

Glossary of Terms

ABANDONED ROAD – A road which is no longer maintained. An abandoned road may or may not still be drivable and may or may not be overgrown with vegetation. In some instances, the term “abandon” is used to signify the process of closing or decommissioning a road (See road abandonment, road decommissioning).

ABNEY LEVEL – A hand-held instrument used to measure slope gradients and vertical angles in the field.

ABRASION – The wearing away of a material by physical processes. Abrasion here relates to both the wearing away of rock particles used in road surfacing and riprap (particle abrasion), as well as the erosion of culvert materials caused by sediment transport in flowing water (culvert abrasion).

ABUTMENT (BRIDGE) – A solid foundation, secured on each stream bank that serves as the foundation for a bridge. Naturally occurring rock outcrops or driven piles may serve as bridge abutments, but most commonly abutments are made of poured concrete foundations, driven steel sheet piles, prefabricated concrete sills, logs or piers.

ACCELERATED EROSION – Erosion which has been caused or increased, directly or indirectly, by human activities or land management. Accelerated erosion is typically thought of as erosion which is not “natural” or that which is excess of that which would have naturally occurred.

ACTIVE ROAD – A road that is part of the overall road network that is (and needs to be) regularly inspected and maintained.

ALTIMETER – A hand-held instrument used to determine elevation or altitude in the field.

ANADROMOUS FISH – Fish that are born and rear in freshwater, move to the ocean to grow and mature, and return to freshwater to reproduce. Salmon, steelhead and shad are examples. While not anadromous, resident fish can also migrate up and down stream channels and may require fish passage designs at stream crossings.

ANGLE OF REPOSE – The steepest slope angle at which a material will freely stand without failing or sliding downslope. The angle of repose of material without cohesion, like loose sand, is about 33 degrees. For material with some cohesion, the comparable term is called the angle of internal friction. Slopes which are steeper than the angle of repose or angle of internal friction are likely to be unstable.

ARCHAEOLOGICAL SITE – A geographic locale that contains the material remains of pre-historic and/or historic human activity.

ARMORED FILL – A type of stream crossing where the stream flows over a dipped road bed and down an armored fill slope rather than through or beneath the fill in a culvert of other drainage structure. Armored fills are used on relatively small stream crossings and in locations where road maintenance is infrequent or not possible during the wet season.

ASPECT – The direction a slope faces with respect to the cardinal compass points.

BACKCASTING – A road construction technique which utilizes a hydraulic excavator to cut a wide bench in front of the machine and below the centerline of the new road, while placing the excavated soil on the bench behind as the new subgrade.

BALANCED BENCHING (BALANCED CUT-AND-FILL) – A road building method used on gentle or moderate sloping land in which material excavated during road construction is used to build the roadbed and fill the low spots along the alignment. In balanced benching, the cut volumes equal the fill volumes and the road is often referred to as a “half-bench” or balanced cut-and-fill road.

BANKFULL WIDTH – The width of the stream measured at the bankfull stage and discharge. Bankfull discharge has a recurrence of 1 to 2 years (mean 1.5 years) and is considered the dominant channel-forming flow. It is typically identified as the point of incipient flooding indicated on

the ground as the upper limit of active channel processes and scour, and the lower limit of perennial vegetation.

BARRIER (FISH PASSAGE BARRIER) – See fish passage.

BASE COURSE – This is the main load-spreading layer of the roadbed immediately beneath the surface course and above the sub-base or prepared native soil materials. It is typically composed of a mix of different sizes of crushed rock or of rock fragments or gravel developed in a rock pit that are compacted in preparation for the application of a surfacing material. It has a relatively low percentage of fines to maintain good strength and drainage.

BEARING SURFACE – The driving surface of the road. Road rocking is a common method of increasing the load bearing capacity of the road surface if the subgrade soils are relatively weak.

BENCH – A naturally occurring bench refers to a relatively flat or low gradient portion of a hillside. A constructed bench is a step or flat area cut into a deep soil or bedrock in an attempt to create a more stable overlying fill and roadbed.

BENEFICIAL USE – In water use law, reasonable use of water for a purpose consistent with the laws and best interest of the people of the state. Such uses include, but are not limited to, the following: instream, out of stream, and ground water uses, domestic, municipal, industrial water supply, mining, irrigation, livestock watering, fish and aquatic life, wildlife, fishing, water contact recreation, aesthetics and scenic attraction, hydropower and commercial navigation.

BERM – A curb or dike (usually earthen) constructed to control water and prevent roadway runoff waters from discharging onto roadside slopes and/or to provide material for subsequent road maintenance. Some berms are unintentionally constructed as a part of routine grading operations and, depending on the road's shape, may or may not interfere with road surface drainage.

BEST MANAGEMENT PRACTICES (BMPs) – Practical guidelines that can be used to reduce the environmental impact of roads and road management activities (including

construction, erosion control, maintenance and decommissioning) and protect water quality. BMPs are a key component of planning, designing, constructing, maintaining and closing roads to minimize their potential impact on the environment. Best management practices for road-related activities are intended to provide simple, practical and cost-effective methods for protecting water quality and aquatic resources, and other environmental values, before, during and after road management activities are undertaken.

BEVELED INLET – See improved inlet.

BIOTECHNICAL ENGINEERING – Utilizes live vegetation integrated with hard structural elements (e.g., logs, riprap, concrete blocks, and gabions) to create complex erosion control structures that provide soil reinforcement, and increased slope stabilization and protection (See soil bioengineering).

BORROW SITE (BORROW PIT) – Locations on the landscape where sand, gravel and/or rock is excavated for use in road construction activities elsewhere in the watershed. Borrow pits and rock quarries on California wildlands may be subject to the Surface Mining and Reclamation Act (SMARA) which requires landowners to develop site reclamation plans for many such sites (See rock pit).

BOTTOMLESS ARCH (PLATE ARCH, BOTTOMLESS "CULVERT") – Three-sided structures that have sides and a top and use the natural channel for the bottom, often composed of metal plates or concrete. They range in size from a few feet to more than 35 feet in width and are supported on footings (usually concrete). Bottomless arches are available in a variety of shapes including semicircular arches, elliptical arches and boxes. They are installed in stable channel reaches where the streambed is not expected to show significant scour. Bottomless arches are an environmentally attractive alternative to box, pipe, and pipe arch culvert designs and are commonly used where fish passage is required.

BOTTOM-UP ROAD CONSTRUCTION – Road construction techniques which involve excavating a bench on the hillside and then filling and compacting fill on the bench to build up a stable roadbed at the desired elevation (as opposed to sidelaying or top-down construction).

BOX CULVERT (OPEN TOP CULVERT) – An open-top trough-like drainage structure, usually constructed of lumber or iron, built into and obliquely across the road surface. It acts to collect and discharge road surface runoff and, less often, ditch flow across the road. Open-top box culverts are more commonly used on ranch roads than on forest roads used for logging operations.

BUFFER STRIP – An area or strip of land adjacent a stream containing relatively undisturbed soils and vegetation that acts as a filter or buffer for erosion and runoff from upslope roads or other land management activities.

BUTTRESS – A gravitational structure designed to resist lateral forces, typically at the base of an unstable cutbank or an oversteepened, potentially unstable fill slope. It is typically constructed of large riprap rock, gabions, or other gravitational structures.

CENTER STAKE METHOD – A method of curve layout, especially for switchbacks, in which a stake is used to mark the center of the curve and radial measurements are taken out from the stake to mark the curve on the ground.

CHECK DAM – A temporary or permanent grade control structure placed across a natural or manmade channel or drainage ditch intended to prevent downcutting. Check dams are almost always used in a series to control the grade of the stream and to reduce or prevent scour and channel erosion by reducing flow velocity and encouraging sedimentation. Check dams have very specific design requirements that must be met or they will be prone to failure. Straw bale check dams are often used in swales and small channels below a new road alignment to temporarily collect and store sediment eroded from a work site, but will usually not provide protection against channel downcutting for more than a single season.

CLASS I WATERCOURSE (CALIFORNIA) – For forestry purposes, those watercourses serving as domestic water supplies, including springs, onsite and/or within 100 feet downstream of the forest operations area, and/or those watercourses where fish are always or seasonally present onsite, including habitat to sustain fish migration and spawning.

CLASS II WATERCOURSE (CALIFORNIA) – For forestry purposes, those watercourses where fish are always or seasonally present offsite within 1000 feet downstream, and/or watercourses which contain aquatic habitat for non-fish aquatic species. Class III watercourses that are tributary to Class I watercourses (hence within 1000 feet of a fish-bearing watercourse) are specifically excluded.

CLASS III WATERCOURSE (CALIFORNIA) – For forestry purposes, watercourses that have no aquatic life present, but still show evidence of being capable of sediment transport downstream to Class I or Class II watercourses under normal high water flow conditions after completion of timber operations.

CLASS IV WATERCOURSE (CALIFORNIA) – For forestry purposes, man-made watercourses, usually supplying downstream established domestic, agricultural, hydro-electric or other beneficial uses (See man-made watercourse).

CLEARING – The act of removing the standing vegetation along a proposed road alignment. Clearing is one of the tasks of road construction, and is followed by grubbing and grading (earthmoving).

CLINOMETER – A pocket field instrument which measures slope steepness in degrees and percent.

CLOSED ROAD – A road that has been closed to vehicle traffic, usually with barricades, berms, gates, or other closure devices, but future use is anticipated (See road closure, road decommissioning).

CMP – Corrugated metal pipe, often used synonymously with culvert. Metal culverts are typically made from galvanized steel or aluminum.

COMPACTION – An increase in bulk density (weight per unit volume) and a decrease in soil porosity resulting from applied loads, vibration or pressure.

CONTROL POINTS – Locations along a proposed road alignment that control the position of the road. Examples of control points include rock outcrops, the end of another road you must tie in to, a saddle on a ridge that

you need the road to pass through, a favorable stream crossing location, a landslide that must be avoided, etc.

CORROSION – Corrosion is the wearing away of a metal through an oxidation/reduction chemical reaction on its surfaces. Rust (oxidation of iron) is a common corrosion process for steel culverts and, combined with abrasion, is the most common reason for culvert replacement. In corrosive environments, protective coatings, linings, and pavings on the inside and/or outside of steel culverts can be used to extend its service life. Plastic pipe is not subject to corrosion.

CRITICAL DIP (DIVERSION DIP; DIPPED CROSSING) – A critical dip is a dip in the road bed at a culverted stream crossing, preferably at the down-road hinge line of the fill, that prevents stream diversion. The dip is designed to act as an overflow structure if the main culvert were to plug and ponded water overtopped the fill. Although somewhat like a rolling dip, it must have sufficient capacity (width and depth) to carry flood flows from the stream without itself overtopping and diverting down the road. An alternate solution is to dip the entire fill, centered over the hinge line.

CROSS ROAD DRAIN – A deeply cut ditch, excavated across a road surface, which drains the roadbed and inboard ditch. Cross-road drains are installed on decommissioned roads to drain springs, seeps, road surfaces and ditches. They are more substantial and deeper than conventional waterbars used to drain forest and ranch roads, and are steeper and more abrupt than rolling dips. Well-constructed cross-road drains will often be deep enough to prevent vehicular access to an area and are typically installed on roads which are being closed permanently or for several years. Cross-road drains are typically constructed (excavated) using a bulldozer, a hydraulic excavator, or a backhoe.

CROWNED – A crowned road surface is one in which the road surface slopes gently away from the centerline of the road and drains to both sides of the crown. Crowning a road surface is one method of providing for surface drainage. Typically, the inside half of the road drains inward to the cutbank and ditch, while the outside half drains out across the fill slope.

Crowns can also be placed anywhere on the running surface of the road to control road surface runoff.

CRUSHED ROCK – Rock which has been run through a mechanical crusher to produce a more uniform range of angular particle sizes. Crushed rock is useful as a road surfacing material.

CULVERT – A transverse drain, usually a metal, plastic or concrete pipe, set beneath the road surface which drains water from the inside of the road to the outside of the road. Culverts are available in many shapes and are used to drain ditches, springs and streams across the road alignment.

CULVERT CROWN – The top of a drainage culvert.

CULVERT INVERT – The floor or bottom of a drainage culvert.

CULVERT LINERS – See trenchless technologies.

CULVERT RISER – A vertical standpipe on a culvert inlet, usually of the same diameter as the culvert, used to allow water to pass while sediment is deposited in a surrounding basin. Risers are usually slotted to allow water to flow into the vertical pipe as water levels rise around it. Risers usually have an open top so water can cascade into the top when the maximum desired water level is reached.

CULVERT SNORKEL – A vertical riser or stand pipe, of the same or smaller diameter as the culvert, welded into the top side of the culvert just downstream from the inlet. While risers are usually connected to the end of a culvert inlet with a 90 degree elbow, snorkels are welded into the top of the culvert while the culvert inlet remains open. Snorkels are used as an emergency culvert inlet if the main culvert inlet becomes plugged with debris or its capacity is exceeded.

CULVERT SPAN – The widest dimension of a culvert, regardless of its shape.

CURVE LAYOUT – The technique or method of laying out a road curve on the ground before a road is constructed. Curves may be broad enough such that little

or no layout is necessary. Switchbacks and sharp curves, especially those on moderate or steep slopes, often require the use of surveying techniques to ensure the best, most functional design (See center stake method).

CUT-AND-FILL – A method of road construction in which a road is built by cutting into the hillside (usually using a bulldozer) and spreading the spoil materials in low spots and as sidecast along the route. “Cut-and-fill” is often a synonym for “cut-and-sidecast” (See balanced benching, top-down road construction).

CUT SLOPE (CUTBANK) – The artificial face or slope cut into soils or rock along the inside of a road.

DEBRIS – Rocks, sediment, and organic material (logs, branches, brush, wood, leaves, etc.), that are carried or transported in surface runoff, ditch flows or flood flows in stream channels that often cause plugging of drainage structures. Floating debris and transported sediment are the main causes of culvert plugging and stream crossing failure.

DEBRIS CONTROL STRUCTURES – Structures built in a stream channel to screen or deflect floating woody debris before it reaches, and can plug, the culvert inlet. They include debris screens, debris racks, and debris deflectors.

DEBRIS DEFLECTOR – A debris control structure installed in front of a culvert inlet to deflect floating organic debris away from the culvert inlet, or to realign it to float through the culvert, so as to prevent plugging.

DEBRIS FLOW – A rapidly moving, saturated mass of rock fragments, soil and mud, with more than half of the particles being larger than sand size. Debris flows may originate as streamside or headwater debris slides that incorporate water, sediment and woody debris as they move down a channel during storms or floods. Debris flows generally travel down small, steep stream channels and result in scouring of streambed over distances from several hundred feet to several miles.

DEBRIS RACK (DEBRIS SCREEN, TRASH RACK) – A structure constructed upstream of a culvert inlet to screen out floating debris that could otherwise plug the culvert inlet. Debris screens should be designed

to allow small debris to pass and float through the culvert, while retaining larger debris (larger than the culvert diameter) that could block the pipe entrance.

DEBRIS SLIDE – A slow to rapid slide, involving downslope translation of relatively dry and predominantly unconsolidated materials, with more than half of the particles being larger than sand size.

DEBRIS TORRENT – See debris flow.

DECKING – The traveling surface (usually wood planks or steel sheets) of railroad flatcar and steel I-beam bridges used on forest, ranch and rural roads. Decking is usually bolted in place and can be replaced when it is worn out.

DECOMMISSIONING – See road decommissioning.

DECOMPACTION – See ripping.

DESIGN FLOW (100-YEAR RECURRENCE (CA)) – The design flow for a stream crossing culvert typically ranges between a 20 and 100 year recurrence interval, depending on the sensitivity of the road, the crossing and downstream resources. Increasingly, stream crossings are designed to accommodate the 100-year peak flow; a flood flow that statistically has a 1-percent chance of occurring in any given year. This flow can be estimated by empirical relationships between precipitation, watershed characteristics and runoff, and then may be modified by direct channel cross section measurements and other evidence. However, sizing culverts for a 100-year flood flow alone does not ensure adequate capacity for wood and sediment.

DITCH (ROADSIDE DITCH) – A dug ditch or small channel, usually at the base of the cutbank and along the inside edge of a road used to collect water from the road and emerging from the cutbank, and to carry it away to a safe disposal area. There may be a ditch on both sides of through cut and crowned roads.

DITCH RELIEF CULVERT – A drainage structure or facility (usually a culvert pipe) which will move water from an inside road ditch to an outside area, beyond the outer edge of the road fill.

DIVERSION POTENTIAL (DP) – A stream crossing has a diversion potential if, when the culvert plugs, the stream would back up and flow down the road or ditch, rather than directly over the fill crossing and back into the natural drainage channel.

DOWNSPOUT – A pipe, flume or trough attached (bolted) to a culvert outlet and used to convey water from the culvert outlet down over and beyond the road fill so as to prevent erosion. The downspout on a stream crossing culvert should be a full-round pipe that is attached to the culvert where it emerges from the fill using an elbow. On steep slopes, downspouts may need to be anchored to the fill slope. Culverts that are placed and discharged at the base of the road fill discharge directly into the natural channel or hill-slope and usually do not require a downspout.

DRAINAGE BASIN – See watershed.

DRAINAGE BLANKET – Also called aggregate filter blankets, these fabric encased aggregate layers are designed and placed at localized wet areas beneath cut-and-fill and backcast constructed roads, or at the base of wet cutbanks to remove groundwater beneath the roadbed and to keep the subgrade dry. A well-drained subgrade can support up to 50% more weight than poorly drained, well graded soils.

DRAINAGE STRUCTURE – A structure installed to control, divert or to cross over water, including but not limited to culverts, bridges, ditch drains, fords, waterbars, outsloping and rolling dips.

DROP INLET – A vertical riser on a culvert inlet, usually of the same diameter as the culvert, and often slotted to allow water to flow into the culvert as streamflow rises around the outside. Drop inlets are often used on ditch relief culverts where cutbank ravel would plug the inlet to a horizontal culvert. Drop inlets are sometimes fitted with a cap or top to protect them from cutbank ravel, and are slotted or cut away at the ditch level to allow flow to enter from the ditch (See riser, snorkel).

DRY SEEDING – A method of spreading seed on the ground surface. Dry seeding can be accomplished

by drilling (actually placing seed in the ground and covering it) or by broadcasting (where seed is aerially spread over the surface of the ground).

EARTHFLOW – A mass-movement landform and slow-to-rapid mass movement process characterized by downslope translation or “flow” of soil and weathered rock over a discrete shear zone at the base, with most of the particles being smaller than sand.

EASEMENT (RIGHT-OF-WAY AGREEMENT) –

An agreement which defines the conditions under which one party may use a road or roads owned by someone else. An easement is usually longer lived than an agreement, which may apply to a limited period of use.

EMBANKMENT – Excavated soil materials, placed and compacted, used to construct and raise the road subgrade. Cut-and-fill roads have an outside fill that is called an embankment fill.

EMBEDDED CULVERT – An embedded culvert is one that has been embedded, or partially sunk, into the bed of a stream channel. “Embedment Depth” is the depth the culvert is embedded from the invert of the culvert barrel to the top of the embedding material. It is usually expressed as the percentage of the culvert diameter that is embedded (e.g., 30% embedded).

EMERGENCY OVERFLOW CULVERT – A secondary culvert, installed higher in the fill than the primary culvert, designed to transmit streamflow through the stream crossing fill if the main culvert plugs or its capacity is exceeded during a flood event. They are designed to reduce the risk of overtopping and failure. Emergency overflow culverts are installed in stream crossings where the main culvert is prone to plugging, it is undersized and cannot be replaced, or where the fill is very deep or very large and failure would cause severe downstream ecological damage or safety concerns. Emergency overflow culverts are sometimes installed in place of a critical dip or dipped fill where those treatments are not feasible.

EMERGENCY ROAD MAINTENANCE

– See storm maintenance.

ENDHAULING – The removal and transportation of excavated material to prevent sidecast, and the storage of the material in a stable location where it cannot enter stream channels. Endhauling is usually accomplished using dump trucks, but on larger jobs may be performed by mobile scrapers.

ENERGY DISSIPATOR – A device or material used to reduce the energy of flowing water. Energy dissipators are typically used at and below culvert outlets and other drainage structures to prevent erosion.

ENVIRONMENTAL IMPACT – The positive or negative effect of any action, or group of actions, upon a given area or resource.

EPHEMERAL STREAMS – Streams that contain running water only sporadically, such as during and immediately following storm events.

EQUIPMENT LIMITATION, EQUIPMENT EXCLUSION – The terms are used when the use of heavy equipment is to be limited or prohibited, respectively, for the protection of water quality, the beneficial uses of water, and/or other wildland or forest resources.

ERODIBLE SOILS – Soils which are relatively prone to erosion by raindrop impact and surface runoff. Granular, non-cohesive soils (such as soils derived sand dunes or from decomposed granite) are known to be especially erodible.

EROSION – The dislodgement of soil particles caused by wind, raindrop impact or by water flowing across the land surface. Erosion usually refers to processes of surface erosion (raindrop erosion, rilling, gullyng and ravel) and not to mass soil movement (landsliding).

EROSION CONTROL – The act of controlling on-going erosion caused by raindrop impact, rilling, gullyng, raveling and other surface processes.

EROSION HAZARD RATING (EHR) – A calculated measure of the susceptibility of soils to erosion by raindrop impact and surface runoff. According to the California Forest Practice Rules, EHR is calculated using a defined field methodology, and the resulting rating

(low, moderate, high, extreme) influence subsequent land management practices which can be employed.

EROSION PREVENTION – Preventing erosion before it has occurred. Erosion prevention is typically less expensive and more effective than controlling erosion once it has started. Erosion prevention is intended to protect a road, including its drainage structures, cut and fill slopes, road bed and other disturbed areas from damage, and to protect water quality.

EROSION-PROOF – The act of performing erosion control and erosion prevention activities which will protect a road, including its drainage structures and fills, from serious erosion during a large storm and flood.

EXCESS MATERIAL – See spoil.

FALL LINE (FALL LINE ROAD) – The fall line of a slope is the direction perpendicular to the slope's contour; that is; it is the line straight up or down a hillslope. A fall line road is a road, or road reach, that goes straight up or down a hillside. Fall line roads can be steep or gentle, depending on the slope gradient of the hill.

FAVORABLE GROUND – Terrain which is favorable for road construction, usually consisting of gentle and stable slopes, benches and ridges.

FISH PASSAGE – The unimpeded movement of anadromous or resident fish up or down a stream channel in all their freshwater life stages. It is often discussed with respect to stream crossings, where roads cross stream channels that are used by fish and/or other aquatic organisms. If passage is blocked to one or more life stages of a fish, when the fish would otherwise be passing through the stream reach, the obstruction is considered a barrier.

FILL – The material that is placed in low areas, compacted and built up to form the roadbed or landing surface.

FILL SLOPE – That part of a road fill between the outside edge of the road and the base of the fill, where it meets the natural ground surface.

FILL SLOPE EXCAVATION – Excavation and removal of unstable or potentially unstable soil and organic debris from the outside fill slope of a road, turnout or landing. Fill slope excavations are performed as a preventive measure to guard against landsliding of unstable material into downslope stream channels. They may be performed on active landings, or as a part of road and landing decommissioning.

FILTER FABRIC – See geotextile.

FILTER STRIP – See buffer.

FILTER WINDROW – A row of slash and woody debris laid and pressed down along the base of a road fill or sidecast slope to contain soil eroded from the fill slope. Filter windrows are often used to contain erosion from fill slopes and sidecast areas where a road approaches and crosses a stream channel.

FISH-BEARING – A stream which supports fish during some part of the year.

FLARED INLET – A culvert inlet which is flared or widened to increase its capacity and reduce the chance of inlet plugging and damage. Flared inlets are culvert attachments that are bolted or secured to the culvert inlet with banks. They are available for most culvert materials and shapes (See improved culvert inlet).

FLATCAR BRIDGE – A portable bridge constructed from a railroad flatcar. Single flatcar bridges can span channels top widths up to about 80 feet wide.

FLOW TRANSFERENCE – A method of estimating the peak flows for an ungaged stream by using flow data from a hydrologically similar, nearby watershed that has a long term gaging record. In general, local stream-flow data are more likely to represent drainage-basin characteristics that determine peak flows than regional regression equations or other analytical relationships.

FORD – A shallow place with good footing where a river or stream may be crossed in a vehicle. A ford is mostly a natural phenomenon, in contrast to a low water crossing, which is an artificial bridge that allows crossing a river

or stream when water is low. Fords may be unimproved (crossing on the natural streambed that is rocky or on bedrock) or improved (usually by artificial hardening of the streambed). A hardened ford is a ford strengthened by rock, concrete or other hardened materials built across the bed and banks of a live or dry stream which allows vehicle passage during low flow periods. A ford is normally only suitable for very minor, low traffic roads and becomes impassable during periods of moderate streamflow.

FRENCH DRAIN (UNDERDRAIN; PIPE UNDERDRAIN) – A buried trench, filled with coarse aggregate, which acts to drain subsurface water from a wet area and discharge it in a safe and stable location. French drains should be lined with filter fabric to keep soil from plugging the drain rock. They are often used beneath roadside ditches where the cut slope is wet and water would otherwise saturate the adjacent road bed. The standard underdrain is the pipe underdrain. A pipe underdrain consists of a perforated pipe near the bottom of a narrow trench lined with filter fabric and backfilled with permeable material. The pipe underdrain provides for much faster removal and discharge of intercepted groundwater.

FULL BENCH ROAD – Road construction technique in which the bench cut width is the same as the road width, and no fill is used in construction. Endhauling is needed to remove the excavated spoil material.

FULL FILL ROAD – Road construction technique in which no bench cut is made into the hillslope and the road prism is made entirely from imported fill. The ground surface must still be prepared (grubbed and bared) for the fill to bind to the underlying substrate. Full fill roads are most commonly built when crossing wet soils and valley bottoms (where the road has been slightly elevated), and wherever a road crosses an incised stream channel.

GEOMORPHIC – Pertaining to the form or shape of the earth's surface, and to those processes that affect and shape the land's surface. Geomorphic processes include all forms of soil erosion and mass soil movement, as well as other processes.

GEOTEXTILE (FILTER FABRIC) – Permeable textile made from synthetic, plastic fibers used to separate, filter,

reinforce, protect, and/or drain rock, soil and other related materials. Geotextiles are synthetic fabrics manufactured and designed for use in subsurface and surface drainage applications. They are especially useful in maintaining a separation between coarse road aggregate and finer native soil particles beneath, as well as in erosion control applications. It comes in a number of different types (with different specifications and uses) and is used in a number of different road building settings. Manufacturer's specifications should always be consulted before using a fabric for drainage or other engineering applications.

GPS – The Global Positioning System is a global navigational system based on earth orbiting satellites that provides precise 2-dimensional information (longitude and latitude) of location. Handheld GPS units are useful for mapping road location or tracking potential road alignments. GPS accuracy can be affected by dense forest canopy, lack of satellite coverage, or atmospheric conditions.

GRADE BREAK – The location of a reversal in the slope (grade) of the road from climbing to falling, or from falling to climbing. Grade breaks occur where a road contours the landscape and rises and falls over short distances, or where rolling dips have been built into the road to drain the road surface.

GRADE CONTROL – The term grade control can be applied to any alteration in the watershed which provides stability to the streambed. The most common method of establishing grade control is the construction of in-channel grade control structures designed to provide hard points in the streambed or gully capable of resisting erosive forces of flowing water. Grade control structures must adhere to specific design criteria to be effective.

GRADING – the act of excavating and moving soil along the road alignment to an established grade-line during road construction or reconstruction. Grading is one of the tasks of road construction, and is preceded by grubbing and followed by surfacing. Grading also refers to the mechanical smoothing of the roadbed to maintain a free-draining, smooth travelling surface.

GROUNDWATER – The standing body of water beneath the surface of the ground, consisting largely of surface water that has seeped down into the earth.

GRUBBING – The act of scarifying the surface of the ground along a proposed road alignment prior to placing fill or sidecast on top. Grubbing is one of the tasks of road construction, and is preceded by clearing and followed by grading.

GULLY (GULLIED) – An erosion channel formed by concentrated surface runoff which is generally larger than 1 ft² in cross sectional area (1' deep by 1' wide). Gullies often form where road surface or ditch runoff is directed onto unprotected slopes, or where a stream has been diverted into a ditch or onto an unprotected slope.

HABITAT – The place where a plant or animal (including aquatic life and fish) naturally or normally lives and grows.

HARDENED FORD – See ford.

HEADWALL – A vertical or sloping (beveled) wall that encompasses the culvert inlet and provides a transition between the stream channel and the inlet. Headwalls can be constructed of various materials, with rock, masonry and concrete being the most common. Headwalls may be used for a variety of reasons, including increasing the efficiency of the inlet, providing embankment stability, and providing embankment protection against erosion (See wingwalls).

HEADWATER SWALE – The swale or dip in the natural topography that is upslope from a stream, at its headwaters. There may or may not be any evidence of overland or surface flow of water in the headwater swale.

HINGE LINE – The intersection between the approaching roadbed and the full fill of a culverted stream crossing. Typically, roads go from a cut-and-fill or full bench cross section on a hillside to a full fill cross section where fill material has been used to "fill" the stream crossing during road construction. There are two hinge lines on a stream crossing fill; one on the left and one on the right.

HORIZONTAL CURVE – The horizontal arc of a circle whose radius is that of the curve of the road.

HYDROLOGIC CONNECTIVITY (HYDROLOGICALLY CONNECTED ROAD) – Hydrologic connectivity refers to the length or proportion of a road or road network that drains runoff directly to streams or other water bodies. Any road segment that has a continuous surface flow path to a natural stream channel during a ‘design’ runoff event is termed a hydrologically connected road or road reach. Connectivity usually occurs through road ditches, road surfaces, gullies, rolling dips, waterbars or other drainage structures or disturbed surfaces associated with roads.

HYDROSEEDING (HYDRAULIC SEEDING) – A technique for applying a slurry of seed, fertilizer and mulch by hydraulically spraying the mixture on the bare ground surface. Hydroseeding is typically performed on slopes that are too steep for dry seeding.

IMPROVED CULVERT INLET (BEVEL EDGED, SIDE TAPERED AND SLOPE TAPERED) – Compared to a projecting culvert with square edges, an improved inlet will increase flow capacity. Improved inlets include a beveled or rounded inlet edge (5 to 20% flow increase), a side tapered inlet (25-40% flow increase), or a slope tapered inlet (up to 100% flow increase). The inlet edge causes contractions of the flow at the culvert inlet. A beveled inlet edge decreases flow contraction at the entrance, thereby increasing flow capacity. A side tapered inlet has an enlarged face area within the culvert inlet throat accomplished by tapering the sidewalls out in a funnel shape. The slope-tapered inlet combines an efficient throat section with additional head as the flow drops into the throat (See flared inlet).

INACTIVE ROAD – A road needed only infrequently, for fire control, tree thinning or other intermittent forest or ranch activities. These roads remain largely unused for most of the year, or for several years in succession, but have drainage structures intact and require regular inspection and maintenance.

INBOARD DITCH – The ditch on the inside of the road, usually at the foot of the cutbank.

INFILTRATION – The movement of water through the soil surface into the soil.

INNER GORGE – A stream reach bounded by steep valley walls that terminate upslope into a more gentle topography. Inner gorge slopes are usually developed by mass wasting processes in areas of rapid stream down-cutting or uplift and may display signs of instability.

INSLOPED ROAD – Road surface that is sloped in toward the cutbank. Insloped roads usually have an inboard ditch that collects runoff from the road surface and cutbank.

INTERMITTENT STREAM – Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. Intermittent streams flow in response to rainfall, and then for some period after the cessation of rainfall (being fed by groundwater discharge).

INTERVISIBLE – The ability to see from one feature to the next. Turnouts which are inter-visible can be seen from one another.

LANDING – Any place on or adjacent to a logging site (usually on a road) where logs are collected and assembled for further transport.

LANDING EXCAVATION – See fill slope excavation.

LANDSLIDE – The gravitational downslope movement of a mass of rock, debris, or earth. Landslides are classified by material type (e.g., rock, debris, and earth) and process type (e.g., slide, flow, fall, topple, and spread). Includes but is not limited to debris slides, debris flows (torrents), rock falls and topples, debris avalanches, and earth flows. It does not, however, include dry ravel or surface erosion by running water. It may be caused by natural erosional processes, by natural disturbances (e.g., earthquakes or fire events) or human disturbances (e.g., mining or road construction).

LEAD-OUT DITCH (LEAD OFF DITCH, BERM BREAKS, DITCH CUTOUTS OR DITCH TURNOUTS) – Excavations through a roadside berm or low through cut that are designed to divert water out of the ditch or off the roadway (at a point where this doesn’t occur naturally). The lead-out ditch is usually a gash or sweeping cut from the side of the road and onto the

adjacent natural slope, made at a grade slightly steeper than the ditch or road they are intended to drain.

LOG CROSSING – A drainage structure made out of logs laid in and parallel to a stream channel and then covered with soil. Before the mid-1980's log crossings were frequently used as "permanent stream crossings" instead of culverts or bridges in forested areas of the Pacific Northwest. Log crossings are highly susceptible to plugging and washout during storm flows. Log crossings are used today only for temporary stream crossings that are to be removed prior to the wet weather season.

LOGGING ROAD – A road other than a public road used by trucks going to and from landings to transport logs and other forest products.

LOW-VOLUME ROAD – A transportation system or road typically constructed to manage, extract resources or otherwise develop rural or wildland areas. They are typically designed for low traffic levels (average <400 vehicles per day) but may also be designed to accommodate commercial loads.

LOW WATER CROSSING – See ford.

MAINTAINED ROAD – A road which is regularly inspected and whose cut slopes, road surface, drainage structures and fill slopes are maintained to prevent erosion and deterioration.

MAN-MADE WATERCOURSE – A watercourse which is constructed and maintained to facilitate man's use of water. They include but are not limited to ditches and canals used for domestic, hydropower, irrigation and other beneficial uses. According to California forestry regulations, man-made watercourses technically do not include road-side drainage ditches.

MASS SOIL MOVEMENT – Downslope movement of a soil mass under the force of gravity. Often used synonymously with "landslide," common types of mass soil movement include rock falls, slumps, earthflows, debris avalanches, debris slides and debris torrents (See landslide).

MITERED INLET – A sloping inlet that is cut or installed usually at the upstream end of a culvert, parallel and against or close to the embankment slope. Mitering the inlet reveals a larger opening at the culvert entrance, and thereby increases the hydraulic efficiency and potential flow volume compared to a projecting inlet. A mitered inlet with a sloping headwall further increases the hydraulic efficiency of the inlet. Mitered inlets on metal culverts are usually made with a cutting torch, while mitered inlets on plastic culverts are usually cut with a saw (See improved culvert inlet).

MULCH (MULCHING) – Material placed or spread on the surface of the ground to protect it from raindrop, rill and surface erosion. Mulches include wood chips, rock, straw, wood fiber, hydromulch and a variety of other natural and synthetic materials. Mulching is the process of spreading mulch.

MULTI-BENCHING – A road building method used on moderate or steeply sloping land in which two or more benches are excavated into the native hillslope and fill is then compacted on the benches to provide a stable road bench.

OBSTACLE – Locations along a proposed road alignment that need to be avoided. Obstacles include rock outcrops, landslides, extremely steep slopes, unsuitable stream crossing locations, wet areas, lakes, etc.

OUTLET (CULVERT OUTLET) – The downstream opening in a drainage structure or pipe where the water leaves the structure.

OUTSLOPED ROAD – Road surface that is sloped out away from the cutbank toward the road's fill slope. Outsloped roads may or may not have an inboard ditch.

OUTSLOPING – The act of converting an insloped road to an outsloped road. Outsloping can also refer to the act of excavating the fill along the outside of the road and placing and grading it against the cutbank, thereby creating an outsloped surface where the roadbed once existed. In road decommissioning, partial or full outsloping (recontouring) are two methods for providing permanent drainage dispersal from the former road bed.

PARTIAL BENCH – A partial bench road is one in which the roadbed is part bench and part fill, somewhere between a full bench and a full fill road (See cut-and-fill).

PEAK FLOW (FLOOD FLOW) – The highest amount of stream or river flow occurring in a year or from a single storm event. For design purposes, roads and drainage structures are typically built to withstand a peak flow event of a given recurrence interval, such as the 100-year flow event.

PERENNIAL STREAM – A stream that typically has running water on a year-round basis.

PERMANENT ROAD – A road which is planned and constructed to be part of a permanent all-season transportation system. These roads have a surface which is suitable for hauling of forest and ranch products, and for the passage of normal vehicle traffic throughout the entire winter period and have drainage structures, if any, at watercourse crossings which will accommodate the design (100-year) flood flow. Permanent roads receive regular and storm-period inspection and maintenance.

PERMANENT WATERCOURSE CROSSING – A watercourse crossing that will be constructed to accommodate the estimated 100-year flood flow, including woody debris and sediment, and will remain in place and continue to be maintained until they are upgraded or removed.

PERMEABLE FILL – See drainage blanket.

PIPE JACKING/ RAMMING – See trenchless technologies.

PLATE ARCH – See bottomless arch.

PROJECTING INLET – An inlet configuration where the culvert pipe projects from the roadway fill into the streambed, without mitering, beveling or headwall construction.

PUT-TO-BED – “Put-to-bed” is a colloquial name for the process of pro-actively abandoning (decommissioning or closing) a road by eliminating the risk of sediment production until the road is again needed in future years. “Putting-to-bed” or road closure involves completely removing stream crossing fills and associated drainage

structures and eliminating the risk of sediment production from roads and landings (See road decommissioning).

QUALIFIED PROFESSIONAL – An experienced, often licensed, professional who interprets complex physical or biological processes and/or designs roads and road structures. They may include engineers, geologists, biologists and other resource or construction specialists.

QUARRY – A site where rock, riprap, aggregate, and other construction materials are extracted, usually from a large rock outcrop or rock face. Quarry materials are usually extracted by ripping or blasting, and often need to be processed by crushing or screening to produce the desired gradation of rock sizes.

RANCH ROAD – A road other than a public road used by ranch and farm vehicles in the conduct of ranching operations. Ranch roads are sometimes used for hauling forest products and thereby are also classified as, and subject to, the same regulations as logging roads.

RANGE FINDER – A hand-held field instrument used to measure distances less than about 1000 feet.

RATIO (SLOPE) – A way of expressing slope gradient as a ratio of horizontal distance to vertical rise, such as 3:1 (3 feet horizontal for every 1 foot vertical rise of fall).

RATIONAL FORMULA (METHOD) – An empirical method for estimating peak flows from a small watershed. The rational formula is often used to estimate flows and to select appropriate culvert sizes for small, ungaged stream channels crossed by a road.

RAVEL (DRY RAVEL) – Soil particles dislodging and rolling down a slope under the influence of gravity. Ravel occurs most rapidly when a cohesionless soil on a steep slope dries out. Raveling is dramatically increased when frost acts on the exposed soil. Ravel on some steep, bare cutbanks can quickly fill ditches and supply sediment that is then eroded and moved to nearby ditch relief culverts or streams by concentrated ditch flow.

RECONSTRUCTION (ROAD) – The upgrading or rebuilding of a road that is abandoned or substandard in one or more elements of its design (See road reconstruction).

RETAINING STRUCTURE (RETAINING WALL) – An engineered structure designed to resist the lateral displacement of soil, especially along the base of a cutbank, the base of a road fill or as a part of a newly constructed road embankment. It is commonly used to support a roadway or to add road width on steep terrain or where there has been a fill slope failure that narrowed the road. They are often constructed of gabions, reinforced concrete, timber cribs, or mechanically stabilized earth.

RILL – An erosion channel, varying in size from a rivulet up to about 1 ft² in cross sectional area, that typically forms where rainfall and surface runoff is concentrated on fill slopes, cutbanks and ditches. If the channel is larger than 1 ft² in size, it is called a gully.

RIPARIAN – The banks and other adjacent terrestrial environs of lakes, watercourses, estuaries and wet areas, where transported surface and subsurface freshwater provides soil moisture to support mesic vegetation.

RIPPING (ROAD) – The process of breaking up or loosening compacted soil (e.g., skid trails, spur roads or landings) to better assure penetration of roots of young tree seedlings and to increase infiltration. It is also termed decompaction (See scarified).

RIPRAP – Large, durable rock, or other suitable material, used to protect the underlying soil from erosion, usually by flowing water. Riprap is used to armor shorelines, streambeds, bridge abutments, pilings and other structures against scour, water or ice erosion. Riprap is usually angular (not platy or round) and sized to resist scour or movement from the expected flows. Riprap, or riprap sized rock, is also used to buttress fills and cuts that might otherwise be unstable and prone to failure.

RIVER RUN ROCK – Aggregate (gravel) that is excavated from a river bed. River run rock is usually well rounded and, unless it is screened, also contains sand.

ROAD ABANDONMENT – Road abandonment was once synonymous with blocking the road and letting it grow over with vegetation. Today, proper road abandonment involves a series of proactive steps and activities which essentially stormproof (decommission) a road so that further maintenance will not be needed and significant erosion will not occur. Road abandonment is a term sometimes used in California forestry that is comparable to road decommissioning (See road decommissioning).

ROAD CLOSURE – A term sometimes used to signify the seasonal closing of a road to traffic, usually by installation of a gate or barrier. However, proper and effective long term road closure is not accomplished by simply blocking a road to traffic and walking away from it to let “nature reclaim the road” (abandoning the road) or by temporarily “storing” the road (road storage) for future use but not treating all the potential sources of erosion and sediment delivery (See road decommissioning).

ROAD DECOMMISSIONING – To remove those elements of a road that unnaturally reroute hillslope drainage or present slope stability and/or erosion and sediment delivery hazards. Road decommissioning treatments include complete removal and restoration of all stream crossing fills, excavation or stabilization of all existing and potential road fill instabilities that could deliver sediment to stream channels, decompacting and permanently dispersing road surface drainage, and treating all other existing or potential road-related sediment sources. Depending on the nature and magnitude of existing and potential threats posed by a road, the required decommissioning treatments could range from minor drainage improvements to major earth moving activities.

Terminology describing road decommissioning practices is varied and often contradictory. While other terms (e.g., road closure, road abandonment, road storage, put-to-bed and road vacating) have been used to describe various road decommissioning techniques, the activities must include those that are necessary to eliminate or greatly reduce the impacts of roads (similar to those described above), or they are likely to be only partially effective and leave some watershed and environmental threats in place.

ROAD FAILURE – Damage to the roadbed (usually caused by a roadbed slump, fill failure, stream crossing washout or major gully) which prevents vehicular passage, but does not usually mean minor cutbank or fill sloughing incidental to road settling.

ROAD OR LANDING FILL EXCAVATION – Excavation and removal of unstable or potentially unstable fill and/or sidecast spoil from the outer edge a road prism. Road fill excavations are performed as a preventive measure to guard against failure of unstable fill materials into downslope stream channels.

ROAD GRADE – The slope of a road along its alignment.

ROAD MAINTENANCE – The actions taken to prevent erosion and/or the deterioration of a road, including the cutbank, the road surface, the fill slope and all drainage structures. Road maintenance activities include such tasks as grading, ditch cleaning, brushing and culvert cleaning.

ROAD NETWORK – The pattern of all the roads in an ownership, watershed, hillside or other defined area. The road network typically includes main trunk roads, secondary roads and spur roads.

ROAD RECONSTRUCTION – Repair or upgrading of those pre-existing roads that are to be restored or improved to make them useable for hauling forest products, for ranching operations or for rural residential traffic.

ROAD RUNOFF – Surface runoff that collects on and is drained from the road surface, usually as a direct response to rainfall. Road runoff usually travels down the road surface or in a roadside ditch.

ROAD STORAGE – A road “in storage” is a maintenance classification where a road may be closed to use for a long period of time with the expectation that it will be used again in the future. A minimum level of erosion prevention is usually conducted to reduce the potential impact of road failure, but many potential sediment sources may remain untreated. For example, stream crossings may be dipped but are usually left in place (See road closure, road decommissioning).

ROAD STORM-PROOFING – See storm-proofing.

ROAD UPGRADING – Measures taken to bring a road up to current design standards, including road cuts and fills, road surface drainage, stream crossings, and other road elements. Road upgrading is considered one type of road storm-proofing (road decommissioning is the other) in which the road is made as resilient to storms and floods as is possible, while also reducing hydrologic connectivity between roads and streams to the maximum extent feasible (See storm-proofing).

ROCK ARMOR – Course rock that is placed to protect a soil surface, usually from erosion caused by flowing or falling water. Rock armor is one type of material used for energy dissipation at culvert outfalls (See riprap).

ROCK PIT – A large outcrop of bedrock that has been developed for aggregate uses, such as road surfacing material and/or larger rock armor. A borrow pit is an excavation from which various materials are removed for use in another location (See borrow site).

ROLLING DIP (BROAD BASED DIP) – Shallow, rounded dip in the road where road grade reverses for a short distance and surface runoff is directed in the dip or trough to the outside or inside of the road. Rolling dips are drainage structures used primarily on gravel surfaced, outsloped roads designed to drain the road surface and constructed to remain effective while allowing passage of motor vehicles at normal or slightly reduced road speed.

ROTATIONAL SLIDE – A landslide that has an arcuate, concave-up failure plain, and whose movement is rotational rather than translational.

RUNOFF – Rainfall or snowmelt which flows overland across the surface of hillslopes and along roads and trails.

RURAL ROADS – Low traffic roads located in forested and rangeland settings that serve residential, recreational and resource management uses. Rural roads may be owned and/or managed by governmental or private parties, and they may be gravel surfaced or paved. Rural roads are the backbone of the transportation system in many rural counties in California and elsewhere.

SCARIFIED (SCARIFICATION) – A soil surface whose organic material is removed and whose surface is mechanically broken up or decompacted (See ripping).

SEASONAL ROAD – A road which is planned and constructed as part of a permanent transportation system where most hauling and heavy vehicle use may be discontinued during the wet season, or whenever roads are wet, and whose use is restricted to periods when the surface is dry. Most seasonal roads are not surfaced for wet weather use, but have a surface adequate for hauling of forest and ranch products in the dry season, and in the extended dry periods or hard frozen conditions occurring during the winter period. Seasonal roads have drainage structures at watercourse crossings which will accommodate the 100-year design flood flow.

SEDIMENT CONTROL – Controlling the path and disposition of eroded sediment.

SEDIMENT DELIVERY – Material (usually referring to sediment) which is delivered to a stream channel. Sediment delivery often refers to the percent of material eroded from a site which actually gets delivered to a stream channel (as opposed to that which is stored on the hillslope).

SEDIMENT RETENTION BASIN – A natural or dug basin or depositional area used to receive or spread runoff, infiltrate water and settle sediment before it can be delivered to a stream.

SEDIMENT YIELD – The quantity of soil, rock particles, organic matter, or other dissolved or suspended debris that is transported through a cross-section of stream in a given period. Technically, yield consists of dissolved load, suspended load, and bed load.

SIDECAST – The excess earthen material pushed or dumped over the side of roads or landings.

SIDE TAPERED INLET – See improved culvert inlet.

SILT FENCE – A constructed barrier used to contain soil eroded from a construction site. The barrier is made from geotextile filter fabric stretched between fence posts placed on contour along a slope or in a ditch, or it may be

composed of a straw bale or other permeable barrier, or non-permeable barrier, used to trap or cause deposition of sediment-laden runoff (See sediment retention basin).

SLIPLINING – See trenchless technologies.

SLIVER FILL – A thin fill lying parallel to the underlying hillslope, rather than as a wedge used in normal cut and fill construction. The use of sliver fills is not recommended, and endhauling of spoils is highly preferred to sliver fill construction. Sliverfills cannot be compacted on slopes exceeding about 35%. As they thicken, sliver fills become more susceptible to failure. Sliver fills are only appropriate where it is impossible to dispose of the material elsewhere and where the fill is composed entirely of coarse rock. Sliverfills are “placed” and are never constructed by uncontrolled sidecasting.

SLOPE RATIO – See ratio.

SLOPE STABILITY – The resistance of a natural or artificial slope or other inclined surface to failure by mass soil movement (landsliding).

SLOPE TAPERED INLET – See improved culvert inlet.

SLUMP – An episodic, fast to very slow mass movement process involving rotation of a block of hillslope or road along a broadly concave slip surface, often referred to as a rotational slide (See rotational slide).

SMARA – California’s Surface Mining and Reclamation Act (SMARA) was passed and adopted in 1975 and updated in 2007. SMARA provides a comprehensive surface mining and reclamation policy in California designed to minimize adverse environmental impacts and to assure mined lands are reclaimed to a usable condition.

SOIL BIOENGINEERING – Soil bioengineering techniques rely on the use of live plant cuttings to provide basic structural stabilization to slopes and streambanks, to reinforce soil substrate, and to reduce soil erosion. Techniques include brush layering, fascines (wattles), branch packing, live staking, wattle fencing and live pole drains, among others (See biotechnical engineering).

SOIL EROSION – See erosion.

SOIL SERIES – A group of soils developed from a particular type of parent material having naturally developed horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement of the soil profile.

SOIL TEXTURE – The relative proportion of sand, silt and clay in a soil; grouped into standard classes and subclasses in the Soil Survey Manual of the U.S. Department of Agriculture.

SOIL WATER – Water in the soil, including groundwater and water in the unsaturated zone above the groundwater table.

SPOIL (SPOIL MATERIALS) – Material (soil and organic debris) that is not used or needed as a functional part of the road or a landing. Spoil material is generated during road construction, reconstruction and maintenance activities.

SPOIL DISPOSAL SITE – The location where spoil material (woody debris and excavated soils) can be placed without the threat of accelerated erosion or of initiating slope instability. Stable spoil disposal sites include the cut portion of closed roads, the inside portion of landings and turnouts, and flat or low gradient natural benches.

SPUR ROAD – A side road off a main trunk road or a secondary road. Most spur roads are dead-end and may terminate at a logging site, a barn site or a rural residential site. Depending on their use, spur roads may be permanent, seasonal or temporary.

STORED ROAD – See road storage, road decommissioning.

STORM MAINTENANCE (EMERGENCY ROAD MAINTENANCE) – Road inspection and maintenance that is performed during and immediately after periods of high rainfall and runoff when drainage structures are most likely to plug, malfunction or fail.

STORM-PROOFING; STORM-PROOFED ROAD – A storm-proofed road is one where measures have been

taken to either upgrade or decommission the road so as to minimize the risk and potential magnitude of future erosion and sediment delivery. It generally consists of reducing hydrologic connectivity; identifying and treating potential road failures (mostly fill slope failures) that could fail and deliver sediment to streams; and reducing the risk of stream crossing failures and stream diversion (See Figure 204, Characteristics of Storm-proofed Roads).

STREAM CROSSING – The location where a road crosses a stream channel. Drainage structures used in stream crossings include bridges, fords, armored fills, arches, culverts and a variety of temporary crossings.

STREAM CROSSING EXCAVATION (DECOMMISSIONING) – The excavation of the fill material that was used to build (fill) a stream crossing, specifically a culverted crossing, an arch, a log crossing or a temporary crossing. A stable stream crossing excavation must be dug down to the level of the original stream bed, with side slopes graded (excavated) back to a stable angle (usually 2:1 (50% gradient) or less, depending on soil characteristics).

STREAM DIVERSION – A stream that has been diverted out of its natural channel and down a road, across a hillslope or into another stream channel is considered to be diverted. Most stream diversions occur at road crossings, where a stream crossing culvert plugs and streamflow travels down the road or ditch rather than back over the fill and back into its natural channel. Diversions can be man-made or natural, and they occur wherever flow has been obstructed. At road crossings, streams are considered diverted if streamflow leaves its natural channel and travels beyond the stream crossing fill, even if that distance is only a few hundred feet. Diverted streams may quickly flow back into their natural channel, or flow down the road some distance before entering another stream channel or flowing down an unchanneled hillslope.

SUB-BASE – The lowest layer of a road's structural section, placed on the subgrade (native materials) and underlying the base or surface course. It normally consists of a well graded coarse material (pit run gravel, natural gravel or gravel/sand/silt mixtures) that has lower strength and durability than road base materials, but which can still provide structural support to overlying loads.

SUBDRAINAGE (SUBSURFACE DRAINAGE) – The flow of water beneath the surface of the ground (through the soil). Along roads, specific construction techniques can be used to make sure subsurface drainage is not impeded by the roadbed or road fill, and that poor subsurface drainage does not result in slope instability, or persistent saturation or damage to roadbed materials.

SUBGRADE – Consists of the native material beneath the constructed road, and is typically a thoroughly compacted portion of natural embankment material directly beneath the imported base materials or road foundation. In some cases, the term can also refer to imported material that has been used to build an embankment.

SURFACE EROSION – The detachment and transport of soil particles by wind, water or gravity. Surface erosion can occur as the loss of soil in a uniform layer (sheet erosion), in many rills, gullies, or by dry ravel.

SURFACING (SURFACE COURSE) – The top layer of the road surface, also called the wearing course. Rock aggregate and paving are two types of surfacing used to weather-proof the road for wet season use.

SWALE – A channel-like linear depression or low spot on a hillslope which rarely carries runoff except during extreme rainfall events. Some swales may no longer carry surface runoff under the present climatic conditions (See headwater swale).

SWITCHBACK – The location along a road where the route turns and reverses direction, usually over a short distance, where the road is climbing or descending a hillside.

TEMPORARY ROAD – A road that is to be used only during short-lived ranch, timber or mining operations. These roads have a surface adequate for seasonal hauling use and have drainage structures, if any, adequate to carry the anticipated flow of water during the period of use. These drainage structures must be removed prior to the beginning of the winter period (if they are constructed for the design storm flow event) (See temporary stream crossing).

TEMPORARY STREAM CROSSING – A stream crossing that is to be excavated and removed, usually on a

temporary road. If a temporary stream crossing is to remain in place over one winter, it should be designed to the same standards as a permanent watercourse crossing.

THROUGH CUT – A road cut through a hillslope or ridge, or down the fall line of a hillside or ridge, in which there is at least a small cut on both sides of the road. Through cuts that are more than about 2 feet deep are very difficult to drain and are prone to gully and high maintenance costs (See fall line road).

THROUGH FILL – A road which is entirely composed of fill material; the opposite of a through cut. Sometimes through fills have a berm along one or both sides of the road, thereby intentionally containing road surface runoff on the road and directing it to a single discharge point. Through fills are typically found at stream crossings where the fill may be bermed on one or both sides of the road to hydrologically disconnect runoff from the stream and discharge it slightly down road from the crossing (See full fill road).

TOP-DOWN ROAD CONSTRUCTION – Road construction techniques which involve excavating a road bench on the hillside and sidecasting the spoil material on the slopes below. Top-down road construction techniques should only be employed on gently or moderately sloping hillslopes where sidecast material cannot fail or be eroded and transported to local stream channels.

TRASH RACK – See debris control structures, debris rack.

TRENCHLESS TECHNOLOGIES – The use of construction methods to install or repair underground infrastructure (culverts) without digging a trench or opening an excavation cut. Trenchless technologies for culvert repair or replacement include culvert liners, sliplining and pipe jacking or ramming, among others.

TRUNK ROAD – A main, through-going road which typically forms the core of a road network that also contains secondary and spur roads.

TURNOUT – A planned wide spot along a single lane road that is used to allow vehicles to safely pass. Turnouts on single lane roads should be intervisible for safety.

UNDERDRAIN (PIPE UNDERDRAIN) – See French drain.

UNSTABLE AREAS – Areas characterized by mass movement features or unstable soils, or by some or all of the following: hummocky topography consisting of rolling bumpy ground, frequent benches, and depressions; short irregular surface drainages which begin and end on the slope; visible tension cracks and head wall scarps; irregular slopes which may be slightly concave in upper half and convex in lower half as a result of previous slope failure; evidence of impaired ground water movement resulting in local zones of saturation including sag ponds with standing water, springs, or patches of wet ground; hydrophilic (wet site) vegetation; leaning, jackstrawed or split trees; and pistol-butted trees with excessive sweep in areas of hummocky topography.

UNSTABLE SOILS – Are indicated by the following characteristics:

- (1) Unconsolidated, non-cohesive soils (coarser textured than loam) and colluvial debris including sands and gravels, rock fragments, or weathered granitics. Such soils are usually associated with a risk of shallow-seated landslides on slopes of 65% or more, having non-cohesive soils less than 5 feet deep in an area where precipitation exceeds 4 inches in 24 hours in a 5-year recurrence interval.
- (2) Soils that increase and decrease in volume as moisture content changes. During dry weather, these materials become hard and rock-like exhibiting a network of polygonal shrinkage cracks and a blocky structure resulting from desiccation. Some cracks may be greater than 5 feet in depth. When wet, these materials are very sticky, dingy, shiny, and easily molded.

UPGRADING – See road upgrading, road reconstruction, storm-proofing.

VENTED FORD – A stream crossing structure, usually used on a perennial, low gradient stream or small river, designed to allow low water flow in the stream channel to pass through the structure (e.g., culverts) below a hardened (usually concrete) roadway. During

periods of high water or flooding, streamflow passes over the roadway and the crossing is closed to traffic.

VERTICAL CURVE – The vertical arc of a circle whose radius is that of the road as it rises and falls (over a hill), or falls and rises (across a swale or dip) through a change in grade.

WASHBOARDING – A series of regular bumps consisting of closely spaced ridges and depressions across the road caused by vehicle traffic over unsurfaced and gravel surfaced roads with low surface cohesion. They are most often seen in hot, dry areas and on sandy, dirt or gravel roads. Washboards develop when vehicles exceed a critical speed, or where they accelerate and repeatedly kick-up loose materials. They worsen with excessive vehicle speeds and high traffic volumes.

WASHED OUT STREAM CROSSING – A stream crossing fill that has been partially or completely eroded and “washed” downstream. Washouts usually occur when a culvert plugs and streamflow backs up and flows over the roadbed during flood events.

WATERBAR (WATERBREAK) – Shallow, drivable ditch excavated at an angle across a road or trail to drain surface runoff. Waterbars are usually built on seasonal or temporary roads which are to receive little or no traffic during the winter period.

WATERCOURSE – Any well-defined channel with distinguishable bed and bank showing evidence of having contained flowing water indicated by erosion or deposit of rock, sand or gravel. Watercourse also includes man-made watercourses (See also Class I, II, III and IV watercourse - California).

WATERCOURSE AND LAKE PROTECTION ZONE (WLPZ - CALIFORNIA) – A strip of land, along both

sides of a watercourse or around the circumference of a lake or spring, where additional practices (or restrictions) may be required for protection of the quality and beneficial uses of water, fish and riparian wildlife habitat, other wildland resources, and for controlling erosion.

WATER QUALITY – The chemical, physical and biological characteristics of water.

WATERSHED – The area or drainage basin contributing water, organic matter, dissolved nutrients and sediments to a stream or lake. An area bounded mostly by ridges and drained, at its outlet, by a single trunk stream.

WATTLES (FASCINE, LIVE FASCINE, STRAW WATTLES) – Long bundles of brush or branch cuttings, bound together into sausage shaped structures, which are partially buried and staked on contour along a slope, preferably to sprout, and form a sediment trap or break up sheet flow on the slope. If the materials are composed of sprouting species, they are called live fascines. Wattles made out of straw encased in a tube-shaped plastic netting are called straw wattles.

WEARING COURSE – See surfacing, surface course.

WET AREA – An area defined by poorly drained, wet soils that are typically caused by emerging springs and seeps and support aquatic vegetation, grasses and forbs as their principal vegetative cover.

WETLANDS – Areas that are inundated by surface water or ground water with a frequency sufficient to support, and under normal circumstances do or would support, a prevalence of vegetative or aquatic life that require saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include, but are not limited to, swamps, marshes, bogs and similar areas that are characterized by seasonally or perennially wet soils and wetland vegetation.

WHEEL GUARDS – Slightly elevated safety rails along both sides of the running surface of a bridge, designed to warn drivers and to help keep vehicles on the bridge.

WINDROW – See filter windrow.

WINGWALLS AND APRONS – Wingwalls are used where the side slopes of the channel adjacent to the entrance are unstable, or where the culvert is skewed to the normal channel flow. They orient flow, protect the fill face and reduce culvert plugging potential.

An apron is a hardened floor between the wingwalls, usually made of concrete, which reduces inlet velocities, turbulence and plugging potential (See headwall).

WINTERIZE – To perform erosion prevention and erosion control work on a road in preparation for winter rains and flood flows. Winterizing activities include waterbarring, ditch cleaning, culvert cleaning, removal of berms, road re-shaping, resurfacing, etc.

WINTER OPERATING PERIOD – In California, the period between November 15 to April 1, except for purposes of installing waterbreaks and rolling dips, in which case the extended period is October 15 to April 1 (for forestry operations).

WINTER OPERATING PLAN – A functional plan developed to describe how land use operations will be conducted during the winter period. Winter operating plans usually contain detailed information on erosion control and erosion prevention actions that are to be followed to protect the site from rainfall and storm runoff.

WINTER OPERATIONS (WET WEATHER OPERATIONS) – Generally refers to logging and associated forest road operations conducted during the wet weather operating period (generally from November 15 to April 1 in California). A wet weather operating plan is required by the California Department of Forestry and Fire Protection for wet season (winter) operations. Other jurisdictions may have similar ordinances and seasonal restrictions.

