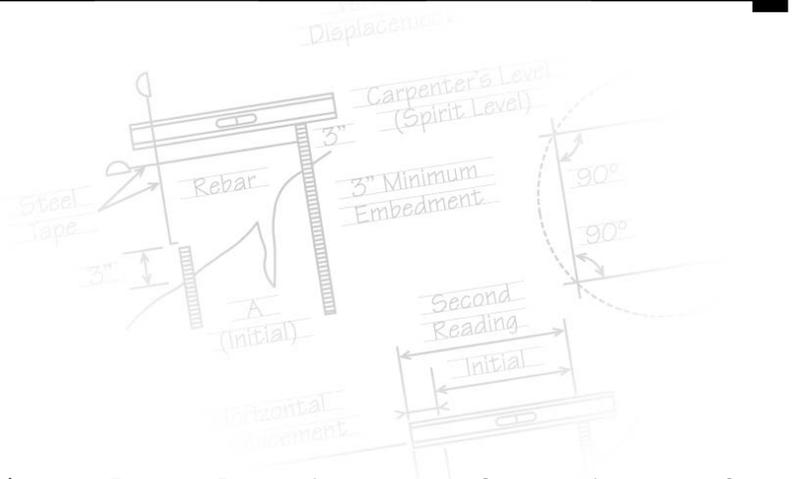


# Glossary



**Abutment** That part of a valley side against which a dam is constructed. Right and left abutments are those on respective sides of an observer looking downstream.

**Air-Vent Pipe** A pipe designed to provide air to the outlet conduit to reduce turbulence during release of water. Extra air is usually necessary downstream of constrictions.

**Appurtenant Structures** Ancillary features of a dam, such as the outlet, spillway, powerhouse, tunnels, etc.

**Arch Dam** A concrete or masonry dam that is curved so as to transmit the major part of the water pressure to the abutments.

**Auxillary Spillway** See *spillway*.

**Backwater Curve** The longitudinal profile of the water surface in an open channel where the depth of flow has been increased by an obstruction, an increase in channel roughness, a decrease in channel width, or a flattening of the bed slope.

**Base Width (Base Thickness)** The maximum width or thickness of a dam measured horizontally between upstream and downstream faces and normal (perpendicular) to the axis of the dam but excluding projections for outlets, etc.

**Berm** A horizontal step or bench in the sloping profile of an embankment dam.

## Blanket

**Drainage Blanket** A drainage layer placed directly over the foundation material.

**Grout Blanket** See *consolidation grouting*.

**Upstream Blanket** An impervious layer placed on the reservoir floor upstream of a dam. In case of an embankment dam, the blanket may be connected to the impermeable element in a dam.

**Butress Dam** A dam consisting of a watertight upstream face supported at intervals on the downstream side by a series of buttresses.

**Cofferdam** A temporary structure enclosing all or part of a construction area so that construction can proceed in a dry area. A *diversion cofferdam* diverts a river into a pipe, channel, or tunnel.

**Concrete Lift** In concrete work the vertical distance between successive horizontal construction joints.

**Conduit** A closed channel for conveying discharge through or under a dam.

**Consolidation Grouting (Blanket Grouting)** The injection of grout to consolidate a layer of the foundation, resulting in greater impermeability, strength, or both.

**Construction Joint** The interface between two successive placings or pours of concrete where a bond, not permanent separation, is intended.

**Core Wall** A wall built of impervious material, usually concrete or asphaltic concrete, in the body of an embankment dam to prevent leakage.

**Crest Length** The length of the top of a dam, including the length of the spillway, powerhouse, navigation lock, fish pass, etc., where these structures form part of the length of a dam. If detached from a dam, these structures should not be included.

**Crest of Dam** Often used when “top of dam” is meant. To avoid confusion, *crest of spillway* and *top of dam* may be used to refer to the overflow section and the dam proper, respectively.

**Culvert** (a) A drain or waterway built transversely under a road, railway, or embankment, usually consisting of a pipe or covered channel of box section. (b) A gallery or waterway constructed through any type of dam, which is normally dry but is used occasionally for discharging water, hence the terms *scour culvert*, *drawoff culvert*, and *spillway culvert*.

**Cutoff** An impervious construction or material which reduces seepage or prevents it from passing through foundation material.

**Cutoff Trench** An excavation later to be filled with impervious material to form a cutoff. Sometimes used incorrectly to describe the cutoff itself.

**Cutoff Wall** A wall of impervious material (e.g., concrete, asphaltic concrete, steel-sheet piling) built into the foundation to reduce seepage under the dam.

**Dam** A barrier built across a watercourse for impounding or diverting the flow of water.

**Dead Storage** The storage that lies below the invert of the lowest outlet and that, therefore, cannot be withdrawn from the reservoir.

**Design Flood** See *spillway design flood*.

**Diaphragm** See *membrane*.

**Dike (Levee)** A long low embankment whose height is usually less than 5 m and whose length is more than 10 times the maximum height. Usually applied to embankments or structures built to protect land from flooding. If built of concrete or masonry, the structure is usually referred to as a *flood wall*. Also used to describe embankments that block areas on a reservoir rim that are lower than the top of the main dam and that are quite long. In the Mississippi River basin, where the old French word *levee* has survived, the term now applies to flood-protecting embankments whose height can average up to 15 m.

**Diversion Channel, Canal, or Tunnel** A waterway used to divert water from its natural course. These terms are generally applied to temporary structures such as those designed to bypass water around a dam site during construction. “Channel” is normally used instead of “canal” when the waterway is short. Occasionally these terms are applied to permanent structures.

**Drainage Area** An area that drains naturally to a particular point on a river.

**Drainage Layer or Blanket** A layer of permeable material in a dam to relieve pore pressure or to facilitate drainage of fill.

**Drainage Wells (Relief Well)** A vertical well or borehole, usually downstream of impervious cores, grout curtains, or cutoffs, designed to collect and direct seepage through or under a dam to reduce uplift pressure under or within it. A line of such wells forms a *drainage curtain*.

**Drawdown** The lowering of water surface level due to release of water from a reservoir.

**Earthen Dam or Earthfill Dam** See *embankment dam*.

**Embankment** A slope of fill material, usually earth or rock, that is longer than it is high. The sloping side of a dam.

**Embankment Dam (Fill Dam)** Any dam constructed of excavated natural materials.

#### *Types of Embankment Dams*

**Earth Dam (Earthfill Dam)** An embankment dam in which more than 50 percent of the total volume is formed of compacted fine-grained material obtained from a borrow area.

**Homogeneous Earthfill Dam** An embankment dam constructed of similar earth material throughout, except internal drains or drainage blankets; distinguished from a zoned earthfill dam.

**Hydraulic Fill Dam** An embankment dam constructed of materials, often dredged, that are conveyed and placed by suspension in flowing water.

**Rockfill Dam** An embankment dam in which more than 50 percent of the total volume comprises compacted or dumped pervious natural or crushed rock.

**Rolled Fill Dam** An embankment dam of earth or rock in which the material is placed in layers and compacted using rollers or rolling equipment.

**Zoned Embankment Dam** An embankment dam composed of zones of materials selected for different degrees of porosity, permeability and density.

**Emergency Action Plan** A predetermined plan of action to be taken to reduce the potential for property damage and loss of lives in an area affected by a dam break.

**Emergency Spillway** See *spillway*.

**Face** The external surface of a structure, e.g., the surface of a wall of a dam.

**Failure** The uncontrolled release of water from a dam.

**Filter (Filter Zone)** A band or zone of granular material that is incorporated into a dam and is graded (either naturally or by selection) so as to allow seepage to flow across or down the filter without causing the migration of material from zones adjacent to it.

**Flashboards** A length of timber, concrete, or steel placed on the crest of a spillway to raise the retention water level but that may be quickly removed in the event of a flood, either by a tripping device or by deliberately designed failure of the flashboard or its supports.

**Floodplain** An area adjoining a body of water or natural stream that has been, or may be, covered by flood water.

**Floodplain Management** A management program to reduce the consequences of flooding—either by natural runoff or by dam failure—to existing and future properties in a floodplain.

**Flood Routing** The determination of the attenuating effect of storage on a flood passing through a valley, channel, or reservoir.

**Flood Surge** The volume or space in a reservoir between the controlled retention water level and the maximum water level. Flood surge cannot be retained in the reservoir but will flow over the spillway until the controlled retention water level is reached.

**Flood Wall** A concrete wall constructed adjacent to a stream to prevent flooding of property on the landward side of the wall, normally constructed in lieu of or to supplement a levee where the land required for levee construction is expensive or not available.

**Foundation of Dam** The natural material on which the dam structure is placed.

**Freeboard** The vertical distance between a stated water level and the top of a dam. *Net freeboard*, *dry freeboard*, *flood freeboard*, or *residual freeboard* is the vertical distance between the estimated maximum water level and the top of a dam. *Gross freeboard* or *total freeboard* is the vertical distance between the maximum planned controlled retention water level and the top of a dam.

**Gallery** (a) A passageway within the body of a dam or abutment, hence the terms *grouting gallery*, *inspection gallery*, and *drainage gallery*. (b) A long and rather narrow hall, hence the following terms for a power plant: *valve gallery*, *transformer gallery*, and *busbar gallery*.

**Gate** A device in which a leaf or member is moved across the waterway from an external position to control or stop the flow.

**Bulkhead Gate** A gate used either for temporary closure of a channel or conduit to empty it for inspection or maintenance or for closure against flowing water when the head difference is small, e.g., for diversion tunnel closure. Although a bulkhead gate is usually opened and closed under nearly balanced pressures, it nevertheless may be capable of withstanding a high pressure differential when in the closed position.

**Crest Gate (Spillway Gate)** A gate on the crest of a spillway to control overflow or reservoir water level.

**Emergency Gate** A standby or reserve gate used only when the normal means of water control is not available.

**Fixed Wheel Gate (Fixed-Roller Gate, Fixed-Axle Gate)** A gate having wheels or rollers mounted on the end posts of the gate. The wheels bear against rails fixed in side grooves or gate guides.

**Flap Gate** A gate hinged along one edge, usually either the top or bottom edge. Examples of bottom-hinged flap gates are tilting gates and *belly gates*, so called due to their shape in cross-section.

**Flood Gate** A gate to control flood release from a reservoir.

**Guard Gate (Guard Valve)** A gate or valve that operates fully open or closed. It may function as a secondary device for shutting off the flow of water in case the primary closure device becomes inoperable, but is usually operated under conditions of balanced pressure and no flow.

**Outlet Gate** A gate controlling the outflow of water from a reservoir.

**Radial Gate (Tainter Gate)** A gate with a curved upstream plate and radial arms hinged to piers or other supporting structures.

**Regulating Gate (Regulating Valve)** A gate or valve that operates under full pressure and flow to throttle and vary the rate of discharge.

**Slide Gate (Sluice Gate)** A gate that can be opened or closed by sliding it in supporting guides.

**Gravity Dam** A dam constructed of concrete, masonry, or both that relies on its weight for stability.

**Grout Cap** A concrete pad or wall constructed to facilitate pressure grouting of the grout curtain beneath it.

**Grout Curtain (*Grout Cutoff*)** A barrier produced by injecting grout into a vertical zone, usually narrow horizontally, in the foundation to reduce seepage under a dam.

**Height Above Lowest Foundation** The maximum height from the lowest point of the general foundation to the top of the dam.

**Hydraulic Height** The height to which water rises behind a dam and the difference between the lowest point in the original streambed at the axis of the dam and the maximum controllable water surface.

**Hydrograph** A graphic representation of discharge, stage, or other hydraulic property with respect to time for a particular point on a stream. (At times the term is applied to the phenomenon the graphic representation describes; hence a flood hydrograph is the passage of a flood discharge past the observation point.)

**Inclinometer** An instrument, usually consisting of a metal or plastic tube inserted in a drill hole and a sensitized monitor either lowered into the tube or fixed within it. The monitor measures at different points the tube's inclination to the vertical. By integration, the lateral position at different levels of the tube may be found relative to a point, usually the top or bottom of the tube, assumed to be fixed. The system may be used to measure settlement.

**Intake** Any structure in a reservoir, dam, or river through which water can be drawn into an aqueduct.

**Internal Erosion** See *piping*.

**Inundation Map** A map delineating the area that would be inundated in the event of a failure.

**Leakage** Uncontrolled loss of water by flow through a hole or crack.

**Lining** With reference to a canal, tunnel, shaft, or reservoir, a coating of asphaltic concrete, reinforced or unreinforced concrete, shotcrete, rubber or plastic to provide water tightness, prevent erosion, reduce friction, or support the periphery of structure. May also refer to lining, such as steel or concrete, of outlet pipe or conduit.

**Low-Level Outlet (*Bottom Outlet*)** An opening at a low level from a reservoir generally used for emptying or for scouring sediment and sometimes for irrigation releases.

**Masonry Dam** A dam constructed mainly of stone, brick, or concrete blocks that may or may not be joined with mortar. A dam having only a masonry facing should not be referred to as a masonry dam.

**Maximum Cross-Section of Dam** A cross-section of a dam at the point of its maximum height.

**Maximum Water Level** The maximum water level, including flood surcharge, the dam is designed to withstand.

**Membrane (*Diaphragm*)** A sheet or thin zone or facing made of a flexible material, sometimes referred to as a *diaphragm wall* or *diaphragm*.

**Minimum Operating Level** The lowest level to which the reservoir is drawn down under normal operating conditions.

**Morning Glory Spillway** See *spillway*.

**Normal Water Level** For a reservoir with a fixed overflow sill the lowest crest level of that sill. For a reservoir whose outflow is controlled wholly or partly by movable gates, siphons or other means, it is the maximum level to which water may rise under normal operating conditions, exclusive of any provision for flood surcharge.

**One-Hundred Year (100-Year) Exceedance Interval** The flood magnitude expected to be equaled or exceeded on the average of once in 100 years. It may also be expressed as an *exceedance frequency*, i.e. a percent chance of being exceeded in any given year.

**Outlet** An opening through which water can be freely discharged from a reservoir.

**Overflow Dam** A dam designed to be overtopped.

**Parapet Wall** A solid wall built along the top of a dam for ornament, for the safety of vehicles and pedestrians, or to prevent overtopping.

**Peak Flow** The maximum instantaneous discharge that occurs during a flood. It coincides with the peak of a flood hydrograph.

**Pervious Zone** A part of the cross-section of an embankment dam comprising material of high permeability.

**Phreatic Surface** The free surface of groundwater at atmospheric pressure.

**Piezometer** An instrument for measuring pore water pressure within soil, rock, or concrete.

**Piping** The progressive development of internal erosion by seepage, appearing downstream as a hole or seam discharging water that contains soil particles.

**Pore Pressure** The interstitial pressure of water within a mass of soil, rock, or concrete.

**Pressure Cell** An instrument for measuring pressure within a mass of soil, rock, or concrete or at an interface between one and the other.

**Pressure Relief Pipes** Pipes used to relieve uplift or pore water pressure in a dam's foundation or structure.

**Probable Maximum Flood (PMF)** A flood that would result from the most severe combination of critical meteorologic and hydrologic conditions possible in the region.

**Probable Maximum Precipitation (PMP)** The maximum amount and duration of precipitation that can be expected to occur on a drainage basin.

**Pumped Storage Reservoir** A reservoir filled entirely or mainly with water pumped from outside its natural drainage area.

**Regulating Dam** A dam impounding a reservoir from which water is released to regulate the flow in a river.

**Relief Well** See *drainage well*.

**Reservoir Area** The surface area of a reservoir when filled to controlled retention level.

**Reservoir Routing** The computation by which the interrelated effects of the inflow hydrograph, reservoir storage, and discharge from the reservoir are evaluated.

**Reservoir Surface** The surface of a reservoir at any level.

**Riprap** A layer of large stones, broken rock, or precast blocks placed randomly on the upstream slope of an embankment dam, on a reservoir shore, or on the sides of a channel as a protection against wave action. Very large riprap is sometimes referred to as armoring.

**Risk Assessment** As applied to dam safety, the process of identifying the likelihood and consequences of dam failure to provide the basis for informed decisions on a course of action.

**Rockfill Dam** See *embankment dam*.

**Rollcrete or Roller-Compacted Concrete** A no-slump concrete that can be hauled in dump trucks, spread with a bulldozer or grader, and compacted with a vibratory roller.

**Seepage** The interstitial movement of water that may take place through a dam, its foundation, or its abutments.

**Sill** (a) A submerged structure across a river to control the water level upstream. (b) The crest of a spillway. (c) A horizontal gate seating, made of wood, stone, concrete or metal at the invert of any opening or gap in a structure, hence the expressions *gate sill* and *stoplog sill*.

**Slope** (a) The side of a hill or mountain. (b) The inclined face of a cutting or canal or embankment. (c) Inclination from the horizontal. In the United States, it is measured as the ratio of the number of units of horizontal distance to the number of corresponding units of vertical distance. The term is used in English for any inclination and is expressed as a percentage when the slope is gentle, in which case the term *gradient* is also used.

**Slope Protection** The protection of a slope against wave action or erosion.

**Sluiceway** See *low-level outlet*.

**Spillway** A structure over or through which flood flows are discharged. If the flow is controlled by gates, it is a controlled spillway; if the elevation of the spillway crest is the only control, it is an uncontrolled spillway.

**Auxiliary Spillway (Emergency Spillway)** A secondary spillway designed to operate only during exceptionally large floods.

**Fuse-Plug Spillway** An auxiliary or emergency spillway comprising a low embankment or a natural saddle designed

to be overtopped and eroded away during a very rare and exceptionally large flood.

**Primary Spillway (Principal Spillway)** The principal or first-used spillway during flood flows.

**Shaft Spillway (Morning Glory Spillway)** A vertical or inclined shaft into which flood water spills and then is conducted through, under, or around a dam by means of a conduit or tunnel. If the upper part of the shaft is splayed out and terminates in a circular horizontal weir, it is termed a “bellmouth” or “morning glory” spillway.

**Side Channel Spillway** A spillway whose crest is roughly parallel to the channel immediately downstream of the spillway.

**Siphon Spillway** A spillway with one or more siphons built at crest level. This type of spillway is sometimes used for providing automatic surface-level regulation within narrow limits or when considerable discharge capacity is necessary within a short period of time.

**Spillway Channel (Spillway Tunnel)** A channel or tunnel conveying water from the spillway to the river downstream.

**Spillway Design Flood (SDF)** The largest flood that a given project is designed to pass safely. The reservoir inflow-discharge hydrograph used to estimate the spillway discharge capacity requirements and corresponding maximum surcharge elevation in reservoir.

**Stilling Basin** A basin constructed to dissipate the energy of fast-flowing water, e.g., from a spillway or bottom outlet, and to protect the riverbed from erosion.

**Stoplogs** Large logs or timber or steel beams placed on top of each other with their ends held in guides on each side of a channel or conduit providing a cheaper or easily handled temporary closure than a bulkhead gate.

**Storage** The retention of water or delay of runoff either by planned operation, as in a reservoir, or by temporary filling of overflow areas, as in the progression of a flood crest through a natural stream channel.

**Tailrace** The tunnel, channel or conduit that conveys the discharge from the turbine to the river, hence the terms *tailrace tunnel* and *tailrace canal*.

**Tailwater Level** The level of water in the tailrace at the nearest free surface to the turbine or in the discharge channel immediately downstream of the dam.

**Toe of Dam** The junction of the downstream face of a dam with the ground surface, referred to as the *downstream toe*. For an embankment dam the junction of upstream face with ground surface is called the *upstream toe*.

**Top of Dam** The elevation of the uppermost surface of a dam, usually a road or walkway, excluding any parapet wall, railings, etc.

**Top Thickness (Top Width)** The thickness or width of a dam at the level of the top of the dam. In general, “thickness” is used for gravity and arch dams, “width” for other dams.

**Transition Zone (Semipervious Zone)** A part of the cross-section of a zoned embankment dam comprising material of intermediate size between that of an impervious zone and that of a permeable zone.

**Trashrack** A screen located at an intake to prevent the ingress of debris.

**Tunnel** A long underground excavation usually having a uniform cross-section. Types of tunnel include: *headrace tunnel*, *pressure tunnel*, *collecting tunnel*, *diversion tunnel*, *power tunnel*, *tailrace tunnel*, *navigation tunnel*, *access tunnel*, *scour tunnel*, *drawoff tunnel*, and *spillway tunnel*.

**Underseepage** The interstitial movement of water through a foundation.

**Uplift** The upward pressure in the pores of a material (interstitial pressure) or on the base of a structure.

**Upstream Blanket** See *blanket*.

**Valve** A device fitted to a pipeline or orifice in which the closure member is either rotated or moved transversely or longitudinally in the waterway so as to control or stop the flow.

**Waterstop** A strip of metal, rubber or other material used to prevent leakage through joints between adjacent sections of concrete.

**Weir** (a) A low dam or wall built across a stream to raise the upstream water level, called *fixed-crest weir* when uncontrolled. (b) A structure built across a stream or channel for measuring flow, sometimes called a *measuring weir* or gauging weir. Types of weir include *broad-crested weir*, *sharp-crested weir*, *drowned weir*, and *submerged weir*.