

List of Symbol Definitions

- a* long dimension for a section subjected to torsion (in, mm);
acceleration (ft/sec², m/sec²);
width of the base of a retaining wall for pressure calculation (ft, m);
equivalent square column size in spread footing design (in, ft, mm, m);
distance used in beam formulas (ft, m);
depth of the effective compression block in a concrete beam (in, mm)
- a* area bounded by the centerline of a thin walled section subjected to torsion (in², mm²)
- A* area, often cross-sectional (in², ft², mm², m²)
- A_b* area of a bolt (in², mm²)
- A_e* effective net area found from the product of the net area *A_n* by the shear lag factor *U* (in², ft², mm², m²)
- A_g* gross area, equal to the total area ignoring any holes or reinforcement (in², ft², mm², m²)
- A_{gv}* gross area subjected to shear for block shear rupture (in², ft², mm², m²)
- A_n* net area, equal to the gross area subtracting any holes (in², ft², mm², m²) (*see A_e*)
- A_{net}* net area, equal to the gross area subtracting any reinforcement (in², ft², mm², m²)
- A_{nt}* net area subjected to tension for block shear rupture (in², ft², mm², m²)
- A_{nv}* net area subjected to shear for block shear rupture (in², ft², mm², m²)
- A_p* bearing area (in², ft², mm², m²)
- A_{req'd}* area required to satisfy allowable stress (in², ft², mm², m²)
- A_s* area of steel reinforcement in concrete beam and masonry design (in², ft², mm², m²)
- A'_s* area of steel compression reinforcement in concrete beam design (in², ft², mm², m²)
- A_{st}* area of steel reinforcement in concrete and masonry column design (in², ft², mm², m²)
- A_{throat}* area across the throat of a weld (in², ft², mm², m²)
- A_v* area of concrete shear stirrup reinforcement (in², ft², mm², m²)
- A_{web}* web area in a steel beam equal to the depth x web thickness (in², ft², mm², m²)
- A₁* area of column in spread footing design (in², ft², mm², m²)
- A₂* projected bearing area of column load in spread footing design (in², ft², mm², m²)
- ASD* Allowable Stress Design
- b* width, often cross-sectional (in, ft, mm, m);
narrow dimension for a section subjected to torsion (in, mm);
number of truss members;
rectangular column dimension in concrete footing design (in, mm, m);
distance used in beam formulas (ft, m)
- b_E* effective width of the flange of a concrete T beam cross section (in, mm)
- b_f* width of the flange of a steel or concrete T beam cross section (in, mm)
- b_o* perimeter length for two-way shear in concrete footing design (in, ft, mm, m)
- b_w* width of the stem (web) of a concrete T beam cross section (in, mm)

B	spread footing or retaining wall base dimension in concrete design (ft, m); dimension of a steel base plate for concrete footing design (in, mm, m)
B_s	width within the longer dimension of a rectangular spread footing that reinforcement must be concentrated within for concrete design (ft, m)
B_1	factor for determining M_u for combined bending and compression
c	distance from the neutral axis to the top or bottom edge of a beam (in, mm, m); distance from the center of a circular shape to the surface under torsional shear strain (in, mm, m); rectangular column dimension in concrete footing design (in, mm, m); the distance from the top of a masonry or concrete beam to the neutral axis (in, mm, m) (<i>see x</i>); buckling and crushing interaction factor for wood columns (<i>see C_p</i>)
c_i	distance from the center of a circular shape to the inner surface under torsional shear strain (in, mm, m)
c_o	distance from the center of a circular shape to the outer surface under torsional shear strain (in, mm, m)
c_1	coefficient for shear stress for a rectangular bar in torsion
c_2	coefficient for shear twist for a rectangular bar in torsion
CL, ℓ	center line
C	compression label; compression force (lb, kips, N, kN); dimension of a steel base plate for concrete footing design (in, mm, m)
C_b	lateral torsional buckling modification factor for moment in ASD & LRFD steel beam design, $C_b = 1$ for simply supported beams (0 moments at the ends)
C_c	column slenderness classification constant for steel column design; compressive force in the concrete of a doubly reinforced concrete beam (lb, k, N, kN)
C_C	curvature factor for laminated arch design
C_D	load duration factor for wood design
C_f	form factor for circular sections or square sections loaded in plane of diagonal for wood design
C_{fu}	flat use factor for other than decks in wood design
C_F	size factor for wood design
C_H	shear stress factor for wood design
C_i	incising factor for wood design
C_L	beam stability factor for wood design
C_m	modification factor for combined stress in steel design; compression force in the masonry for masonry design (lb, k, N, kN)
C_M	wet service factor for wood design
C_p	column stability factor for wood design
C_r	repetitive member factor for wood design
C_s	compressive force in the compression steel of a doubly reinforced concrete beam (lb, k, N, KN)

C_t	temperature factor for wood design
C_T	buckling stiffness factor for wood truss design
C_v	web shear coefficient for steel design
C_V	volume factor for glue laminated timber design
d	depth, often cross-sectional (in, mm, m); diameter (in, mm, m); perpendicular distance from a force to a point in a moment calculation (in, ft, mm, m); effective depth from the top of a reinforced concrete or masonry beam to the centroid of the tensile steel (in, ft, mm, m); critical cross section dimension of a rectangular timber column cross section related to the profile (axis) for buckling (in, mm, m); symbol in calculus to represent a very small change (like the greek letters for d, <i>see</i> δ & Δ)
d'	effective depth from the top of a reinforced concrete beam to the centroid of the compression steel (in, ft, mm, m)
d_b	bar diameter of a reinforcing bar (in, mm); nominal bolt diameter (in, mm)
d_f	depth of a steel column flange (wide flange section) (in, mm)
d_x	difference in the x direction between an area centroid (\bar{x}) and the centroid of the composite shape (\hat{x}) (in, mm)
d_y	difference in the y direction between an area centroid (\bar{y}) and the centroid of the composite shape (\hat{y}) (in, mm)
D	diameter of a circle (in, mm, m); dead load for LRFD design
DL	dead load
e	eccentric distance of application of a force (P) from the centroid of a cross section (in, mm)
E	modulus of elasticity (psi; ksi, kPa, MPa, GPa); earthquake load for LRFD design
E_c	modulus of elasticity of concrete (psi; ksi, kPa, MPa, GPa)
E_s	modulus of elasticity of steel (psi; ksi, kPa, MPa, GPa)
f	symbol for stress (psi, ksi, kPa, MPa)
f_a	calculated axial stress (psi, ksi, kPa, MPa)
f_b	calculated bending stress (psi, ksi, kPa, MPa)
f_c	calculated compressive stress (psi, ksi, kPa, MPa)
f'_c	concrete design compressive stress (psi, ksi, kPa, MPa)
f_{cr}	calculated column stress based on the critical column load P_{cr} (psi, ksi, kPa, MPa)
f_m	calculated compressive stress in masonry (psi, ksi, kPa, MPa)
f'_m	masonry design compressive stress (psi, ksi, kPa, MPa)
f_p	calculated bearing stress (psi, ksi, kPa, MPa)

f_s	stress in the steel reinforcement for concrete or masonry design (psi, ksi, kPa, MPa)
f'_s	compressive stress in the compression reinforcement for concrete beam design (psi, ksi, kPa, MPa)
f_t	calculated tensile stress (psi, ksi, kPa, MPa)
f_v	calculated shearing stress (psi, ksi, kPa, MPa)
f_x	combined stress in the direction of the major axis of a column (psi, ksi, kPa, MPa)
f_y	yield stress (psi, ksi, kPa, MPa)
f_{yt}	yield stress of transverse reinforcement (psi, ksi, kPa, MPa)
F	force (lb, kip, N, kN); capacity of a nail in shear (lb, kip, N, kN); symbol for allowable stress in design codes (psi, ksi, kPa, MPa); fluid load for LRFD design
F_a	allowable axial stress (psi, ksi, kPa, MPa)
F_b	allowable bending stress (psi, ksi, kPa, MPa)
F'_b	allowable bending stress for combined stress for wood design (psi, ksi, kPa, MPa)
F_c	allowable compressive stress (psi, ksi, kPa, MPa)
$F_{c\perp}$	allowable compressive stress perpendicular to the wood grain (psi, ksi, kPa, MPa)
$F_{connector}$	resistance capacity of a connector (lb, kips, N, kN)
F_{cE}	intermediate compressive stress for ASD wood column design dependant on material (psi, ksi, kPa, MPa)
F_{cr}	flexural buckling (column) stress in ASD and LRFD (psi, ksi, kPa, MPa)
F'_c	allowable compressive stress for ASD wood column design (psi, ksi, kPa, MPa)
F^*_c	intermediate compressive stress for ASD wood column design dependant on load duration (psi, ksi, kPa, MPa)
F_e	elastic critical buckling stress is steel design
F_{EXX}	yield strength of weld material (psi, ksi, kPa, MPa)
$F_{horizontal-resist}$	resultant frictional force resisting sliding in a footing or retaining wall (lb, kip, N, kN)
F_n	nominal strength in LRFD steel design (psi, ksi, kPa, MPa) nominal tension or shear strength of a bolt (psi, ksi, kPa, MPa)
F_p	allowable bearing stress parallel to the wood grain (psi, ksi, kPa, MPa)
F_s	allowable tensile stress in reinforcement for masonry design (psi, ksi, kPa, MPa)
$F_{sliding}$	resultant force causing sliding in a footing or retaining wall (lb, kip, N, kN)
F_t	allowable tensile stress (psi, ksi, kPa, MPa)
F_v	allowable shear stress (psi, ksi, kPa, MPa); allowable shear stress in a welded connection
F_x	force component in the x coordinate direction (lb, kip, N, kN)

F_y	force component in the y coordinate direction (lb, kip, N, kN); yield stress (psi, ksi, kPa, MPa)
F_{yw}	yield stress in the web of a steel wide flange section (psi, ksi, kPa, MPa)
F_u	ultimate stress a material can sustain prior to failure (psi, ksi, kPa, MPa)
$F.S.$	factor of safety
g	acceleration due to gravity, 32.17 ft/sec ² , 9.807 m/sec ² ; gage spacing of staggered bolt holes (in, mm)
G	shear modulus (psi; ksi, kPa, MPa, GPa); gigaPascals (10^9 Pa or 1 kN/mm ²); relative stiffness of columns to beams in a rigid connection (<i>see</i> Ψ); specific gravity (ie. factor multiplied by density of water to get density)
h	depth, often cross-sectional (in, ft, mm, m); height (in, ft, mm, m); sag of a cable structure (ft, m); effective height of a wall or column (<i>see</i> ℓ_e)
h_c	height of the web of a wide flange steel section (in, ft, mm, m)
h_f	depth of a flange in a T section (in, ft, mm, m); height of a concrete spread footing (in, ft, mm, m)
H	hydraulic soil load for LRFD design; height of retaining wall (ft, m)
H_A	horizontal force due to active soil pressure (lb, k, N, kN)
I	moment of inertia (in ⁴ , mm ⁴ , m ⁴)
\bar{I}	moment of inertia about the centroid (in ⁴ , mm ⁴ , m ⁴)
I_c	moment of inertia of a component about the centroid (in ⁴ , mm ⁴ , m ⁴);
I_{min}	minimum moment of inertia of I_x and I_y (in ⁴ , mm ⁴ , m ⁴)
$I_{transformed}$	moment of inertia of a multi-material section transformed to one material (in ⁴ , mm ⁴ , m ⁴)
I_x	moment of inertia with respect to an x-axis (in ⁴ , mm ⁴ , m ⁴)
I_y	moment of inertia with respect to a y-axis (in ⁴ , mm ⁴ , m ⁴)
j	multiplier by effective depth of masonry section for moment arm, jd (<i>see</i> d)
J, J_o	polar moment of inertia (in ⁴ , mm ⁴ , m ⁴)
k	kips (1000 lb); shape factor for plastic design of steel beams, M_p/M_y ; effective length factor for columns (<i>also</i> K); distance from outer face of W flange to the web toe of fillet (in, mm); multiplier by effective depth of masonry section for neutral axis, kd
kg	kilograms
klf	kips per linear foot (k/ft)
ksf	kips per square foot (k/ft ²)
ksi	kips per square inch (k/in ²)

kN	kiloNewtons (10^3 N)
kPa	kiloPascals (10^3 Pa)
K	effective length factor with respect to column end conditions (<i>also k</i>); masonry mortar strength designation
K_{cE}	material factor for wood column design
ℓ	length (in, ft, mm, m); cable span (ft, m)
l_d	development length for reinforcing steel (in, ft, mm, m) (<i>also L_d</i>)
l_{dc}	development length for column dowels (in, ft, mm, m)
l_{dh}	development length for hooks (in, ft, mm, m)
ℓ	effective length that can buckle for wood column design (in, ft, mm, m) (<i>also L_e</i>)
l_n	clear span from face of support to face of support in concrete design (in, ft, mm, m)
l_{sc}	lap splice length in compression for reinforcement (in, ft, mm, m)
lb	pound force
L	length (in, ft, mm, m); live load for LRFD design; spread footing dimension in concrete design (ft, m)
L_b	unbraced length of a steel beam in LRFD design (in, ft, mm, m)
L_c	clear distance between the edge of a hole and edge of next hole or edge of the connected steel plate in the direction of the load (in, ft, mm, m)
L_d	development length of reinforcement in concrete (ft, m) (<i>also l_d</i>)
L_e	effective length that can buckle for column design (in, ft, mm, m) (<i>also ℓ_e</i>)
L_m	projected length for bending in concrete footing design (ft, m)
L_p	maximum unbraced length of a steel beam in LRFD design for full plastic flexural strength (in, ft, mm, m)
L_r	roof live load in LRFD design; maximum unbraced length of a steel beam in LRFD design for inelastic lateral-torsional buckling (in, ft, mm, m)
L'	length of an angle in a connector with staggered holes (in, mm); length of the one-way shear area in concrete footing design (ft, m)
LL	live load
$LRFD$	Load and Resistance Factor Design
m	mass (lb-mass, g, kg); meters
mm	millimeters
M	moment of a force or couple (lb-ft, kip-ft, N-m, kN-m); bending moment (lb-ft, kip-ft, N-m, kN-m); masonry mortar strength designation

M_a	required bending moment in steel ASD beam design (unified) (lb-ft, kip-ft, N-m, kN-m)
M_A	moment value at quarter point of unbraced beam length for LRFD beam design (lb-ft, kip-ft, N-m, kN-m)
M_B	moment value at half point of unbraced beam length for LRFD beam design (lb-ft, kip-ft, N-m, kN-m)
M_C	moment value at three quarter point of unbraced beam length for LRFD beam design (lb-ft, kip-ft, N-m, kN-m)
M_m	moment capacity of a reinforced masonry beam (lb-ft, kip-ft, N-m, kN-m)
M_n	nominal flexure strength with the full section at the yield stress for LRFD steel beam design (lb-ft, kip-ft, N-m, kN-m); nominal flexure strength with the steel reinforcement at the yield stress and compressive stress at the concrete design strength for reinforced beam design (lb-ft, kip-ft, N-m, kN-m)
$M_{overturning}$	resulting moment from all forces on a footing or retaining wall causing overturning (lb-ft, kip-ft, N-m, kN-m)
M_p	(also M_{ult}) internal bending moment when all fibers in a cross section reach the yield stress (lb-ft, kip-ft, N-m, kN-m)
M_{resist}	resulting moment from all forces on a footing or retaining wall resisting overturning (lb-ft, kip-ft, N-m, kN-m)
M_u	maximum moment from factored loads for LRFD beam design (lb-ft, kip-ft, N-m, kN-m)
M_{ult}	(also M_p) internal bending moment when all fibers in a cross section reach the yield stress (lb-ft, kip-ft, N-m, kN-m)
M_y	internal bending moment when the extreme fibers in a cross section reach the yield stress (lb-ft, kip-ft, N-m, kN-m)
M_1	smaller end moment used to calculate C_m for combined stresses in a beam-column (lb-ft, kip-ft, N-m, kN-m)
M_2	larger end moment used to calculate C_m for combined stresses in a beam-column (lb-ft, kip-ft, N-m, kN-m)
MPa	megaPascals (10^6 Pa or 1 N/mm^2)
n	number of truss joints, nails or bolts; modulus of elasticity transformation coefficient for steel to concrete or masonry
$n.a.$	neutral axis (axis connecting beam cross-section centroids)
N	Newtons ($\text{kg}\cdot\text{m}/\text{sec}^2$); bearing-type connection with bolt threads included in shear plane; normal load (lb, kip, N, kN); masonry mortar strength designation; bearing length on a wide flange steel section (in, mm); number of stories
o	point of overturning of a retaining wall, commonly at the “toe”
$o.c.$	on-center
O	point of origin; masonry mortar strength designation

p	pitch of nail or bolt spacing (in, ft, mm, m); pressure (lb/ft ² , kips/ft ² , N/m ² , Pa, MPa)
p_A	active soil pressure (lb/ft ² , kips/ft ² , N/m ² , Pa, MPa)
plf	pounds per linear foot (lb/ft)
psf	pounds per square foot (lb/ft ²)
psi	pounds per square inch (lb/in ²)
P	force, concentrated (point) load (lb, kip, N, kN); axial load in a column or beam-column (lb, kip, N, kN)
P_a	allowable axial load (lb, kip, N, kN); required axial force in ASD steel design (unified) (lb, kip, N, kN)
$P_{allowable}$	allowable axial load (lb, kip, N, kN)
P_c	available axial strength for steel unified design (lb, kip, N, kN)
P_{cr}	critical (failure) load in column calculations (lb, kip, N, kN)
P_{dowels}	nominal capacity of dowels from concrete column to footing in concrete design ((lb, kip, N, kN)
P_{el}	Euler buckling strength in steel unified design (lb, kip, N, kN)
P_n	nominal column or bearing load capacity in LRFD steel and concrete design (lb, kip, N, kN); nominal axial load for a tensile member or connection in LRFD steel (lb, kip, N, kN)
P_o	maximum axial force with no concurrent bending moment in a reinforced concrete column (lb, kip, N, kN)
P_r	required axial force in steel unified design (lb, kip, N, kN)
P_u	factored column load calculated from load factors in LRFD steel and concrete design (lb, kip, N, kN); factored axial load for a tensile member or connection in LRFD steel (lb, kip, N, kN)
Pa	Pascals (N/m ²)
q	shear flow (lb/in, kips/ft, N/m, kN/m); soil bearing pressure (lb/ft ² , kips/ft ² , N/m ² , Pa, MPa)
$q_{allowed}$	allowable soil bearing pressure (lb/ft ² , kips/ft ² , N/m ² , Pa, MPa)
q_g	gross allowed soil pressure (lb/ft ² , kips/ft ² , N/m ² , Pa, MPa)
q_{net}	net allowed soil bearing pressure (lb/ft ² , kips/ft ² , N/m ² , Pa, MPa)
q_u	ultimate soil bearing strength in allowable stress design (lb/ft ² , kips/ft ² , N/m, Pa, MPa); factored soil bearing pressure in concrete design from load factors (lb/ft ² , kips/ft ² , N/m, Pa, MPa)
Q	first moment area used in shearing stress calculations (in ³ , mm ³ , m ³); generic axial load quantity for LRFD design (<i>also see R</i>)
$Q_{connected}$	first moment area used in shearing stress calculations for built-up beams (in ³ , mm ³ , m ³)
Q_x	first moment area about an x axis (using y distances) (in ³ , mm ³ , m ³)
Q_y	first moment area about an y axis (using x distances) (in ³ , mm ³ , m ³)
r	radius of a circle or arc (in, mm, m); radius of gyration (in, mm, m)

r_n	nominal capacity per bolt in a connection (k/bolt or k/bolt/in.)
r_o	polar radius of gyration (in, mm, m)
r_x	radius of gyration with respect to an x-axis (in, mm, m)
r_y	radius of gyration with respect to a y-axis (in, mm, m)
R	force, reaction or resultant (lb, kip, N, kN); radius of curvature of a beam (ft, m); rainwater or ice load for LRFD design; generic load quantity (force, shear, moment, etc.) for LRFD design (<i>also see Q</i>); radius of curvature of a laminated arch (ft, m)
R_a	required strength (ASD-unified) (<i>also see V_a, M_a</i>)
R_n	concrete beam design ratio = M_u/bd^2 (lb/in ² , MPa) nominal value for LRFD design to be multiplied by ϕ (<i>also see P_n, M_n</i>) nominal value for ASD design to be divided by the safety factor Ω
R_u	design value for LRFD design based on load factors (<i>also see P_u, M_u</i>)
R_x	reaction or resultant component in the x coordinate direction (lb, kip, N, kN)
R_y	reaction or resultant component in the y coordinate direction (lb, kip, N, kN)
s	length of a segment of a thin walled section (in, mm); spacing of stirrups in reinforced concrete beams (in, mm); longitudinal center-to-center spacing of any two consecutive holes (in, mm)
$s.w.$	self-weight
S	section modulus (in ³ , mm ³ , m ³); snow load for LRFD design; allowable strength per length of a weld for a given size (lb/in, kips/in, N/mm, kN/m); masonry mortar strength designation
$S_{required}$	section modulus required to not exceed allowable bending stress (in ³ , mm ³ , m ³)
S_x	section modulus with respect to the x-centroidal axis (in ³ , mm ³ , m ³)
S_y	section modulus with respect to the y-centroidal axis (in ³ , mm ³ , m ³)
SC	slip critical bolted connection
$S4S$	surface-four-sided
t	thickness (in, mm, m)
t_f	thickness of the flange of a steel beam cross section (in, mm, m)
t_w	thickness of the web of a steel beam cross section (in, mm, m)
T	tension label; tensile force (lb, kip, N, kN); torque (lb-ft, k-ft, N-m, kN-m); throat size of a weld (in, mm); effect of thermal load for LRFD design; period of vibration (sec)
T_s	tension force in the steel reinforcement for masonry design (lb, kip, N, kN)
U	shear lag factor for steel tension member design (<i>see A_e and A_{net}</i>)
U_{bs}	reduction coefficient for block shear rupture

v	shear force per unit length (lb/ft, k/ft, N/m, kN/m) (<i>see q</i>)
V	volume (in ³ , ft ³ , mm ³ , m ³); shear force (lb, k, N, kN); wind speed (mi/hr, m/hr)
V_a	required shear in steel ASD design (unified) (lb, kip, N, kN)
V_c	shear force capacity in concrete (lb, kip, N, kN)
V_n	nominal shear strength capacity for LRFD beam design (lb, kip, N, kN)
V_s	shear force capacity in steel shear stirrups (lb, kip, N, kN)
V_u	maximum shear from factored loads for LRFD design (lb, kip, N, kN); shear at a distance d away from the face of support for reinforced concrete beam design (lb, kip, N, kN)
V_{u1}	maximum one-way shear from factored loads for LRFD beam design (lb, kip, N, kN)
V_{u2}	maximum two-way shear from factored loads for LRFD beam design (lb, kip, N, kN)
w	load per unit length on a beam (lb/ft, k/ft, N/m, kN/m) (<i>also ω</i>); load per unit area (lb/ft ² , kips/ft ² , N/m ² , Pa, MPa); width dimension (in, ft, mm, m)
$w_{adjusted}$	adjusted distributed load for equivalent live load deflection limit (lb/ft, kip/ft, N/m, kN/m)
w_c	weight of reinforced concrete per unit volume (lb/ft ³ , N/m ³)
$w_{equivalent}$	the equivalent distributed load derived from the maximum bending moment (lb/ft, kip/ft, N/m, kN/m)
w_u	factored load per unit length on a beam from load factors (lb/ft, kip/ft, N/m, kN/m); factored load per unit area on a surface from load factors (lb/ft ² , kip/ft ² , N/m ² , kN/m ²)
W	weight (lb, kip, N, kN); total load from a uniform distribution (lb, kip, N, kN); wind load for LRFD design; wide flange shape designation (i.e. W 21 x 68)
x	a distance in the x direction (in, ft, mm, m); the distance from the top of a masonry or concrete beam to the neutral axis (in, mm, m) (<i>see c</i>)
\bar{x}	the distance in the x direction from a reference axis to the centroid of a shape (in, mm)
\hat{x}	the distance in the x direction from a reference axis to the centroid of a composite shape (in, mm)
X	bearing-type connection with bolt threads excluded from shear plane
y	a distance in the y direction (in, ft, mm, m); distance from the neutral axis to the y-level of a beam cross section (in, mm)
\bar{y}	the distance in the y direction from a reference axis to the centroid of a shape (in, mm)
\hat{y}	the distance in the y direction from a reference axis to the centroid of a composite shape (in, mm)
Z	plastic section modulus of a steel beam (in ³ , mm ³); lateral design value for a single fastener in a timber connection (lb/nail, k/bolt)
Z_x	plastic section modulus of a steel beam with respect to the x axis (in ³ , mm ³)

'	symbol for feet
"	symbol for inches
#	symbol for pounds
=	symbol for equal to
\approx	symbol for approximately equal to
\propto	symbol for proportional to
\leq	symbol for less than or equal to
\int	symbol for integration
α	coefficient of thermal expansion ($^{\circ}\text{C}$, $^{\circ}\text{F}$); angle, in a math equation (degrees, radians); method factor for B_1 for steel beam-column design
β	angle, in a math equation (degrees, radians); ratio of long side to short side of the column in concrete footing design
β_1	coefficient for determining stress block height, a , based on concrete strength, f'_c ; coefficient for determining stress block height, c , in masonry LRFD design
δ	elongation (in, mm)
δ_p	elongation due to axial load (in, mm)
δ_s	shear deformation (in, mm)
δ_T	elongation due to change in temperature (in, mm)
Δ	beam deflection (in, mm); an increment
Δ_{LL}	beam deflection due to live load (in, mm)
Δ_{max}	maximum calculated beam deflection (in, mm)
Δ_{TL}	beam deflection due to total load (in, mm)
Δ_x	beam deflection in beam diagrams and formulas (in, mm)
ΔT	change in temperature ($^{\circ}\text{C}$, $^{\circ}\text{F}$)
ε	strain (no units)
ε_t	thermal strain (no units)
ε_y	yield strain (no units)
ϕ	diameter symbol; angle of twist (degrees, radians); resistance factor in LRFD steel design and reinforced concrete design
ϕ_b	resistance factor for flexure in LRFD design
ϕ_c	resistance factor for compression in LRFD design
ϕ_t	resistance factor for tension in LRFD design

ϕ_v	resistance factor for shear in LRFD design
λ	modification factor for reinforced concrete shear for lightweight materials
μ	Poisson's ratio; coefficient of static friction
γ	specific gravity of a material (lb/in ³ , lb/ft ³ , N/m ³ , kN/m ³); angle, in a math equation (degrees, radians); shearing strain; load factor in LRFD design
γ_D	dead load factor in LRFD design
γ_L	live load factor in LRFD design
θ	angle, in a trig equation, ex. $\sin\theta$ (degrees, radians); slope of the deflection of a beam at a point (degrees, radians)
π	pi (180°)
ρ	radial distance (in, mm); radius of curvature in beam deflection relationships (ft, m); reinforcement ratio in concrete beam design = A_s/bd
ρ_b	balanced reinforcement ratio in masonry design
$\rho_{balanced}$	balanced reinforcement ratio in concrete beam design
ρ_g	reinforcement ratio in concrete column design = A_{st}/A_g
ρ_{max}	maximum reinforcement ratio allowed in concrete beam design for ductile behavior
σ	engineering symbol for normal stress (axial or bending)
τ	engineering symbol for shearing stress
v_c	shear strength in concrete design
ω	load per unit length on a beam (lb/ft, kip/ft, N/m, kN/m) (<i>see w</i>); load per unit area (lb/ft ² , kips/ft ² , N/m ² , Pa, MPa)
ω'	load per unit volume (lb/ft, kip/ft, N/m, kN/m) (<i>see γ</i>)
Σ	summation symbol
Ω	safety factor for ASD of steel (unified)
Ψ	relative stiffness of columns to beams in a rigid connection (<i>see G</i>)