

GLOSSARY OF TERMS

Abrasion - The wearing away of the surface of a solid by friction.

Abscissa - The distance measured in the "x" or horizontal direction on a graph.

Absorption - Process of a soil or aggregate holding a fluid mechanically, by capillary action. This applies both to water and asphalt.

Adhesion - (1) Shearing resistance between soil and another material under zero externally applied temperature.

(2) Molecular attraction exerted between the surfaces of bodies in contact.

Admixtures for Portland Cement Concrete - Materials other than water, aggregate, Portland cement, and fiber reinforcement that is used as an ingredient of Portland cement concrete to modify its freshly mixed, setting, or hardened properties and that is added to the batch before or during its mixing.

Aggregate - Any hard, inert mineral material used for mixing in graduated fragments. It includes sand, gravel, crushed stone, and blast-furnace slag.

(1) Coarse aggregate for Portland cement concrete - that retained on a No. 8 (2.36 mm) sieve.

(2) Fine aggregate for Portland cement concrete - that passing a 3/8" (9.5 mm) sieve and almost entirely passing a No. 4 (4.75 mm) sieve, and predominantly retained on a No. 200 (75µm) sieve.

Air-Entraining Agent - An admixture used in Portland cement concrete to increase the amount of entrained air in the mixture. Air is entrained in minute bubbles in the concrete or mortar during mixing.

Aliquot - A part of the whole that divides evenly into the whole, as 3 ml is an aliquot portion, 1/8 of 24 ml.

Anhydrous - A material which has an affinity for water due to the fact that the water in its crystalline structure has been removed.

Asphalt - A dark brown to black cementitious material, solid or semi-solid in consistency, in which the predominating constituents are bitumens which occur in nature as such or are obtained as residual in refining petroleum.

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Asphalt Cement - Asphalt that is refined to meet specifications for paving, industrial, and special purposes.

Asphalt Emulsion Slurry Seal - A mixture of slow-setting emulsified asphalt, fine aggregate and mineral filler, with water added to produce a slurry consistency.

Asphalt Joint Fillers .. Asphaltic products used for filling cracks and joints in pavement and other structures.

Asphaltic Concrete .. A thoroughly controlled hot mixture of asphalt cement and well-graded aggregate, thoroughly compacted into a uniform dense mass.

Auger - A drill for test holes in unconsolidated material modeled after the conventional screw auger.

Bitumen - Hydrocarbon material of natural and/or pyrogenous origin, frequently accompanied by their non-metallic derivatives, which may be gaseous, liquid, semi solid or solid, and is completely soluble in carbon disulfide.

Bleeding .. (1) Upward migration of bituminous material resulting in a film of asphalt on the surface.

(2) Escape of water from freshly placed concrete commonly observed as an accumulation on a horizontal surface.

Boulder - A rock fragment, usually rounded by weathering or abrasion, which will be retained on a 3 inch (75 mm) sieve.

Capillarity - The rise or movement of a liquid in the interstices of a soil due to capillary forces.

Chemical Change - Any change resulting in formation of a new substance.

Clay (Clay Soil) - Fine-grained soil or the fine-grained portion of a soil that can be made to exhibit plasticity within a range of water contents and that exhibits considerable strength when air-dry.

Coal Tar - Tar produced by destructive distillation of bituminous coal.

Cohesion - (1) The property of a soil that makes its particles stick together (clay is a cohesive soil).

(2) The property of a bituminous material that holds the mass together.

Colloidal - Pertaining to soil particles that are so small (less than 0.001 mm) that the surface activity has an appreciable influence on the properties of the aggregate.

Compaction - The densification of a soil by means of mechanical manipulation.

Compressibility - Property of a soil pertaining to its susceptibility to decrease in volume when subjected to load.

Consistency- (1) The relative ease with which a soil can be deformed.

(2) Relative mobility of freshly mixed concrete commonly defined as slump.

Corrugations - Regular transverse undulations on the surface of sheet metal, consisting of alternate valleys and crests.

Curing of Concrete - A period provided to prevent formation of surface cracks due to rapid loss of water while concrete is plastic, and to assure attainment of maximum strength.

Curing Compound (Liquid) - A liquid, membrane-forming material used in curing Portland cement concrete, which prevents moisture loss during the early hardening period. Papers and other impermeable sheet materials can be used for the same purpose.

Cutback (Liquid) Asphalt - Asphalt cement which has been liquified by blending with petroleum distillates. Upon exposure to atmospheric conditions the diluents evaporate, leaving the asphalt cement to perform its function.

(1) Rapid Curing (RC) - Composed of asphalt cement and a naphtha or gasoline-type diluent of high volatility.

(2) Medium Curing (MC) - Composed of asphalt cement and a kerosene-type medium volatility.

(3) Slow Curing (SC) - Composed of asphalt cement and oils of low volatility.

Deflocculant - An agent that prevents fine soil particles in suspension from coalescing to form flocs; for example the working solution employed in the Sand Equivalent test.

Density (Unit Weight) - Weight of a material per unit volume.

Disintegration - Deterioration or separation into smaller fragments from any cause.

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Distillation - Process of driving off gas or vapor from liquids or solids, with heat, in a retort or still, and condensing products therefrom.

Ductility - Capability of being drawn out or hammered thin. A common test for bituminous materials, which determines, indirectly, the adhesive quality, and temperature susceptibility.

Elasticity - That property of a body which causes it to recover its original shape and size when it is deformed and the deforming forces are removed.

Emulsified Asphalt - A heterogeneous system containing two normally immiscible phases (asphalt cement and water) with a small amount of emulsifying agent. It exists in a liquid state at normal temperatures. Emulsified asphalts may be anionic, with electro-negatively charged asphalt globules; or cationic, with electropositively charged asphalt globules, depending upon the emulsifying agent.

Erosion - The loosening and transporting of rock debris and soil by moving agents operating on the earth's surface. The four main agents are: wind, waves and currents in bodies of water, glaciers, and running water.

Expansion Joint - Joint permitting pavement to expand in length.

Fabricating Plant - A plant where steel members are riveted or welded together to form steel beams, trusses, metal pipe, etc.

Fineness Modulus - An index of the fineness or coarseness of an aggregate; the summation of the cumulative percentages of the material retained on the specified series of sieves divided by 100. It is **not** an indication of grading. Sieve sizes used are No. 100 (150 μ m), No. 50 (300 μ m), No. 30 (600 μ m), No. 16 (1.18 mm), No. 8 (2.36 mm), No. 4 (4.75 mm), 3/8 inch (9.5 mm), 3/4 inch (19.0 mm), 1-1/2 inch (37.5 mm), and larger, increasing in the ratio of 2 to 1.

Floe - Loose, open-structured mass formed in a suspension by aggregation of minute particles.

Flocculation - Process of forming flocs.

Free Water (Ground Water) - Water that is free to move through a soil mass under the influence of gravity.

Friable - Easily broken or crumbled.

Frost Action - Freezing and thawing of moisture in materials and the resultant effects on these materials and on structures of which they are a part or with which they are in contact.

Gradation - Proportion of material of each grain-size present in a given aggregate sample.

Granular - Material that does not contain more than 35 percent of soil particles which will pass a No. 200 (75 μ m) sieve.

Gravel - Rounded or semi-rounded particles of rock that will pass a 3 inch (75 mm) sieve and be retained on a No. 10 (2.00 mm) sieve.

Heave - Upward movement of soil caused by expansion or displacement resulting from phenomena such as moisture absorption, removal of overburden, driving of piles, frost action, etc.

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

High-Early Strength Cement - A finer ground cement with a different chemical composition that reaches a high strength in a shorter period of time than regular cement.

Hydrated Lime - A dry powder obtained by treating quicklime with water enough to satisfy its chemical affinity for water under the conditions of its hydration. It is predominantly calcium hydroxide.

Hydraulic Cement - A cement that sets and hardens by chemical interaction with water and that is capable of doing so under water.

Hydrophilic - Literally, water-loving. The property that defines a material as having an affinity (attractive force) for water.

Hydrophobic - Literally, water-averting. The property that defines a material as lacking an affinity (attractive force) for water.

Hygroscopic Water - Water retained in an air-dried soil. It is held by each soil grain in a very thin film and has both physical and chemical affinity for the grain. This moisture is in equilibrium with the air humidity.

Joint (Pavement) - A narrow space separating two slabs or sections of pavement.

Leaching - The removal of soluble salts or other soluble particles by percolating water.

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- Liquid Limit** - (1) The moisture content which is the boundary between the liquid and plastic states for the minus No. 40 (425 μ m) fraction of a soil.
- (2) That moisture content at which a soil fraction will close a standard groove for a length of about 1/2 inch (13 mm) when subjected to 25 blows in a liquid limit device.

Macadam - An asphalt pavement construction using a coarse, open-graded aggregate that is usually produced by crushing and screening stone, slag or gravel.

Maximum Size of Soil and Aggregate - The smallest sieve opening through which the entire amount of material will pass.

Note: Another definition, which applies only to aggregates used in Superpave mixes (Section 417, "Asphaltic Concrete (End Product) SHRP Volumetric Mix", of the ADOT Specifications) is: Maximum Aggregate Size - One size larger than the nominal maximum aggregate size.

Mesh - The square opening of a sieve.

Modulus of Rupture - A measure of the flexural strength of concrete when it is broken by bending. The higher the values the greater the strength.

- Moisture Content** - (1) The proportion of moisture in soil or aggregate material, expressed as a percent of the dry weight.
- (2) Optimum Moisture Content - The percentage of moisture at which the greatest density of a particular soil can be obtained through compaction by a specified method.
- (3) The proportion of moisture in bituminous mixtures, expressed as a percent of the wet weight.

Nominal Maximum Size of Soil and Aggregate - The smallest sieve opening through which the entire amount of material, by specification, is permitted to pass.

Note: Another definition, which applies only to aggregates used in Superpave mixes (Section 417, "Asphaltic Concrete (End Product) SHRP Volumetric Mix", of the ADOT Specifications) is: Nominal Maximum Aggregate Size - One size larger than the first sieve that retains more than 10 percent aggregate.

Ordinate - The distance measured in the "y" or vertical direction on a graph.

Overlay - One or more courses of asphalt construction on an existing pavement, generally including a leveling course, followed by a uniform course or courses to provide needed thickness.

Penetration - The consistency of a bituminous material expressed as the distance that a standard needle vertically penetrates a sample of the material under known conditions of loading, time and temperature.

Permeability - That property of a material which permits a liquid to flow through its pores or interstices.

pH - An index of acidity or alkalinity, in terms of the logarithm of the reciprocal of the hydrogen ion concentration. A pH of seven, the value for pure distilled water, is regarded as neutral; pH values of less than seven indicate acidity; and, pH values of greater than seven indicate alkalinity.

Plasticity - The property of a soil which allows it to be deformed beyond the point of elastic recovery without cracking or appreciable volume change.

Plasticity Index (PI) - Numerical difference between the liquid limit and the plastic limit.

Plastic Limit - (1) The water content corresponding to an arbitrary limit between the plastic and semisolid states of consistency of a soil.

(2) Water content at which a soil will just begin to crumble when rolled into a thread about 1/8 inch (3 mm) in diameter.

Porosity - The ratio, in percent, of the volume of void space (pores) of a material to the total volume of its mass.

Portland Cement - A hydraulic cement made by pulverizing portland-cement clinker (a clinker, partially fused by pyroprocessing, consisting predominantly of crystalline hydraulic calcium silicates), and usually containing calcium sulfate.

Prime Coat - The first application of a bituminous material to an existing absorbent surface.

Pumping - The ejection of foundation soil wet or dry, through joints or cracks, or along edges of rigid slabs, due to vertical movements under traffic.

Quicklime - A calcined material, the major part of which is calcium oxide or calcium oxide in association with a lesser amount of magnesium oxide, capable of slaking with water.

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Raveling - Progressive disintegration of a pavement surface by dislodgment of aggregate particles.

Relative Density - (1) Soils - The ratio of (1) the difference between the void ratio of a cohesionless soil in the loosest state and any given void ratio, to (2) the difference between the void ratios in the loosest and in the densest states. This definition is expressed as an equation below:

$$Dr = \frac{E_{max} - E_n}{E_{max} - E_{min}}$$

Where: Dr = Relative density of cohesionless soils
 E_{max} = Void ratio of soil in the loosest state
 E_{min} = Void ratio of soil in the densest state
 E_n = Any given void ratio

(2) Asphaltic Concrete - Often used for specimens prepared by means of the Superpave gyratory compactor; the ratio, expressed as a percentage, of the bulk specific gravity (at any number of gyrations) to the theoretical maximum specific gravity.

Riprap - Broken rock used for the protection of embankments, cut slopes, etc., against agents of erosion, primarily water.

Road Mix - A mixture of aggregate and asphalt prepared in place.

Rock - Natural solid mineral matter occurring in large masses or fragments.

Rutting - Formation of longitudinal depressions by the lateral displacement of soils or surfaces under traffic.

Sand - Particles of rock that will pass the No. 4 (4.75 mm) sieve and be retained on the No. 200 (75 μ m) sieve.

Saturated Surface-Dry - Term used to describe the condition of an aggregate in which the pores of all the particles are completely filled with water, but their surfaces are free from moisture.

Screed - To strike off excess material to bring the top surface to proper contour and elevation.

Screen - An apparatus, in which the apertures are circular, for separating sizes of material.

Seal Coat - A thin asphaltic surface treatment used to improve the texture of and to waterproof an asphalt pavement surface.

Settlement - The reduction in elevation of short sections of pavement or structures, due to compressibility of underlying soils.

Shear Strength - The maximum resistance of a soil to shearing stresses.

Shear Stress - An action or stress, resulting from applied forces, which tends to cause two contiguous parts of a body to slide relatively to each other in a direction parallel to their plane of contact.

Sieve - An apparatus, in which the apertures are square, for separating sizes of material.

Silt - Material passing the No. 200 (75 μm) sieve that is nonplastic or very slightly plastic and that exhibits little or no strength when air-dried.

Slump - The measure of the consistency of concrete determined by placing the concrete in a standard slump cone, removing the cone, and allowing the concrete to settle under its own weight.

Soil - Sediments or other consolidated accumulations of solid particles produced by the chemical and physical disintegration of rocks, and which may or may not contain organic matter.

Soil Profile - Vertical section of a soil, showing the nature and sequence of the various layers, as developed by deposition or weathering or both.

Soundness - Resistance to both physical and chemical deterioration.

Spalling - Peeling away of a surface, particularly Portland cement concrete.

Specific Gravity (Absolute) - The ratio of the weight in air of a given volume of material at a stated temperature, to the weight in air of the volume of water which the material displaces.

Specific Gravity (Apparent) Ratio of the weight in air of a given volume of impermeable material (that is, the solid matter including the impermeable pores) to the weight of an equal volume of water at a stated temperature.

Specific Gravity (Bulk) - Ratio of the weight of a given volume of permeable material (including permeable and impermeable voids) to the weight of an equal volume of water at a stated temperature.

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Spelter - The zinc coating used for rustproofing iron or steel by galvanizing.

Stability - Property of a material which enables it to retain its other essential characteristics throughout the range of conditions expected in service.

Stone - Crushed or naturally angular particles of rock that will pass a 3 inch (75 mm) sieve and be retained on a No. 10 (2.00 mm) sieve.

Stripping - Separation of bituminous films from aggregate particles due to presence of moisture.

Swell - Increase in volume due to the absorption of water into the intergranular pore space.

Tack Coat - A very thin spraying of bituminous material on an existing surface to increase the adhesion, or bond, between a new course of construction and the old surface.

Titration - The volumetric addition of a solution, of known concentration, to another solution to determine an end point reaction.

Top Soil - Usually the upper 6 inches (150 mm) of native soil and that portion used in dressing and landscaping earth slopes.

Viscosity - The property of a fluid to resist internal flow.

Void - Space in a mass not occupied by solid mineral matter; it may be occupied by air, or other fluids.

Warping - Deviation of pavement surface from original shape caused by temperature and moisture differentials within the slab.

Yield - Ratio of the volume of a Portland cement concrete mixture produced to that which theoretically should be produced.

NOTE: Additional information on Terminology and Definitions of Terms can be found in various other sources, including the following:

AASHTO M 146: "Terms Relating to Subgrade, Soil-Aggregate, and Fill Materials".

AASHTO R 10: "Definition of Terms for Specifications and Procedures".

ASTM C 125: "Standard Terminology Relating to Concrete and Concrete Aggregates".

ASTM C 219: "Standard Terminology Relating to Hydraulic Cement".

ASTM D 8: "Standard Terminology Relating to Materials for Roads and Pavements".

ASTM D 653: "Standard Terminology Relating to Soil, Rock, and Contained Fluids".

ASTM E 456: "Standard Terminology Relating to Quality and Statistics".