

## Glossary of Terms and Acronyms

Below is a list of terms and acronyms that you'll likely come across when reading highway plans.

Note that some specifications described in the following content may not be the same as the specifications followed by your agency. Always check with your State agency's standards and specifications when using these guidelines.

### Glossary

- ❑ **Abutment** – A substructure composed of stone, concrete, brick, or timber supporting the end of a single span or the extreme end of a multispan superstructure and, in general, retaining or supporting the approach embankment placed in contact therewith.
- ❑ **Cantilever Abutments** – An abutment in which the stem or breast wall is fixed rigidly to the footing. The stem, acting as a cantilever beam, transmits the horizontal earth pressure to the footing, which maintains stability by virtue of the dead weight of the abutment and of the soil mass resting on the rear portion, or heel, of the footing.
- ❑ **Gravity Abutment** – A heavy abutment which resists the horizontal earth pressure by its own dead weight.
- ❑ **Integral Abutment** – A small abutment cast monolithically with the end diaphragm of the deck. Although such abutments usually encase the ends of the deck beams and are pile supported, spread footings with a combination backwall and end diaphragm may also be used.
- ❑ **Spill-thru Abutment** – Consists essentially of two or more columns supporting a grade beam spanning the space between them. The approach embankment is retained only in part by the abutment since the embankment's sloped front and side portions extend with their normal slope to envelop the columns. Also called an arched abutment.

- ❑ **Acre** – Ten square chains or 43,560 square feet.
- ❑ **Along** – “Along a line” means on and in the direction of the line; it implies motion. “Along the road” means along the center line or thread of the road unless qualified as, for example, “Along the east side line of the road.” “Along a line” may be changing in direction by curves or angles. Avoid “with a line,” “by a line,” or “on a line” where “along a line” is meant. The term “along” may mean “on”; thus “along the shore” means “on” the shore and includes the shore. (Church v Meeker, 34 Conn 421)
- ❑ **Addendum** – Changes to the contract proposal documents issued by the contracting agency prior to the time of opening proposals.
- ❑ **Advertisement** – A public announcement inviting bids for work to be performed or materials to be furnished.
- ❑ **Anchor Bolt** – A bolt-like piece of metal commonly threaded and fitted with a nut, or a nut and washer at the end only, used to secure in a fixed position upon the substructure the end of a truss or girder, the base of a column, a pedestal, shoe, or other member of a structure. The end intended to engage the masonry may be formed in various ways depending somewhat upon the conditions attending its setting in final position.
- ❑ **Angle, Deflection** – The horizontal angle measured at a corner between the extension of the preceding line and the line ahead. Right is to the right in the direction of travel.
- ❑ **Approach Slab** – A heavy reinforced concrete slab placed on the approach roadway adjacent to and usually resting upon the abutment back wall. The function of the approach slab is to carry wheel loads on the approaches directly to the abutment, preventing the transfer of a horizontal dynamic force through the approach fill to the abutment stem.
- ❑ **Area Engineer** – A representative of the director of operations acting under the supervision of the region engineer and in charge of assigned operations with a designated area.
- ❑ **Average Daily Traffic (ADT)** – This is the total traffic volume during a given period divided by the number of days in the period.

- ❑ **Award** – The acceptance by the Department of Transportation of a bid proposal.
- ❑ **Azimuth** – The way; the direction. In surveying, azimuth is a direction measured clockwise from a given meridian. The army uses north as the meridian; the geodetic system uses south. If azimuths are used in a description, the meridian must be defined.
- ❑ **Azimuth Mark** – A marked point visible from a survey station, the azimuth to which is determined for use in dependent surveys.
- ❑ **Backwall** – The topmost portion of an abutment above the elevation of the bridge seat, functioning primarily as a retaining wall with a live load surcharge. It may serve also as a support for the extreme end of the bridge deck and the approach slab.
- ❑ **Backwater** – The water of a stream retained at an elevation above its normal level through the controlling effect of a condition existing at a downstream location such as a flood, an ice jam, or other obstruction.

The increase in the elevation of the water surface above normal produced primarily by the stream width contraction beneath a bridge. The wave-like effect is most pronounced at and immediately up-stream from an abutment or pier, but extends downstream to a location beyond the body of the substructure part.

- ❑ **Base Course** – The layer or layers of specified selected material placed on a subbase or subgrade to support a surface course.
- ❑ **Base Metal** – The metal at and closely adjacent to the surface to be incorporated in a welded joint which will be fused and by coalescence and inter-diffusion with the weld will produce a welded joint.
- ❑ **Batter** – The inclination of a surface in relation to a horizontal or a vertical plane or occasionally in relation to an inclined plane. Batter is commonly designated upon bridge detail plans as so many inches to one foot.

- ❑ **Bay** – As applied to a stringer of multibeam structure, the area between adjacent stringers.
- ❑ **Bearing Failure** – Concerning the usual materials of construction, a crushing under extreme compressive load on an inadequate support; concerning soil, a shear failure in the supporting soil caused by excessively high pressures applied by a footing or pile.
- ❑ **Bearing Pad** – A thin sheet of material placed between a masonry plate and the masonry bearing surface used to fill any voids due to imperfection of the masonry plate and bearing surface, to seal the interface, and to aid in even distribution of loads at the interface. The bearing pads may be made of alternating layers of red lead and canvas, of sheet lead, or of preformed fabric pads.
- ❑ **Bearing Seat** – Top of masonry supporting bridge bearing.
- ❑ **Bearing Stiffener** - A thick or heavy web stiffener placed immediately over the center of the bearing shoe on a beam or girder to help carry the end reactions of the bridge.
- ❑ **Bench Mark** – A relatively permanent object, natural or artificial, bearing a marked point whose elevation above or below an adopted datum is known. Usually designated as a BM, such a mark is sometimes further qualified as a permanent bench mark (PBM) or as a temporary bench mark (TBM).
- ❑ **Bent** – A supporting unit of a trestle or a viaduct-type structure made up of two or more column or column-like members connected at their top-most ends by a cap, strut, or other member holding them in their correct positions. This connecting member is commonly designed to distribute the superimposed loads upon the bent, and when combined with a system of diagonal and horizontal bracing attached to the columns, the entire construction functions somewhat like a truss distributing its loads into the foundation. A bent is a framed unit made up of columns and a cap. A bent may be made of concrete, wood, or steel. When piles are used as the column elements, the entire construction is designated a “pile bent” or “piled bent” and, correspondingly, when those elements are framed, the assemblage is termed a “framed bent.”

- ❑ **Berm (Berme)** – The line, whether straight or curved, which defines the location where the top surface of an approach embankment or causeway is intersected by the surface of the side slope. This term is synonymous with Roadway Berm.
- ❑ **Bidder** – An individual, partnership, firm, corporation, or an acceptable combination thereof, such as a joint venture, submitting a proposal form.
- ❑ **Bid Schedule** – The list of bid items, together with estimated quantities, appearing in the proposal form.
- ❑ **Bond** – (1) In reinforced concrete, the grip of the concrete on the reinforcing bars, thereby preventing slippage of the bars. (2) The mechanical bond resulting from irregularities of surface produced in the manufacturing operations is an important factor in the strength of a reinforced concrete member. For plain round bar reinforcement, it is the difference between the force required to produce initial slip and ultimately, producing failure. “Deformed” bars utilize this mechanical bond in conjunction with the surface bond. (3) The mechanical force developed between two concrete masses when one is cast against the already hardened surface of the other.
- ❑ **Bounded** – Properties that share a common boundary with no intervening spaces.
- ❑ **Bounds** – Bounds are the line by which different parcels of land are divided. A monument is sometimes referred to as a bound.
- ❑ **Box Beam** – A rectangular-shaped precast, and usually prestressed, concrete beam. These beams may be placed side by side, connected laterally, and used to form a bridge deck, with or without a cast-in-place (CIP) slab or topping. In such cases, the beam units act together similar to a slab. Where a CIP slab is used and the units are spread, they act as beams.
- ❑ **Box Girder (Concrete)** – A large concrete box-shaped beam, either reinforced or prestressed, usually multi-celled with several interior webs. The bottom slab of the girder serves as a flange only, while the top slab is both a flange and a transverse deck slab.

- ❑ **Box Culvert** – A structure not classified as a bridge that provides an opening under the roadway for passage of water, animals, and equipment.
- ❑ **Bridge** – A structure, including supports, erected over a depression or an obstruction, such as water, highway, or railroad. They are a structure having a length measured along the center of roadway of more than 20 feet between under copings of abutments or extreme ends of openings for multiple boxes and pipes where the clear distance between openings is less than half of the smaller contiguous opening.
- ❑ **Bridge Length** – The greater dimension of a structure measured along the center of the roadway between backs of abutments backwalls or between ends of bridge floor.
- ❑ **Bridge Roadway Width** – The clear width of structure measured at right angles to the center of the roadway between the bottom of curbs, or if curbs are not used, between the inner faces of parapet or railing.
- ❑ **Bridge Seat** – The top surface of an abutment or pier upon which the superstructure span is placed and supported. For a sill, it is the surface forming the support for the superstructure and from which the backwall rises. For a pier, it is the entire top surface.
- ❑ **Bridging** – A carpentry term applied to the cross-bracing, nailed or otherwise, fastened between wooden floor stringers, usually at the one-third span points, to increase the rigidity of the floor construction and to distribute more uniformly the live load and minimize the effects of impact and vibration.
- ❑ **Bulkhead** – (1) A retaining wall-like structure commonly composed of driven piles supporting a wall or a barrier of wooden timbers or reinforced concrete members functioning as a constraining structure resisting the thrust of earth or of other material bearing against the assemblage. (2) A retaining wall-like structure comprised of timber, steel, or reinforced concrete members commonly assembled to form a barrier held in a vertical or an inclined position by members interlocking therewith and extending into the restrained material to obtain the anchorage necessary to prevent both sliding and overturning of the entire assemblage.

- Bumper** – A mechanism designed to absorb the concussion or impact of a moving superstructure or other moving part when it swings, rises, or falls to its limiting position of motion.
- Butt Weld** – A weld joining two abutting surfaces by depositing weld metal within an intervening space. This weld serves to unite the abutting surfaces of the elements of a member or to join members or their elements abutting upon or against each other.
- Camber** – The slightly arched form or convex curvature, provided in a single span or in a multiple span structure, to compensate for dead load deflection and to secure a more substantial and aesthetic appearance than is obtained when uniformly straight lines are produced. In general, a structure built with perfectly straight lines appears slightly sagged. This optical illusion is unsatisfactory and is most manifest in relatively long structures over rivers or other water areas.
- Cantilever** – A projecting beam, truss, or slab supported at one end only.
- Cardinal Direction** – Cardinal direction is either north, east, south, or west and is sometimes used to include all if in the plural form.
- Cement (Portland)** – The commercial product used in combination with fine and coarse aggregates and water to produce concrete.
- Centerline of Roadway** – This is a line drawn on highway plan sheets representing the middle of the roadbed with equal distance of roadbed to either side of the drawn line.
- Change Order** – A written order issued by the engineer to the contractor, covering changes in plans, specifications, or quantities within the scope of the contract and establishing the basis of payment and time adjustments for the work affected by the changes.
- Channel Profile** – Longitudinal section of a channel.
- Chord** – In a truss, the upper and the lower longitudinal members, extending the full length and carrying the tensile and compressive forces which form the internal resisting moment, are termed chords. The upper portion is

designated the upper, or top chord, and correspondingly, the lower portion is designated the lower, or bottom chord. The chords may be parallel, or the upper one may be polygonal or curved (arched) and the lower one horizontal, or both may be polygonal. In general, the panel points of polygonal top chords are designed to follow the arch of a parabola and are, therefore, truly parabolic chords. Polygonal shaped chords are commonly described as “broken chords.”

- ❑ **Chord Members** – Trusses are commonly divided lengthwise into panels, the length of each being termed a panel length. The corresponding members of the chords are described as upper, or top chord members and lower, or bottom chord, members.
- ❑ **Clear Span** – The unobstructed space or distance between the substructure elements measured, by common practice, between faces of abutments and/or piers. However, when a structure is located upon a stream, river, tidal inlet, or other waterway used by navigation, the clear span dimension is measured at mean low water elevation and may be the distance between guard or fender piers, dolphins, or other constructions for the protection of navigation.
- ❑ **Coefficient of Thermal Expansion** – The unit strain produced in a material by a change of one degree of temperature.
- ❑ **Cofferdam** – In general, an open box-like structure constructed to surround the area to be occupied by an abutment, pier, retaining wall, or other structure and permit unwatering of the enclosure so that the excavation for the preparation of a foundation and the abutment, pier, or other construction may be effected in the open air. In simplest form, the dam consists of interlocking steel sheet piles.
- ❑ **Column** – A leg or legs (called bent or bents) that hold up a structure. Columns are jointed with a cap. Columns are part of the bent.
- ❑ **Clockwise Angle** – A horizontal angle measured from left and right. A clockwise angle may have any value between zero degrees and 360 degrees. Azimuths are clockwise angles measured from either north or south.

- ❑ **Composite Beam** – A beam which has angle, channel, or stud shear connectors attached to its top flange which, during construction, are embedded in the concrete slab. This embedment rigidly attaches the slab to the beam and causes the slab to assist the top flange of the beam in carrying compressive stresses due to live roads.
- ❑ **Concrete** – A composite material consisting essentially of a binding medium within which are embedded particles or fragments of relatively inert mineral filler. In Portland cement concrete, the binder or matrix, either in the plastic or the hardened state, is a combination of Portland cement and water. The filler material, called aggregate, is generally graded in size from fine sand to pebbles or stones, which may in some concrete, be several inches in diameter.
- ❑ **Concrete Box Girder Structure** – A structure where poured concrete around reinforcing bar is formed into a hollow box. The box acts like a beam and supports the roadway.
- ❑ **Continuous Concrete Structure** – A structure where no beams or girders are used to support the deck or roadway; the roadway supports itself due to hundreds of steel reinforcing bars inside the concrete of the roadway.
- ❑ **Contour Line** – An imaginary line on the ground, where all points are at the same elevation above or below a specified datum.
- ❑ **Contour Interval** – A predetermined difference in elevation (vertical distance) at which contour lines is drawn. The contour interval is usually the same for maps of the same scale.
- ❑ **Contour Map** – A map that portrays relief by means of contour lines.
- ❑ **Contract Item (Pay Items)** – A specified unit of work for which a price is provided in the contract.
- ❑ **Connection Angle (Clip Angle)** – A piece or pieces of angle serving to connect two elements of a member or two members of structure.
- ❑ **Continuous Spans** – A beam, girder, or truss-type superstructure designed to extend continuously over one or more intermediate supports.

- ❑ **Continuous Weld** – A weld extending throughout the entire length of a joint.
- ❑ **Corrosion** – The general disintegration and wasting of surface metal or other material through oxidation, decomposition, temperature, and other natural agencies.
- ❑ **Cotter Bolt** – A bolt having a head at one end and near the opposite end, a round hole or a hexagonal slot fitted with a cotter pin in the former or a tapered wedge in the latter. A cotter pin is usually formed by bending a piece of half-round rod to form a loop eye, and a split body permitting its end to be splayed, thus holding it in position while a cotter wedge may be split for the same purpose. But, either of these locking devices may be undivided and only bent sharply to prevent withdrawal.
- ❑ **Counter** – A truss web member which functions only when the span is partially loaded and shear stresses are opposite in sign to the normal conditions. The dead load of the truss does not stress the counter.
- ❑ **Counterclockwise Angle** – A horizontal angle measured in a counterclockwise direction. Used primarily for the measurement of deflection angles.
- ❑ **Cover** – In reinforced concrete, the clear thickness of concrete between a reinforcing bar and the surface of the concrete.
- ❑ **Cover Plate** – A plate used in conjunction with flange angles or other structural shapes to provide additional flange section upon a girder, column, strut, or similar member.
- ❑ **Cracking** – Linear fractures in concrete.
- ❑ **Transverse Cracks** – These are fairly straight cracks that are roughly perpendicular to the center line of the roadway. Transverse cracks vary in length, width, and in spacing. They frequently occur over the main slab reinforcement on stringer bridges. Cracks may extend completely through the slab. These same cracks may extend through curbs, sidewalks, and parapets. On skewed bridges where the transverse deck steel is not placed at right angles to the roadway center line, this type of crack may appear parallel to the deck steel. On continuous structures, pronounced transverse cracking

may be noted in or near the negative moment zones over the piers. Pier caps are also subject to transverse cracking.

- Horizontal Cracking** – Cracking that occurs in walls, abutments, pier stems, and columns. They are similar in nature to transverse cracks, and may be listed as such.
- Longitudinal Cracks** – Cracks that are fairly straight (in slabs) running parallel to the centerline of the roadway. They are of variable widths, lengths, and spacings. These cracks may extend partially or completely through the deck.
- Vertical Cracks** – Vertical cracks in walls, abutments, pier stems, and caps are similar to longitudinal cracking in slabs, and should be described as such.
- Diagonal Cracks** – These cracks appear roughly parallel in slabs skewed to the centerline of the bridge. They are usually shallow and are of varying lengths, widths, and spacings. When found in the vertical faces of beams or pier caps, they may be deeper than usual, and thus pose a more serious problem.
- Pattern or Map Cracking** – These interconnected cracks form networks of varying size, and appear similar to that of sun-cracking seen on dried flats. They vary in width from barely visible, fine cracks to well-defined openings. They are found in both slabs and walls.
- D-Cracks** – These are usually defined by dark colored deposits, generally near joints and edges. They may widen gradually and eventually produce failure. Vertical cracks near vertical expansion joints in abutments and walls can also be classified as D-cracks. This type of cracking may be indicative of alkali reactive concrete.
- Random Cracks** – These are meandering irregular cracks appearing on the surface of slabs. They have no particular form and do not logically fall into any of the classifications described previously.
- Creep** – An inelastic deformation that increases with time while the stress is constant.
- Cross Frames** – Transverse bracings between two main longitudinal members.

- ❑ **Crown of Roadway** – (1) The crest line of the convexed surface. (2) The vertical dimension describing the total amount the surface is convexed or raised from gutter to crest. This is sometimes termed the cross fall of roadway.
- ❑ **Cubic Yard Stations** – A quantity of earth to be hauled through 10 centerline stations times the distance (over the 10+ stations) that the earth must be hauled.
- ❑ **Curtain Wall** – A term commonly applied to a thin masonry wall not designed to support superimposed loads either vertically or transversely. It is also a thin vertically placed and integrally built portion of the paving slab of a culvert intended to protect the culvert against undermining by stream scour. A similar construction placed in an inclined position is termed an “apron wall” or “apron.”
- ❑ **Curves in Plan and Profile** – A roadway may be curved in its lateral alignment, its vertical contour, or in both alignment and contour combined. The primary curves are described as:
  - 1. Horizontal Curve – A curve in the plan location defining the alignment.
  - 2. Vertical Curve – A curve in the profile location defining the elevation.
- ❑ **Cut (Cutting)** – The portion of the highway, railway, canal, ditch, or other artificial construction of similar character produced by the removal of the natural formation of earth or rocks, whether sloped or level. The general terms “slide hill cut” and through cut” are used to describe the resulting cross sections of the excavations commonly encountered.
- ❑ **Datum** – A reference element such as a line or plane, in reference to which the positions of other elements are determined. See Horizontal Datum, Level Datum, and Vertical Datum.
- ❑ **Dead Load** – A static load due to the weight of the structure itself.
- ❑ **Debris Rack (Trash Rack)** – A grill type barrier used to intercept debris above a sewer or culvert inlet.

- ❑ **Deck** – That portion of a bridge which provides direct support for vehicular and pedestrian traffic. The deck may be either a reinforced concrete slab, timber flooring, a steel plate or grating, or the top surface of abutting concrete members or units. While normally distributing load to a system of beams and stringers, a deck may also be the main supporting element of a bridge, as with a reinforced concrete slab structure or a laminated timber bridge.
- ❑ **Deck Bridge** – A bridge having its floor elevation at, nearly at, or above the elevation of the uppermost portion of the superstructure.
- ❑ **Decking** – A term specifically applied to bridges having wooden floors and used to designate the flooring only. It does not include the floor stringers, floor beams, or other members serving to support the flooring.
- ❑ **Declination** – The angle between true north and either grid or magnetic north.
- ❑ **Deflection** – The bending of a beam, girder, or truss under a load.
- ❑ **Degradation of Channel** – The gradual lowering of the flow line of a stream due to material in the stream bed being washed away.
- ❑ **Degree of Curve** – Along railroads, the degree of curve is the central angle of a curve subtended by a 100-foot chord on the said curve. Along highways, the degree of curve is usually, but not always, defined as the central angle subtended by a 100-foot arc of said curve.
- ❑ **Design Hourly Volume (DHV)** – The peak hourly volume of vehicles expected in the thirtieth-highest hour during the chosen design year.
- ❑ **Design Load** – The loading comprising magnitudes and distributions of wheel, axle, or other concentrations used in determination of the stresses, stress distributions, and ultimately, the cross-sectional areas and compositions of the various portions.
- ❑ **Diagonal** – See Web Members.
- ❑ **Diaphragm** – A reinforcing plate or member placed within a member or deck system, respectively, to distribute stresses and improve strength and rigidity.

- ❑ **Directional Distribution (D)** – This is a measure of the highest traffic volume in one direction during peak traffic hours. It is expressed as a percentage of Design Hourly Volume.
- ❑ **Drainage Area** – The area from which the run-off water passing beneath a bridge of passing a specific location in a river or stream is produced.
- ❑ **Drip Bead (Drip Groove)** – A channel or groove in the underside of a slab, coping, or other producing exposed portion of a masonry structure intended to arrest the downward flow of rain water and cause it to drip off free from contact with surfaces below the projection.
- ❑ **Efflorescence** – A white deposit on concrete or brick caused by crystallization of soluble salts brought to the surface by moistures in the masonry.
- ❑ **Elevation** – The vertical distance of a point above or below a reference surface, or level datum. Often abbreviated as Elev. or El.
- ❑ **End Block** – On a prestressed concrete beam, the thickening of the web or increase in beam width at the end to provide adequate anchorage bearing for the posttensioning wires, rods, or strands.
- ❑ **End Post** – The end compression member of a truss, either vertical or inclined in position and extending from chord to chord, functions to transmit the truss end shear to its end bearing.
- ❑ **Epoxy** – A synthetic resin which cures or hardens by chemical reaction between components which are mixed together shortly before use.
- ❑ **Erosion Control** – Those items necessary to the completed highway which provide for the preservation of landscape materials and features. The rehabilitation and protection against erosion of areas disturb by construction through seeding, sodding, mulching, and the placing of other ground covers. Such suitable planting and other improvements as may increase the effectiveness and enhance the appearance of the highway.
- ❑ **Estimate of Quantities** – plan shown summary of the estimated quantities of work necessary to complete the project.

- ❑ **Expansion Bearing** – a general term applied to a device or assemblage designed to transmit a reaction from one member or part of a structure to another and to permit the longitudinal movements resulting from temperature changes and superimposed loads without transmitting a horizontal force to the substructure. The expansion bearing is designed to permit movement by overcoming sliding, rolling, or other friction conditions.
- ❑ **Expansion Dam** – The part of an expansion joint serving as an end form for the placing of concrete at a joint. Also applied to the expansion joint device itself.
- ❑ **Expansion Joint** – A joint designed to provide means for expansion and contraction movements produced by temperature changes, loadings, or other agencies.
- ❑ **Expansion Rocker** – An articulated assemblage forming a part of the movable end of a girder, or truss and facilitating the longitudinal movements resulting from temperature changes and superimposed loads. Apart from its hinge connection the rocker proper is a cast or built-up member consisting essentially of a circular segment integrally joined by a web-like portion to a hub fitted for hinge action either with a pin hole or by having its ends formed into trunnions. In its service operation, the rocker is commonly supported upon a shoe plate or pedestal. Strictly speaking, this is a segment of a roller. A short cast or built-up member hinged at both ends, or instead hinged at one end and provided with a circular segment or spherical type bearing at the other to facilitate expansion and contraction on other longitudinal rotational movements.
- ❑ **Expansion Shoe (Expansion Pedestal)** – An expansion bearing member or assemblage designed to provide means for expansion and contraction or other longitudinal movements. In general, the term “shoe” is applied to an assemblage of structural plates or plate-like castings permitting movement by sliding while the term “pedestal” is used to describe assemblages of castings or built-up members securing a somewhat greater total depth and providing for movement either by sliding or by rolling. The masonry plate or casting is commonly held in a fixed position by anchor bolts and the superimposed shoe plate or pedestal is free to move longitudinally upon it or

upon intervening rollers, but is restrained from transverse movement either by a rib and slot, by pintles, by anchorage, or by anchorage in combination with one of the first two mentioned. The term “bed plate” is sometimes used to designate the bottom of the assemblage.

- ❑ **Extra Work** – An item of work not provided for in the contract as awarded, but found by the engineer essential to the satisfactory completion of the contract within its intended scope.
- ❑ **Extra Work Authorization** – An agreement between the department and the contractor to perform extra work at agreed price or on a force account basis.
- ❑ **Eyebar** – A member consisting of a rectangular bar body with enlarged forged ends or heads having holes through them for engaging connecting pins. An adjustable eyebar is composed of two section fitted with upset threaded ends engaging a sleeve nut or a turnbuckle.
- ❑ **Factor of Safety** – A factor or allowance predicated by common engineering practice upon the failure stress or stresses assumed to exist in a structure or a member or part, thereof. Its purpose is to provide a margin in the strength, rigidity, deformation, and endurance of a structure or its component parts compensating for irregularities existing in structural materials and workmanship, uncertainties involved in mathematical analysis and stress distribution, service deterioration and other unevaluated conditions.
- ❑ **Fatigue** – The tendency of a member to fail at a lower stress when subjected to cyclical loading than when subjected to static loading.
- ❑ **Fender** – (1) A structure placed at an upstream location adjacent to a pier to protect it from the striking force, impact, and shock of floating stream debris, ice floes, etc. This structure is sometimes termed an “ice guard” in latitudes productive of lake and river ice to form ice flows. (2) A structure commonly consisting of dolphins, capped and braced rows of piles, or of wooden cribs either entirely or partially filled with rock ballast, constructed upstream and downstream from the center and end piers (or abutments) of a fixed or movable superstructure span to fend off water-borne traffic from collision with these substructure parts, and in case of a swing span, with the span while in its open position.

- ❑ **Filler Plate** – In wooden and structural steel construction. A piece used primarily to fill a space beneath a batten, splice plate, gusset, connection angle, stiffener, or other element.
- ❑ **Fillet** – (1) A curved portion forming a junction of two surfaces which would otherwise intersect at an angle. (2) In metal castings and rolled structural shapes, a fillet is used to disseminate and relieve the shrinkage or other stresses tending to overstress and, perhaps, rupture the junction material. In castings, it may also provide means for movement to take place at locations where the rigidity of the mold would otherwise resist and obstruct this action. (3) In concrete construction, the use of forms not only serves the purposes applying to castings, but also facilitates both the placing of concrete and the subsequent removal of forms.
- ❑ **Fillet Weld** – A weld joining intersecting members by depositing weld metal to form a near-triangular or fillet shaped junction of the surfaces of the members so jointed. This weld serves to unite the intersecting surfaces of two elements of a member.
- ❑ **Fish Belly** – A term applied to a girder or a truss having its bottom flange or its bottom chord, as the case may be, constructed either haunched or bow-shaped with the convexity downward.
- ❑ **Fixed Bearing** – The plates, pedestals, or other devices designed to receive and transmit to the substructure or to another supporting member or structure the reaction stress of a beam, slab, girder, truss, arch, or other type of superstructure span. The fixed bearing is considered as holding the so-called “fixed end” of the structure rigidly in position, but in practice the clearance space commonly provided in the anchorage may permit a relatively small amount of movement.
- ❑ **Flange** – The part of a rolled I-shaped beam or of a built-up girder extending transversely across the top and bottom edges of the web. The flanges are considered to carry the compressive and tensile forces that comprise the internal resisting moment of the beam, and may consist of angles, plates, or both.

## Plan Reading – Highway Plan Reading Basics AT-TC3CN009-18-T1-JA01

- ❑ **Flange Angler** – An angle used to form a flange element of a built-up girder, column, strut, or similar member.
- ❑ **Floor Beam** – A beam or girder located transversely to the general alignment of the bridge and having its end framed upon the columns of bents and towers or upon the trusses or girders of superstructure spans. A floor beam at the extreme end of a girder or truss span is commonly termed an end floor beam.
- ❑ **Floor System** – The complete framework of floor beams and stringers or other members supporting the bridge floor proper and the traffic loading including impact thereon.
- ❑ **Flow Line** – The surface elevation of the dirt, gravel, etc. which comprises the stream bed.
- ❑ **Galvanic Action** – Electrical current between two unlike metals.
- ❑ **Girder** – A flexural member which is the main or primary support for the structure, and which usually receives loads from floor beams and stringers.
- ❑ **Grade Crossing** – A term applicable to an intersection of two or more highways, two railroads, or one railroad and one highway at a common grade or elevation; now commonly accepted as meaning the last of these combinations.
- ❑ **Grade Separation** – A term applied to the use of a bridge structure and its approaches to divide or separate the crossing movement of vehicular, pedestrian, or other traffic, by confining portions thereof to different elevations.
- ❑ **Grid** – A network composed of two sets of equidistant parallel lines intersecting at right angles.
- ❑ **Grid Azimuth** – An azimuth measured from grid north.
- ❑ **Grid Coordinates** – The numbers and letter of a coordinate system that designates a point on a grid map.

- ❑ **Grid Declination** – The angular difference in direction between grid north and true north at any given place.
- ❑ **Grid Position** – The grid coordinates of a point.
- ❑ **Grillage** – A platform-like construction or assemblage used to insure distribution of loads upon unconsolidated soil material. A frame composed of I-beams or other structural shapes rigidly connected and built into masonry abridge seat, skewback, or other substructure support to insure a satisfactory distribution of the loads transmitted by the superstructure shoes, pedestals, or other bearing members.
- ❑ **Ground Control** – In photomapping, control obtained from surveys as distinguished from control obtained by photogrammetric methods.
- ❑ **Grout** – A mortar having a sufficient water content to render it a free flowing mass, used for filling (grouting) the interstitial spaces between the stones or the stone fragments (spalls) used in the “backing” portion of stone masonry; for fixing anchor bolts and for filling cored spaces in castings, masonry, or other spaces where water may accumulate.
- ❑ **Guard Stake** – A stake driven near a hub, usually sloped with the top of the guard stake over the hub. The guard stake protects, and its markings identify the hub.
- ❑ **Gusset** – A plate serving to connect or unite the elements or a member or the members of a structure and to hold them in correct alignment and/or position at a joint. A plate may function both as a gusset and splice plate while under other conditions it may function as a gusset and stay plate.
- ❑ **H-Beam** – A rolled steel bearing pile having an H-shaped cross-section.
- ❑ **Hanger** – A tension element or member serving to suspend or support a member attached thereto. A tension member, whether a rod, eyebar, or built-up member supporting a portion of the floor system of a truss, arch, or suspension span.
- ❑ **Haunch** – A deepening of a beam or column, the depth usually being greatest at the support and vanishing towards or at the center. The curve of the lower

flange or surface may be circular, elliptic, parabolic, straight, or stepped. The concrete placed immediately between the top flange of a beam or girder and the bottom of the roadway slab to make up for irregularities in the beam and dead load deflection due to the weight of the beam and slab.

- Hinged Joint** – A joint constructed with a pin, cylinder segment, spherical segment, or other device permitting movement by rotation.
- Horizontal Angle** – An angle measured in a horizontal plane.
- Horizontal Direction** – A direction in a horizontal plane.
- Horizontal Distance** – The distance measured in a horizontal plane, as distinguished from a distance measured on a slope.
- Hub** – A wooden stake set in the ground, with a tack or other marker to indicate the exact position. A guard stake protects and identifies the hub.
- Inspector** – The engineer’s authorized representative assigned to make detailed inspection of contract performance.
- Intermittent Weld** – A non-continuous weld commonly composed of a series of short welds with intervening spaces arranged with fixed spacing and length.
- Joint** – In stone masonry, the space between individual stones. In concrete construction, the divisions or terminations of continuity produced at predetermined locations or by the completion of a period of construction operations. These may or may not be open. In a truss or frame structure, (1) a point at which members of a truss or frame are joined, (2) the composite assemblage of pieces or members around or about the point of intersection of their lines of action in a truss or frame.

**Laboratory** – The testing laboratory of the department, or other testing laboratory which may be designated by the engineer.

- Laminated Timber** – In common usage, a laminated timber deck is made up of 2-by-4s or 2-by-6s laid on edge and nailed together to form a continuous deck. The timber members are transverse to the beams or girders that support the deck.

- ❑ **Lateral Bracing** – The bracing assemblage engaging the chords and inclined end posts of truss and the flanges of plate girder spans in the horizontal or inclined planes of these members to function in resisting the transverse forces resulting from wind, lateral vibration, and traffic movements tending to produce lateral movement and deformation.
- ❑ **Lattice (Lacing)** – An assemblage of bars, channels, or angles singly or in combination bolted, riveted, or welded in inclined position upon two or more elements of a member to secure them in correct position and assure their combined action. When the bars form a double system by being inclined in opposite directions, the assemblage is termed “double lattice.” When so arranged, the bars are commonly connected at their intermediate length intersections.
- ❑ **Level Datum** – A level surface to which deviations are referred. The generally adapted level datum for leveling in the United States is mean sea level. For local surveys, an arbitrary level datum is often adopted and defined in terms of an assumed elevation for some physical mark (bench mark).
- ❑ **Live Load** – A dynamic load such as traffic load that is supplied to a structure suddenly or that is accompanied by vibration, oscillation, or other physical condition affecting its intensity.
- ❑ **Longitudinal Reinforcement** – Steel reinforcement in a concrete member running generally parallel with the long dimension of the member. In a column, it is vertical. In a bent cap, it is horizontal. In a deck, it is horizontal and runs parallel to the direction of traffic.
- ❑ **Masonry** – A general term applying to abutments, piers, retaining walls, arches, and allied structures built of stone, brick, or concrete and known correspondingly as stone, brick, or concrete masonry.
- ❑ **Masonry Plate** – A steel plate or a plate-shaped member whether cast, rolled, forged, built into, or otherwise attached upon an abutment, pier, column, or other substructure part to support the rocker, shoe, or pedestal of a beam, girder or truss span and to distribute the load to the masonry beneath.

- ❑ **Materials** – Substances specified for use in the construction of the project.
- ❑ **Meander** – The tortuous channel that characterizes the serpentine curvature of a slow flowing stream in a flood plain.
- ❑ **Meridian** – A north-south line from which longitudes (or departures) and azimuths are reckoned.
- ❑ **Mile, Statute** – 5,280 feet.
- ❑ **Moment** – The product of a force and distance to a particular axis or point. The bending action within a beam which produces stress and deflection.
- ❑ **Monument** – Any object or collection of objects that indicate the position on the ground of a survey station. In military surveys, the term monument usually refers to a stone or concrete station marker containing a special bronze plate on which the exact station point is marked.
- ❑ **More or Less** – The words “more or less” in their ordinary use are to be taken as words of caution, denoting some uncertainty in the mind of one using them and a desire not to misrepresent. When used in connection with quantity and distance, more or less are words of safety and precaution, intended merely to cover some slight or unimportant inaccuracy. (Russo v. Corideo, 102 Conn 663)
- ❑ **Mortar** – The component of concrete composed of cement or other indurating material with sand and water when the concrete is a mobile mass and correspondingly this same component after it has attained a rigid condition through hardening of its cementing constituents.
- ❑ **Mud Sill** – A single piece of timber or a unit composed of two or more timbers placed upon a soil foundation as a support for a single column, a framed trestle bent, or other similar member of a structure. A load distribution piece aligned with and placed directly beneath the sill piece of a framed bent is termed a “Sub-sill,” although it may serve also as a mud sill.
- ❑ **Neutral Axis** – The axis of a member in bending along which the strain is zero. On one side of the neutral axis, the fibers are in tension. On the other side, they are in compression.

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- Normal** – Normal to a line is 90 degrees to the line. Normal to a curve is a radial line.
- Northerly** – Where nothing is given to limit the exact direction, northerly means due north. Directional calls as northerly are often given in deeds to avoid ambiguity.
- Notice to Proceed** – Written notice to the contractor to begin with the contract work.
- P.C.** – Point of curvature. The point where a line changes from tangent to curve.
- P.I.** – Point of intersection of tangent line from the ends of a curve.
- P.O.T.** – Point on Tangent. A reference point on a section of straight (tangent) line.
- P.T.** – Point of tangent. The point where a line changes from a curve to a tangent.
- Paddleboard** – Striped, paddle-shaped signs or boards placed on the roadside in front of a narrow bridge as a warning.
- Panel (Sub-panel)** – The portion of a truss span between adjacent points of intersection of web and chord members and, by common practice, applied to intersection upon the bottom chord. A truss panel divided into two equal or unequal parts by an intermediate web member, generally by a sub-diagonal or a hanger, forms the panel division commonly termed “sub-panels.”
- Panel Point** – The point of intersection of primary web and chord members of a truss.
- Parapet** – The portion of a box culvert consisting of a low wall or block running parallel to the direction of traffic and placed at the outer extremities of the top slab to retain the roadway fill.
- Parcel** – Parcel generally refers to a piece of land that cannot be designated by lot number. The Department of Transportation uses this term to identify the individual takings along a project.

- ❑ **Pavement Structure** – The combination of subbase, base course, and surface course placed on a subgrade to support and distribute the traffic load to the roadbed.
- ❑ **Pedestal** – A cast or built-up metal member or assemblage functioning primarily to transmit load from one member or part of a structure to another member or part. A secondary function may be to provide means for longitudinal, transverse, or revolution movements. A block-like construction of stone, concrete, or brick masonry placed upon the bridge seat of an abutment or pier to provide a support for the ends of the beams.
- ❑ **Permanent Bench Mark** – A bench mark of as nearly permanent character as it is practicable to establish. Usually designated bench mark.
- ❑ **Picture Point** – In surveying, a terrain feature that is easily defined on an aerial photograph, and whose horizontal or vertical position has been determined by survey measurements. Picture points are marked on the aerial photographs by the surveyor and are used by the photo mapper.
- ❑ **Pier** – In common usage in South Dakota, a pier is a massive substructure unit usually made of concrete whereas a bent is a lighter, framed unit made up of columns and a cap. A bent may be made of concrete, wood, or steel members.
- ❑ **Pier Cap (Pier Top)** – The topmost portion of a pier. On rigid frame piers, the term applies to the beam across the column tops. On hammerhead and tee piers, the cap is a continuous beam.
- ❑ **Pile** – A rod or shaft-like linear member of timber, steel, concrete, or composite materials driven into the earth to carry structure loads thru weak strata of soil to those strata capable of supporting such loads. Piles are also used where loss of earth support due to scour is expected.
- ❑ **Pin** – A cylindrical bar used as a means of connecting, holding in position, and transmitting the stresses of, the members forming a truss or a framed joint. To restrain the pin against longitudinal movement, its ends are fitted with nuts, cotter bolts, or both. The nuts are commonly of the recessed type taking bearing at their edges upon the assemblage of members. To prevent

the loosening of the nuts and the displacement of the pins by vibration, joint movements, and other service conditions, the pins ends may be burred or they may be fitted with cotters.

- Pin-Connected Truss** – A general term applied to a truss of any type having its chord and web members connected at the truss joints by pins.
- Pitch** – The longitudinal spacing between rivets, studs, bolts, holes, etc., which are arranged in a straight line.
- Plans** – The contract drawings which show the location, character, and dimensions of the prescribed work, including layouts, profiles, cross sections, and contract documents.
- Plate Girder** – An I-shaped beam composed of a solid plate web with either flange plates or flange angles bolted, riveted, or welded upon its edges. Additional cover plates may be attached to the flanges to provide greater flange area.
- Plate Girder Structure** – A structure (bridge) where welded, riveted, or bolted steel plates form a girder or beam used when the span between supports or the traffic loads will exceed the I-beam maximum load capacity. Splices join girders together. Diaphragms space and hold girders in place.
- Pony Truss** – A general term applied to a truss having insufficient height to permit the use of an effective top chord system of lateral bracing above the bridge floor.
- Pop-out** – Conical fragment broken out of concrete surface. Normally about one inch in diameter. Shattered aggregate particles usually are found at the bottom of the hole.
- Portal** – The unobstructed space of a through bridge forming the entrance to the structure.
- Pot Holes** – Small worn or disintegrated areas of bridge floor or approach surface concaved by the wearing action of vehicle wheels.

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- Prestressed Beam or Girder** – A concrete member, usually I-shaped, through which are stretched highly stressed tendons that, when released from their end anchorage, produce a compressive stress in the member.
- Prestressed Concrete Beam Structure** – A structure where the girders or beams are made of concrete reinforced with steel (reinforcing bars).
- Prime Meridian** – An initial or zero median from which longitudes are reckoned. At an international conference in 1884, the Greenwich Meridian was adopted by most countries as the prime meridian for the earth.
- Profile Grade** – The trace of a vertical plane usually intersects the top surface of the proposed subgrade surface, usually along the longitudinal centerline of the roadbed. Profile grade means either elevation or gradient of such trace according to the context.
- Project** – The specific section of the highway together with all appurtenances and construction to be performed under the contract.
- Property** – The ownership of a thing is the right of one or more persons to possess and use it to the exclusion of others. The thing of which there may be ownership is called property.
- Region Engineer** – A representative of the director of operations in charge of assigned operation within a region.
- Right-of-way** – A general term denoting land, property, or interest therein acquired for or devoted to a highway use. Often referred to as ROW.
- Road** – A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.
- Roadbed** – The graded portion of a highway within top and side slopes, prepared as a foundation for the pavement structure and shoulders.
- Roadside** – A general term denoting the area adjoining the outer edge of the roadway. Extensive areas between the roadways of a divided highway may also be considered roadside.
- Roadway** - The portion of a highway within limits of construction.

- ❑ **Rocker Bent** – A bent composed of metal, reinforced concrete, or timber. It is hinged or otherwise articulated at one or both ends to prove the longitudinal movements resulting from temperature changes and the superimposed loads of the span or spans supported thereon.
- ❑ **Rolled Beams** – Structural steel wide flange or I-beam members produced in a rolling mill.
- ❑ **Safe Load** – The maximum loading determined by a consideration of its magnitude and distributions of wheel, axle, or other concentrations as productive or unit stresses in the various members and incidental details of a structure, permissible for service use, due consideration being given to the physical condition of the structure resulting from its previous service use.
- ❑ **Scaling** – Surface deterioration of concrete (usually a deck) generally due to the presence of de-icing chemicals and/or a weak mortar on the surface.
- ❑ **Scour** – An erosion of a river, stream, tidal inlet, lake, or other water bed area by a current, wash, or other water in motion. It produces a deepening of the overlying water, or a widening of the lateral dimension of the flow area.
- ❑ **Scupper (Curb Inlet)** – An opening in the floor portion of a bridge, commonly located adjacent to the curb or wheel guard, to provide means for rain or other water accumulated upon the roadway surface to drain through it into the space beneath the structure. Bridges having reinforced concrete floors with concrete curbs may be effectively drained through scuppers located within the curb face surfaces.
- ❑ **Shear** – The force tending to slide the part of a member to one side of a cross section transversely with respect to the part of the member on the other side of the section.
- ❑ **Sheet Piling (Sheeting)** – A general or collective term used to describe a number of sheet piles taken together to form a crib, cofferdam, bulkhead, etc.
- ❑ **Shoe** – In general, a pedestal-shaped member at the end of a plate girder or truss functioning to transmit and distribute its loads to a masonry bearing area or to any other supporting area or member. A shoe may be a cast or a

built-up member; the base plate or plate-like part of which is commonly termed the “shoe plate,” which may take bearing directly upon a masonry plate or upon an intervening expansion device.

- Shoulder** – The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.
- Sidewalk** – The portion of the roadway primarily constructed for the use of pedestrians.
- Sill (Sill Piece)** – The base piece or member of a viaduct or trestle bent serving to distribute the column loads directly upon the foundation or upon mud sills embedded in the foundation soil transversely to the alignment of the bent. An end substructure unit upon which a truss, beam, or girder structure rests. The truss or beams are not cast into the sill, but merely rest upon it.
- Simple Span** – A superstructure span having, at each end, a single unrestraining bearing or support and designed to be unaffected by stress transmission to or from an adjacent span or structure.
- Stay-In-Place (SIP) Forms**– A prefabricated metal concrete deck form that will remain in place after the concrete has set.
- Skew Angle** – As applied to oblique bridges; the skew angle, angle of skew, or simply “skew” is the acute angle subtended by a line normal to the longitudinal axis of the structure and a line parallel to or coinciding with the alignment of its end.
- Slab Bridge** – A bridge having a superstructure composed of a reinforced concrete slab constructed either as a single unit or as a series of narrow slabs placed parallel with the roadway alignment and spanning the space between the supporting abutments or other substructure parts. The former is commonly constructed in place, but the latter may be precast.
- Slag Inclusion** – Small particles of slag trapped inside a weld during the fusion process.

- ❑ **Slope Pavement (Slope Protection)** – A thin surfacing of stone, concrete, or other material deposited upon the sloped surface of an approach cut, embankment, or causeway to prevent its disintegration by rain, wind, or other erosive action.
- ❑ **Sole Plate** – A plate bolted, riveted, or welded upon the bottom flange of a rolled beam, plate girder, or truss to take direct bearing upon a roller nest, bearing pedestal, or masonry plate. It distributes the reaction of the bearing to the beam, girder, or truss member. The sole plate may also function as a combined sole and masonry plate at the fixed end of a beam, girder, or truss.
- ❑ **Spalls (Spalling)** – Circular or oval depression in concrete caused by a separation of a portion of the surface concrete, revealing a fracture parallel with or slightly inclined to the surface. Usually part of the rim is perpendicular to the surface. The pieces of spalled concrete themselves.
- ❑ **Special Provisions** – Additions and revisions to the standard and supplemental specifications applicable to an individual project.
- ❑ **Specifications** – A general term applied to all directions, provisions, and requirements pertaining to performance of the work.
- ❑ **Spur Dike** – A dam or dike (usually of earth and protected with rip-rap) running upstream from a bridge to ensure more even flow under the structure and minimize erosion. The upstream end is flared outward from the stream on a roughly parabolic curve.
- ❑ **Standard Specifications** – A book of specifications approved for general applications and repetitive use.
- ❑ **Stay Plate (Tie Plate)** – A plate placed at or near the end of a latticed side or web of a compression or other member and also at intermediate locations where connections for members interrupt the continuity of the latticing. This plate serves to distribute the lattice bar stress to the elements of the member and adds stiffness and rigidity to joint assemblages.
- ❑ **Steel I-Beam Structure** – A structure (bridge) where the steel I-beams under the structure deck (roadway) support the deck and the traffic loads.

- ❑ **Stiffener** – An angle, tee, plate, or other rolled section riveted, bolted, or welded upon the web of a plate girder or other “built-up” member to transfer stress and to prevent buckling or other deformation.
- ❑ **Stirrup** – In reinforced concrete bridges: A U-shaped bar placed in beams, slabs, or similar constructions to resist diagonal tension stresses.
- ❑ **Strain** – The distortion of a body produced by the application of one or more external forces and measured in units of length. In common usage, this is the proportional relation of the amount of distortion divided by the original length.
- ❑ **Street** – A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.
- ❑ **Stress** – The resistance of a body to distortion when a solid or plastic state and when acting in an unconfined condition. Stress is produced by the strain (distortion) and holds in equilibrium the external forces causing the distortion. It is measured in pounds or tons. Within the elastic limit, the strain in a member of a structure is proportional to the stress in the member.
- ❑ **Unit Stress** – The stress per square inch (or other unit of surface or cross sectional area). The Allowable Unit Stress is: (a) Assumed in determining the composition and construction details of a member or the members of a proposed structure, or (b) assumed for judging the safe load-capacity of an existing structure; while working stress is (c) produced in the members and parts of an existing structure when subjected to loads, impacts, and other stress-producing elements and factors to which the structure is proposed to be or may have been subjected.
- ❑ **Stress Sheet** – A drawing showing a structure in skeletal form sufficient only to impart or suggest in conjunction with notations, thereon, its general makeup, major dimensions and the arrangement and composition of its integral parts. Special construction details may be shown by section views and sketches with or without dimensional data. Upon the skeletal outline of the structure or in tabulated form, the drawing should show the computed stresses resulting from the application of a system of loads together with the design composition of the individual members resulting from the application

of assumed unit stresses for the material or materials to be used in the structures. The assumed design load or loads should appear either in diagrammatic form with dimensions and magnitudes, or reference be made to readily available information relating thereto by a special note conspicuously displayed upon the drawing. A future investigation of a given structure to determine its reliability for a given load or combination of loads may be greatly facilitated and expedited by an adequate stress sheet record of its original design conditions.

- Stringer** – A longitudinal beam supporting the bridge deck. In large bridges or truss bridges, it is framed into or upon the floor beams.
- Strut** – A general term applying to a piece or member acting to resist compressive stress.
- Structures** – Bridges, culverts, catch basins, drip inlets, retaining walls, cribbing, manholes, endwalls, buildings, sewers, service pipes, underdrains, foundation drains, and other features which may be encountered in the work and not otherwise classified.
- Subbase** – The layer or layers of specified or selected material of designated thickness placed on a subgrade to support a base course or a surface course.
- Subgrade** – The top surface of a roadbed upon which the pavement structure and shoulders, including curbs, are constructed.
- Substructure** – The abutments, piers, grillage, or other constructions built to support the span or spans of a bridge superstructure, whether consisting of beam, girder, truss, trestle, or other type or types of construction.
- Superelevation (Curve Banking)** – The transverse inclination of the roadway surface within a horizontal curve and the relatively short tangent lengths adjacent thereto required for its full development. The purpose of superelevation is to provide a means of resisting or overcoming the centrifugal forces of vehicles in transit.
- Superstructure** – The entire portion of a bridge structure which primarily receives and supports highway, railway, canal, or other traffic loads and in its turn, transfers the reaction resulting therefrom to the bridge substructure.

The superstructure may consist of beam, girder, truss, trestle, or other type or types of construction. A superstructure may consist of a single span upon two supports or of a combination of two or more spans having the number and distribution of supports required by their types of construction, whether consisting of simple, continuous, cantilever suspension, arch, or trestle span-tower-bent construction.

- Supplemental Specifications – Approved addition and revisions to the standard specifications.
- Surface Course – One or more layers of pavement structure designed to accommodate the traffic load, the top layer of which resists skidding, traffic abrasion, and the disintegrating effects of climate. The top layer is sometimes called “wearing course.”
- Suspended Span – A superstructure span having one or both of its ends supported upon or from adjoining cantilever arms, brackets, brackets or towers. It is designed to be unaffected by other stress transmissions to or from an adjacent structure. The ordinary use of a suspended span is in connection with cantilever span construction.
- Sway Bracing – The transverse overhead bracing in a truss normally at panel points and attached to the vertical web members.
- Tendon – A prestressing cable or strand.
- Tension – A force or stress caused by equal and opposite forces pulling at the ends of the members.
- Tie Rod (Tie Bar) – A rod-like or bar-like member in a truss or other frame functioning to transmit tensile stress.
- Township, City, Town, or District – A subdivision of the country used to designate or identify the location of a project.
- Township – Township is a nearly square area of land usually containing 36 sections of land.

- ❑ **Transverse Reinforcement** – Steel reinforcement in a concrete member normally perpendicular to the long axis of the member. In a deck, this is perpendicular to the direction of traffic.
- ❑ **Traveled Way** – The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.
- ❑ **Truck Average Daily Traffic (TADT)** – This is the total truck volume during a given time period divided by the number of days in the period, normally a year.
- ❑ **Truck Design Hourly Volume (TDHV)** – This is the peak hourly volume of truck traffic expected in the thirtieth-highest hour during the chosen design year.
- ❑ **Truss** – A jointed structure having an open built web construction arranged so that the frame is divided into a series of triangular figures with its component straight members primarily stressed axially only. The triangle is the truss element and each type of truss used in bridge construction is an assemblage of triangles. The connecting pins are assumed to be frictionless.
- ❑ **Truss Bridge** – A bridge having a truss for a superstructure: The ordinary single span rests upon two supports, one at each end, which may be abutments, piers, bents, towers, or a combination of these. The superstructure span may be divided into three parts: (1) the trusses, (2) the floor system, and (3) the bracing.
- ❑ **Waterway** – The available width for the passage of stream, tidal, or other water beneath a bridge, if unobstructed by natural formations or by artificial constructions beneath or closely adjacent to the structure. For a multiple span bridge, the available width is the total of the unobstructed waterway lengths of the spans.
- ❑ **Web** – The portion of a beam, girder, or truss located between and connected to the flanges or the chords. It serves mainly to resist shear stresses.
- ❑ **Web Members** – The intermediate members of a truss extending, in general, from chord to chord, but not including the end posts. Inclined web members are termed diagonals. A “tie” is a diagonal in tension, while a brace or strut is

a diagonal in compression. A vertical web member in compression is commonly designated a post. In contrast, a hanger is one in tension due entirely to the external forces applied at its lower end.

- Web Plate** – The plate forming the web element of a plate girder, built-up beam, or column.
- Wheel Guard (Felloe Guard)** – A member placed longitudinally along the side limit of the roadway to guide the movements of vehicle wheels and safeguard the bridge truss, railings, and other constructions existing outside the roadway limit from collision with vehicles and their loads.
- Wide Flange** – A rolled member having an II-shaped cross section, which differs from an I-beam in that the flanges are wider and the web is thinner.
- Wind Bracing** – The bracing systems in girder and truss spans and in towers and bents which function to resist the stresses induced by wind forces.
- Wing Dam** – A stream deflector usually built of structural steel framing and sheet metal sheeting placed upstream from a bridge to direct the stream evenly through the bridge opening.
- Work** – Work shall include the furnishing of labor, materials, equipment, and incidentals necessary to the successful completion of the contract.
- Work Drawings** – Stress sheets, show drawings, erection plans, falsework plans, framework plans, bending diagrams for reinforcing steel, or supplementary plans or similar data which the contractor is required to submit to the engineer for review.
- Written Order** – An order, issued in writing by the engineer, of a contractual status requiring performance by the contractor without negotiation of any sort.