EQUATIONS ... (UNDER REVISION)

A = b h ... cross section area (rectangular section)

$A_b = b\,\ell_b$ ... bearing area

$C_V = \left(\frac{5.125\text{ in.}}{b}\right)^{1/10}\left(\frac{12\text{ in.}}{d}\right)^{1/10}\left(\frac{21\text{ ft}}{L}\right)^{1/10}$ ... Volume factor for glulam (western softwoods)

$\Delta = \frac{5\omega L^4}{384EI}$ ... or ... $\Delta = \frac{5WL^3}{384EI}$ ... deflection due to uniform line load ω or W

$\Delta = \frac{5\omega L^4}{384EI} + \frac{3\omega L^2}{20Gbd}$ ... deflection (first term is due to pure bending and second due to shear)

$\Delta_{TL\text{ incl. creep}} = \Delta_{\textit{due to non-sustained loads}} + \Delta_{\textit{immediate due to sustained loads}} + \Delta_{\text{creep due to sustained loads}}$ ... which generally leads to ... $\Delta_{TL\text{ incl. creep}} = \Delta_{LL\text{ or SL}} + \Delta_{DL\text{ and s.w.}} + 0.5\Delta_{DL\text{ and s.w.}}$

$\varepsilon = \frac{\delta}{L}$ ... strain (unit deformation) is deformation divided by length

$E = \frac{\sigma}{\varepsilon}$ ... modulus of elasticity is stress divided by strain

$f_{c\perp} = \frac{R}{A}$ ... compression perp to grain at bearing location

$\frac{f}{F'} \le 1.00?$ ... `Unity Check' (generic)

$f_b = \frac{M}{S}$ ... extreme fiber bending stress

$f_v = \frac{3}{2}\frac{V}{A}$ ... maximum shear stress in a rectangular section subject to shear force V

$F_{( )}' = F_{( )} C$'s ... Allowable stress determined from Design value multiplied by Adjustment factors (generic)

$f_c = \frac{P}{A}$ ... axial compressive stress due to centric force P

I = $bh^3/12$ ... Moment of Inertia for a rectangular section

M = $\omega L^2 / 8$ = W L / 8 ... maximum moment for a simple beam under uniform load

M = P e

$M_p = F_y Z_x$ ... Plastic Moment = Yield Stress times Plastic Section Modulus

$\phi P_n = \phi F_{cr} A_g$ ... factored axial strength of a column

$P = \sigma A,\ P_u = \sigma_u A$ ... Column load = area load times tributary area (service or factored load levels)

R = W/2 = ω L/2 ... Reaction at end of uniformly loaded simple beam

S = $bh^2/6$ ... Section Modulus for a rectangular section

V = W/2 = ω L/2 ... shear at end of uniformly loaded simple beam

W = ω L ... `Whole' load due to uniformly distributed load ω

$\sigma = \frac{P}{A}, \sigma = \frac{T}{A}$ ... stress equals load divided by area

$\omega = \gamma A$ ... self weight (line load) determined from specific weight

$\omega = \sigma$ S ... line load based on area load and tributary width (or spacing)