Nomenclature

Symbol: Definition (Units)

A: bearing pad area (in^2)
A: area of stringer, beam, or girder (in^2)
a: depth of equivalent rectangular stress block (in)
A_1: factor for dead load used in computing the rating factor
A_2: factor for live load used in computing the rating factor
A_b: area of concrete reinforcing bar (in^2)
A_c: area of composite section (in^2)
ADT: average daily traffic (vehicles/day)
ADTT: average daily truck traffic
$ADTT_{SL}$: single-lane average daily truck traffic
A_g: gross area of cross-section (in^2)
A_{gc}: area of transformed gross composite section (in^2)
A_{ps}: area of prestressing steel (in^2)
A_s: area of nonprestressed reinforcement (in^2)
A_s: peak seismic ground acceleration coefficient modified by short-period site factor
$A_{s,temp}$: area of temperature reinforcement in concrete slab (in^2)
A_v: area of transverse reinforcement with distance s (in^2)
b: width of beam or width of the compression face of the member (in)
b_c: width of the compression flange (in)
b_e: effective flange width for beams (in)
b_{et}: transformed effective deck width (in)
b_f: full width of the flange (in)
b_i: flange width of interior beam (in)
b_{min}: minimum width of T-beam stem (in)
BR: vehicular braking force (kips)
BR: vertical braking force (kips/ft)
BR_{hor}: horizontal braking force at the top of the abutment (kips/ft)
BR_{max}: maximum braking force (kips)
BR_{tandem}: braking force resulting from tandem, single traffic lane (kips)
$BR_{tandem+lane}$: braking force resulting from tandem and lane load, single traffic lane (kips)
BR_{truck}: braking force resulting from truck, single traffic lane (kips)

$BR_{truck+lane}$: braking force resulting from truck and lane load, single traffic lane (kips)
BR_{vert}: vertical braking force at the top of the abutment (kips/ft)
b_s: effective width of concrete deck (in)
b_s: width of beam (in)
$b_{s,ext}$: effective flange width for exterior beams (in)
$b_{s,int}$: effective flange width for interior beams (in)
b_t: width of the tension flange (in)
b_f: flange width of steel beam section (in)
b_v: width of web (in)
BW: barrier weight (kips/ft)
b_w: web width (in)
c: distance from the extreme compression fiber to the neutral axis (in)
C: ratio of the shear buckling resistance to the shear specified minimum yield strength
C: stiffness parameter
C&P: curb and parapet cross-section area (ft^2)
c.g.: center of gravity
CE: vehicular centrifugal force
CL: center line
CR: forces resulting from creep
C_{rb}: distance from top of concrete deck to bottom layer of longitudinal concrete deck reinforcement (in)
C_{rt}: distance from top of concrete deck to top layer of longitudinal concrete deck reinforcement (in)
CT: vehicular collision force
CV: vessel collision force
D: clear distance between flanges (in)
D: dead load (lbf)
D: depth of steel beam (in)
D: width of distribution per lane (ft)
d: depth of beam or stringer (in)
d_b: nominal diameter of reinforcing bar, wire, or prestressing strand (in)
d_c: concrete cover measured from extreme tension fiber to the center of the flexural reinforcement located closest thereto (in)
d_c: distance from the compression flange to the PNA (in)
DC: dead load of structural components and nonstructural attachments (kips)
DC_1: noncomposite dead load (kips/ft)
DC_2: composite dead load (kips/ft)
$DC_{C\&P}$: distributed load resulting from curb and parapet self-weight (kips/ft)
DC_{haunch}: noncomposite dead load resulting from haunch self-weight (kips/ft)
D_{cp}: depth of girder web in compression at the plastic moment (in)
DC_{slab}: noncomposite dead load resulting from slab self-weight (kips/ft)
$DC_{stay\text{-}in\text{-}place\ forms}$: noncomposite dead load resulting from self-weight of stay-in-place forms (kips/ft)

$DC_{T\text{-}beam}$: distributed load resulting from T-beam self-weight (kips/ft)
DD: downdrag load
d_e: effective depth from extreme compression fiber to the centroid of the tensile force in the tensile reinforcement (in)
de: horizontal distance from the centerline of the exterior web of exterior beam at the deck level to the interior edge of curb at barrier.
DF: distribution factor for moment or shear
$DF_{deflection}$: distribution factor for deflection
DFM: distribution factor for moment
DFM^{E}_{fat}: load distribution for fatigue moments, exterior girder
DFM_{ext}: load distribution for moments, exterior girders
$DFM_{fat,ext}$: load distribution for fatigue moments, exterior girder
$DFM_{fat,int}$: load distribution for fatigue moments, interior girder
$DFM_{fatigue}$: load distribution for fatigue moments
DFM^{I}_{fat}: load distribution for fatigue moments, interior girder
DFM_{int}: load distribution for moments, interior girders
DFM_{me}: distribution factor for moment for multiple design lanes loaded for exterior beams
DFM_{mi}: distribution factor for moment for multiple design lanes loaded for interior beams
DFM_{se}: distribution factor for moment for a single design lane loaded for exterior beams
DFM_{si}: distribution factor for moment for a single design lane loaded for interior beams
DFV: distribution factor for shear
DFV_{ext}: load distribution for shears, exterior girders
$DFV_{fat,ext}$: load distribution for fatigue shears, exterior girder
$DFV_{fat,int}$: load distribution for fatigue shears, interior girder
DFV_{int}: load distribution for shears, interior girders
DFV_{me}: distribution factor for shear for multiple design lanes loaded for exterior beams
DFV_{mi}: distribution factor for shear for multiple design lanes loaded for interior beams
DFV_{se}: distribution factor for shear for a single design lane loaded for exterior beams
DFV_{si}: distribution factor for shear for a single design lane loaded for interior beams
d_{girder}: depth of girder (in)
d_o: transverse stiffener spacing (in)
d_p: distance from extreme compression fiber to the centroid of the prestressing tendons (in)
D_p: distance from the top of concrete deck to the neutral axis of the composite section (in)
d_s: distance from extreme compression fiber to the centroid of the nonprestressed tensile reinforcement (in)

d_s: thickness of concrete deck slab (in)
D_t: depth of the composite section (in)
d_t: distance from the tension flange to the PNA (in)
d_v: effective shear depth (in)
d_w: distance from the web to the PNA (in)
DW: superimposed dead load (wearing surfaces and utilities) (kips or kips/ft)
DW_{FWS}: future wearing surface dead load (kips/ft)
e: correction factor for load distribution for exterior beams
E: modulus of elasticity of steel (ksi)
E_B: modulus of elasticity of beam material (kips/in^2)
E_{beam}: modulus of elasticity of beam (ksi)
E_c: modulus of elasticity of concrete (ksi)
e_c: strand eccentricity at midspan (in)
E_{cg}: modulus of elasticity of concrete after 28 days (ksi)
E_{ci}: modulus of elasticity of concrete at transfer (ksi)
E_{cs}: modulus of elasticity of concrete after losses (ksi)
E_D: modulus of elasticity of deck material (kips/in^2)
E_{deck}: modulus of elasticity of the deck (ksi)
e_g: distance between the centers of gravity of the beam and deck (in)
EH: horizontal earth pressure load
EL: accumulated locked-in force effects resulting from the construction process, including the secondary forces from posttensioning
e_m: average eccentricity at midspan (in)
E_p: modulus of elasticity of prestressing tendons (ksi)
EQ: forces resulting from earthquake loading (kips)
EQ_h: horizontal earthquake loading at the top of the abutment (kips/ft)
ES: earth surcharge load
E_s: modulus of elasticity of prestressing steel (kips/in^2)
E_s: modulus of elasticity of steel (ksi)
f: bending stress (kips/in^2)
f'_c: compressive strength of concrete at 28 days (ksi)
$f'_{c,\,beam}$: beam concrete strength (kips/in^2)
$f'_{c,\,deck}$: deck concrete strength (kips/in^2)
f'_{cg}: compressive strength of concrete at 28 days for prestressed I-beams (ksi)
f'_{cgp}: the concrete stress at the center of gravity of prestressing tendons due to prestressing force immediately after transfer and self-weight of member at section of maximum moment (ksi)
f'_{ci}: compressive strength of concrete at time of prestressing transfer (ksi)
f'_{cs}: compressive strength of concrete at 28 days for roadway slab (ksi)
f'_s: stress in compression reinforcement (ksi)
f_{bt}: amount of stress in a single strand at 75% of ultimate stress (kips/in^2)
f_{bu}: required flange stress without the flange lateral bending
f_c: compressive stress in concrete at service load (ksi)
f_{cgp}: concrete stress at the center of gravity of prestressing tendons that results from the prestressing force at either transfer or jacking and the self-weight of the member at sections of maximum moment (ksi)

f_{ci}: temporary compressive stress before losses due to creep and shrinkage (ksi)
f_{cpe}: compressive stress in concrete due to effective prestress forces only (after allowance for all prestress losses) at extreme fiber of section where tensile stress is caused by externally applied loads (ksi)
f_{cs}: compressive strength of concrete after losses (ksi)
f_{DC}: steel top flange stresses due to permanent dead loads (kips/in^2)
f_{DW}: steel top flange stresses due to superimposed dead load (kips/in^2)
f_f: flange stress due to the Service II loads calculated without consideration of flange lateral bending (ksi)
f_f: allowable fatigue stress range (ksi)
f_{gb}: tensile stress at bottom fiber of section (kips)
f_l: flange lateral bending stress due to the Service II loads (ksi)
f_{LL+IM}: steel top flange stresses due to live load including dynamic load allowance (kips/in^2)
f_{min}: minimum live load stress resulting from the fatigue load combined with the permanent loads; positive if in tension (kips/in^2)
f_{pbt}: stress in prestressing steel immediately prior to transfer (ksi)
f_{pc}: compressive stress in concrete (after allowance for all prestress losses) at centroid of cross-section resisting externally applied loads (ksi)*
f_{pe}: compressive stress in concrete due to effective prestress forces only (after allowance for all prestress losses) at extreme fiber of section where tensile stress is caused by externally applied loads (ksi)
f_{pga}: seismic site factor
f_{ps}: average stress in prestressing steel at the time for which the nominal resistance of member is required (ksi)
f_{pt}: stress in prestressing steel immediately after transfer (ksi)
f_{pu}: specified tensile strength of prestressing steel (ksi)
f_{pul}: stress in the strand at the strength limit state (ksi)
f_{py}: yield strength of prestressing steel (ksi)
f_r: modulus of rupture of concrete (psi)
f_s: stress in the mild tension reinforcement at the nominal flexural resistance (ksi)
f_s: stress in the reinforcement (ksi)
f_s: stress in the reinforcement due to the factored fatigue live load (kips/in^2)
f_{se}: effective steel prestress after losses (ksi)
f_{si}: allowable stress in prestressing steel (ksi)
f_{ss}: tensile stress in mild steel reinforcement at the service limit state (ksi)
f_t: excess tension in the bottom fiber due to applied loads (kips)
f_t: tensile stress at the bottom fiber of the T-beam (kips/in^2)
f_{ti}: temporary tensile stress in prestressed concrete before losses (ksi)
f_{ts}: tensile strength of concrete after losses (psi)
FWS: future wearing surface (in)

* In a composite member, f_{pc} is resultant compressive stress at centroid of composite section.

f_y: specified minimum yield strength of reinforcing bars (ksi)
F_y: specified minimum yield strength of steel (ksi)
F_{yc}: specified minimum yield strength of the compression flange (kips/in^2)
F_{yf}: specified minimum yield strength of a flange (ksi)
F_{yt}: specified minimum yield strength of the tension flange (kips/in^2)
F_{yw}: specified minimum yield strength of a web (ksi)
g: centroid of prestressing strand pattern (in)
g: distribution factor
G: shear modulus of bearing pad elastomers (ksi)
$g_{interior}$ = DFV_{mi}: distribution factor designation for interior girders
g_M^{ME}: distribution factor for moment with multiple lanes loaded, exterior girder
g_M^{MI}: distribution factor for moment with multiple lanes loaded, interior girder
g_M^{SE}: distribution factor for moment with single lane loaded, exterior girder
g_M^{SI}: distribution factor for moment with single lane loaded, interior girder
g_V^{ME}: distribution factor for shear with multiple lanes loaded, exterior girder
g_V^{MI}: distribution factor for shear with multiple lanes loaded, interior girder
g_V^{SE}: distribution factor for shear with single lane loaded, exterior girder
g_V^{SI}: distribution factor for shear with single lane loaded, interior girder
H: average annual ambient relative humidity (%)
h: depth of deck (in)
h: overall depth or thickness of a member (in)
H_{contr}: load due to contraction (kips)
h_{min}: minimum depth of beam including deck thickness (in)
$h_{parapet}$: height of parapet (in)
H_{rise}: load due to expansion (kips)
$H_{temp\ fall}$: horizontal force at the top of the abutment due to temperature fall (kips/ft)
$H_{temp,fall}$: horizontal load due to temperature fall (kips/ft)
H_u: ultimate load due to temperature (kips)
I: moment of inertia (in^4)
I: live load impact factor
I_c: composite section moment of inertia (in^4)
I_g: moment of inertia of gross concrete section about centroidal axis, neglecting reinforcement (in^4)
IM: dynamic load allowance
I_p: polar moment of inertia (in^4)
I_x: moment of inertia with respect to the x-axis (in^4)
I_y: moment of inertia with respect to the y-axis (in^4)
I_{yc}: moment of inertia of the compression flange of the steel section about the vertical axis in the plane of the web (in^4)
I_{yt}: moment of inertia of the tension flange of the steel section about the vertical axis in the plane of the web (in^4)
k: shear-buckling coefficient for webs

K_g: longitudinal stiffness parameter (in^4)
L: span length of beam (ft)
LL: vehicular live load, TL + LN
LN: design lane load
LS: live load surcharge
M: bending moment about the major axis of the cross-section (in-kips)
M: moment designation
m: multiple presence factor
$M_{all, inv}$: allowable bending moment for inventory rating (ft-kips)
$M_{all, opr}$: allowable bending moment for operating rating (ft-kips)
M_C: moment at midspan
M_{cr}: cracking moment (in-kips)
M_D: moment due to slab dead load
M_{DC}: moment due to superstructure dead load (ft-kips)
$M_{DC, tot}$: moment for the total component dead load (kips)
M_{DC1}: unfactored moment resulting from noncomposite dead loads (ft-kips)
M_{DC2}: unfactored moment resulting from composite dead loads (ft-kips)
M_{DW}: moment due to superimposed dead load (ft-kips)
$M^E_{U, fat}$: factored fatigue design live load moment, exterior beam (ft-kips)
M^E_{fat+IM}: unfactored distributed fatigue live load moment with impact, exterior beam (ft-kips)
M_f: moment per lane due to fatigue load (in-kips)
$M_{F,fatigue}$: factored moment per beam due to FatigueI load (in-kips)
$M_{fat,ext}$: unfactored distributed moment resulting from fatigue loading, exterior girder (ft-kips)
$M_{fat,int}$: unfactored distributed moment resulting from fatigue loading, interior girder (ft-kips)
$M_{fat,LL}$: fatigue moment due to live load (ft-kips)
$M_{fatigue}$: unfactored moment per beam due to fatigue load (in-kips)
M_g: midspan moment due to beam weight (in-kips)
$mg_{SI,M}$: distribution of live load moment per lane with one design lane loaded for interior beams
MI: multiple lane, interior designation
mi, MI: two or more design lanes loaded, interior girder
$M^I{}_{fat+IM}$: unfactored distributed fatigue live load moment with impact, interior beam (ft-kips)
$M^I{}_{U, fat}$: factored fatigue design live load moment, interior beam (ft-kips)
M_{LL+IM}: total live load moment per lane including impact factor (ft-kips)
M_{ln}: lane load moment per lane (in-kips)
M_{LN}: unfactored live load moment per beam due to lane load (in-kips)
M_{max}: maximum dead load moment (ft-kips)
M_n: nominal flexural resistance (in-kips)
M_p: plastic moment capacity of steel girder (ft-kips)
M_r: factored flexural resistance of a section in bending, ΦM_n (in-kips)
M_s: moment due to superimposed dead loads (ft-kips)

$M_{service}$: total bending moment resulting from service loads
M_{tandem}: tandem load moment per lane (ft-kips)
M_{TL}: unfactored live load moment per beam due to truck load (in-kips)
M_{tr}: HS-20 truck load moment per lane (in-kips)
M_u: factored design moment at section $\leq \Phi M_n$ (in-kips)
n: modular ratio = E_s/E_c or E_p/E_c
N: number of stress cycles over fatigue design life
n: number of stress cycles per truck passage
N_b: number of beams, stringers, or girders
N_c: number of cells in a concrete box girder
N_g: number of girders
N_L: number of design lanes
p: fraction of truck traffic in a single lane
P: total nominal shear force in the concrete deck for the design of the shear connectors at the strength limit state (kips)
PB: base wind pressure corresponding to a wind speed of 100 mph
P_B: base wind pressure specified in AASHTO (kips/ft^2)
P_c: plastic force in the compression flange (kips)
$P_{C\&P}$: load for the curb and parapet for exterior girders (kips/ft)
P_D: design wind pressure (kips/ft^2)
P_e: effective prestress after losses (kips)
PGA: peak seismic ground acceleration coefficient on rock (Site Class B)
P_i: initial prestress force (kips)
PL: pedestrian live load
PNA: plastic neutral axis
P_{pe}: prestress force per strand after all losses (kips)
P_{pi}: prestress force per strand before transfer (kips)
P_{pt}: prestress force per strand immediately after transfer (kips)
P_{rb}: plastic force in the bottom layer of longitudinal deck reinforcement (kips)
P_{rt}: plastic force in the top layer of longitudinal deck reinforcement (kips)
P_s: plastic force in the slab (kips)
P_t: plastic force in the tension flange (kips)
P_w: plastic force in the web (kips)
Q: total factored load (kips)
Q_i: force effect
Q_i: force effect from various loads
R: reaction at support (kips)
R_F: rating factor for the live load carrying capacity
RF: rating factor for the live load carrying capacity
R_h: hybrid factor
R_n: nominal resistance
R_r: factored resistance (ΦR_n)
RT: load rating for the HS-20 load at the inventory level (tons)
S: section modulus of section (in^3)
s: spacing of bars or stirrups (in)

S: spacing of beams or webs (ft)
S: spacing of supporting elements (ft)
S_b, S_t: noncomposite section moduli (in^3)
S_{bc}, S_{tc}: section moduli of composite beam section at the bottom and top extreme fibers, respectively (in^3)
S_{bottom}: section modulus of the bottom steel flange (in^3)
S_c: section modulus for the extreme fiber of the composite section where tensile stress is caused by externally applied loads (in^3)
S_c, S_{bc}: composite section moduli where the tensile stress is caused by externally applied loads (in^3)
S_e: effective span length (ft)
SE: loads resulting from settlement
SE: single lane, exterior designation
se, SE: single design lane loaded, exterior girder
S_g: section modulus for gross section
SH: loads resulting from shrinkage
SI: single lane, interior designation
si, SI: single design lane loaded, interior girder
s_{max}: maximum spacing of flexural reinforcement (in)
S_{nc}: section modulus for the extreme fiber of the monolithic or noncomposite section where tensile stress is caused by externally applied loads (in^3)
$S_{nc,bottom}$: section modulus for extreme bottom fiber of the monolithic or noncomposite section where tensile stress is caused by externally applied loads (in^3)
$S_{nc,top}$: section modulus for extreme top fiber of the monolithic or noncomposite section where compressive stress is caused by externally applied loads (in^3)
S_{ncb}: section modulus for extreme bottom fiber of the monolithic or noncomposite section where tensile stress is caused by externally applied loads (in^3)
S_{nct}: section modulus for extreme top fiber of the monolithic or noncomposite section where compressive stress is caused by externally applied loads (in^3)
S_{top}: section modulus for the top flange (in^3)
S_x: section modulus with respect to the x-axis (in^3)
S_{xt}: elastic section modulus about the major axis of the section to the tension flange (in^3)
S_{xx}: section modulus with respect to the y-axis (in^3)
S_y: section modulus with respect to the y-axis (in^3)
t: slab thickness (in)
$t_{bearing}$: thickness of bearing (in)
t_c: thickness of a compression flange (in)
t_d: deck thickness (in)
t_{deck}: thickness of deck (in)
t_f: flange thickness (in)

t_g: depth of steel girder or corrugated steel plank including integral concrete overlay or structural concrete component, less a provision for grinding, grooving, or wear (in)
TG: loads resulting from temperature gradient
TL: design truck load, or design tandem load
t_{min}: minimum depth of concrete slab to control deflection (in)
t_o: depth of structural overlay (in)
t_s: thickness of concrete slab (in)
t_t: thickness of the tension flange (in)
TU: loads resulting from uniform temperature
t_w: web thickness (in)
U: factored force effect
V: shear designation
V: shear force (kips)
V_B: base design wind velocity (mph)
V_c: shear resistance provided by the concrete (kips)
V_{cr}: shear-buckling resistance (kips)
V_{DC}: shear due to superstructure dead load (kips)
$V_{DC, tot}$: shear for the total component dead load (kips)
V_{DC1}: unfactored shear resulting from noncomposite dead loads (kips)
V_{DC2}: unfactored shear resulting from composite dead loads (kips)
V_{DL}: unfactored shear force caused by DL (kips)
V_{DW}: shear due to superimposed dead load (kips)
V_{DZ}: design wind velocity (mph)
V_{fat}: shear force resulting from fatigue load (kips)
$V_{fatigue}$: fatigue load shear per lane (kips)
$V_{fatigue+IM}$: fatigue load shear per girder (kips)
V_{LL+IM}: total live load shear per lane including impact factor (ft-kips)
V_{ln}: lane load shear per lane (kips)
V_{LN}: unfactored live load shear per beam due to lane load (kips)
V_{max}: maximum dead load shear (kips)
V_n: nominal shear resistance (kips)
V_p: plastic shear resistance of the web (kips)
V_p: shear yielding of the web (kips)
$V_{permanent}$: shear due to unfactored permanent load (kips)
V_s: shear resistance provided by shear reinforcement (kips)
V_{tandem}: tandem load shear per lane (kips)
V_{TL}: unfactored live load shear per beam due to truck load (kips)
V_{tr}: truck load shear per lane (kips)
V_u: factored shear force at section (kips)
v_u: average factored shear stress on concrete (ksi)
$V_{u,ext}$: factored shear force at section in external girder (kips)
$V_{u,int}$: factored shear force at section in internal girder (kips)
$V_{u,total}$: total factored shear force at section (kips)
w: distributed load (kips/ft^2)

W: weight in tons of truck used in computing live load effect
w: width of clear roadway (ft)
WA: water load and stream pressure
w_c: self-weight of concrete (kips/ft^3)
$w_{C\&P}$: distributed load resulting from self-weight of curb and parapet (kips/ft)
w_{DC}: distributed load of weight of supported structure (kips/ft^2)
w_{DW}: distributed load of superimposed dead load (kips/ft^2)
w_{FWS}: future wearing surface load (kips/ft^2)
WL: loads resulting from wind forces on live load
WL: wind pressure on vehicles, live load
WL_h: horizontal loading due to wind pressure on vehicles
WL_h: horizontal wind loading at the top of the abutment (kips/ft)
WL_v: vertical wind loading at the top of the abutment (kips/ft)
w_s: superimposed dead loads, parapet/curb load plus the future wearing surface load (kips/ft^2)
WS: wind load pressure on superstructure
WS: wind pressures on superstructures (kips)
WS_h: horizontal load on top of abutment due to wind pressure on superstructure
WS_h: horizontal wind loading at the top of the abutment (kips/ft)
w_{slab}: distributed load of concrete slab (kips/ft^2)
$w_{slab,ext}$: deck slab distributed load acting on exterior girder (kips/ft)
$w_{slab,int}$: deck slab distributed load acting on interior girder (kips/ft)
WS_{sub}: horizontal wind load applied directly to the substructure
WS_{total}: total longitudinal wind loading (kips)
WS_v: vertical load on top of abutment due to wind pressure on superstructure
WS_v: vertical wind loading along the abutment (kips/ft)
X: distance from load to point of support (ft)
x: distance from beam to critical placement of wheel load (ft)
x: distance of interest along beam span (ft)
y_t', y_b', y_t, and y_b: for composite beam cross-section (in)
y_b: distance from the bottom fiber to the centroid of the section (in)
y_{bs}: distance from the center of gravity of the bottom strands to the bottom fiber (in)
y_t: distance from the neutral axis to the extreme tension fiber (in)
y_t, y_b: distance from centroidal axis of beam gross section (neglecting reinforcement) to top and bottom fibers, respectively (in)
$Z_{req'd}$: required plastic section modulus (in^3)
α: angle of inclination of stirrups to longitudinal axis
α: angle of inclination of transverse reinforcement to longitudinal axis (deg)
β: factor indicating ability of diagonally cracked concrete to transmit tension
β_1: factor for concrete strength
β_1: ratio of the depth of the equivalent uniformly stressed compression zone assumed in the strength limit state to the depth of the actual compression zone

β_s: ratio of the flexural strain at the extreme tension face to the strain at the centroid of the reinforcement layer nearest the tension face
γ: load factor
γ_e: exposure factor
γ_h: correction factor for relative humidity of the ambient air
γ_i: load factor; a statistically based multiplier applied to force effects including distribution factors and load combination factors
γ_p: load factors for permanent loads
γ_{st}: correction factor for specified concrete strength at the time of the prestress transfer to the concrete
δ: beam deflection (in)
$\Delta_{25\%\ truck}$: 25% of deflection resulting from truck loading (in)
$\Delta_{25\%\ truck+\ lane}$: 25% of deflection resulting from truck loading plus deflection resulting from lane loading (in)
Δ_{contr}: contraction resulting from thermal movement (in)
Δ_{contr}: contractor thermal movement
Δ_{exp}: expansion resulting from thermal movement (in)
Δ_{exp}: expansion thermal movement
Δf_{ext}: maximum stress due to fatigue loads for exterior girders (kips/in^2)
Δf_{int}: maximum stress due to fatigue loads for interior girders (kips/in^2)
(Δf): load-induced stress range due to fatigue load (ksi)
$(\Delta F)_n$: nominal fatigue resistance (ksi)
Δf_{pES}: sum of all losses or gains due to elastic shortening or extension at the time of application of prestress and/or external loads (ksi)
Δf_{pLT}: losses due to long-term shrinkage and creep of concrete, and relaxation of the steel (ksi)
Δf_{pR}: estimate of relaxation loss taken as 2.4 kips/in^2 for low relaxation strand, 10.0 kips/in^2 for stress-relieved strand, and in accordance with manufacturer's recommendation for other types of strand (kips/in^2)
Δf_{pT}: total loss (ksi)
$(\Delta F)_{TH}$: constant amplitude (ksi)
Δ_{truck}: deflection resulting from truck loading (in)
δ_{LL}: deflection due to live load per lane (in)
δ_{LL+IM}: deflection due to live load per girder including impact factor (in)
δ_{ln}: deflection due to lane load (in)
δ_{max}: maximum deflection for vehicular load (in)
ε_x: tensile strain in the transverse reinforcement
η: load modifier
η_D: ductility factor (strength only)
η_i: load modifier relating to ductility redundancy, and operational importance = 1.0 (for conventional designs)
η_I: operational importance factor (strength and extreme only) = 1.0 for (for conventional bridges)
η_R: redundancy factor
θ: angle of inclination of diagonal compressive stresses (degrees)

Φ: resistance factor
Φ_c: condition factor
Φ_f: resistance factor for flexure
Φ_s: system factor
Φ_v: resistance factor for shear