3.1 Section Properties of Sawn Lumber and Structural Glued Laminated Timber

3.1.1 Standard Sizes of Sawn Lumber

Details regarding the dressed sizes of various species of lumber in the grading rules of the agencies which formulate and maintain such rules. The dressed sizes in Table 1A conform to the sizes set forth in U.S. Department of Commerce Voluntary Product Standard PS 20-10 (American Softwood Lumber Standard). While these sizes are generally available on a commercial basis, it is good practice to consult the local lumber dealer to determine what sizes are on hand or can be readily secured.

Dry lumber is defined as lumber which has been seasoned to a moisture content of 19% or less. Green lumber is defined as lumber having a moisture content in excess of 19%.

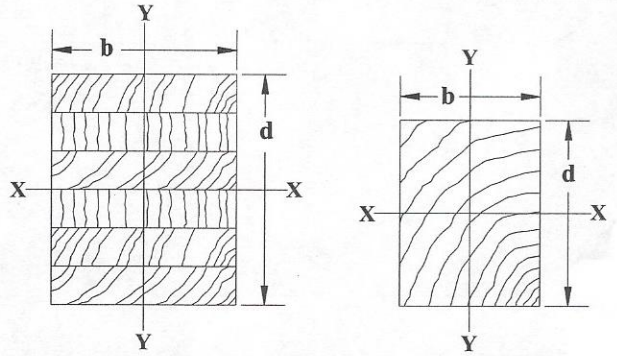
3.1.2 Properties of Standard Dressed Sizes

Certain mathematical expressions of the properties or elements of sections are used in design calculations for various member shapes and loading conditions. The section properties for selected standard sizes of boards, dimension lumber, and timbers are given in Table 1B. Section properties for selected standard sizes of structural glued laminated timber are given in Tables 1C and 1D.

3.1.3 Definitions

NEUTRAL AXIS, in the cross section of a beam, is the line on which there is neither tension nor compression stress.

Figure 1A Dimensions for Rectangular Cross Section



Structural Glued Laminated Timber Sawn Lumber

MOMENT OF INERTIA, I, of the cross section of a beam is the sum of the products of each of its elementary areas multiplied by the square of their distance from the neutral axis of the section.

SECTION MODULUS, S, is the moment of inertia divided by the distance from the neutral axis to the extreme fiber of the section.

CROSS SECTION is a section taken through the member perpendicular to its longitudinal axis.

The following symbols and formulas apply to rectangular beam cross sections:

X-X = neutral axis for edgewise bending (load applied to narrow face)

Y-Y = neutral axis for flatwise bending (load applied to wide face)

b = breadth (thickness) of rectangular bending member, in.

d = depth (width) of rectangular bending member, in.

$A = bd$ = area of cross section, in.^{2}

c = distance from neutral axis to extreme fiber of cross section, in.

$I_x = bd^3/12$ = moment of inertia about the X-X axis, in.^{4}

$I_y = db^3/12$ = moment of inertia about the Y-Y axis, in.^{4}

$r_x = \sqrt{I_x / A} = d/\sqrt{12}$ = radius of gyration about the X-X axis, in.

$r_y = \sqrt{I_y / A} = b/\sqrt{12}$ = radius of gyration about the Y-Y axis, in.

$S_x = I_x/c = bd^2/6$ = section modulus about the X-X axis, in.^{3}

$S_y = I_y/c = db^2/6$ = section modulus about the Y-Y axis, in.^{3}

The following formula shall be used to determine the density in lbs/ft^3 of wood:

$$\text{density} = 62.4\left[\frac{G}{1+G(0.009)(\text{m.c.})}\right]\left[1+\frac{\text{m.c.}}{100}\right]$$

where:

G = specific gravity of wood

m.c. = moisture content of wood, %