

# **APPENDIX A**

# **GLOSSARY**

**(From ODOT's BDDM Appendix B)**



## APPENDIX - B

### GLOSSARY

#### Definitions

#### A

**Abutment** - Supports at the end of the bridge used to retain the approach embankment and carry the vertical and horizontal loads from the superstructure. Current terminology is bent or end bent.

**Access Control** - The condition where the legal right of owners or occupants of abutting land to access a highway is fully or partially controlled by the Department of Transportation.

**Advance Plans** – 95-100% complete plans including special provisions, normally sent at 15 weeks.

**Advertisement** - The period of time between the written public announcement inviting proposals for projects and the opening of the proposals (bid or letting date).

**Aggregate** - Inert material such as sand, gravel, broken stone, or combinations thereof.

**Aggregate, Coarse** - Aggregates predominantly retained on the No. 4 sieve for portland cement concrete and those predominantly retained on the 1/4" for asphalt concrete.

**Aggregate, Fine** - Those aggregates which entirely pass the 3/8" sieve.

**Aggregate, Dense Graded** - A well-graded aggregate so proportioned as to contain a relatively small percentage of voids.

**Aggregate, Open Graded** - A well-graded aggregate containing little or no fines, with a relatively large percentage of voids.

**Aggregate, Well-Graded** - An aggregate possessing proportionate distribution of successive particle sizes.

**Air-Entraining Agent** - A substance used in concrete to increase the amount of entrained air in the mixture. Entrained air is present in the form of minute bubbles and improves the workability and frost resistance.

**Allowable Headwater** - The maximum elevation to which water may be ponded upstream of a culvert or structure as specified by law or design.

**Allowable Span** – The greatest horizontal distance permitted between supports.

**Anchor Bolts** - Bolts that are embedded in concrete which are used to attach an object to the concrete such as rail posts, bearings, steel girder-to-cross beam connections, etc.

**Anode** - The positively charged pole of a corrosion cell at which oxidations occur.

**Apron** - The paved area between wingwalls at the end of a culvert.

**Definitions - (continued)**

**Arch** - A curved structure element primarily in compression, producing at its support reactions having both vertical and horizontal components.

**Arch Pipe** - A conduit in the form of a broad arch without a bottom.

**Average Daily Traffic (ADT)** - The average 24-hour volume of traffic, being the total during a stated period divided by the number of days in that period. Unless otherwise stated, the period is a year.

**Axle Load** - The load borne by one axle of a traffic vehicle.

**Award** - Written notification to the bidder that the bidder has been awarded a contract.

**B**

**Backfill** - Material used to replace or the act of replacing material removed during construction; also may denote material placed or the act of placing material adjacent to structures.

**Backwater** - The water upstream from an obstruction in which the free surface is elevation above the normal water surface profile.

**Bar Chair** - A device used to support horizontal reinforcing bars above the base of the form before the concrete is poured.

**Bar Cutting Diagram** - A diagram used in the detailing of bar steel reinforcement where the bar lengths vary as a straight line.

**Base Course** - The layer of specified material of designed thickness placed on a subbase or a subgrade to support a surface course.

**Bascule Bridge** - A bridge over a waterway with one or two leaves which rotate from a horizontal to a near-vertical position, providing unlimited clear headway.

**Base Flood** - Flood having 1% chance of being exceeded in any given year.

**Battered Pile** - A pile driven in an inclined position to resist horizontal forces as well as vertical forces.

**Beam** - Main longitudinal load carrying member in a structure, designed to span from one support to another (girder).

**Bearings** - Device to transfer girder reactions without overstressing the supports.

**Bearing Capacity** - The load per unit area which a structural material, rock, or soil can safely carry.

**Bearing Failure** - A crushing of material under extreme compressive load.

**Bearing Seat** - A prepared horizontal surface at or near the top of a substructure unit upon which the bearings are placed.

**Definitions - (continued)**

**Bearing Stiffener** - A stiffener used at points of support on a steel beam to transmit the load from the top of the beam to the support point.

**Bedrock** - The solid rock underlying soils or other superficial formation.

**Bench Mark** - A relatively permanent material object bearing a marked point whose elevation above or below an adopted datum is known.

**Bent** - Supports at the ends or intermediate points of a bridge used to retain approach embankments and/or vertical and horizontal loads from the superstructure.

**Bicycle Lane** - A lane in the traveled way designated for use by bicyclists.

**Bicycle Path** - A public way physically separated from the roadway, that is designated for use by bicyclists.

**Bid Schedule** - The list of bid items, their units of measurement, and estimated quantities, bound in the proposal booklet. (When a contract is awarded, the Bid Schedule becomes the Schedule of Contract Prices.)

**Bidder** - Any qualified individual or legal entity submitting a proposal in response to an advertisement.

**Biennium** - For the State of Oregon, a two-year period, always odd numbered years, starting July 1 and ending two years later on June 30.

**Bleeding (Concrete)** - The movement of mixing water to the surface of freshly placed concrete.

**Blind Copy (bc)** - Copy of correspondence that goes internally to office personnel or file. Is not typed on the original, but is typed on yellow copy.

**Bowstring Truss** - A general term applied to a truss of any type having a polygonal arrangement of its top chord members conforming to or nearly conforming to the arrangement required for a parabolic truss.

**Box Beam** - A hollow structural beam with a square, rectangular, or trapezoidal cross-section.

**Box Culvert** - A culvert of rectangular or square cross-section.

**Breakaway** - A design feature that allows a device such as a sign, luminaire, or traffic signal support to yield or separate upon impact. The release mechanism may be a slip plane, plastic hinges, fracture elements, or a combination of these.

**Bridge** - A structure spanning and providing passage over a river, chasm, road, or the like, having a length of 20 feet or more from face to face of abutments or end bents, measured along the roadway centerline.

**Bridge Approach** - Includes the embankment materials and surface pavements that provide the transition between bridges and roadways.

**Bridge End Panel** - A reinforced concrete slab placed on the approach embankment 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, thereby eliminating any approach roadway misalignment due to approach embankment settlement.

**Definitions - (continued)**

**Bridging** - A carpentry term applied to the cross-bracing fastened between timber beams to increase the rigidity of the floor construction, distribute more uniformly the live load and minimize the effects of impact and vibration.

**Bridge Railing** - A longitudinal barrier whose primary function is to prevent an errant vehicle from going over the side of the bridge structure.

**Brush Curb** - A curb 10" or less in width, which prevents a vehicle from brushing against the railing or parapet.

**Buckle** - To fail by an inelastic change in alignment as a result of compression.

**Built-Up Member** - A column or beam composed of plates and angles or other structural shapes united by bolting, riveting or welding.

**Bulkhead** - A partition built into wall forms to terminate each placement of concrete.

**Buoyancy** - Upward force exerted by the fluid in which an object is immersed.

**Bushings** - A lining used to reduce friction and/or insulate mating surfaces usually on steel hanger plate bearings.

**Butt Splice** - A splice where the ends of two adjoining pieces of metal in the same plane are fastened together by welding.

**Butt Weld** - A weld joining two abutting surfaces by combining weld metal and base metal within an intervening space.

**C**

**Cable-Stayed Bridge** - A bridge in which the superstructure is directly supported by cables, or stays, passing over or attached to towers located at the main piers.

**CADD - Computer-Aided Design and Drafting.**

**Caisson** - A watertight box of wood or steel sheeting; or a cylinder of steel and concrete, used for the purpose of making an excavation. Caissons may be either open (open to free air) or pneumatic (under compressed air).

**Camber** - A predetermined vertical curvature built into a structural member, to allow for deflection and/or vertical grade.

**Cast-in-Place** - The act of placing and curing concrete within formwork to construct a concrete element in its final position.

**Definitions - (continued)**

**Catch Basin** - A receptacle, commonly box shaped and fitted with a grided inlet and a pipe outlet drain, designed to collect the rain water and floating debris from the roadway surface and retain the solid material so that it may be periodically removed.

**Catenary** - The curve obtained by suspending a uniform rope or cable between two points.

**Cathode** - The negatively charged pole of a corrosion cell that accepts electrons and does not corrode.

**Cathodic Protection** - A means of preventing metal from corroding; this is done by making the metal a cathode through the use of impressed direct current and by attaching a sacrificial anode.

**Catwalk** - A narrow walkway to provide access to some part of a structure.

**Chain Drag** - A series of short medium weight chains attached to a T-shaped handle; used as a preliminary technique for inspecting a large deck area for delamination.

**Chamfer** - A beveled edge formed in concrete by a triangular strip of wood (chamfer strip) placed in a form corner.

**Change Order** - A written order issued by the Engineer to the Contractor modifying work required by the contract and establishing the basis of payment for the modified work.

**Chord** - A generally horizontal member of a truss.

**Clay** - Soil passing a No. 200 sieve that can be made to exhibit plasticity (putty-like properties) within a range of water contents.

**Clear Zone** - Roadside border area, starting at the edge of the traveled way, that is available for safe use by errant vehicles. Establishing a minimum width clear zone implies that rigid objects and certain other hazards with clearances less than the minimum width should be removed and relocated outside the minimum clear zone, or remodeled to make breakaway, shielded, or safely traversable.

**Closed Spandrel Arch** - A stone or reinforced concrete arch span having spandrel walls to retain the spandrel fill or to support either entirely or in part the floor system of the structure when the spandrel is not filled.

**Cobbles** - Particles of rock, rounded or not, that will pass a 12" square opening and be retained on a 3" sieve.

**Cofferdam** - A barrier built in the water so as to form an enclosure from which the water is pumped to permit free access to the area within.

**Cohesionless Soil** - A soil that when unconfined has little or no strength when air-dried and that has little or no cohesion when submerged.

**Cohesive Soil** - A soil that when unconfined has considerable strength when air-dried and that has significant cohesion when submerged. Clay is a cohesive soil.

**Commission** - The Oregon Transportation Commission.

**Definitions - (continued)**

**Composite Section** - Two sections made of the same or different materials together to act as one integral section; such as a concrete slab on a steel or prestressed girder.

**Compression Seals** - A preformed, compartmented, elastomeric (neoprene) device, which is capable of constantly maintaining a compressive force against the joint interfaces in which it is inserted.

**Concept Plans** – plans to determine the basic features of a project including alignments, typical sections, slopes, preliminary drainage and TS&L bridge plans.

**Concrete Overlay** – 1.5” to 2” of concrete placed on top of the deck, used to extend the life of the deck and provide a good riding surface.

**Contract** - The written agreement between the Division and the Contractor describing the work to be done and defining the obligations of the Division and the Contractor.

**Contract Plans** - Detailed drawings and diagrams usually made to scale showing the structure or arrangement, worked out beforehand, to accomplish the construction of a project and/or object(s).

**Contract Time** - The number of calendar days shown in the proposal which is allowed for completion of the work.

**Contraction Joint** - A joint in concrete that does not provide for expansion but allows for contraction or shrinkage by the opening up of a crack or joint.

**Contractor** - The individual or legal entity that has entered into a contract with the Division.

**Coordinates** - Linear or angular dimensions designating the position of a point in relation to a given reference frame. It normally refers to the State Plane Coordinate System.

**Core** - A cylindrical sample of concrete removed from a bridge component for the purpose of destructive testing.

**Counterfort Wall** - A reinforced concrete retaining wall whose vertical stem has triangular-shaped ribs projecting into the soil and spaced at regular intervals to provide strength and stability.

**Crash Cushion** - An impact attenuator device that prevents an errant vehicle from impacting fixed object hazards by gradually decelerating the vehicle to a safe stop or by redirecting the vehicle away from the hazard.

**Crash Tests** - Vehicular impact tests by which the structural and safety performance of roadside barriers and other highway appurtenances may be determined. Three evaluation criteria are considered, namely (1) structural adequacy, (2) impact severity, and (3) vehicular post-impact trajectory.

**Creep** - Time dependent inelastic deformation under elastic loading of concrete or steel resulting solely from the presence of stress.

**Cross Bracing** - Bracing used between stringers and girders to hold them in place and stiffen the structure.

**Definitions - (continued)**

**Cross Section** - The exact image formed by a plane cutting through an object usually at right angles to a central axis.

**Crown Section** - Roadway section with the height of the center of the roadway surface above its gutters.

**Culvert** - Federal Highway Administration definition: "A structure not classified as a bridge having a span of 20 feet or less spanning a watercourse or other opening on a public highway"; a conduit to convey water through an embankment.

**Curb** - A vertical or sloping member along the edge of a pavement or shoulder forming part of a gutter, strengthening or protecting the edge, and clearly defining the edge of vehicle operators. A curb is a horizontal offset varying from 10" to less than 18". The surface of the curb facing the general direction of the pavement is called the "face".

**Curing** - The preparation of a material by chemical or physical processing for keeping or use; treating concrete by covering its surface with some material to prevent the rapid evaporation of water.

**Cut-Off-Wall** - A wall built at the end of a culvert apron to prevent the undermining of the apron.

**D**

**Dead End** - End of post-tensioned bridge where tendons are anchored but no jacking takes place (opposite of jacking end).

**Dead Load** - Structure weight including future wearing surface on deck and attachments.

**Deadman** - A concrete mass, buried in the earth behind a structure, that is used as an anchor for a rod or cable to resist horizontal forces that act on the structure.

**Deformed Bars** - Concrete reinforcement consisting of steel bars with projections or indentations to increase the mechanical bond between the steel and concrete.

**Delamination** - Subsurface separation of concrete into layers.

**Department** - The Department of Transportation of the State of Oregon.

**Design Volume or Design Hourly Volume** - A volume determined for use in design representing traffic expected to use the highway. Unless otherwise stated, it is an hourly volume.

**Diaphragm** - Structural: A structural member used to tie adjoining girders together and stiffen them in a lateral direction as well as to distribute loads.

**Diamond Grinding** - Process to abrade or remove a surface, such as concrete, by the cutting action of rotating circular blade with diamond-tipped teeth.

**Direct Tension Indicator** - Load-indicating washer for bolts.

**Definitions - (continued)**

**Doby** - A precast block of concrete of various sizes used to support or provide clearances between reinforcing bars and formwork.

**Dolphins** - A group of piles or sheet piling driven adjacent to a pier. Their purpose is to prevent extensive damage or possible collapse of a pier from a collision with a ship or barge.

**Draped Strands** - Strand pattern for prestressing strands, where strands are draped to decrease the prestressing stress at the ends of the girder where the applied moments are small.

**Drift Pin** - A metal pin, tapered at both ends, used to draw members of a steel structure together by being driven through the corresponding bolt holes.

**Drip Groove** - A groove formed into the underside of a projecting concrete sill or coping to prevent water from following around the projection.

**E**

**E** - modulus of elasticity of a material; the stiffness of a material.

**E&C** - Engineering costs are ODOT's costs to administer the construction contract. Contingencies are unforeseen costs due to construction extra work price agreements or types of problems caused by weather, accidents, etc. by the contract pay item.

**Elastomeric Bearing Pads** - Pads  $\frac{1}{2}$ " and less in thickness made of all rubber-like material that supports girders and concrete slabs; pads over  $\frac{1}{2}$ " in thickness consist of alternate laminations of elastomer and metal.

**End-Bearing Pile** - A pile which provides support primarily due to reaction at its tip.

**Environmental Classes** - Class I Environmental Impact Statement: Projects that normally involve significant changes in traffic capacities and patterns. These projects generally involve major right-of-way acquisitions. Both draft and final Environmental Impact Statements are required.

Class II Categorical Exclusions: Projects that normally involve the improvement of pavement conditions on traffic safety, but little, if any, change in traffic capacities or patterns. Right-of-way requirements must be minor. These projects are categorically excluded from further environmental documentation, unless permit requirements indicate otherwise.

Class III Environmental Assessment: Projects that do not clearly fall within Class I or Class II. These projects require assessments to determine their environmental significance.

**Epoxy** - A synthetic resin which cures or hardens by chemical reaction between components which are mixed together shortly before use.

**Epoxy Coated Rebar** - Steel reinforcement coated with a powdered epoxy resin, to prevent corrosion of the bar steel.

**Definitions - (continued)**

**Expansion Bearings** - Bearings that allow longitudinal movement of the superstructure relative to the substructure and rotation of the superstructure relative to the substructure.

**Expansion Device** - A device placed at expansion points in bridge superstructures to carry the vertical bridge loads without preventing longitudinal movement.

**Expansion Joint** - A joint in concrete that allows expansion due to temperature changes, thereby preventing damage to the structure.

**Extra Work** - Work not included in any of the contract items as awarded but determined by the Engineer necessary to complete the project according to the intent of the contract. This may be paid on a negotiated price, force account, or established price basis.

**Extrados** - The curved edge of an arch rib or barrel formed by the intersection of the top and side arch surfaces.

**F**

**Falsework** - In general, a temporary construction work on which a main or permanent work is wholly or partially supported until it becomes self-supporting. For cast-in-place concrete or steel construction, it is a structural system to support the vertical and horizontal loads from forms, reinforcing steel, plastic concrete, structural steel, and placement operations.

**Fatigue** - The tendency of a member to fail at a lower stress when subjected to cyclical loading than when subjected to static loading.

**Fatigue Crack** - Any crack caused by repeated cyclic loading.

**Federal-Aid System of Highways** - The national system of interstate highways, Federal-aid highway system, system of secondary and feeder roads, Federal-aid grade crossing projects, federal forest highway systems and projects and other highway and related projects, all within the meaning of the Federal-Aid Road Act (1916), and all acts amendatory thereof and supplementary thereto, and the federal regulations issued under such acts.

**Fender** - A structure that acts as a buffer to protect the portions of a bridge exposed to floating debris and water-borne traffic from collision damage.

**Fiscal Year** - For the State of Oregon, July 1 through June 30 of the next year; for the Federal government, October 1 through September 30 of the next year. The Federal fiscal year (FY) is broken into quarters:

- 1 F1Q (October, November, December)
- 1 F2Q (January, February, March)
- 1 F3Q (April, May, June)
- 1 F4Q (July, August, September)

**Felloe Guard** - Timber curb, usually 10" x 12", bolted to timber deck and timber rail post. Sometimes called wheel guard.

**Filler Plate** - A steel plate or shim used for filling in space between compression members.

**Definitions - (continued)**

**Fixed Bearings** - Bearings that do not provide for any longitudinal movement of the superstructure relative to the substructure, but allows for rotation of the superstructure relative to the substructure.

**Flat Slab** - A reinforced concrete superstructure that has a uniform depth throughout.

**Flood Plain** - An area that would be inundated by a flood.

**Floodway** - A stream channel plus any adjacent flood plain areas that must be kept free of encroachment so that the 100-year flood can be conveyed without substantial increases in flood heights.

**Floor Beam** - A transverse structural member that extends from truss to truss or from girder to girder across the bridge.

**Flux** - A material that protects the weld from oxidation during the fusion process.

**Force Account Work** - Items of extra work ordered by the Engineer that are to be paid for by material, equipment, and labor.

**Forms** - A structural system constructed of wood or metal used to contain the horizontal pressures exerted by plastic concrete and retain it in its desired shape until it has hardened.

**Fracture Critical Members** - Members of a bridge where a single fracture in a member can lead to collapse.

**Fracture Mechanics** - Study of crack growth in materials.

**Friction Pile** - A pile that provides support through friction resistance along the surface area of the pile.

**Front Office** - Room 301, Bridge Section Administrative Office.

**Functionally Obsolete Bridges** - Those bridges which have deck geometry, load carrying capacity (comparison of the original design load to the current state legal load), clearance, or approach roadway alignment which no longer meet the usual criteria for the system of which they are a part as defined by the Federal Highway Administration.

**G**

**Gabions** - Rock-filled wire baskets used to retain earth and provide erosion control.

**Galvanic Action** - Electrical current between two unlike metals.

**Galvanize** - To coat with zinc.

**Geotextiles** - Sheets of woven or non-woven synthetic polymers or nylon used for drainage and soil stabilization.

**Girder** - Main longitudinal load carrying member in a structure (beam).

**Glare Screen** - A device used to shield a driver's eye from the headlights of an oncoming vehicle.

**Definitions - (continued)**

**Grade Separation** - A crossing of two highways or a highway and a railroad at different levels.

**Gravity Wall** - A retaining wall that is prevented from overturning by its weight alone.

**Green Concrete** - Concrete that has set but not appreciably hardened.

**Grid Flooring** - A steel floor system comprising a lattice pattern which may or may not be filled with concrete.

**Grout** - A mixture of cementitious material and water having a sufficient water content to render it a free-flowing mass, used for filling (grouting) the joints in masonry, for fixing anchor bolts and for filling post-tensioning ducts.

**H**

**Hammerhead Pier** - A pier that has only one column with a cantilever cap and is somewhat similar to the shape of a hammer.

**Hanger Plate** - A steel plate that connects the pins at hinge points thus transmitting the load through the hinge.

**Haunch** - An increase in depth of a structural member usually at points of intermediate support.

**Haunched Slab** - A reinforced concrete superstructure that is haunched (has an increased depth) at the intermediate supports.

**Headwall** - A concrete structure at the ends of a culvert to retain and protect the embankment slopes, anchor the culvert, and prevent undercutting.

**High Performance Concrete (HPC)** – Concrete with enhanced properties including higher strength, greater durability and decreased permeability.

**High Performance Steel (HPS)** - Steel with enhanced properties including increased durability and weldability.

**Hinge** - A device used to hold the ends of two adjoining girders together, but does not allow for longitudinal movement of the superstructure. A point in a structure where a member is free to rotate.

**Holddown Device** - A device used on bridge abutments to prevent girders from lifting off their bearings as a result of the passage of live load over the bridge.

**Honeycomb** - A surface or interior defect in a concrete mass characterized by the lack of mortar between the coarse aggregate particles.

**Definitions - (continued)**

**Howe truss** - A truss of the parallel chord type with a web system composed of vertical (tension) rods at the panel points with an X pattern of diagonals.

**Hydration** - The process by which cement combines with water to form a hard binding substance.

**Hybrid Girder** - A steel plate girder with the web steel having a lower yield strength than the steel in one or both flanges.

**Hydrodemolition** - Process to abrade or remove a surface, such as concrete, by streams of water ejected from a nozzle at high velocity.

**I**

**Incidental Work** - Work necessary for fulfillment of the contract but which is not listed as a pay item in the contract and for which no separate or additional payment will be made.

**Initial Set (Concrete)** - Initial stiffening of concrete, with time based upon penetration of a weighted test needle. In the field, it is commonly assumed to be the time when the dead weight of vibrator does not penetrate into the concrete.

**Inlet Control** - The case where the discharge capacity of a culvert is controlled at the culvert entrance by the depth of headwater and the entrance geometry, including barrel shape, cross sectional area, and inlet edge.

**Intermediate Stiffener** - A vertical transverse steel member used to stiffen the webs of plate girders between points of support.

**Internal File Number** - Number assigned by the Bridge Front Office as part of office automation (computerized files) and used to track all files.

**Invert** - The bottom or lowest point of the internal surface of the transverse cross section of a pipe.

**Inventory Rating (Design Load)** - Load level that produces normal design stresses in the structures. The inventory rated load is the load that can safely utilize an existing structure for an indefinite period of time.

**International System of Units (SI)** - The modernized metric system.

**Intrados** - The curved edge of an arch rib or barrel formed by the intersection of the bottom and side arch surfaces.

**Isotropic** - Have the same material properties in all directions, e.g., steel.

**J**

**Jacking End** - End of post-tensioned bridge where jacking takes place (opposite of dead end).

**Jetting** - Forcing water into holes in an embankment to settle or to compact the earth. Forcing water through holes in piles to install the piles to a specified depth before driving.

**Definitions - (continued)**

**K**

**Key Number** - Number assigned to a project by Program Section to identify it in the Project Control System (PCS). All structures in a project have the same key number.

**Kilogram (kg)** - The base unit for mass in the International System of Units (metric).

**King Post Truss** - Two triangular panels with a common center vertical; the simplest of triangular trusses.

**L**

**Lacing** - Small flat plates used to connect individual sections of built up members.

**Laitance** - A weak mortar that collects at the surface of freshly placed concrete, usually caused by an excess of mixing water or by excessive finishing.

**Lamellar Tear** - Incipient cracking between the layers of the base material (steel).

**Lateral Bracing** - Bracing placed in a horizontal plane between steel girders near the bottom and/or top flanges.

**Latex Modified Concrete (LMC)** - Emulsion of synthetic rubber or plastic obtained by polymerization used as a concrete additive to decrease permeability.

**Leaf** - The movable portion of a bascule bridge which forms the span of the structure.

**Lenticular Truss** - A truss having parabolic top and bottom chords curved in opposite directions with their ends meeting at a common joint; also known as a fish belly truss.

**Level of Performance** - The degree to which a longitudinal barrier, including bridge railing, is designed for containment and redirection of different types of vehicles.

**Liquid Penetrant Inspection** - Nondestructive inspection process for testing for continuities that are open to the surface, by using a liquid dye.

**Live Load** - Force of the applied moving load of vehicles and/or pedestrians.

**Load Rating** - Evaluation of the safe live load capacity of the weakest member of a bridge.

**LRFD** - Load Resistance Factor Design.

**Longitudinal Stiffener** - A longitudinal steel plate (parallel to girder flanges) used to stiffen the webs of welded plate girders. Normally thicker webs are used to eliminate longitudinal stiffeners.

**Low Relaxation Strands** - Prestressing tendons that are manufactured by subjecting the strands to heat treatment and tensioning causing a permanent elongation. This increases the strand yield strength and reduces strand relaxation under constant tensile stress.

**Definitions - (continued)**

**M**

**Magnetic Particle Inspection (MT)** - Nondestructive inspection process for testing for the location of surface cracks or surface discontinuities, by applying dry magnetic particles to a weld area or surface area that has been suitably magnetized.

**Microsilica (Silica Fume) (MC)** - Very fine non-crystalline silica used as an admixture in concrete to improve the strength, permeability and abrasion resistance.

**Minor Structure Concrete (MSC)** - Nonstructural concrete furnished according to contractor proportioning, placed in minor structures and finished as specified. Previously called commercial concrete.

**Modular Expansion Joints** - Multiple, watertight joint assemblies for bridges requiring expansion movements greater than 4 inches.

**Mud Sill** - A timber platform laid on earth as a support for vertical members or bridge falsework.

**Mylars** - Full-size drawings on mylar. The final "legal" drawing used for signatures and printing contract plans.

**N**

**NDT** - Nondestructive testing, a method of checking the structural quality of materials that does not damage them.

**Negative Moment** - The moment causing tension in the top fibers and compression in the bottom fibers of a structural member.

**Negative Reinforcement** - Reinforcement placed in concrete to resist negative bending moments.

**Newton (N)** - The derived unit for force (mass times acceleration or kg times  $m/s^2$ ) in the International System of Units (metric).

**Nominal** - Used to designate a theoretical dimension, size, or slope that may vary from the actual by a very small or negligible amount. Example: a 1" nominal diameter steel pipe has an actual 0.957" inside diameter.

Nominal Pile Resistance – LRFD term for the maximum axial pile bearing resistance. Equivalent to the ultimate pile capacity term used in allowable stress design.

**Non-Redundant Structure** - Type of structure with single load path, where a single fracture in a member can lead to the collapse of the structure.

**Nosing** – A bulkhead at the ends of bridges or at expansion joints made of a durable material to protect and reinforce the slab edge. It also provides a smooth edge or surface at expansion joints to facilitate installation and provide a better seal.

**Definitions - (continued)**

**O**

**Operating Rating (Permit Loads)** - The absolute maximum permissible stress level to which a structure may be subjected. It is that stress level that may not be exceeded by the heaviest loads allowed on the structure. Special permits for heavier than normal vehicles shall be issued only if such loads are distributed so as not to produce stress in excess of the operating stress.

**Outlet Control** - The case where the discharge capacity of a culvert is controlled by the elevation of the tail water in the outlet channel and the slope, roughness, and length of the culvert barrel, in addition to the cross-sectional area and inlet geometry.

**Orthotropic** - A description of the physical properties of a material that has pronounced differences in two or more directions at right angles to each other.

**P**

**Parapet** - A low concrete rail designed and placed to prevent traffic from passing over the edge of a bridge deck or end of box culvert.

**Pascal (Pa)** - The derived unit for pressure or stress ( $\text{Pa}=\text{N}/\text{m}^2$ ) in the International System of Units (metric).

**Paving Dam** – (see Nosing) - – A bulkhead at the ends of bridges or at expansion joints made of a durable material to protect and reinforce the slab edge and provide a stopping place for the wearing surface.

**Paving Ledge** – A ledge or corbel attached to the end beam of a bridge, to provide support for a current or future end panel.

**Performance Level** - See Level of Performance.

**Pier** - Intermediate substructure unit of a bridge. Current terminology is bent.

**Pile** - A long, slender piece of wood, concrete, or metal to be driven, jettied, or cast-in-place into the earth or river bed to serve as a support or protection.

**Pile Bent** - A pier where the piles are extended to the pier cap to support the structure.

**Pile Cap** - A member, usually of reinforced concrete, covering the tops of a group of piles for the purpose of tying them together and transmitting to them as a group the load of the structure that they support.

**Pipe Arch** - A conduit in the form of a broad arch with a slightly curved integral bottom.

**Plastic Deformation** - Deformation of material beyond the elastic range.

**Positive Moment** - In a girder the moment causing compression in the top flange and tension in the bottom flange.

**Post-Tensioning** - Method of prestressing in which the tendon is tensioned after the concrete has cured.

**Definitions - (continued)**

**Pot Bearing** - A bearing type that allows for multi-directional rotation by using a neoprene or spherical bearing element.

**Prestress Camber** - The deflection in prestressed girders (usually upward) due to the application of the prestressing force.

**Pratt Truss** - A truss with parallel chords and a web system composed of vertical posts with diagonal ties inclined outward and upward from the bottom chord panel points toward the ends of the truss; also known as N-truss.

**Preliminary Plans** – 85-90% complete plans, normally sent at 20 weeks.

**Prestressed Concrete** - Concrete in which there have been introduced internal stresses (normally pretensioned steel) of such magnitude and distribution that the stresses resulting from given external loadings are counteracted to a desired degree

**Pretensioned** - Any method of prestressing in which the strands are tensioned before the concrete is placed.

**Project Manager** - The Engineer's representative who directly supervises the engineering and administration of a contract.

**Proposal** - A written offer by a bidder on forms furnished by the Division to do stated work at the prices quoted.

**PS&E** - Literally, plans, specifications, and estimates. Usually it refers to the time when the plans, specifications, and estimates on a project have been completed and referred to FHWA for approval. When the PS&E has been approved, the project goes from the preliminary engineering phase to the construction phase.

**Pumping** - The ejection of mixtures of water, clay and/or silt along or through transverse or longitudinal joints, crack or payment edges, due to vertical movements of the roadway slab under traffic.

**Q**

**Queen-post Truss** - A parallel chord type of truss having three panels with the top chord occupying only the length of the center panel; unless center panel diagonals are provided, it is a trussed beam.

**R**

**Radiographic Inspection** - Nondestructive inspection process where gamma rays or X rays pass through the object and cast an image of the internal structure onto a sheet of film as the result of density changes.

**RATS Team** - ODOT Region and Technical Services Team.

**Redundant Structure** - Type of structure with multiple-load paths where a fracture in a single member cannot lead to the collapse of the structure.

**Definitions - (continued)**

**Reflection Crack** - A crack appearing in a resurfacing or overlay caused by movement at joints or cracks in the underlying base or surface.

**Reinforced Pile Tip** - Metal reinforcement fastened to the pile tip to protect it during driving.

**Residual Camber** - Camber due to the prestressing force minus the dead load deflection of the girder.

**Right of Way** - Land, property, or property interest, usually in a strip, acquired for or devoted to transportation purposes.

**Riprap** - A facing of stone used to prevent erosion. It is usually dumped into place, but is occasionally placed by hand.

**Roadside Barrier** - A longitudinal barrier used to shield roadside obstacles or non-traversable terrain features. It may occasionally be used to protect pedestrians from vehicle traffic.

**Roadway** - The portion of a highway, including shoulders, for vehicular use.

**Rubble** - Irregularly shaped pieces of varying size stone in the undressed condition obtained from a quarry.

**S**

**Sacrificial Anode** - The anode in a cathodic protection system.

**Sand** - Particles of rock that will pass a No. 4 sieve and be retained on a No. 200 sieve.

**Scaffolding** - Temporary elevated walkway or platform to support workmen, materials and tools.

**Scarify** - To loosen, break up, tear up, and partially pulverize the surface of soil, or of a road.

**Scour** - Erosion of a river bed area caused by water flow.

**Scour Protection** - Protection of submerged material by steel sheet piling, riprap, mattress, or combination of such methods.

**Screeding** - The process of striking off excess material to bring the top surface to proper contour and elevation.

**Seal** - A concrete mass (usually not reinforced) poured under water in a cofferdam that is designed to resist hydrostatic uplift. The seal facilitates construction of the footing in dry conditions.

**Shear Connector** - A connector used to joint cast-in-place concrete to a steel section and to resist the shear at the connection.

**Shear Lag** - Nonuniform stress pattern due to ineffective transmission of shear.

**Shed Roof** - Roadway section with the height of one gutter greater than the centerline and other gutter.

**Definitions - (continued)**

**Sheet Pile** - A pile made of flat or arch cross section to be driven into the ground or stream bed and meshed or interlocked with like members to form a wall, or bulkhead.

**Sheet Pile Cofferdam** - A wall-like barrier composed of driven piling constructed to surround the area to be occupied by a structure and permit dewatering of the enclosure so that the excavation may be produced in the open air.

**Shoofly** - Detour alignment of temporary railroad track and bridge around the site of a permanent railroad bridge replacement.

**Shotcrete** - Mortar or concrete pneumatically projected at high velocity onto a surface.

**Shoulders** - The portions of the roadway between the traveled way and the inside edges of slopes of ditches or fills, exclusive of auxiliary lanes, curbs, and gutters.

**Shy Distance (E-Distance)** - The distance from the edge of the traveled way beyond which a roadside object will not be perceived as an immediate hazard by the typical driver, to the extent that the vehicle's placement or speed will be changed.

**Shrinkage** - Contraction of concrete due to drying and chemical changes, dependent on time.

**Silt** - Soil passing a No. 200 sieve that is non-plastic or exhibits very low plasticity.

**Simple Spans** - Spans with the main stress carrying members non-continuous, or broken, at the intermediate supports.

**Skew or Skew Angle** - The acute angle formed by the intersection of a line normal to the centerline of the roadway with a line parallel to the face of the abutments or piers, or in the case of culverts with the centerline of the culverts. Left hand forward skew indicates that, look up station, the left side of the structure is further up station than the right hand side. Right hand skew indicates that the right side of structure is further up station than the left side.

**Slip Base** - A structural element at or near the bottom of a post or pole that will allow release of the post from its base upon impact while resisting wind loads.

**Slope** - The degree of inclination to the horizontal. It is sometimes described by such adjectives as steep, moderate, gentle, mild or flat.

**Slope Paving** - Pavement placed on the slope in front of abutment to prevent soil erosion.

**Soffit** - The bottom surface of a beam or an arch rib or barrel.

**Spandrel** - The area between the roadway and the arch in the side view of an arch bridge.

**Definitions - (continued)**

**Special Provisions** - The special directions, provisions, and requirements peculiar to the project that augment the standard specifications. They are commonly referred to as “specials”.

**Specifications** - The body of directions, provisions, and requirements, together with written agreements and all documents of any description, made or to be made, pertaining to the method or manner of performing the work, the quantities, and the quality of materials to be furnished under the contract.

**Spread Footing** - A footing that is supported directly by soil or rock.

**Spur Dike** - A wall or mound built or extended out from the upstream side of an abutment used for training the stream flow to prevent erosion of stream bank. May also be used where there is no bridge, but the stream flows along the side of highway embankment.

**Stainless Steel Teflon Bearings** - Incorporated stainless steel and teflon with steel to provide the necessary expansion movement.

**St. Venant Torsion** - Uniform torsion resulting in no deformation of the cross section.

**State Plane Coordinates** - The plane-rectangular coordinate system established by the United States Coast and Geodetic Survey. Plane coordinates are used to locate geographic position.

**Station** - A distance of 100 feet measured horizontally.

**Stirrup** - Vertical U-shaped or rectangular shaped bars placed in concrete beams to resist the shearing stresses in the beam.

**Stress Relieved Strands** - Any prestressing tendons that are manufactured by relieving the high residual stresses that were introduced into the steel during the wire drawing and stranding operations. Stress relieving is not a heat treatment and does not change the strand yield strength.

**Strip Seal Joint** - Molded neoprene glands inserted and mechanically locked between armored interfaces of extruded steel sections.

**Structurally Deficient Bridges** - Those bridges which have been (1) restricted to light vehicles only, (2) closed, or (3) require immediate rehabilitation to remain open, as defined by the Federal Highway Administration.

**Subgrade** - The top surface of completed earthwork on which subbase, base, surfacing, pavement, or a course of other material is to be placed.

**Substructure** - Those parts of a structure which support the superstructure, including bents, piers, abutments, and integrally built wingwalls, up to the surfaces on which bearing devices rest. Substructure also includes portions above bearing surfaces when those portions are built integrally with a substructure unit (e.g. backwalls of abutments). When substructure and superstructure elements are built integrally, the division between substructure and superstructure is considered to be at the bottom soffit of the longitudinal or transverse beam, whichever is lower. Culverts and rigid frames are considered to be entirely substructure.

**Definitions - (continued)**

**Sufficiency Rating** - A method of evaluating data by calculating four separate factors to obtain a numeric value which is indicative of bridge sufficiency to remain in service. The result of this method is a percentage in which 100 percent would represent an entirely sufficient bridge and zero percent would represent an entirely insufficient or deficient bridge.

**Superelevation** - The difference in elevation between the inside and outside edges of a roadway in a horizontal curve; required to counteract the effects of centrifugal force.

**Superplasticizer** - A high range water-reducing admixture that increases the slump of freshly mixed concrete without increasing the water content.

**Superstructure** - Those parts of a structure above the substructure, including bearing devices.

**Surcharge** - Any load that causes thrust on a retaining wall, other than backfill to the level of the top of the wall. Also preloading of an embankment to minimize the time for initial consolidation of the subsurface soils.

**Suspension Bridge** - A bridge in which the floor system is supported by catenary cables which are supported upon towers and are anchored at their extreme ends.

**Suspender** - A wire cable, metal rod or bar connected to a catenary cable of a suspension bridge at one end and the bridge floor system at the other, thus transferring loads from the roadway to the main suspension members.

**I**

**Tack Welds** - Small welds used for temporary connections.

**Telltale (Tattletale)** - Any device designed to indicate movement of formwork or falsework.

**Tendon** - A name for prestressed reinforcing element whether wires, bars, or strands.

**Tenon** - A constant diameter extension welded to the tip of the tapered metal arm of a luminaire support pole to receive the luminaire.

**Thixotropy** - Property of a material that enables it to stiffen in a short period on standing, but to acquire a lower viscosity again on mechanical agitation. A property desirable for post-tensioning duct grout.

**Three-Dimensional Finite Element Analysis** - Analysis in which a three-dimensional continuum is modeled as an assemblage of discrete elements in three-dimensional space.

**Three-Hinged Arch** - An arch which is hinged at each support and at the crown.

**Through Structure** - A structure that has its floor connected to the lower portion of the main stress-carrying members, so that the bracing goes over the traffic. A structure whose main supporting members project above the deck or surface.

**Tining** - Is used on finished concrete deck or slab surfaces to provide friction and reduce hydroplaning. Grooves are placed in the plastic concrete or cut into the hardened concrete.

**Definitions - (continued)**

**Torsional Stress** - Shear stress on a transverse cross section resulting from a twisting action.

**Transformed Section** - A hypothetical section of one material so as to have the same elastic properties as a section of two materials.

**Transition** - A section of barrier between two different barriers or, more commonly, where a roadside barrier is connected to a bridge railing or to a rigid object such as a bridge pier. The transition should produce a gradual stiffening of the approach rail so vehicular pocketing, snagging, or penetration at the connection can be avoided.

**Traveled Way** - The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

**Tremie** - A pipe or tube through which concrete is deposited underwater.

**Trial Batch** - A batch of concrete prepared to establish or check proportions of the constituents.

**Turnbuckle** - A long, cylindrical, internally threaded nut used to connect the elements of adjustable rod and bar members.

**Turn-of-the-Nut** - A bolt-tightening method.

**Two-hinged Arch** - A rigid frame which may be arch-shaped or rectangular but is hinged at both supports.

**U**

**Ultrasonic Inspection** - A non-destructive inspection process where by an ultra-high frequency sound wave induced into a material is picked up in reflection from any interface or boundary.

**Unbonded Strands** - Strands so coated as to prevent their forming a bond with surrounding concrete. Used to reduce stress at the ends of a member.

**Underpinning** - The addition of new permanent support to existing foundations to provide additional capacity.

**Uplift** - A force tending to raise a structure or part of a structure and usually caused by wind and/or eccentric loads, or the passage of live-load over the structure.

**Utility** - A line, facility, or system for producing, transmitting, or distributing communications, power, electricity, heat, gas, oil, water, steam, waste, storm water not connected with highway drainage, or any other similar commodity which directly or indirectly serves the public. The term utility shall also mean the utility company, district, or cooperative, including any wholly owned or controlled subsidiary.

**Definitions - (continued)**

**V**

**Vierendeel Truss** - A Pratt truss without diagonal members and with rigid joints between top and bottom chords and the verticals.

**Vibrator** - An oscillating device inserted at selected locations to consolidate fresh concrete.

**W**

**Wales** - Horizontal support members in close contact with a row of sheet piles in a cofferdam or shoring wall. Sometimes called whalers.

**Warrants** - The criteria by which the need for a safety treatment or improvement can be determined.

**Warren Truss** - A triangular truss consisting of sloping members between the top and bottom chords and no verticals; members form the letter W.

**Water/Cement Ratio** - The weight of water divided by the weight of cement in a concrete; ratio controls the strength of the concrete.

**Waterproofing Membranes** - Impervious material overlaid with bituminous concrete to protect decks from the infiltration of chlorides and resulting deterioration.

**Wearing Surface** - The top layer of a pavement designed to provide structural values and a surface resistant to traffic abrasion.

**Weep Hole** - A drain hole through a wall to prevent the building up of hydraulic pressure behind the wall.

**Weld Inspection** - Covers the process, written procedure, and welding in process. Post weld heat maintenance if required, post weld visual inspection and non-destructive testing as specified in contract and Standard Specifications.

**Welded-Wire Fabric** - A two-way reinforcing mat, fabricated from cold-drawn steel wire, having parallel longitudinal wires welded at regular intervals to parallel transverse wires.

**Well-Graded** - An aggregate possessing a proportionate distribution of successive particle sizes.

**Wetlands** - Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

**Wheel Load** – Half of an axle load.

**Wingwall** - A wall attached to the abutments of bridges or box culverts retaining the roadway fill. The sloping retaining walls on each side of the center part of a bridge abutment.

**Definitions - (continued)**

X

Y

**Yield** - Permanent deformation (permanent set) which a metal piece takes when it is stressed beyond the elastic limit.

**Young's Modulus** - modulus of elasticity of a material (E); or the stiffness of a material.

Z