathing of 1/2" thickness shall be permitted only in conjunction with brick veneer construction. Wall sheathing shall not be exposed as a finished wall material, but shall provide adequate support and means of attaching other materials used as exposed wall finishes. **(Ord. #639, 1/16/78)**

25.9.2 Roof Sheathing

Roof sheathing shall be nominal 1 x 8 (1" x 8") lumber or 1/2"thick structural plywood (water-resistant glue).

25.9.3 Sub-Flooring

Sub-flooring shall be nominal 1 x 8 (1" x 8") S4S lumber (re-sawn sheathing shall not be permitted) or 5/8" structural plywood (water-resistant glue). Combination sub-flooring for direct application of non-rigid finish flooring (carpet, resilient tile and similar materials) shall be 3/4" structural plywood (water-resistant glue) with splined or tongue and grooved joints perpendicular to joists.

25.10.0 General and Miscellaneous Requirements

25.10.1 Bearing Joists and Rafters

Joists and rafters which are supported directly in masonry bearing walls shall have a minimum bearing of three inches (3") and a two-inch (2") bevel fire cut.

25.10.2 Balloon Framing

In balloon framing systems, joists and rafters shall be securely nailed to studs and shall be supported on let-in nominal 1 x 4 (1" x 4") wood ribbons.

25.10.3 Allowable Spans

Allowable spans of floor joists, ceiling joists and rafters may be increased a maximum of 15% under either of the following conditions: When spacing is reduced from 1' 4" to 1' 0", or when member thickness is increased from a nominal 2 inches to a nominal 3 inches, allowable spans of floor joists, ceiling joists and rafters may be increased 10% when members of Southern Pine, or Larch, or Douglas Fir are provided, bearing stress grade markings of not less than "1,800 f" or "select structural" and when a separate statement signed by both the Architect and General Contractor is submitted with the permit application indicating that members will comply with the stress grading requirements. However, in no case shall any wood joist or rafter exceed a maximum span of 21' 0".

25.10.4 Chimney and Fireplace Framing

No wood framing or combustible sheathing, blocking or furring shall be supported from chimney or fireplace construction, or be placed closer than two inches (2") from such construction. The two-inch space thus formed shall be packed with incombustible insulating material.

25.10.5 Unusual Bearing and Loading

When bearing partitions perpendicular to floor joists occur in the middle half of the span or when heavy floor finishes or roof finishes are supported by a wood framing system or when other unusual loading conditions exist, the size, spacing, or span of the framing system shall be adjusted correspondingly to provide adequate strength equivalent to the requirements specified in this Section, subject to review and acceptance by the Building Commissioner.

25.10.6 Cut-Outs

Cut-outs through the top plates or bottom plates of wall framing for heating ductwork and similar purposes shall not be permitted in any two adjoining wall stud spaces. Top plates which have been structurally damaged by cut-outs shall be reinforced on both sides of the plate with 1-1/2" x 1-1/2" x 16 gauge galvanized steel angel thirty inches (30") long, unless a double wall is built to reinforce the wall or unless other reinforcing construction is provided.