CHAPTER 17

GLOSSARY OF TERMS

Absorption, gross. Total amounts of preservative indicated in the wood at the termination of the pressure period.

Abutment. A substructure supporting the end of a single span or the extreme end of a multispan superstructure.

Aggregate. Sand, gravel, broken or crushed stone, or combinations thereof.

Air-dried. Wood dried by exposure to the atmosphere without artificial heat.

All Heart. Wood that is heartwood throughout, i.e., free of sapwood.

Allowable stress. The maximum allowable material stress used for the design of timber members. Allowable stress equals the tabulated stress adjusted by all applicable modification factors.

Anchor bolt. A bolt or boltlike piece of metal commonly threaded and fitted with a nut, used to secure the superstructure to the substructure.

Anisotropic. Not isotropic; that is, not having the same properties in all directions.

Annual growth ring. The layer of wood growth put on a tree during a single growing season.

Arch. In general, any structure having a curved shape, either actual or approximated, and producing at its supports reactions having both horizontal and vertical components.

> **Two-hinge arch.** An arch that is supported by a pinned connection at each support.
>
> **Three-hinge arch.** An arch with end supports pinned and a third hinge (or pin) located somewhere near midspan.

Assay. Determination, by appropriate physical and chemical means, of the amount of preservative or fire retardant in a sample of treated wood.

Axial combinations. Glulam members manufactured primarily for axial loads or bending loads applied parallel to the wide faces of the laminations.

Axle load. The total load transferred by one axle of a traffic vehicle.

Backfill. Material (soil or rock) placed behind and within the abutment and wingwalls to fill the unoccupied portion of the foundation excavation.

Backwall. The topmost portion of an abutment above the elevation of the bearings, functioning primarily as a retaining wall.

Bark pocket. A natural opening between annual growth rings that contains bark.

Batter. The inclination of a surface in relation to a horizontal or vertical plane.

Batter pile. A pile driven in an inclined position to resist forces acting in a direction other than vertical.

Beam. A structural member supporting a load applied transversely to it. Beams used in bridge construction include stringers, girders, and floorbeams.

Bearing. The assembly or connection between the superstructure and the substructure at the superstructure reactions.

> **Fixed bearing.** A type of bearing that does not allow longitudinal movement of the superstructure.
>
> **Expansion bearing.** A type of bearing that allows small longitudinal movements of the superstructure, generally those resulting from thermal expansion and contraction.

Bearing pad. A thin layer of material, generally elastomeric rubber, placed between the superstructure and the substructure to provide an even surface at the reaction and allow for longitudinal and rotational movement of the superstructure.

Bearing plate. A steel plate placed at the reaction of a structural member (beam, column, etc.) to distribute and transmit loads to supporting members.

Bending combinations. Glulam members manufactured primarily for bending loads applied perpendicular to the wide face of the laminations.

Bent. A type of pier consisting of two or more column or columnlike members connected at their top ends by a cap, strut, or other member holding them in their correct positions.

> **Pile bent.** A type of bent using timber piles as the column members.
>
> **Frame bent.** A type of bent using a timber frame as the column.

Bleeding. The secretion of liquid preservative from treated wood. The secreted preservative may evaporate, remain liquid, or harden into a semisolid or solid state.

Board foot. A unit of measurement of lumber represented by a board 1 foot long, 1 foot wide, and 1 inch thick, or its cubic equivalent. In practice, the board foot calculation for lumber 1 inch or more thick is based on its nominal thickness, width, and length. Lumber with a nominal thickness of less than 1 inch is calculated as 1 inch.

Boards. Lumber that is nominally less than 2 inches thick and 2 inches or more wide.

Bole. The main stem of a tree of substantial diameter capable of yielding sawtimber, veneer logs, or large poles.

Bound water. Water (or moisture) contained in the cell walls of wood.

Bow. The distortion of lumber in which there is a deviation, in a direction perpendicular to the flat face, from a straight line from end to end of the piece.

Boxed heart. The term used when the pith falls entirely within the four faces of a piece of wood anywhere in its length. Also called boxed pith.

Bracing. A system of tension and/or compression members that provides strength, support, or stability to beam, truss, or frame structures.

Branding. Permanent marking on a treated wood product to identify the supplier, date of treatment, and other information as specified.

Bridging. A carpentry term applied to wood cross bracing fastened between lumber beams.

Brown rot. In wood, any decay in which the attack concentrates on the cellulose and associated carbohydrates rather than on the lignin, producing a light to dark brown friable residue.

Brush curb. A narrow curb, 9 inches or less in width, that prevents a vehicle from brushing against the traffic railing.

Buckle. To fail by an inelastic change in alignment, usually a result of compressive stress.

Bulkhead. A retaining wall-like structure commonly composed of driven piles supporting a wall or barrier of wooden timbers functioning as a constraining structure resisting the thrust of earth or other material bearing against the assemblage.

Burl. A distortion of grain, usually caused by abnormal growth from injury of the tree.

Camber. A slight amount of 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.

Cambium. A thin layer of tissue between the bark and wood that repeatedly subdivides to form new wood and bark cells.

Cap. A sawn lumber or glulam member placed horizontally on an abutment or pier to distribute the live load and dead load of the superstructure. Also a metal, wood, or mastic cover to protect exposed wood end grain from wetting.

Cellulose. The carbohydrate that is the principal constituent of wood and that forms the framework of the wood cells.

Charge. All the wood treated together in one cylinder or treating tank at one time.

Check. A lengthwise separation of the wood that usually extends across the rings of annual growth and commonly results from stress set up in wood during seasoning.

Chord. In a truss, the upper and lower longitudinal members, extending the full length and carrying the tensile and compressive forces that form the internal resisting moment.

Clear. Free or practically free of all blemishes and strength-reducing characteristics.

Clear span. The unobstructed space or distance between the substructure elements measured between faces of abutments and/or piers.

Column. A general term applying to a member resisting compressive stress and having, in general, a considerable length in comparison with its transverse dimensions.

Combination symbol. A designation used for glulam to indicate the combination of laminations used to manufacture the member.

Compression failure. Deformation of the wood fibers from excessive compression along the grain either in direct end compression or in bending. It may develop in standing trees or result from stresses imposed after the tree is cut. In surfaced lumber, compression failures may appear as fine wrinkles across the face of the piece.

Compression wood. Wood formed on the lower side of branches and inclined trunks of softwood trees.

Conditioning. The removal of moisture from unseasoned or partially seasoned wood.

Connector, timber. Metal rings, plates, or grids that are embedded in the wood of adjacent members to increase the strength of the joint.

Continuous spans. A beam or truss-type superstructure designed to extend continuously over one or more intermediate support.

Creep. An inelastic deformation that increases with time while the stress is constant.

Creosote. A wood preservative that is a distillate of coal tar produced by high-temperature carbonization of bituminous coal.

Crib. A structure consisting of a foundation grillage combined with a superimposed framework providing compartments that are filled with gravel, stones, or other material satisfactory for supporting the structure to be placed thereon.

Crook. The distortion of lumber in which there is a deviation, in a direction perpendicular to the edge, from a straight line from end to end of the piece.

Cross frames. Transverse bracing between two main longitudinal beams or other structural members.

Cross section. The surface obtained when cutting a log perpendicular to its long axis or a piece of wood perpendicular to the longitudinal direction.

Cup. A distortion of a board in which there is a deviation flatwise from a straight line across the width of the board.

Curb. A barrier paralleling the side limit of the roadway to guide the movement of vehicle wheels and protect railings or other elements outside the roadway limit.

Dead load. The static load imposed by the weight of the materials that make up the structure.

Decay. A disintegration of the wood substance from action of wood-destroying fungi.

> **Advanced (or typical) decay.** The older stage of decay in which the destruction is readily recognized because the wood has become punky, soft, spongy, stringy, pitted, or crumbly. Decided discoloration or bleaching of the rotted wood is often apparent.
>
> **Incipient decay.** The early stage of decay that has not proceeded far enough to soften or otherwise perceptibly impair the hardness of the wood. It is usually accompanied by a slight discoloration or bleaching of the wood.

Deck. That portion of a bridge which provides direct support for vehicular and pedestrian traffic. While normally distributing loads to a system of

beams and stringers, a deck may also be the main supporting element of a bridge, as with a longitudinally laminated timber bridge or a stressed-deck system.

Deformation, elastic. Deformation from applied loads; when the loads are removed, the material will return to its original shape.

Deformation, inelastic. Deformation from applied loads; when the loads are removed, the material will not return to its original shape.

Delamination. The separation of layers in a laminate through failure within the adhesive or at the mechanical bond between laminae.

Density. As usually applied to wood of normal cellular form, density is the mass of wood substance enclosed within the boundary surfaces of a wood-plus-voids complex having unit volume.

Design load. The loading comprising magnitudes and distributions of all loads used in the determination of the stresses, stress distributions, and ultimately the cross-sectional areas and compositions of the various portions of a bridge structure.

Design stress. The stress produced in a member by the design loading.

Diaphragm. Blocking between two main longitudinal beams consisting of solid lumber or glued-laminated timber.

Dimensional stability. Resistance of wood to swelling (or shrinking) upon adsorption or loss of water.

Distribution factor. The fractional portion of the forces produced by one wheel line of a design vehiclethat is distributed to a component of the structure.

Dowel. A short length of round metal bar used to interconnect or attach two members and prevent movement and displacement.

Drift bolt. A drift pin with a head formed or welded at one end for driving.

Drift pin. A length of metal bar, either round or square, used to connect and hold in position timber members placed in contact. Drift pins are commonly driven in holes having a diameter slightly less than the pins.

Dry. As applied to wood, having a relatively low moisture content, by definition 19 percent for sawn lumber and 16 percent for glued laminated timber.

Dry rot. A term loosely applied to any dry, crumbly rot but especially to that which, when in an advanced stage, permits the wood to be crushed easily to a dry powder. The term is actually a misnomer for any decay, since all fungi require considerable moisture for growth.

Dual treatment. Treatment of wood to be used under severe conditions of exposure with two dissimilar preservatives (usually creosote and an inorganic arsenical) in two separate treating cycles.

Durability. A general term for permanence or resistance to deterioration. As applied to wood, its lasting qualities or permanence in service, with reference to its resistance to decay and other forms of deterioration.

Duration of load factor. A factor expressing the dependence of wood strength on the duration of the loading.

Earlywood. The portion of the annual growth ring that is formed during the early part of the growing season.

Edge. The narrow face of rectangular-shaped pieces of lumber. Eased edges mean slightly rounded corners. Lumber 4 inches or less in thickness is frequently shipped with eased edges unless otherwise specified.

Elastomeric. Having elastic, rubberlike properties.

Empty-cell process. Any process for impregnating wood with preservatives or chemicals in which air, trapped in the wood under pressure, is released to drive out part of the injected preservative or chemical. The aim is to obtain good preservative distribution in the wood and leave the cell cavities only partially filled, thus minimizing future bleeding.

Equilibrium. In statics, the condition in which the forces acting upon a body are such that no external effect (or movement) is produced.

Equilibrium moisture content (EMC). The moisture content at which wood neither gains nor loses moisture when surrounded by air at a given relative humidity and temperature.

Equivalent uniform load. A load having a constant intensity per unit length producing an effect equal or practically equal to that of one or more concentrated loads.

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 or other unevaluated conditions.

Fatigue. The decrease in member strength when subjected to cyclical loading as compared to static loading.

Fiber saturation point (FSP). The stage in the drying or wetting of wood at which the cell walls are saturated and the cell cavities free from water. It applies to an individual cell or group of cells, not to whole boards. It is usually taken as approximately 30 percent moisture content, based on ovendry weight.

Fibril. A threadlike component of cell walls, visible under a light microscope.

Flashing. Metal sheets placed over the top of timber piles or posts to protect them from water. Also, metal sheets placed on the top of glulam beams to protect them from draining water at the joint between glulam deck panels.

Floorbeam. A beam located transverse to the bridge alignment that supports the deck or other components of the floor system.

Footing. The enlarged lower portion of a substructure that distributes the structure loads either to the earth or to supporting piles.

Foundation. The supporting material upon which the substructure portion of a bridge is placed.

Frame. A structure having its parts or members so arranged and secured that the entire assemblage may not be distorted when supporting the loads, forces, and physical pressures considered in its design.

Frass. Insect droppings.

Free water. Water (or moisture) contained in the cell cavities of wood.

Frost heave. The upward movement of soil from alternate freezing and thawing of retained moisture.

Full-cell process. Any process for impregnating wood with preservative chemicals in which a vacuum is drawn to remove air from the wood before admitting the preservative. This favors heavy adsorption and retention of preservatives in the treated portions.

Galleries. Tunnels made in wood by insects.

Girder. A flexural member that is the main or primary support for the structure. In general, a girder is any large beam, especially if built up.

Glue line. The layer of adhesive that attaches two adherents.

Glued-laminated timber (glulam). An engineered, stress-rated product of a timber laminating plant comprising assemblies of specially selected and prepared wood laminations securely bonded together with adhesives.

Grade. The designation of the quality of a manufactured piece of wood.

Grade mark. Identification of lumber with symbols or lettering to certify its quality or grade.

Grain. The direction, size, arrangement, appearance, or quality of the fibers in wood or lumber. To have a specific meaning the term must be qualified.

> **Close-grained.** Wood with narrow, inconspicuous annual rings.
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> **Coarse-grained.** Wood with wide, conspicuous annual rings in which there is considerable difference between springwood and summerwood.
>
> **Cross-grained.** Wood in which the fibers deviate from a line parallel to the sides of the piece.
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> **Edge-grained.** Lumber that has been sawn so that the wide surfaces extend approximately at right angles to the annual growth rings. Lumber is considered edge-grained when the rings form an angle of 45 to 90 degrees with the wide surface of the piece.
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> **End-grained.** The grain as seen on a cut made at right angles to the direction of the fibers.
>
> **Flat-grained.** Lumber that has been sawn parallel to the pith and approximately tangent to the growth rings. Lumber is considered flat-grained when the annual growth rings make an angle of less than 45 degrees with the wide surface of the piece.
>
> **Straight-grained.** Wood in which the fibers run parallel to the axis of a piece.

Green. Freshly sawed or undried wood. Wood that has become completely wet after immersion in water would not be considered green, but may be said to be in the green condition.

Grillage. A platformlike construction or assemblage used to ensure distribution of loads upon unconsolidated soil material.

Gross vehicle weight (GVW). The maximum total weight of a traffic vehicle.

Gusset. A plate serving to connect the members of a joint and hold them in correct alignment and position.

Hanger. A tension element or member serving to suspend or support a portion of the floor system of a truss, arch, or suspension span.

Hardness. A property of wood that enables it to resist indentation.

Hardwood. Generally, one of the botanical groups of trees that have broad leaves, in contrast to the conifers or softwoods. The term has no reference to the actual hardness of the wood.

Heartwood. The wood extending from the pith to the sapwood, the cells of which no longer participate in the life processes of the tree.

Hydroplaning. Loss of contact between a tire and the deck surface when the tire planes or glides on a film of water covering the deck.

Impact. As applied to bridge design, a dynamic increment of stress equivalent in magnitude to the difference between the stresses produced by a static load and those produced by the same loads applied dynamically.

Incising. The practice of puncturing the lateral surfaces of wood as an aid in securing more uniform penetration of preservative.

Increment borer. An augerlike instrument with a hollow bit and equipped with an extractor used to sample wood internally without destroying the piece.

Inventory rating. The load capacity rating for a bridge that represents the vehicle load level that can safely utilize an existing structure for an indefinite period of time.

Isotropic. The quality of having properties that are independent of the direction in which they are measured; properties are equal in all directions.

Joint. The junction of two pieces of wood or veneer.

> **Butt joint.** An end joint formed by abutting the square ends of two pieces.
>
> **Edge joint.** The place where two pieces of wood are joined together edge to edge.
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> **End joint.** The place where two pieces of wood are joined together end to end, commonly by scarf or finger jointing.
>
> **Face joint.** The joint occurring between the wide faces of lamination.
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> **Finger joint.** An end joint made up of several meshing wedges or fingers of wood bonded together with an adhesive.
>
> **Lap joint.** A joint made by placing one member partly over another and bonding the overlapped portions.
>
> **Scarf joint.** An end joint formed by joining with glue the ends of two pieces that have been tapered or beveled to form sloping plane surfaces.
>
> **Starved joint.** A glue joint that is poorly bonded because an insufficient quantity of glue remained in the joint.

Joint efficiency. The strength of a joint expressed as a percentage of the strength of clear straight-grained material.

Juvenile wood. The wood formed adjacent to the pith.

Kiln. A chamber having controlled air flow, temperature, and relative humidity, for drying lumber, veneer, and other wood products.

Kiln-dried. Dried in a kiln with the use of artificial heat.

Kneebrace. A member engaging at its ends two other members which are joined at right angles, or approximately right angles. It serves to strengthen the joint and make it more rigid.

Knot. That portion of a branch or limb that has been surrounded by subsequent growth of the stem.

> **Encased knot.** A knot whose rings of annual growth are not intergrown with those of the surrounding wood.
>
> **Intergrown knot.** A knot whose rings of annual growth are completely intergrown with those of the surrounding wood.

Laminate. A product made by bonding together two or more layers (laminations) of material or materials.

Laminated veneer lumber (LVL). Lumber made by laminating veneers in which the grain of all the veneers is essentially parallel to the longitudinal axis of the piece (as opposed to plywood).

Laminated wood. An assembly made by bonding layers of veneer or lumber with an adhesive so that the grain of all laminations is essentially parallel.

> **Horizontally laminated.** Laminated wood in which the laminations are arranged with their wider dimension approximately perpendicular to the direction of load.
>
> **Vertically laminated.** Laminated wood in which the laminations are arranged with their wider dimension approximately parallel to the direction of load.

Laminating. The process of bonding laminations together with adhesive, including the preparation of the laminations, preparation and spreading of adhesive, assembly of laminations in packages, application of pressure, and curing.

Lamination. A full-width and full- length layer contained in a member bonded together with adhesive. It may be composed of one or several wood pieces in width or length.

Lateral bracing. The bracing assemblage engaging the chords and inclined end posts of a truss, or the longitudinal beams of a beam superstructure, in the horizontal or inclined plane of the members to function in resisting the transverse forces tending to produce lateral movement and deformation.

Latewood. The portion of the annual growth ring that is formed late in the growing season, after the earlywood formation has ceased.

Lignin. The thin cementing layer between wood cells. It is the second most abundant constituent of wood and is located principally in the secondary wall and the middle lamella of the cells.

Live load. A dynamic load that is applied to a structure suddenly or that is accompanied by vibration, oscillation, or other physical condition affecting its intensity.

Longitudinal. For bridges, the direction parallel to the bridge span. For wood, parallel to the direction of the wood fibers.

Lumber. The product of the saw and planing mill not further manufactured than by sawing, resawing, passing lengthwise through a standard planing machine, crosscutting to length, and matching.

Dimension lumber. Lumber with a nominal thickness of from 2 up to but not including 5 inches and a nominal width of 2 inches or more.

Dressed lumber. Lumber that has been surfaced by a planing machine on one or more sides or edges.

Factory and shop lumber. Lumber intended to be cut up for use in further manufacture, not for structural engineered uses.

Machine stress rated (MSR) lumber. A grade of structural lumber determined by measuring the stiffness of each piece by a grading machine.

Matched lumber. Lumber that is edge dressed and shaped to make a close tongued-and-grooved joint at the edges or ends when laid edge to edge or end to end.

Rough lumber. Lumber that has not been dressed (surfaced) but that has been sawed, edged, and trimmed.

Structural lumber. Lumber that is intended for use where allowable properties are required. The grading of structural lumber is based on the strength of the piece as related to anticipated uses.

Visual stress grade lumber. A grade of structural lumber determined by estimating the influence of strength-reducing characteristics by visual examination of the surfaces.

Yard lumber. A little-used term for lumber of all sizes and patterns that is intended for general property requirements.

Lumen. In wood anatomy, the cell cavity.

Manufacturing defects. Includes all defects or blemishes that are produced in manufacturing.

Marine borers. Marine organisms that attack wood in the submerged portions of structures located in salt or brackish waters.

Modification factor. A multiplicative factor applied to tabulated stress for lumber and glulam to compensate for various design and/or use conditions.

Modulus of rupture (MOR). Maximum stress at the extreme fiber in bending, calculated from the maximum bending moment on the basis of an assumed stress distribution. In clear wood the value of the modulus of rupture is intermediate between the tensile and compressive strengths.

Moisture content (MC). The amount of water contained in the wood, usually expressed as a percentage of the weight of the ovendry wood.

Moisture meter. An electrical instrument used to indicate the moisture content of wood.

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 column, framed bent, or other similar member of a structure.

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.

Nominal size. As applied to timber or lumber, the size by which it is known and sold in the market; often differs from the actual size.

Nondestructive evaluation (NDE). The measurement of mechanical properties using test procedures that do not destroy the tested material.

Nondestructive testing (NDT). See nondestructive evaluation.

Occasional pieces. In lumber shipments, not more than 10 percent of the pieces in a parcel or shipment.

Old growth. Timber in or from a mature, naturally established forest.

Operating rating. The load capacity rating for a bridge that represents the absolute maximum vehicle load level to which the structure may be subjected.

Orthotropic. Having unique and independent properties in three mutually orthogonal (perpendicular) planes of symmetry. A special case of anisotropy.

Overload. In general, any load that is in excess of the design load.

Peck. Pockets or areas of disintegrated wood caused by advanced stages of localized decay in the living tree. It is usually associated with cypress and incense cedar.

Penetrant. A liquid used as a carrier for a soluble wood preservative.

Penetration. The depth to which preservative enters the wood.

Pentachlorophenol (penta). A chlorinated phenol used as a wood preservative, usually in petroleum oil.

Pier. A substructure built to support the ends of the spans of a multiple-span superstructure at intermediate points between the abutments.

Pile. A shaftlike linear member driven into the earth through weak material to provide a secure foundation for structures built on soft, wet, or submerged sites.

> **Bearing pile.** A pile that receives its support in bearing through the tip or lower end.
>
> **Friction pile.** A pile that receives its support through friction resistance along its lateral surface.

Pile cap. A lumber or glulam member attached to the tops of several piles to provide support and a point of attachment for the superstructure or other structural components.

Pile shoe. A metal piece fixed to the penetration end of a pile to protect it from damage in driving and to facilitate penetration in very dense material.

Pitch. An accumulation of resinous material in wood.

Pitch pocket. A natural opening extending parallel to the annual growth rings that contains, or has contained, pitch, either solid or liquid.

Pitch streaks. A well-defined accumulation of pitch in a more or less regular streak in the wood of certain conifers.

Pith. The small, soft core occurring near the center of a tree trunk, branch, twig, or log.

Plank. A broad board, usually more than 1 inch thick, laid with its wide dimension horizontal and used as a bearing surface.

Pocket rot. Advanced decay in wood that appears in the form of a hole or pocket, usually surrounded by apparently sound wood.

Preservative. Any substance that, for a reasonable length of time, is effective in preventing the development and action of wood-rotting fungi, borers of various kinds, and harmful insects that deteriorate wood.

> **Preservative, oil-borne.** A wood preservative that is introduced into wood in the form of a solution in oil.
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> **Preservative, oil-type.** Preservatives such as creosote, creosote/coal-tar solutions, creosote-petroleum solutions and oil-borne preservatives, or other preservatives strictly of an oily nature that are generally insoluble in water.
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> **Preservative, waterborne.** A wood preservative that is introduced into wood in the form of a solution in water.

Press-lam. A type of laminated veneer lumber developed at the FPL.

Pressure process. Any process of treating wood in a closed container whereby the preservative or fire retardant is forced into the wood under pressures greater than atmospheric pressure. The American Wood Preservers' Association usually denotes pressure as greater than 50 lb/in^2.

Radial. A direction in wood that is coincident with a radius from the axis of the tree or log to the circumference. A radial section is a lengthwise section in a plane that passes through the centerline of the tree trunk.

Rays, wood. Strips of cells extending radially within a tree and varying in height from a few cells in some species to 4 inches or more in others. The rays serve primarily to store food and transport it horizontally in the tree.

Reaction wood. Wood with more or less distinctive anatomical characters, formed typically in parts of leaning or crooked stems and in branches. In hardwoods this consists of tension wood and in softwoods of compression wood.

Refractory. Very difficult to penetrate with wood preservatives.

Refusal point. The point beyond which the rate of absorption of preservatives in wood at the maximum permitted pressure and temperature is too slow to be significant.

Resin. Inflammable, water-soluble, vegetable substances, secreted by certain plants or trees, and characterizing the wood of many coniferous species. The term is also applied to synthetic organic products related to the natural resins.

Retention. The amount of preservative, in lb/ft^3, remaining in the wood immediately after completion of the treating operation.

Retort. A steel tank, commonly horizontal, in which wood is placed for pressure treatment.

Roadway. The portion of the bridge deck intended for use by vehicular and pedestrian traffic.

Sapwood. The wood of pale color near the outside of the log. Sapwood generally has no natural resistance to decay.

Saw kerf. (1) Grooves or notches made in cutting with a saw; (2) that portion of a log, timber, or otherpiece of wood removed by the saw in parting the material into two pieces; (3) an artificial, predetermined split of limited length made by sawing through and parallel to the axis of a piece, thus preventing the uncontrolled location and direction of a possible natural split or check.

Scupper. An opening in the bridge deck, commonly located adjacent to the curb or wheel guard, provided to drain water from the roadway.

Seasoning. Removing moisture from green wood to improve its serviceability.

Second growth. Timber that has grown after the removal, whether by cutting, fire, wind, or other agency, of all or a large part of the previous stand.

Service load. The vehicle live load used for design which represents the maximum load level that can use the structure on a continual basis.

Shake. A separation along the grain, the greater part of which occurs between the rings of annual growth. Usually considered to have occurred in the standing tree or during felling.

Simple span. A superstructure span having, at each end, a single pinned, roller, or hinged support designed to be unaffected by load transmission to or from an adjacent span or structure.

Skewed bridge. A bridge with a superstructure forming an angle other than 90 degrees with the direction of the stream channel or the substructure.

Slenderness ratio. Measure of stiffness of a member, expressed as the length of the member divided by its radius of gyration.

Soft rot. A special type of decay developing under very wet conditions in the outer wood layers, caused by cellulose-destroying microfungi.

Softwoods. Generally, one of the botanical groups of trees that in most cases have needlelike or scalelike leaves; the conifers, also the wood produced by such trees. The term has no reference to the actual hardness of the wood.

Span. When applied to the design of beam, girder, truss, or arch superstructures, the distance center to center of the end bearings or the distance between the lines of action of the reactions.

Specific gravity. Ratio of the density of a material to the density of water. In wood it is the ratio of the weight of wood to the weight of an equal volume of water, the volume being gross volume of the wood and not of the wood substance itself.

Split. A separation of the wood from the tearing apart of the wood cells.

Stain. A discoloration in wood that may be caused by such diverse agencies as micro-organisms, metal, or chemicals. The term also applies to materials used to impart color to wood.

Stiffness. Resistance to deformation by loads that cause bending stress.

Stirrup. A U-shaped rod, bar, or angle providing a stirruplike support for a member.

Strain. The distortion of a body produced by the application of one or more external forces.

Strength. The ability of a member to sustain stress without failure.

Strength ratio. The hypothetical ratio of the strength of a structural member to that which it would have if it contained no strength-reducing characteristics (knots, cross-grain, shake, and so forth).

Stress. The intensity of forces distributed over a given section measured as force per unit area.

Stress grades. Lumber grades having assigned working stress and modulus of elasticity values in accordance with accepted basic principles of strength grading.

Stringer. A longitudinal beam supporting the bridge deck.

Structural composite lumber. A structural reconstituted lumber-type product of uniform cross section comprised of parallel-to-the-grain veneer strands, strips, or sheets predominantly bonded together parallel to each other using exterior grade adhesive.

Substructure. The abutments, piers, bents, or other constructions built to support the superstructure and transmit loads to the foundation.

Superelevation. The transverse inclination of the roadway surface within a horizontal curve. The purpose of superelevation is to provide a means of resisting or overcoming the centrifugal forces from moving vehicles.

Superstructure. The entire portion of a bridge structure that primarily receives and supports highway, pedestrian, or other traffic loads and transfers the applied loads to the bridge substructure.

Surface-hardened. A condition of the surface of timbers that appears to be from improper seasoning and may result in resistance to penetration of preservatives. Sometimes incorrectly called case-hardened.

Tabulated stress. The permissible material stress tabulated in appropriate design specifications. Tabulated stresses must be adjusted by all applicable modification factors to arrive at the allowable stress used for design.

Tangential. The direction in wood coincident with a tangent at the circumference of a tree or the annual growth rings. A tangential section is a longitudinal section through a tree perpendicular to a radius.

Tension wood. A form of wood found in leaning trees of some hardwood species and characterized by the presence of gelatinous fibers and excessive longitudinal shrinkage.

Threshold. The minimum amount of wood preservative that is effective in preventing significant decay by a particular fungus.

Timbers. Lumber that is nominally 5 inches or more in least dimension.

Toughness. A quality of wood that permits the material to absorb a relatively large amount of energy, to withstand repeated shocks, and to undergo considerable deformation before breaking.

Tracheid. The elongated cells that constitute the greater part of the structure of the softwoods (frequently referred to as fibers).

Track width. The transverse center-to-center spacing between the wheels of a traffic vehicle, equal to the distance between two wheel lines.

Transverse. For bridges, the direction perpendicular to the bridge span. For wood, the direction at right angles to the wood fibers, including the radial and tangential directions.

Transverse bracing. The bracing assemblage between beams or columns that serves to resist and distribute lateral loads and provides support for stability of the members.

Trestle. A bridge structure consisting of beam or truss spans supported upon bents.

Truss. A jointed structure having an open web construction so arranged that the frame is divided into a series of triangles with members primarily stressed axially only.

Twist. A distortion caused by the turning or winding of the edges of a board so that the four comers of any face are no longer in the same plane.

Unseasoned. Wood that is freshly sawn from green logs, specifically wood not dried to 19 percent or lower moisture content.

Uplift. A negative reaction or a force tending to lift a beam, truss, pile, or any other bridge element upwards.

Veneer. A thin layer or sheet of wood.

Waler (or wale). A horizontal member used for bracing the sheeting of a trench, cofferdam, retaining wall, bulkhead, or similar structure.

Wane. Bark or lack of wood from any cause on edge or comer of a piece.

Warp. Any variation from a true or plane surface. Warp includes bow, crook, cup, and twist, or any combination thereof.

Wearing surface. A topmost layer or course of material applied upon a roadway to receive the traffic service loads and to resist the abrading, crushing, or other disintegrating action resulting therefrom.

> **Full wearing surface.** A wearing surface that covers the entire bridge deck.
>
> **Partial wearing surface.** A wearing surface that covers only the portion of the bridge deck intended for vehicle tracking.

Weathering. The mechanical or chemical disintegration and discoloration of the surface of wood caused by exposure to light, the action of dust and sand carried by winds, and the alternate shrinking and swelling of the surface fibers with the continual variation in moisture content brought by changes in the weather. Weathering does not include decay.

Web. The portion of a beam or truss, located between and connected to the flanges or the chords. It serves mainly to resist shear stress.

Wet-use. Use conditions where the moisture content of the wood in service exceeds 16 percent for glulam and 19 percent for sawn lumber.

Wheel guard. A timber member placed longitudinally along the side limit of the roadway to guide the movement of vehicle wheels and protect railings or other elements outside the roadway limit.

Wheel line. The series of wheel loads measured along the length of a traffic vehicle. The total weight of one wheel line is one-half the gross vehicle weight.

Wheel load. The total load transferred by one wheel of a design vehicle.

White rot. Any wood decay or rot attacking both the cellulose and the lignin, producing a generally whitish residue.

Wing wall. The retaining wall extension of an abutment intended to restrain and hold in place the side slope of an approach roadway embankment.

Working stress. The unit stress in a member under design load.