

## Glossary

See also list of Abbreviations and Acronyms on pp. xiv-xv.

**Note.** The following interpretations of terms apply to chipsealing, irrespective of any meaning the words may have for other topics.

Entries in CAPITALS are defined further as a separate entry.

Entries in *italics* are alternative terms that are not defined further.

### A

**AADT (annual average daily traffic):** the total yearly traffic volume in both directions divided by the number of days in the year, expressed as vehicles per day (vpd).

**ABRASION:** the wearing away of the surface of an aggregate by mechanical action, including trafficking.

*Los Angeles Abrasion Test:* a test of resistance to abrasion offered by an aggregate under specified conditions.

**ABSORPTION:** the process of water molecules penetrating the interior of an aggregate particle.

**ABUTMENT:** an end support of a bridge or similar structure.

**ADDITIVE:** any substance which is added in small amounts to impart some particular property, e.g. to improve adhesion, lower the viscosity, or modify the end properties.

**ADHESION:** the action by means of which a fluid substance, e.g. a bituminous binder, sticks to the surface of a solid body, e.g. chip. It arises through intermolecular attraction between the contact surfaces.

**ADHESION AGENT:** any substance which is added in small amounts to bituminous materials to improve adhesion of the binder to aggregate in the presence of water. May also be referred to as an *Anti-stripping Agent*.

**ADSORPTION:** the attachment of a substance to the surface of a solid, such as an aggregate particle, by molecular attraction, e.g. condensation of water on a chip surface.

**AGGREGATE:** a general term for discrete mineral particles of specified size or size distribution, e.g. crushed rock, slag, gravel and sand.

Size may be: COARSE aggregate for material retained on the 4.75 mm sieve; or FINE aggregate for material passing the 4.75 mm sieve. Also called CHIP.

**AGO (Automotive Gas Oil):** a petroleum distillate used to FLUX bituminous materials. Colloquially known as *Diesel Fuel*.

**AIR VOID:** see VOID.

**ALIGNMENT:** the geometric form of the centreline, or other reference line, of the CARRIAGEWAY with respect to the horizontal or vertical axes.

**ALLIGATOR CRACKING:** see CRACKING.

**ALLUVIUM (n); ALLUVIAL (adj.):** material (gravel, sand, silt) which has been carried by water and deposited where the water velocity was insufficient to keep it moving. In roading, *alluvial aggregates* usually refer to rounded river-borne aggregates.

**ANIONIC EMULSION:** a bituminous emulsion which has a negative charge conferred on each bitumen droplet.

**ANISOTROPIC:** having properties that vary in different directions.

**ANTI-FOAM AGENT:** a substance, e.g. silicone oil, which when added to a bitumen will reduce surface tension and hence reduce frothing tendency of hot bitumen in the presence of water.

**ANTI-STRIPPING AGENT:** see ADHESION AGENT.

**AP, ALL PASSING; PAP, PREMIUM ALL PASSING:** aggregate that passes through certain sized sieves.

**APPLICATION RATE:** For BINDER, the amount of material applied to a given area of road surface, expressed in litres per square metre ( $\ell/m^2$ ). For CHIP, application rates are traditionally specified in terms of area per volume ( $m^2/m^3$ ).

**AQUAPLANING:** a condition occurring on a wet road surface where the tyres of a moving vehicle lose contact with the road surface and ride on a film of water. Vehicular control is lost. Also known as *Hydroplaning*.

**AREA-WIDE PAVEMENT TREATMENT (AWPT):** usually refers to structural pavement treatments applied to substantial lengths of roads, including large areas requiring DIGOUT and replace, or RECYCLING.

**ARTERIAL ROAD:** a road that carries predominantly through-traffic from one region to another, and is a principal avenue of communication for traffic movements.

**ASPHALT:** a natural or manufactured mixture in which bitumen is associated with inert mineral matter.

**ASPHALT (HOT MIXED); ASPHALT CONCRETE:** see ASPHALTIC CONCRETE.

**ASPHALT PLANT:** see MIXING PLANT.

**ASPHALTENE:** a constituent of bitumen soluble in carbon disulphide, but insoluble in a selected paraffin hydrocarbon solvent such as n-heptane.

**ASPHALTIC CONCRETE:** a mixture of bituminous binder and aggregate with or without mineral filler produced in a mixing plant. It is delivered, spread and compacted while hot, for use in road construction. Also known as *Asphaltic Concrete Surfacing*.

Where an asphaltic concrete is applied over existing chipseals, or constructed directly over a new chipseal, the chipseal is called a MEMBRANE SEAL and acts as waterproofing beneath the asphalt layer.

**ASSET MANAGEMENT:** the application of engineering, financial and management practices to optimise the LEVEL OF SERVICE of an asset, such as a road, in return for the most cost-effective financial input.

**ASSET MANAGEMENT SYSTEM:** see PAVEMENT MANAGEMENT SYSTEM (PMS).

**ATTERBERG LIMIT(S):** set of arbitrarily defined boundary conditions in a material, e.g. SOIL, related to water content.

- LIQUID and PLASTIC LIMITS – define the water contents at which a material passes from liquid

to plastic state, and from plastic to semi-solid state.

- SHRINKAGE LIMIT – the water content below the Plastic Limit when no further change in volume (shrinkage) will take place.
- PLASTICITY INDEX – the numerical difference between the values of the Liquid and Plastic Limits of a material.

**ATTRITION:** the wear of chip used for roadmaking. It is measured by the *Micro-Duval Attrition Test*, in which pieces of chip are placed in a closed cylinder, rotated for a given time, and the loss of weight caused by wear is recorded.

**AVERAGE GREATEST DIMENSION (AGD):** the average of the greatest dimension of a sample of chips, aligned in their greatest dimension.

**AVERAGE LEAST DIMENSION (ALD):** the average of the least dimension of a sample of chips. The least dimension of a chip is the distance between two parallel plates in contact with the chip when the chip is placed so that the distance is a minimum.

**AXLE LOAD:** the load applied to a pavement by a single axle.

## B

**BACKFILL:** (noun) fill placed in an excavation.

**BALLAST:** broken stone of about 100 mm diameter used as a foundation course.

**BANDAGING:** a treatment for narrow cracks less than 5 mm wide. Hot binder is poured on to the cleaned pavement, spread to make a 2-3 mm thick by 75-100 mm wide bandage.

**BARRIER:** an obstruction placed to prevent access to a particular area, e.g. prevent vehicles leaving a road.

**BASE:** the base represents the uppermost structural element of a pavement and can either be asphaltic concrete or basecourse. See BASECOURSE.

**BASECOURSE:**

- One or more layers of material usually constituting the uppermost structural element of a pavement and on which the surfacing may be placed. It may be composed of fine crushed rock, natural gravel, broken stone, stabilised material, asphalt or Portland cement concrete.

- A graded aggregate used in such a layer.

**BATCH:** a quantity of materials mixed at the same time.

**BATCH PLANT:** see also MIXING PLANT.

Equipment used to measure by mass or volume the quantities of various ingredients to make up each complete charge for an asphalt mixer.

**BATTER:** the uniform side slope of walls, banks, cuttings, etc. The amount of such slope or rake, usually expressed as a ratio of horizontal to vertical, distinct from GRADE.

**BENCH:** a ledge cut or formed in the batter of a cutting or natural slope to provide greater security against slips.

**BENEFIT/COST RATIO (BCR):** a ratio of the present value of economic benefits derived by the community from transport system improvements over the present value costs of those improvements.

**BENKELMAN BEAM:** an instrument for measuring the deflection of the surface of a pavement caused by the passage of a dual-tyred single axle carrying a standard axle load.

**BERM:**

- A grassed area between the kerb and footpath or between the footpath and boundary.
- The shoulder of a road.
- A narrow shelf, path or ledge formed typically at the top or bottom of an earth slope.
- A mound on the outer edge of a road above a fill batter to protect the batter from erosion.

**BIND (verb):**

- To hold or stick aggregate together in a mass.
- To fill the interstices of small stones or coarse gravels with finer material to provide mechanical and physical binding.

**BINDER:** a general term for a viscous material used to hold solid particles together as a coherent mass (e.g. bitumen, clay). In a chipseal, it is the waterproof adhesive viscous material that binds to both the existing road surface and the sealing chips of the chipseal as a cohesive mass.

**BINDER RISE:** a natural action which occurs during the life of a chipseal that can cause flushing and bleeding.

**BITUMEN:** a viscous liquid or a solid, consisting essentially of hydrocarbons and their derivatives, which is soluble in trichloroethylene. It is almost non-volatile and has thermoplastic properties, i.e. it softens gradually when heated and hardens when cooled. It is black or brown in colour, and has waterproofing and adhesive properties. See also RESIDUAL BINDER.

**BITUMEN BURNS CARD:** a yellow card which gives the correct treatment for bitumen burns. It is attached to the victim when they go to the doctor or hospital in order to alert medical staff to the special treatment required.

**BITUMEN DISTRIBUTOR:** see DISTRIBUTOR.

**BITUMEN EMULSION:** a liquid in which a substantial amount of bitumen or bituminous binder is dispersed as fine droplets (the DISPERSED PHASE) in water (the CONTINUOUS PHASE), and stabilised by means of one or more emulsifying agents. It is available in two basic types, CATIONIC and ANIONIC, and in several grades (*Quick Break, Slow Break, or Stable Grades*), according to the rapidity of BREAKING (*setting*).

**BLEEDING:** the extrusion of a bituminous binder onto the road surface, generally in hot weather. It is distinguished from FLUSHING, which is a solid smooth surface caused by binder rise that may be the end result of Bleeding.

**BLIND:** (verb) to spread a thin layer of suitable material to absorb excess binder or to assist in remedying a slippery or loose condition, or to fill excess surface voids.

**BLOCK CRACKING:** a pattern of cracking of a pavement surface which appears as a series of connected rectangles.

**BLOWN BITUMEN:** bitumen produced by hardening the distillation residue of a crude petroleum by blowing air or steam through it at elevated temperatures.

**BOIL OVER:** The rapid increase in volume caused by the presence of water in hot bitumen and the subsequent overflow of bitumen from a tank. May be called a *Foam Over*. See also FLASHING.

**BONY:** lacking small particles; particularly on the surface of an unsealed road surface or shoulder.

**BOULDER:** a rounded or sub-angular stone or piece of rock of large size, usually larger than 300 mm.

**BOUND MATERIAL or PAVEMENT:** granular material with particles bound together by bitumen, cement, lime, fly ash etc., to improve the strength and stability properties of the aggregate.

**BPN (BRITISH PENDULUM NUMBER):** units of surface friction measured by the BPT.

**BPT (BRITISH PENDULUM TESTER):** device for measuring the surface friction or SKID RESISTANCE of a pavement surface.

**BREAKING:** separation of particles of bituminous binder (the DISPERSED PHASE) from the water (the CONTINUOUS PHASE) in a BITUMEN EMULSION, to form a continuous film. When this occurs, the colour changes from brown to black.

**BRIDGE:** a structure designed to carry a road or path over an obstacle by spanning it.

**BROOM:** a device for sweeping (used for *Brooming*) to:

- remove dust and loose foreign material before spraying a chipseal;
- uniformly distribute aggregate that has been spread inconsistently;
- remove loose aggregate from completed chipseal.

**BULK DENSITY:** the mass of material (including solid particles and contained water) per unit volume including voids.

**BUND:** watertight wall designed to contain any liquids accidentally escaping from tanks, drums or other equipment caused by leaks, damage or incorrect operation.

## C

**CALCINED BAUXITE:** a very high PSV (high skid resistance) chip produced by heating bauxite ore in a kiln. Applied as a high skid resistance road surfacing using epoxy or polyurethane as a binder.

**CALIFORNIA BEARING RATIO, CBR:** a ratio expressed as a percentage between a test load and a standard load. A standardised testing procedure (initiated by Californian State Highways Department in 1929) for comparing the strengths of basecourses for roads (and airfields).

**CAMBER:** the transverse convexity given to the surface of a carriageway or footway.

**CAPACITY:** the maximum rate of flow at which persons or vehicles can reasonably be expected to traverse a point or uniform segment of a lane or road during a given period of time under the prevailing road, traffic and control conditions.

**CAPE SEAL:** a two coat seal in which the first coat is a chipseal, and the second coat is a slurry seal applied soon after (within 1-2 weeks) to fill the texture of the chipseal.

**CAPPING LAYER:** a layer of material placed on the road bed to provide a working platform for construction equipment, and not considered to be part of the pavement.

**CARCINOGENIC:** capable of causing cancer.

**CARRIAGEWAY:** that portion of a road or bridge devoted particularly to the use of vehicles, inclusive of shoulders and auxiliary lanes. Divided roads are considered to have two carriageways. May be called ROADWAY.

**CATCH DRAIN:** a surface channel constructed along the high side of a road or embankment, outside the batter to intercept surface water.

**CATCH PIT:** a concrete pit at the end of a water channel to settle out solids before the flow enters a pipe drain. Also known as a *Gully trap*, *Mud tank*, or *Sump*.

**CATIONIC EMULSION:** a bitumen emulsion which has a positive charge conferred on each bitumen droplet. See BITUMEN EMULSION, ANIONIC EMULSION.

**CEMENT:** a general term for substances that bind aggregates. In concrete work it generally refers to PORTLAND CEMENT.

**CEMENT CONCRETE PAVEMENT:** a general term for a PORTLAND CEMENT CONCRETE (PCC) rigid pavement.

**CEMENT STABILISATION:** the controlled application of CEMENT to improve the load-carrying capacity of a pavement layer (usually the BASECOURSE) or the SUBGRADE.

**CENTISTOKE:** the unit of kinematic viscosity

normally used to define binder viscosity. One centistoke (cSt) = 1 mm<sup>2</sup>/second. See also VISCOSITY.

**CENTRELINE:**

- The line which defines the axis or alignment of the centre of a road or other work.
- A marked line on the centre of the carriageway separating opposing traffic streams.

**CHANNEL:** the drain which accepts water directly from the pavement. See also KERB & CHANNEL (K&C), SURFACE WATER CHANNEL.

**CHIP:** crushed aggregate of similar size, used for road surfacing, particularly in chipsealing. Sizes range from 4.75 mm to 19 mm.

**CHIP LOSS:** loss of chips from a sealed surface.

**CHIP ROLLOVER:** chip is rolled out of its original position.

**CHIP SPREADING:** the action of spreading the chip over a binder film which has been sprayed onto the road surface.

**CHIPSEAL:** a WEARING COURSE consisting of a layer or layers of uniformly sized aggregate or sealing chip, spread over a film of freshly sprayed binder and subsequently rolled into place. Called *Surface dressing* in UK, *Sprayed seal* in Australia.

**CLAY:** very fine (<75mm) complex silicates formed by the natural decomposition of rocks. It shrinks on drying and expands on wetting.

**CLAY INDEX:** a measure (%) of the expandable clay minerals in the <75 µm fraction in an aggregate or in a crushed rock powder.

**COARSE AGGREGATE:** a general term used to differentiate between various sizes of aggregate, usually material retained on a 4.75 mm sieve. Includes Grades 3 and 2 (7.5-10 mm; 9.5-12 mm ALD).

**COHESION:** the ability of a material to resist, by means of internal forces, the separation of its constituent particles.

**COLD MIX:** a mixture of bituminous binder, graded coarse and fine aggregate, with or without mineral filler, produced warm or cold in a mixing plant. It is delivered in a workable condition for stockpiling and ultimate spreading and compaction. The mix is spread and compacted cold. Also known as PREMIX.

**COMBUSTIBLE:** describes a material that, once ignited, is capable of self-sustained burning in air.

**COMPACTION:** the process of reducing the volume of a material by inducing packing of its particles to increase the density or reduce content of air voids, by *Rolling, Tamping* or other mechanical means.

**CONDITION:** a quantitative description of the condition of an asset, often expressed through the results of a survey of pavement defects. See also PAVEMENT RATING.

**CONSISTENCY:** a general term for the physical state of a semi-fluid or plastic material associated with its resistance to deformation or to flow.

**CONSOLIDATION:** the process by which earth or soil reduces in volume over a period of time usually involving loss of water.

**CONSTRUCTION JOINT:** a joint made in construction to separate the mass of the work into several portions for convenience of construction.

**CONTINUOUS PHASE:** the liquid (e.g. water) in which a substantial amount of bitumen or bitumen binder is dispersed as fine droplets (the DISPERSED PHASE) in a BITUMEN EMULSION.

**COPOLYMER:** a polymer that contains two or more kinds of monomer in the same molecule, e.g. SBS.

**CORE:** a cylinder drilled out of a pavement for testing purposes.

**CORRUGATION:** a pavement defect consisting of closely spaced ripples running across the line of traffic, generally where braking and acceleration of vehicles occurs.

**COST EFFECTIVENESS:** an economic measure defined as the effectiveness of an action or treatment in terms of present worth of life-cycle costs.

**CRACKING:**

- Alligator cracking (or Crocodile cracking in Australia): small semi-regular polyhedral shaped contiguous areas of cracking.
- Block cracking: a pattern of cracking of a pavement surface which appears as a series of connected rectangles.
- Reflective cracking: visible cracks in the pavement surfacing, caused by propagation of cracks

through to the pavement surface from the underlying pavement layer.

- Longitudinal and Transverse cracking: long cracks that run along or across the road.
- Shrinkage cracking: cracks caused by shrinkage of old bituminous surfaces.

**CRACK FILLING; CRACK SEALING:** means of filling cracks, usually by BANDAGING.

**CREEP:**

- Slow natural movement of a material.
- Slow plastic deformation of a material under stress; measured by the *Creep test*.

**CROSSFALL:** the slope, at right angles to the alignment, of the surface of any part of the carriageway.

**CROSS SECTION:** a vertical section, generally at right angles to the centreline. On drawings it commonly shows the road to be constructed, or as constructed.

**CROWN:** the highest point on the cross section of a carriageway with two-way crossfall.

**CRUSHED GRAVEL:** a gravel in which all or most of the particles have been crushed.

**CRUSHER DUST:** continuously graded fines remaining after removal of coarser (>5 mm) aggregate from crushed aggregate by screening. Dust or fines produced by crushing gravel or rock.

**CULVERT:** one or more adjacent pipes or enclosed channels for conveying a watercourse or stream below the formation level of a road.

**CURE:** to stiffen or harden by evaporation of volatile constituents or by chemical reaction to achieve the desired end state of a material, such as chipseal, emulsion or concrete.

**CUT:**

- The depth from the natural surface of the ground down to the subgrade level (see also CUTTING),
- To excavate.

**CUT-OFF DRAIN:** an interceptor drain constructed along the top of a cutting or batter to prevent surface water running down the face.

**CUTBACK BITUMEN (or CUTBACK) (noun):** a bitumen the viscosity of which has been temporarily

reduced by the addition of a volatile diluent (CUTTER), such as KEROSENE, to make it more fluid for ease of application.

**CUTBACK (verb):** to reduce temporarily the viscosity of a bituminous material by blending it with a volatile material (CUTTER).

**CUTTER (Cutter Stock):** a volatile distillate added to bitumen to temporarily reduce its viscosity, e.g. KEROSENE, *Turpentine*.

**CUTTING:**

- The portion of the road where the finished road surface is below the natural surface.
- The addition of a solvent, usually kerosene, to bitumen to reduce its viscosity.

**CYCLE PATH:** separate carriageway devoted to the use of pedal cycles.

**CYCLEWAY:** portion of road or footpath devoted to the use of pedal cycles.

## D

**DECIBEL (dB):** a measure of sound. Sound is measured as a ratio of the pressure of the sound waves to the pressure of the quietest sound just detectable by the human ear. A decibel (dB) is 1/10<sup>th</sup> of a Bel. Measures commonly used for levels of sound are  $L_{eq}$ ,  $L_{10}$ ,  $L_{max}$ .

**DECK:** the part of a bridge which directly carries traffic loads.

**DEFLECTION:** the vertical elastic (recoverable) deformation of a pavement surface caused by the application of a load by the tyres of a standard axle.

**DEFLECTION BOWL:** the depressed shape produced at the surface of a pavement when a load is applied.

**DEGRADATION:** the wear and breakdown of an aggregate under compaction equipment or while in service, and caused by rubbing or grinding within the mass.

**DENSE-GRADED MIX:** a bituminous mix made with graded chip, with or without added mineral filler and low in voids. It depends on grading for stability. See also OGEM, OGPA, SMA.



**DENSIFICATION:** reduction in voids and an increase in dry density of an aggregate.

**DEPRESSION:** a road defect in which the road surface has sunk.

**DESIGN LIFE:** the period during which the performance of a pavement or structure, e.g. riding quality, is expected to remain acceptable.

**DESIGN PERIOD:** a period considered appropriate to the function of the road. It is used to determine the total traffic for which the pavement is designed.

**DESIGN PROCESS:** process for arriving at a final design for a transport project and normally divided into three distinct phases:

1. *Functional Design:* preparation of the conceptual design with enough detail to ensure that the design will function as intended.
2. *Preliminary Design:* finalised design in terms of calculations, specifications and estimates so that all aspects of the design have been determined. See also PRELIMINARY ENGINEERING.
3. *Documentation:* preparation of plans and documents describing the design sufficiently for it to be constructed.

**DESIGN SPEED:** a speed fixed for the design of minimum geometric features of a road.

**DESIGN TRAFFIC:** the cumulative traffic, expressed in terms of EQUIVALENT STANDARD AXLES (ESAs), predicted to use a road over the structural design life of the pavement.

**DESIGN VEHICLE:** a hypothetical road vehicle whose mass, dimensions and operating characteristics are used to establish design requirements.

**DESIGN VOLUME:** the number of vehicles expected to use a road, adopted for the purposes of geometric design, normally expressed as the number of vehicles per hour or per day.

**DESIGN WATER CONTENT:** the highest water content of the subgrade soil likely to be reached for a significant period during the design life of the road.

**DESIGN YEAR:** the predicted year in which the design traffic would be reached.

**DIESEL FUEL:** a petroleum distillate used as a FLUX

or CUTTER with bituminous materials. Also known as AGO (*Automotive Gas Oil*).

**DIGOUT:** a pavement repair where soft or defect-ridden pavement is excavated and new basecourse material is added. Either a new first coat seal or a surfacing of hot mix asphalt is applied on top.

**DILUENT:** A substance which has the effect of reducing viscosity when added to bitumen. See also CUTTER or FLUX.

**DIPSTICK:** a steel rod for direct measurement of the volume of binder in the tank (or DISTRIBUTOR).

**DISCHARGE:** the volumetric rate of water flow.

**DISH CHANNEL:** a channel with a shallow U-shaped cross-section.

**DISPERSED PHASE:** the bitumen or bitumen binder dispersed as fine droplets in the liquid (e.g. water or CONTINUOUS PHASE) in a BITUMEN EMULSION.

**DISTRIBUTOR:** also called *Bitumen Distributor* or *Bitumen Tank and Sprayer*. It is built specifically for storing hot bituminous BINDER at the correct temperature for spraying.

**DIVIDED ROAD; DIVIDED CARRIAGEWAY:** a road having a separate carriageway for traffic travelling in opposite directions.

**DRAG:** (noun) a simple towed frame used to re-distribute running course over an unsealed surface; (verb) to use a drag.

**DRAG BROOM:** a towed frame carrying several broom heads, used for levelling or re-distributing sealing chip.

**DRAIN:** a channel formed at the surface or a culvert, pipe or other similar construction for drainage, for intercepting and removing water.

**DRAINAGE:** natural or artificial means for intercepting and removing surface or subsurface water (usually by gravity).

**DRIVEWAY:** a defined area used by vehicles travelling between a carriageway and a property adjacent or near to the road. Also called *Access Way*.

**DROP OUT:** a road fault where the downhill edge of the pavement has slipped away.

**DRUM PLANT** or *Continuous Plant*: See MIXING PLANT.

**DRY DENSITY**: ratio of the mass of dry material, after drying to constant mass at 105°C, to its undried volume. Also the weight of a dry unit volume of a material.

**DRYER**: a rotating metal cylinder in which aggregates (chip) are dried and heated by an oil or gas burner.

**DRY LOCK SEAL**: an application of small chip to a new chipseal, usually after some traffic has used the new seal. No binder is applied before spreading the dry lock chip.

**dTIMS**: Deighton's Total Infrastructure Management System software program used for predictive modelling of road deterioration.

**DUCTILITY**: the ability of a substance to undergo plastic deformation without breaking.

**DUCTILITY TEST**: a test to measure the extent to which a standard-sized test piece of bitumen can be elongated under specific test conditions, until it passes a pre-set length or before it breaks.

**DURABILITY**: the ability of a material to continue to provide the service for which it is intended.

## E

**EARTHWORKS**: a general term to describe all operations involved in loosening, removing and depositing or compacting earth, soil, or rock.

**EDGE BREAK**: a road failure where the edge of the seal breaks away.

**EDGE LINE**: a line used to differentiate the outer edge of the traffic lanes from the shoulder.

**EDGE RUTTING**: a defect where ruts appear at the edge of the seal, usually in the unsealed shoulder.

**ELASTICITY**: the property of a material in which deformation is linearly related to load and is recoverable.

**ELASTOMER**: an elastic material such as natural or synthetic rubber, which is added to bitumen to modify its performance as a binder.

**elv (EQUIVALENT LIGHT VEHICLES)**: a concept equating one heavy vehicle to 10 light vehicles or cars.

**EMBANKMENT**: a construction (usually of earth or stone) to raise the ground (or formation) level above the natural surface.

**EMBEDMENT**: the action of pushing the chips down into the binder or substrate.

**EMULSION**: see BITUMEN EMULSION.

**ENRICHMENT SEAL**: a light application of bituminous binder, with or without a fine cover of chip, for the purpose of increasing the binder content of a road surface. Also called FOG COAT, REJUVENATING SEAL.

**EQUILIBRIUM SKID RESISTANCE**: the equilibrium level at which skid resistance stabilises. It is reached after polishing by traffic has reduced the initial *Microtexture* (see TEXTURE) and SKID RESISTANCE.

**EQUILIBRIUM SCRIM COEFFICIENT (ESC)**: a correction applied to SCRIM data to adjust for between-year variations in SKID RESISTANCE.

**EQUIVALENT STANDARD AXLE (ESA)**: the number of standard axle loads which are equivalent in damaging effect on a pavement to an 8.2 tonne dual-tyred standard given vehicle or axle loading.

**EXCEPTION REPORT**: a report on the assets which are performing below the required LEVEL OF SERVICE, and are exceptions to an otherwise compliant road network.

**EXPANSION JOINT**: a space between two parts of a structure or pavement, formed to allow small relative movements with or without provision of means to preserve functional continuity.

## F

**FAILURE**: a pavement is considered to be in a failed condition when the surface has become distorted to the extent that it is no longer safe for vehicle use.

*Chipseal Failure* generally relates to either loss of waterproofness of the chipseal, endangering the integrity of the underlying pavement; or loss of chip; or loss of skid resistance through flushing or polishing.



*Pavement Failure* generally relates to a pavement surface which has become distorted to the extent that it is no longer safe for vehicle use.

**FALLING WEIGHT DEFLECTOMETER (FWD):** a device to measure surface deflection of a pavement under a dynamic load in order to evaluate its structural adequacy.

**FATIGUE:** the deterioration of a pavement or a test specimen caused by the action of repetitive loads.

**FATIGUE CRACKING:** a visible crack in the WEARING COURSE eventually resulting from the propagation of cracks caused by fatigue in the underlying pavement layer.

**FATTING UP:** the development of a pavement surface containing an excess of bituminous binder or puddle-up fines. A colloquial name for FLUSHING, BLEEDING.

**FATTY:** containing an excess of binder or puddled-up fines.

**FEATHER:** to blend an asphaltic concrete patch into the existing pavement surface.

**FEATHER EDGE:** the surface of the pavement layers between the shoulder hinge point and the subgrade surface.

**FILL:** see also EMBANKMENT.

- The depth from the formation surface to the natural surface.
- To deposit fill.
- Material that has been deposited in a fill area.

**FILLER (MATERIAL):** finely ground material, e.g. particles of rock, hydrated lime, Portland cement or other non-plastic mineral matter, predominantly finer than 0.075 mm added to asphaltic mixes or slurries to reduce air voids (by filling) and to stiffen the binder.

**FILTER FABRIC:** a material which allows water to pass through but prevents the passage of fines; a type of GEOTEXTILE.

**FINE:** in this book, FINE refers to the smaller chip sizes of Grades 4 (5.5-8.0 mm), 5 (4.75-9.5 mm), and 6 (6.7-15 mm).

**FINES (FINE AGGREGATE; FINE CHIP):** material passing the 4.75 mm sieve. ATTERBERG LIMIT tests are carried out on soils passing the 0.425 mm sieve.

**FINE CRUSHED ROCK:** a graded aggregate prepared by crushing rock for use as chip in pavement construction, normally 19.0 to 26.5 mm maximum size.

**FIRE POINT:** the temperature at which sufficient vapour is given off by a flammable product, under standard test conditions, to ignite and continue to burn. This temperature is slightly higher than a FLASH POINT.

**FIRST COAT SEAL:** an initial seal on a prepared unsealed surface, which is usually a basecourse.

**FLAKY AGGREGATE:** particles which have one dimension considerably less than the other two dimensions making them elongated.

**FLAME TUBE (FLAME TUBE HEATER):** a means of heating bitumen, normally applicable to smaller sized vessels or tanks. It consists of an oil or gas-fired burner in a tube with a flue pipe and the tube is immersed in the product to be heated.

**FLAMMABLE:** a combustible substance, solid, liquid, gas or vapour, which is easily ignited in air. The term is preferred to *inflammable*. The term *non-flammable* refers to substances which are not easily ignited but it does not necessarily indicate that they are non-combustible.

**FLASHING (FLASH OFF):** the rapid evolution of vapour from volatile liquids or water.

**FLASH POINT:** the lowest temperature at which the application of a small flame in a prescribed manner causes a vapour to ignite (flash). The flash point is usually measured using the Cleveland Open Cup Method.

**FLEXIBLE PAVEMENT:** a pavement consisting of an unbound granular basecourse with a top surface of chipseal or thin AC. The surfacing is less than 45 mm thick. See also RIGID PAVEMENT.

**FLUSHED SURFACE:** a smooth pavement surface caused by the presence of binder.

**FLUSHING:** see also BINDER RISE, BLEEDING. Loss of *Macrotexture* (see TEXTURE), either through presence of solid binder high up around the sealing chip, or chip embedment, or chip loss.

**FLUX:** a relatively non-volatile distillate used as an additive which is blended with bitumen to

permanently or semi-permanently reduce the viscosity of the bitumen, e.g. AGO (*diesel fuel*).

**FLUXED BITUMEN:** a bitumen which has had its viscosity reduced by the addition of a less volatile diluent (FLUX).

**FLY ASH:** a fine-grained waste product obtained from the combustion of pulverised fuel in power stations.

**FOAMED BITUMEN:** or *Expanded Bitumen*, is a hot bituminous binder which is temporarily converted to a foamed state by the addition of about 2% (by weight of bitumen) of water in controlled conditions.

**FOG COAT:** a very light application of binder sprayed onto the road surface over an ageing coarse-textured chipseal. (It is not a PRIME.) Usually the binder is emulsion with low bitumen content. Also called ENRICHMENT SEAL, REJUVENATING SEAL.

**FOOTPATH; FOOTWAY:** a public way reserved for the movement of pedestrians and manually propelled vehicles (e.g. prams); a pedestrian facility on a bridge.

**FORMATION:** the surface of the finished earthworks, excluding CUT, FILL or BATTERS.

**FORMATION LEVEL:** the general level of the surface of the ground proposed or obtained on completion of the earthworks.

**FORWARD WORKS PROGRAMME:** the principal output of asset management, detailing specific maintenance treatments required for TREATMENT LENGTHS on a road network. It covers the next 10 years as a minimum, but 20 year programmes are common. The *Current Work Programme* is extracted from it.

**FOUNDATION:** the soil or rock on which a structure rests. Also known as SUBGRADE when under a pavement.

**FRETTING:** see CHIP LOSS, RAVELLING, SCABBING, STRIPPING.

**FRICTION COURSE:** an obsolete term for a bitumen aggregate surfacing mix. See OGPA (Open-Graded Porous Asphalt).

**FROST HEAVE:** The movement of a pavement or soil surface caused by expansion of water freezing within it.

**FURNITURE:** see ROAD FURNITURE.

**FUSION POINT:** the temperature at which a substance liquefies, often referred to as a *Melting Point*.

## G

**GABION:** a rectangular wire-mesh cage filled with boulders, used to retain embankments and river banks.

**GANGSPRAYER; GANGBAR:** see SPRAYBAR.

**GAP GRADED:** an aggregate or chip with both fine and coarse material but without one or more of the intermediate size fractions. See also SINGLE-SIZED and WELL-GRADED Aggregate/ Chip.

**GEOTEXTILE:** a synthetic fabric composed of flexible polymeric materials, woven or unwoven, used in geotechnical or general engineering works, for strengthening, for retaining or restricting movement of water or sediment as a filter, e.g. in swamps, or as a strain absorbing membrane (SAM).

**GEOTEXTILE SEAL:** a seal constructed usually by a light application of binder, over which a geotextile fabric is laid. The fabric is sprayed with binder until it is saturated. Chip is then spread, followed by rolling.

**GRADE:** has at least 6 definitions.

1. The rate of longitudinal rise or fall of a carriageway with respect to the horizontal, expressed as a ratio or as a percentage. Also called GRADIENT.
2. To design the longitudinal profile of a road.
3. To shape or smooth an earth, gravel, or other surface by means of a GRADER or similar implement.
4. Bitumen penetration grades of 80/100, etc.
5. To arrange aggregates or other material in accordance with particle sizes.
6. A designation given to the size of sealing chips, i.e. Grades 1, 2, 3, 4, 5, 6 (from TNZ M/6 Specification for Sealing Chip).

**GRADED AGGREGATE:** aggregate having a wide and continuous distribution of sizes from coarse to fine, the largest size being several times larger than the smallest size.

**GRADER:** a motor-powered wheeled machine with a blade mounted centrally between the axles, used to shape road surfaces.

**GRADIENT:**

- A length of carriageway sloping longitudinally.
- The rate of longitudinal rise or fall of a carriageway with respect to the horizontal, expressed as a ratio or as percentage (See also GRADE definition 1).

**GRADING:**

- The operation of cutting and spreading material with a grader (see also GRADE definition 3).
- The particle size distribution of a material (see also GRADE definitions 5 and 6).

**GRANULAR MATERIAL:** material with a particle size no finer than SAND.

**GRASS VERGE:** grass area on the side of a road.

**GRAVEL:** a mixture of non-cohesive mineral particles occurring in natural deposits, generally passing a 75 mm sieve with a substantial portion retained on the 4.75 mm sieve.

**GREENFIELD DEVELOPMENT:** a development for roads or other structures which begins with a landscape that is in its natural state.

**GRIT:** fine angular mineral aggregate, usually passing a 4.75 mm sieve.

**GROUND LEVEL:** the reduced level of any particular point on the surface of the ground.

**GROUND WATER:** water flowing or lying under the natural surface of the ground; contained in the soil or rocks, below the WATER TABLE.

**GROUTING:** the operation of pouring or forcing a liquid binder, such as bitumen, into the interstices of a pavement surface, a structure or a natural formation, under the action of gravity or applied pressure. Also used in concrete work.

**GUARDRAIL:** a rail erected to restrain vehicles which are out of control. Also called ROAD SAFETY BARRIER.

**GULLY TRAP:** see CATCH PIT.

## H

**HAIR CRACK:** a thin, narrow crevice or fissure running irregularly across the surface of a concrete or clay product, not penetrating deeply.

**HAND SPRAYER:** spraying equipment which discharges binder through a jet at the end of a hand-held lance.

**HARDENING:** in the short term, is the increase in viscosity as a freshly sprayed bituminous binder cools or cures. In the long term it is the ageing and oxidising of a bituminous binder.

**HARDNESS:** the resistance of a rock to scratching or abrasion. Mineralogical hardness is by comparison with an arbitrary reference scale (Moh's Scale of Hardness).

In chipseal design, hardness of an existing seal or substrate is considered because sealing on a soft surface is undesirable.

**HAZARD:** a physical situation with significant potential for human injury, damage to property, or damage to the environment. An occurrence, process, substance or situation that is an actual or potential cause or source of harm.

*Significant Hazard:* a hazard that is an actual or potential cause or source of serious harm, or harm which depends on the frequency or extent of exposure to the hazard, or harm which does not occur or is not easily detectable until a significant time after exposure.

**HEAVE:** upward movement of soil caused by expansion or displacement resulting from phenomena such as moisture absorption, removal of overburden, pile driving or frost.

**HEAVY VEHICLE (Heavy Commercial Vehicle HCV):** rigid trucks with or without a trailer, or articulated vehicle with at least three or four axles. A vehicle capable of being laden to a gross laden weight exceeding 3.5 tonnes.

**HIGH PRESSURE WATER TREATMENTS:** a collective term for WATER BLASTING and WATER CUTTING. Jets are used to direct very fine streams of water at the road to restore *Macrotecture* by removing excess binder at the chipseal surface. They have replaced the pavement burner treatment which has been phased out.

**HIGHWAY:** a principal road in a road system.

**HORIZONTAL CURVE:** a curve in the plane or horizontal alignment of a carriageway.

**HOT MIX ASPHALT (HMA):** aggregate and bitumen heated and mixed while hot, transported to the site of construction, laid and compacted while hot. See ASPHALTIC CONCRETE and PLANT MIX.

**HOT WORK:** work involving flames or equipment which might cause ignition of any flammable vapours present.

**HYDRATED LIME:** see SLAKED LIME.

**HYDROCARBON:** a substance composed only of molecules of carbon and hydrogen.

**HYDROPHILIC MATERIAL:** material (e.g. aggregate) showing a relatively high affinity for water.

**HYDROPHOBIC MATERIAL:** material (e.g. bitumen) showing no affinity for water.

**HYSTERESIS:** in the context of SKID RESISTANCE, relates to the contribution of *Macrotecture* (see TEXTURE) to skid resistance through the inelastic deformation of a vehicle tyre, resulting in loss of energy.

**IGNITION POINT (IGNITION TEMPERATURE):** the lowest temperature at which, under standard test conditions, the vapour of a solid, liquid or gas will take fire and continue to burn.

**IGNITION SOURCES:** accessible sources of heat or energy capable of igniting flammable atmospheres.

**IMPERMEABLE:** cannot be penetrated by a fluid such as air or usually water.

**IMPERVIOUS:** relatively waterproof soils, such as clays, through which a fluid, e.g. air or water, cannot percolate or only very slowly.

**INERT ATMOSPHERE:** a virtually oxygen-free atmosphere, usually of nitrogen or carbon dioxide, used to prevent oxidation or combustion.

**INERT MATERIAL:** a material which does not exhibit any binding or cementitious properties, or is not chemically reactive.

**INFRASOUND:** the low frequency component of sound (below 20 Hz).

**INITIAL BOILING POINT (IBP):** the temperature at which a distillate such as kerosene begins to boil.

**IN-LINE BLENDING:** blending, usually of diluents with a bituminous binder, by addition of the diluent to the binder while it is being pumped through a pipe.

**IN SITU:** a material, or operation carried out on a material, in place, e.g. its original position in the field.

**INTERCEPTOR DRAIN:** a type of side drain that prevents water from flowing towards the road, and is normally sited away from the road.

**INTERMEDIATE COURSE:** any course between the base- and surface courses.

**INTERSECTION:** a place where two or more roads cross. Also called *Node*.

**INVERT:** the lowest portion of the internal surface of a drain or culvert.

**ISOKINETIC:** having equal rates of movement in all directions.

**ISOTROPIC:** having properties that are equal in all directions.

## JK

**JUNCTION:** a place where two or more roads meet.

**KERB:** a raised border of rigid material formed at the edge of a carriageway or pavement.

**KERB & CHANNEL (K&C):** combined kerb and drainage channel, to capture and discharge run-off.

**KEROSENE:** a hydrocarbon used as a DILUENT.

## L

**LAKE ASPHALT:** a natural bitumen found in well-defined surface deposits, e.g. Trinidad Lake asphalt.

**LANDSLIDE:** a movement of the surface of a hillside, generally resulting from natural causes.

**LANE:** see TRAFFIC LANE.

**LANE LINE:** a line (usually painted), other than the centreline which divides adjacent traffic lanes.

**LATERAL FRICTION:** the force which, when generated between the tyre and the road surface, assists a vehicle to maintain a centrifugal path where a road changes direction.

**LATEX:** a naturally occurring rubber emulsion (i.e. the sap of the rubber tree).

**LAYER:** portion of a pavement course placed and compacted as an entity.

**LAYER INSTABILITY:** inadequacy in the structural performance of multiple seal layers, where the combined thickness is greater than 40 mm and more than 12% binder is present in the layer.

**LEVEL OF SERVICE:** the outcome that the road asset provides for the end user. It may be a fixed standard (and not to be exceeded) or a desirable target.

**LIFE:** the time (in years) that a road surface remains in service.

**LIME MORTAR:** a mixture of cement or lime with sand and water.

**LIME STABILISATION:** the controlled application of lime to improve the load-carrying capacity of a pavement layer (usually the basecourse), or of the subgrade.

**LIMESTONE:** calcium carbonate,  $\text{CaCO}_3$ , sometimes used as a filler. The material from which burnt lime (CaO), QUICK LIME and SLAKED LIME are derived.

**LINE OF SIGHT:** the direct line or uninterrupted view between a driver and an object of specified height above the carriageway in their lane of travel.

**LINK:** the portion of road between two INTERSECTIONS (or nodes).

**LIQUID BITUMEN:** bitumen which is liquid at 25°C, according to the penetration test.

**LIQUID LIMIT:** see ATTERBERG LIMIT(S). The moisture content, as a % of its dry mass, at which a material passes from the plastic to the liquid state under specified test conditions.

**LIVELY:** the state of being workable as applied to premix patching materials; bitumen that is in or on the road surface which still retains its original

properties, i.e. will liquefy in hot weather causing bleeding. The opposite of old oxidised inert bitumen.

**LOCKED-IN TYPE SEAL:** a WET LOCK or DRY LOCK SEAL.

**LONGITUDINAL SECTION or PROFILE:** the shape of a pavement surface measured as vertical distances from some datum parallel to the traffic. (See also TRANSVERSE PROFILE, CROSS SECTION and VERTICAL ALIGNMENT.)

## M

**MACADAM:** uniformly sized interlocking stones, bound with smaller stone, gravel, etc., which are forced into the gaps by brooming, watering and rolling to form a road surface. The road may be water-bound, cement-bound, or coated with (tar or) bitumen. If the latter it is called *Tarmacadam* or *Tarmac*.

**MACROTEXTURE:** see TEXTURE.

**MANHOLE:** see SERVICE HOLE.

**MARGINAL AGGREGATE:** a local aggregate which does not meet conventional aggregate specifications but is suitable for specific uses in a pavement.

**MARKING:** any line painted on the road to control traffic movement or parking.

**MATRIX:** a mixture of binding material and fine aggregate in which larger aggregate is embedded or held in place.

**MAXIMUM DRY DENSITY:** the dry density of a soil obtained by a specified amount of compaction at the OPTIMUM MOISTURE CONTENT.

**MECHANICAL BOND:** the bond obtained in a MACADAM or other pavement created by the interlocking of angular fragments of aggregate.

**MECHANISTIC ANALYSIS:** a design procedure based on stress analysis and on elastic material behaviour in pavements.

**MEDIAN BARRIER; MEDIAN STRIP:** see ROAD SAFETY BARRIER.

**MEDIUM COMMERCIAL VEHICLE (MCV):** two-axle heavy trucks without a trailer, over 3.5 tonnes gross laden weight.

**MELTING POINT:** see FUSION POINT.

**MEMBRANE SEAL:** a seal composed of straight-run BITUMEN, with little or no CUTBACK, and a light covering of chip. Covered soon after construction with ASPHALTIC CONCRETE.

**MICROSURFACING:** a surface dressing comprising a specially graded aggregate mixed with a polymer modified emulsion (PME) binder (of 3% maximum polymer). See also SLURRY SEAL.

**MICROTEXTURE:** see TEXTURE.

**MIX:** the proportions of ingredients in a batch of concrete or asphalt.

**MIXING PLANT (ASPHALT PLANT):** equipment used to manufacture hot asphalt mixes.

**MODIFICATION:** the improvement of properties of a material by the addition of small quantities of additive, e.g. lime, cement, for stabilisation.

**MODULUS:** a ratio of the stress (force per unit area) to strain (deformation per unit area), expressed in units of stress. It is a measure of a material's resistance to deformation.

For bitumens, the modulus depends on both the temperature and the time the load is applied. In loading conditions that give rise to non-permanent deformations (i.e. material returns to its original dimensions) the resulting modulus is *Young's modulus (E)*, or the *Modulus of Elasticity*.

**MOISTURE CONTENT:** see WATER CONTENT.

**MOTORWAY:** a defined class of road for which certain activities or uses are restricted or prohibited by legislative provision. Also called *Expressway*, *Freeway*.

**MPD (MEAN PROFILE DEPTH) (mm):** the measure of texture given by SCRIM+ and Transit New Zealand's STATIONARY LASER PROFILER (SLP).

**MSSC:** Mean Summer SCRIM Coefficient.

**MTD (MEAN TEXTURE DEPTH) (mm):** the volumetric patch test using glass spheres of 0.15 to 0.3 mm diameter.

**MULTICOAT SEAL:** a two coat chipseal, and other chipseals, having more than one layer of chip.

**MULTIPLE LANE:** a carriageway with more than one traffic lane.

**MULTIPLE SEAL:** any seal with two or more layers, e.g. TWO COAT, RACKED-IN, and SANDWICH seals.

## N

**NAASRA:** National Association of Australian State Road Authorities; superseded by Austroads.

**NATURAL ASPHALT:** a naturally occurring bitumen, e.g. Trinidad Lake Asphalt.

**NOMINAL SIZE:** a designation of an aggregate, chosen to give an indication of the largest sized particle present.

**NORMAL CROSS SECTION:** the cross section of the carriageway where it is not affected by superelevation or widening.

**NORSEMETER RoAR:** a machine for measuring skid resistance.

**NUCLEAR DENSOMETER:** an instrument for the non-destructive measurement of the density and moisture content of pavement layers.

## O

**OGEM, OPEN GRADED EMULSION MIX:** see OGPA for comparable description.

**OGPA, OPEN GRADED POROUS ASPHALT:** a gap-graded hot mixed asphalt containing a mix of binder and larger sized aggregates with only small amounts of fine material, with relatively high void content, and depending largely on mechanical interlock for stability. It has interconnected voids which aid drainage of road surface water.

**OPTIMUM MOISTURE CONTENT (OMC):** the moisture content at which a specified amount of compaction will produce the maximum density under specified test conditions.

**OVERBURDEN:** soil or other material which has to be removed to enable the material beneath it to be quarried or excavated.

**OVERLAY:** a layer of material constructed on top of an existing pavement to improve its shape or increase the strength.



## P

**PAH:** polycyclic aromatic hydrocarbons.

**PAP (PREMIUM ALL PASSING):** see AP (ALL PASSING).

**PARTICLE SIZE:** the diameter of the aggregate or chip particle, i.e. minimum square-hole sieve opening that allows the particle to pass through.

**PARTICLE SIZE DISTRIBUTION (psd):** the proportion by weight of particles of different sizes in a granular material (aggregate, chip) as determined by sieve analysis. See also GRADE, GRADING.

**PATCHING:** the repair of depressions, holes or other defective places in a pavement by adding material to restore the surface.

**PAVEMENT:**

- The portion of the road, excluding shoulders, that is placed above the design subgrade level for the support of, and to form a running surface for, vehicular traffic. It is supported by the subgrade.
- Also used to describe the sealed area of the footpath or other sealed areas.

**PAVEMENT DISTRESS:** the deterioration of the pavement shown by visible surface defects.

**PAVEMENT MANAGEMENT SYSTEM (PMS):** a systematic method of information collection and decision making, to permit the optimisation of use of resources for maintenance and rehabilitation of pavements.

**PAVEMENT PERFORMANCE:** the relationship of serviceability to age of the pavement.

**PAVEMENT RATING:** a method of systematically describing the condition of a pavement, usually by visual inspection.

**PAVEMENT SERVICEABILITY:** the measure of the pavement's ability to serve its function at any time.

**PENETRATION GRADE:** determines the hardness of a roading bitumen by measuring the distance in tenths of a millimetre that a standard needle weighted with 100 g will sink (penetrate) in 5 seconds into a bitumen sample, at 25°C.

**PENETRATION GRADE BITUMEN:** a bitumen compliant with the required specification and named for its penetration grade. It is produced by vacuum distillation usually, followed in some cases by solvent extraction or a partial oxidation process. Such bitumens are principally used for road surfacing or industrial applications.

**PERMEABILITY:** the property of an aggregate which permits a fluid, e.g. air or water, to pass through it when subjected to pressure.

**PERMIT TO WORK:** a document issued by an authorised person or persons permitting specific work to be carried out in a defined area during a stated period of time, provided that specified safety precautions are taken.

**PERSONAL PROTECTIVE EQUIPMENT (PPE):** includes high visibility vest, hard hat, gauntlet gloves, flame-retardant overalls, boots, and specialist protective equipment appropriate to the job in hand.

**PERVIOUS:** describes a material through which water can pass.

**PITCH:** the solid or semi-solid residue from the partial distillation or evaporation of oils from coal tar. (Not to be confused with BITUMEN.)

**PIT-RUN GRAVEL:** material obtained from a natural deposit of gravel without separation or addition of other material.

**PLANT MIX:** a general term for mixtures of bituminous binder and aggregate produced in a central mixing plant. See also PREMIX.

**PLASTIC LIMIT:** see ATTERBERG LIMIT(S). the moisture content, expressed as % of dry mass, at which a material passes from the plastic to the non-plastic state, under specified test conditions.

**PLASTIC MATERIAL:** a material in a condition when it can be easily remoulded.

**PLASTICITY INDEX:** see ATTERBERG LIMIT(S). The numerical difference between the values of the LIQUID LIMIT and the PLASTIC LIMIT of a material.

**PMB (POLYMER MODIFIED BITUMEN):** a bitumen with polymer added, usually up to 5-6% by mass. Polymers tend to reduce the temperature sensitivity of the binder, and some polymers make the binder more elastic.

**PME (POLYMER MODIFIED EMULSION):** a polymer-modified bitumen that has been emulsified.

**POLISHED STONE VALUE (PSV):** a measure of how a stone will polish under standard conditions. The PSV test is primarily used to identify aggregates (chip) that will retain their microtexture (i.e. will not polish) under traffic.

**POLISHING:** the action of vehicle tyres and fine road detritus on road surface chips which smooths the surface.

**POLYMER:** high molecular weight, usually organic, compound made up of many units, identical to each other (*monomers*), and joined in a regular way, e.g. polypropylene. Some polymers may be used to permanently modify bitumen. Usually polymers provide improved temperature/ viscosity response and/or greater fatigue resistance.

*Copolymer:* a polymer that contains two or more kinds of monomer in the same molecule, e.g. Styrene-butadiene rubber SBR, Styrene-butadiene styrene SBS.

**POLYMER MODIFIED BITUMEN; POLYMER MODIFIED EMULSION:** see PMB, PME.

**POROSITY:** ratio of the volume of voids in a material to its total volume.

**PORTLAND CEMENT:** an artificial cement as defined in AS 1315. Usually called CEMENT.

**PORTLAND CEMENT CONCRETE (PCC):** concrete in which the binding material is PORTLAND CEMENT. Usually called *Concrete*.

**POTHOLE:** a hole in the pavement, frequently round in shape, resulting from loss of pavement material caused by the action of traffic.

**PPE:** see PERSONAL PROTECTIVE EQUIPMENT.

**PRECOATING:** coating an aggregate with a bituminous material to improve the rate at which it is wetted, or to improve the adhesion of a bituminous binder.

**PRELIMINARY ENGINEERING:** work of locating and designing, making surveys and maps, preparing specifications and estimates, and doing other engineering work before letting a contract for construction of a transport project. See also DESIGN PROCESS.

**PREMIX:** a mixture of bitumen and chip, usually stored in a stockpile and used for patching.

**PREP; PREPARATION; PRE-SEAL REPAIR:** any activity undertaken in the period up to a year before chipsealing, to prepare the surface for the chipseal, e.g. DIGOUT, CRACK FILLING, lichen removal.

**PRETREATMENT SEAL:** treatment applied to a surface as a pretreatment, e.g. for reducing texture variance. See also TEXTURISING SEAL.

**PRIME; PRIMER; PRIME COAT:** a low viscosity, fluid, bituminous material applied to a prepared base without cover aggregate, before the initial application of a seal. Used to improve penetration of the binder into the base surface, to wet any surface dust layer, and to adhere to the stone beneath. Not used often in New Zealand.

**PROFILE:** the shape of a pavement layer or surface measured in a vertical plane, from a datum, parallel to the traffic flow, or at right angles or transverse to the traffic flow.

**PUBLIC ROAD:** a public place which has been provided for use by the public for traffic movement and has been declared, or proclaimed, notified or dedicated.

**PUMPING:** the ejection of water and fine particles in suspension through joints or cracks in a pavement caused by the action of traffic, or by ground water pressure.

## Q

**QUALITY ASSURANCE (QA):** all planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements as to the quality of a product.

**QUALITY CONTROL:** the operational techniques and activities that are used to fulfil defined requirements for quality production.

**QUARRY:** an open-surface working from which rock is obtained.

**QUARRY DUST or FINES:** the finest sized material most of which passes a 4.75 mm sieve, produced from a crushing or screening plant. Also known as CRUSHER DUST.

**QUARRY WASTE:** reject material from a crushing or screening plant containing a wide range of aggregate or chip sizes.

**QUICK LIME:** calcium oxide, CaO, used as an additive (with granular form) in soil stabilisation. Also referred to as *Burnt Lime*.

## R

**RACKED-IN CHIPSEAL:** one application of binder and two applications of chip are made in the following sequence:

- A single application of binder is applied, followed by application of a large chip;
- A further application of a smaller chip is made.

The first application of large chip has spaces into which the smaller chip can fall between the large chip, and adhere to the layer of binder below.

**RAISED PAVEMENT MARKER (RPM):** a device used to supplement or replace traffic lines on the road surface. It may be reflectorised (RRPM).

**RAMM (Road Assessment and Maintenance Management system):** a computer-based system to manage the maintenance and rehabilitation of pavements and associated roading features.

**RAP (Reclaimed Asphalt Pavement):** obtained from milling or excavation of asphalt pavements. The crushed and graded product can be added during manufacture and included as a percentage of a new asphaltic concrete.

**RATING:** see PAVEMENT RATING.

**RAVELLING:** the loosening of aggregate from the surface of a pavement. Also called CHIP LOSS, *Fretting*, SCABBING, STRIPPING.

**RCA or ROAD CONTROLLING AUTHORITY:** the authorities responsible for roading within their jurisdiction, e.g. Transit New Zealand for the national State Highway system; District or City Councils for roads within Local Government regions including roads within urban boundaries.

**RECYCLING:** re-using existing materials or incorporating waste materials such as glass, tyres, slag.

**RE-CIRCULATION:** pumping binder from a tank, through a pipe system and back to the tank.

**REFLECTIVE CRACKING:** visible cracks in the pavement surface, caused by propagation of cracks through to the pavement surface from the underlying pavement layer.

**REFLECTORISED RAISED PAVEMENT MARKER (RRPM):** a RAISED PAVEMENT MARKER with reflectors, fixed in a CARRIAGEWAY.

**REHABILITATION:** an area treatment that restores a distressed pavement to improve its serviceability for a further design period. Usually it is a complete excavation and replacement of basecourse and surfacing for an entire TREATMENT LENGTH.

**REINFORCEMENT (*reinforced concrete*):** steel rods, bars or other reinforcing materials, embedded in concrete, masonry or brickwork, for the purpose of resisting particular stresses.

**REJUVENATING SEAL:** a seal composed of a light application of binder, with no chip, and sprayed over an ageing coarse-textured chipseal. Usually the binder is emulsion with low bitumen content. Also called FOG COAT or ENRICHMENT SEAL.

**RESEAL:** a seal applied to an existing sealed, asphalt, concrete or timber surface. Also known as *Resurfacing*.

**RESIDUAL BINDER:** the non-volatile fraction of a binder that remains in service after evaporation of volatiles.

**RESILIENT MODULUS:** ratio of stress to recoverable strain under repeated loading conditions. Also referred to as *Elastic Stiffness*.

**RHEOLOGY:** the science of the flow of matter. Effectively the study and evaluation of time-temperature dependent responses of materials, e.g. bitumen, that are stressed or subjected to an applied force. Rheological properties of bitumen include: age hardening, ductility, penetration, temperature susceptibility, shear susceptibility, stiffness, viscosity.

**RIGID PAVEMENT:** a pavement constructed of Portland cement concrete or several layers of structural asphalt, generally 110 mm or more thick. See also FLEXIBLE PAVEMENT.

**RIPRAP:** medium to large sized rocks placed to protect a structure (e.g. a bridge) against scour.

**RISK:** the likelihood of human injury, damage to property, or damage to the environment, from a specified hazard, weighted against probability and consequence.

**ROAD:** a route trafficable by motor vehicles. In law, it is the public right-of-way between the boundaries of adjoining properties. It is owned or administered by an RCA.

**ROAD CAPACITY:** see CAPACITY.

**ROAD CATEGORY:** Urban Arterial – in urban areas with traffic volumes >7000vpd; Urban Other – carry <7000 vpd; Rural Strategic – connect main centres and carry >2500 vpd; Rural Other – other roads outside urban areas. See Transfund NZ's *Project Evaluation Manual (2002)* Appendix A2.2.1 for details, and *Land Transport Rule (2002) Vehicle Dimensions and Mass* for latest information.

**ROAD CLASSIFICATION:** consistent terminology and designation of roads to provide a basis for planning and decision making by national and local government agencies responsible for various aspects of road administration.

**ROAD FURNITURE:** a general term covering all signs and devices for the control, guidance and safety of traffic, and the convenience of road users, e.g. barriers, GUARDRAILS, lighting, parking meters, poles and posts, all signs and traffic lights.

**ROAD GEOMETRY:** the overall shape of the road.

**ROAD HIERARCHY:** the grading of roads according to increasing or decreasing importance of their traffic-carrying or other function. See also ROAD CATEGORY.

**ROAD INVENTORY:** schedule of all road characteristics, i.e. control devices, parking restrictions, road widths, number of traffic lanes, etc.

**ROAD MAINTENANCE:** the work required to keep a road at its specified level of service. It includes work on the road structure, furniture and drainage system. The work tends to be piecemeal rather than large scale works, as it is carried out as required throughout the year.

**ROAD MARKING:** a line painted on the road to control traffic movement or parking.

**ROAD RESERVE:**

- A legally described area within which facilities such as roads, footpaths and associated features may be constructed for public travel. Often called a road.
- The entire right-of-way devoted to public travel, including footpaths, verges and carriageways.

**ROAD SAFETY BARRIER:** a rail or fence erected to restrain vehicles which are out of control. See also GUARDRAIL.

**ROADWAY:** the portion of a road or bridge devoted particularly to the use of travelling vehicles, inclusive of shoulders and auxiliary lanes. A divided road has two roadways. See also CARRIAGEWAY.

**ROAD WORKS:** a general term for any work on a road for construction, repair or maintenance.

**RoAR (NORSEMETER):** a machine used to measure SKID RESISTANCE of a pavement surface.

**ROCK:** a term used generally to describe a stone larger than about 150 mm.

A geological term to describe a kind of mineral matter, e.g. igneous rock, sedimentary rock.

**ROLLER:** an item of equipment designed to compact soil and pavement layers, such as pneumatic-tyred, rubber-coated vibrating drum, or combination rollers.

**ROLLING:** see COMPACTION.

**ROLL OVER:** see CHIP ROLLOVER.

**ROUNDABOUT:** an intersection of two or more carriageways at a common level, where all traffic travels in one direction around a central island (usually circular), to induce weaving movements in lieu of direct crossings.

**ROUGHNESS:** the consequence of irregularities in the longitudinal profile of a road with respect to the intended profile. It is measured by the unidirectional displacement of a standard (NAASRA) test vehicle (ROUGHNESS METER) relative to its axle, as the vehicle travels over the surface at a standard speed.

**ROUGHNESS METER:** a device for measuring vehicle response to roughness. Traditional devices measure the vertical displacement of an axle to a vehicle body, as the vehicle travels over the surface at a standard speed. Modern roughness meters use lasers to measure road surface texture. May be a *Roughometer*, a (NAASRA) *Roughness Response Meter*, or *Laser Profilometer*.

**RUBBER:** naturally occurring polymer of isoprene. Available as an emulsion called LATEX.

**RUNNING COURSE:** a thin layer of loose stone which protects the surface of an unsealed road.

**RUN-OFF:**

- A general term for water (normally from rainfall) flowing across the surface of the ground.
- The amount of water precipitated onto a catchment area which flows as surface discharge from the catchment area past a specified point.

**RUT:** a longitudinal depression in a pavement caused by the passage of the wheels of vehicles.

**RUTTING:** the longitudinal vertical deformation of a pavement surface, measured at right angles to the traffic flow and across the wheelpath.

**S**

**SAM (Stress Absorbing Membrane):** a chipseal, which may be a single coat, two coat, or racked-in seal, that uses a PMB (Polymer modified binder).

**SAMI (Stress Absorbing Membrane Interlayer):** usually constructed with a PMB and a single covering of chip. An asphaltic mix surfacing is then constructed on top.

**SAMPLE:** a representative portion of a material, such as aggregate.

**SAMPLING:** the selection of a representative portion of a material, such as aggregate, for the purpose of ascertaining its characteristics.

**SAND:** natural mineral particles which pass through a defined sieve, e.g. 4.75 mm or 2.36 mm sieves, and are retained on a 0.075 mm sieve. Free of appreciable quantities of clay and silt.

**SAND CIRCLE:** a test used to determine the average texture depth of a pavement surface. A circle is made with a standard volume of sand, and its diameter relates to the volume of voids. The test is in accordance with TNZ T/3 Specification: *Measurement of texture by the Sand Circle Method.*

**SANDWICH SEAL:** a seal applied as a layer of large chip spread directly on the existing surface followed by a relatively light application of binder. A finer chip is then spread directly onto the sprayed binder, and rolled to compact the seal.

**SBR Styrene-butadiene rubber:** a polymer used for modifying bitumen.

**SBS Styrene-butadiene-styrene:** a polymer used for modifying bitumen.

**SCABBING:** loss of patches of chips from a chipseal. See also CHIP LOSS, *Fretting*, RAVELLING, STRIPPING.

**SCALPING:** a process in a quarry crushing plant where separation of two grades of rock takes place. The removal of unwanted material using grizzly bars from excavated rock before crushing.

**SCARIFYING:** the systematic disruption and loosening of the top of a pavement or of natural ground by mechanical or other means.

**SCREED:** (noun) strip of wood or metal which is used to strike off or finish a surface to the required shape or texture; (verb) to carry out this action.

**SCREEN:** a large sieve usually mechanically operated, used to separate material by size. The sieving surface may be either flat or cylindrical in form.

**SCREENINGS:** aggregate or chip of small size, usually passing a 26.5 mm sieve and retained on a 4.75 mm sieve.

**SCRIM or Sideway force Coefficient Routine Investigation Machine:** a machine used to measure wheelpath skid resistance.

**SCRIM+:** a SCRIM machine with additional equipment to measure road condition (e.g. roughness, rutting & texture) and road geometry, in addition to wheelpath skid resistance.

**SEAL:** a thin layer of bituminous binder sprayed onto a pavement surface which prevents water entering the underlying pavement and having a layer of aggregate rolled in. Depending on the application sequence, seals are referred to as first coat, second coat, and reseals. See also CHIPSEAL.

**SEAL COAT:** a bituminous waterproofing layer on the surface of a pavement.

**SEALED SHOULDER:** that portion of the sealed carriageway beyond the traffic lane, located between the traffic lane edge line and the edge of the seal, generally flush and contiguous with the sealed carriageway. See also SHOULDER.

**SEALING CHIP:** see AGGREGATE, CHIP, and GRADE (definition 6).

**SEASONAL VARIATION:** the fluctuation in skid resistance after the equilibrium level has been

reached, in which it tends to increase in winter and decrease in summer.

**SECOND COAT SEAL:** previously, the term given to a seal placed on top of a primed or first coat sealed surface and before subsequent reseals. The term is obsolete as all second coat seals are now considered as RESEALS.

**SEEPAGE:** small quantities of water percolating through a porous material.

**SEGREGATION:** separation of coarse aggregate from fine material or from the rest of a bituminous mix. Liable to occur in stockpiles of aggregates, or during transportation of aggregate or hot mix.

**SELECTED FILL:** fill complying with specified requirements.

**SERVICEABILITY:** the degree to which a facility such as a road meets relevant requirements or standards.

**SERVICE HOLE:** a shaft with a removable cover that leads down to a sewer, drain or other underground service. Also called *Manhole*.

**SET UP:** to harden or cure by evaporation of volatiles, e.g. of a cutback binder.

**SETTLEMENT:** a downward movement of the soil or of the structure it supports by the reduction of the voids in the underlying material.

**SFC or SIDEWAY-FORCE COEFFICIENT:** the ratio of the resistance to sideways motion of the tyre of a vehicle (on a specified pavement) and the normal force on that wheel related to the vehicle's mass. SCRIM machines measure this force.

**SHALE:** sedimentary argillaceous rock characterised by, or able to be split into, thin laminae.

**SHALLOW SHEAR:** a defect occurring where an upper pavement layer loses stability and shoves. It is caused by vehicle loading.

**SHAPE CORRECTION:** correcting the longitudinal or cross-sectional shape of a road, using an OVERLAY.

**SHEAR FAILURE:** a form of failure in a material when the shear stress exceeds the available shear strength on a plane.

**SHEAR STRENGTH:** the maximum shear stress that the mass of material can withstand under a specified set of loading conditions. It is controlled by normal pressure on the shear plane, drainage conditions, or rate of strain. It is a function of the effective stress, cohesion and the angle of shearing resistance.

**SHOULDER:** the portion of the carriageway beyond the traffic lanes that is contiguous and flush with the surface of the pavement.

**SHOULDER HINGE POINT:** the point in a cross section of a road at which a side slope would intersect with the unsealed shoulder or, in the absence of an unsealed shoulder, the sealed shoulder.

**SHOVING:** lateral displacement of the pavement structure caused by braking, accelerating or turning vehicles.

**SHRINKAGE:** volume change in either the base, subgrade or occasionally in the asphalt mix.

**SHRINKAGE CRACKS:** interconnected cracks forming a series of large blocks, usually with sharp angles. Frequently caused by volume change or SHRINKAGE.

**SHRINKAGE LIMIT:** see ATTERBERG LIMIT(S).

**SIDE CHANNEL:** see SURFACE WATER CHANNEL.

**SIDE DRAIN:** a longitudinal surface drain or ditch usually U-shaped and generally located between the surface water channel and the legal road boundary. It prevents water flowing onto the road or into its pavement layers.

**SIDE SLOPE:** that area of road formation, located between the SHOULDER HINGE POINT and the surface water channel, having a gradient steeper than 12:1.

**SIDEWAY FORCE COEFFICIENT:** see SFC.

**SIEVE:** a box or tray, the base of which is made of woven wire or similar material or perforated metal plate, with apertures of defined shapes and sizes, e.g. 13.2 mm, 9.5 mm, 6.7 mm, 4.75 mm, 2.36 mm.

**SIGHT DISTANCE:** the distance measured along the carriageway over which objects of defined height are visible to a driver.



**SIGNIFICANT HAZARD:** an actual or potential cause or source of serious harm, or harm which depends on the frequency or extent of exposure to the hazard, or harm which does not occur or is not easily detectable until a significant time after exposure.

**SILT:** a material intermediate in particle size between sand and clay (i.e. 0.06–0.002 mm). Usually non-plastic.

**SINGLE COAT CHIPSEAL:** a single sprayed application of sealing binder followed immediately with a single application of chip which is spread and rolled into place.

**SINGLE-SIZED AGGREGATE/CHIP:** an aggregate or chip in which the particle size distribution is limited to a very narrow range. See also GAP-GRADED and WELL-GRADED Aggregate/ Chip.

**SKID RESISTANCE:** the frictional resistance provided by the pavement surface to the vehicle tyres during braking or cornering manoeuvres, which opposes skidding. It is usually measured on wet surfaces.

**SLAKED LIME:** calcium hydroxide,  $\text{Ca}(\text{OH})_2$ , also referred to as *Hydrated Lime*, and supplied in powdered form.

**SLIP:** a movement or fall of earth in a cut or bank.

**SLOPE:** the inclination of a surface with respect to the horizontal expressed as rise or fall in a certain longitudinal distance. Also an inclined surface.

**SLP, STATIONARY LASER PROFILER:** a machine used to measure *Macrotecture* (roughness) of a pavement surface.

**SLURRY SEAL:** a surface dressing comprising a specially graded aggregate mixed with an emulsion binder, and a small percentage of cement and water. Not to be confused with MICROSURFACING which has a PME as binder.

**SMA:** see STONE MASTIC ASPHALT.

**SOAK PIT:** a large hole filled with rock or stone to create a large surface area in the surrounding ground so that surface run-off can soak away.

**SOIL:** unconsolidated inorganic and organic material derived from weathering or breakdown of rock and decay of organic material (from plants

and animals). The upper weathering layer above bedrock.

**SOUND LEVELS:** pressure levels measured in decibels (dB) or adjusted decibels (dBA). See also DECIBEL.

**SPAN:**

- The distance between the centres of adjacent supports of a bridge, beam or truss.
- The superstructure of a bridge between two adjacent supports.

**SPECIALISED SURFACING:** a surfacing designed to provide skid resistance (e.g. incorporating CALCINED BAUXITE chip), to delineate uses of a pavement (e.g. coloured bus lanes).

**SPECIFICATION:** a document containing best practice in construction and maintenance of roads, including specifications for materials, paving, surfacings, road formation, equipment, traffic control, quality assurance. Most of the specifications referred to in this book are dated to indicate the versions that were used. Specifications referred to in contract and other works documents may not be dated, to indicate that the latest version available is to be used.

**SPRAYBAR:** a multiple DISTRIBUTOR for spraying binder. Also called *Gangsprayer* or *Gangbar*.

**SPRAYING:**

- Application of bitumen on surface to be sealed.
- Use of chemicals and hot water to control vegetation.

**STABILISATION/ STABILISE:** to modify any natural material to improve, correct a known deficiency, or maintain its load-carrying capacity, usually by adding lime, cement, emulsion, or water.

**STABILISED MATERIAL:** any material which has been stabilised.

**STABILITY (of asphalt):** the ability to resist deformation under load, without permanent loss of shape.

**STANDARD AXLE LOAD:** a single axle with dual-tired wheels loaded to a total mass of 8.2 tonnes (80 kN).

**STIFFNESS:** the resistance of a material to permanent or recoverable deformation.

**STOCKPILE:** a heap or stack of material held in stock for future use.

**STOICHIOMETRIC AIR:** the amount of air needed to provide enough oxygen atoms to match up with each carbon and hydrogen atom in a fuel, so that no oxygen, carbon or hydrogen is left over after combustion is complete.

**STONE MASTIC ASPHALT (SMA):** a gap-graded hot mixed asphalt which has a high proportion of coarse aggregate that interlocks to form a stone-on-stone skeleton to resist permanent deformation. The stone skeleton is filled with a mastic of bitumen and filler to which fibres are added to provide adequate stability of the bitumen, and to prevent drainage of binder during transport to the site and placement.

**STRAIGHT-RUN BITUMEN:** the residuum obtained after vacuum distillation of crude oil, not subjected to further processing such as air-blowing or solvent extraction.

**STRAIN:** the change of shape as a result of an applied stress, expressed as a ratio of increase or decrease divided by the original length. Elastic strain is wholly recoverable.

**STRATEGIC ROAD:** a road which connects main centres of population, and carries >2500 vpd.

**STREET:** a road within an urban locality.

**STRESS:** the force on a member divided by the area which carries the force, expressed in  $\text{N/mm}^2$  or MPa.

**STRIPPING:** see CHIP LOSS.

- Displacement of binder from a chip surface by action of water, e.g. in an asphaltic mix.
- Loss of chip from a chipseal, generally along wheelpaths.
- The removal of formwork from concrete.
- The removal of the upper layer of soil or overburden.

**SUB-BASE:** the material laid on the SUBGRADE below the BASECOURSE either for the purpose of making up additional PAVEMENT thickness required; to prevent intrusion of the subgrade into the base; or to provide a working platform. Usually constructed from aggregate, stabilised aggregate or stabilised soil, of larger size than material used in the basecourse.

**SUBGRADE:** the trimmed or prepared portion of the formation (the ground) on which the pavement is constructed. Generally taken to relate to the upper line of the formation.

**SUBSTRUCTURE:** the piers and abutments (including wing walls) of a bridge which support the superstructure.

**SUMP:** see CATCH PIT.

**SUPERELEVATION:** the continuous transverse slope normally given to the carriageway at horizontal curves.

**SUPERSTRUCTURE:** the part of a bridge structure which is supported by the piers and abutments.

**SURFACE COURSE:** see SURFACING, WEARING COURSE.

**SURFACE SEAL:** a thin layer of bitumen and chip which prevents ingress of water into the pavement.

**SURFACE WATER CHANNEL:** an open drain or ditch formed for the collection and drainage of water run-off from the road's surface. The width of the channel shall be a minimum of 1.0 m (0.5 m either side of the invert).

**SURFACING:** the uppermost part of a pavement specifically designed to resist abrasion from traffic and to minimise the entry of water. It may be chipseal, asphaltic mix, or other material. See WEARING COURSE, TOP COURSE. Also called *Surface Course*.

**SWALE:** an open vegetated drainage channel or shallow trough-like depression designed to carry, detain, partly treat and promote the filtration of stormwater run-off, usually 5–10 m wide.

**SWEEPING:** the removal of loose material from a pavement by means of a broom.

**SWEEPINGS:** material removed by sweeping, usually referring to chips.

## T

**TACHOMETER:** a counter that records the cumulative number of pump revolutions. They are fitted to DISTRIBUTORS.

**TACK COAT:** a thin application of binder to improve adhesion between two seal layers, e.g.

between two layers of asphaltic mixes, or between an old chipseal and a new asphaltic mix layer.

**TAMP:** to COMPACT a loose material by repeated blows.

**TAR:** a viscous product resulting from the destructive distillation of carbonaceous material, coal being the most common source. (Tar, not to be confused with BITUMEN, is no longer used for roadmaking in New Zealand.)

**TENSILE STRENGTH TEST:** determination of strength and elasticity of a material when tested in tension under specified test conditions.

**TEXTURE:** irregularities in the pavement surface classified in three groups by their dimensions:

Group	Horizontal (mm)	Vertical (mm)
Microtexture	0 – 0.5	0 – 0.2
Macrottexture	0.5 – 50	0.2 – 10
Megattexture	5 – 50	1 – 50

**TEXTURISING SEAL:** a pretreatment to prepare a surface for a reseal by reducing texture variance, or to reinstate texture. Also called PRETREATMENT SEAL.

**TOE DRAIN:** an interceptor drain constructed along bottom of a batter to collect batter RUN-OFF.

**TOE WALL:** a low retaining wall constructed at the foot of an earth slope.

**TOP COURSE (or Top Surface):** a pavement layer constructed on top of the basecourse layer. This layer is constructed of material with a smaller top size than the basecourse layer. See also SURFACING.

**TOPPINGS:** fine material from rock crushing, usually including dust, passing through a 4.75 mm sieve.

**TRACKING:** a term used in chipsealing for the black discolouration in the WHEELPATHS caused by low viscosity binder being carried or tracked on vehicle tyres from its source (usually from on-road BLEEDING).

**TRAFFIC:** a generic term covering any vehicles, persons or animals travelling on a road.

**TRAFFIC FLOW:** the number of vehicles passing a given point during a specified period of time.

**TRAFFIC ISLAND:** a defined area, usually at an intersection, from which traffic is excluded and which is used for control of vehicular movements and for pedestrian refuge.

**TRAFFIC LANE:** a portion of the paved carriageway allotted for the use of a single line of vehicles.

**TRAFFIC VOLUME:** the number of vehicles flowing in both directions past a particular point in a given time (e.g. vehicles per hour, vehicles per day (vpd)). See also TRAFFIC FLOW.

**TRANSVERSE PROFILE:** the shape of a pavement surface measured as vertical distances from a datum perpendicular to traffic flow.

**TREATMENT LENGTH:** a uniformly performing section of pavement, but different to sections on either side of it. May be lengths of road scheduled for resealing.

**TRIAXIAL TEST:** a test to determine the stress-strain properties of a pavement material in which a cylindrical specimen of the material is subjected to a 3-dimensional stress system. The axial strain is related to the applied stress.

**TRIMMING:** finishing off the formation accurately to the designed profile.

**TWO COAT CHIPSEAL:** a chipseal with two applications of binder and two applications of chip applied in the following sequence:

- an application of sprayed binder followed immediately with an application of large size chip;
- a second application of sprayed binder, and another application of finer chip.

Both coats are applied one after the other with little to no time delay between coats.

## U

**ULLAGE:** the air space left when a container is nominally full; the unused part of the capacity of a container. Ullage ensures that any subsequent expansion of the liquid does not cause overflow or excessive hydraulic pressure. The ullage space is usually measured at 15°C.

**UNBOUND GRANULAR MATERIAL/BASE:** aggregate or soil which contains no additives or binder such as bitumen or cement. A base comprised of granular or mechanically stabilised materials. It cannot resist significant tensile stresses.

**UNIFORMLY GRADED:** an aggregate having a limited particle-size distribution approaching a single size.

**UNSEALED SHOULDER:** that portion of the carriageway, located between the edge of seal and the shoulder hinge point, having a slope generally no steeper than 12:1, except on curves where the superelevation may increase the slope.

**UTILITIES SERVICES:** services such as gas, water, electricity, telephone, sewer, and stormwater. Also called *Underground Services*.

## V

**VAPOUR VENTING:** water vapour trapped in or below a seal rises and creates a bubble of binder rising to the pavement surface between the chip. When pricked the bubble, known as a VOLCANO has a drop of water inside. The volcanoes tend to join up, ultimately resulting in a large area of flushed surface.

**VEHICLE CLASS:** classification of vehicles by type, or by number of axles. Vehicles may be: Passenger cars (LV); Light (LCV, up to 3.5t); Medium (MCV, over 3.5t); Heavy Commercial Vehicles (HCV-I with 3 or 4 axles; HCV-II with 5 or more axles); Buses. See Transfund NZ's *Project Evaluation Manual* (2002) Appendix A2.2.1 for details, and *Land Transport Rule (2002) Vehicle Dimensions and Mass* for latest information.

**VEHICLE TYPE:** classification of vehicles by type, e.g. car, station wagon, utility, light commercial vehicle, etc., and/or by number of axles.

**VERGE:** the area of road located between the shoulder hinge point and the road boundary.

**VERTICAL ALIGNMENT:** the longitudinal profile along the design line of a road.

**VERTICAL CURVE:** a curve in longitudinal profile of a carriageway to provide for gradual change of grade.

**VIBRATING PLATE COMPACTOR:** an automotive machine which compacts by applying vibration to the heavy metal plate on which it operates.

**VIBRATING ROLLER:** a roller that uses vibration to assist compaction, characterised primarily by frequency, amplitude and mass.

**VISCOELASTICITY:** the combined viscous and elastic response of a material to an applied stress. A viscoelastic material demonstrates both energy storage (elastic) and energy dissipation (viscous) responses to mechanical deformation.

**VISCOMETER:** an instrument for measuring viscosity. Bitumen viscosity is usually measured using capillary tube glass viscometers.

**VISCOSITY:**

- The resistance of a fluid to flow, caused by internal friction from inter-molecular cohesion.
- The numerical assessment of this property made according to a prescribed method.
- The ratio of the shear stress to the rate of shear strain of a Newtonian liquid.

A high viscosity liquid does not flow easily. The viscosity of bitumen (or its cutbacks) is usually measured by the time taken for a known volume to flow by gravity through a calibrated capillary tube at a specified temperature. The result, *kinematic viscosity*, is expressed in mm<sup>2</sup>/s (or centistokes cSt).

**v/l/d (Vehicles per Lane per Day):** the volume of traffic expressed as vehicles per lane per day.

**vpd (Vehicles per Day):** the number of vehicles observed passing a point on a road in both directions for 24 hours.

**VOID:** a space within a material, between particles, that is not occupied by solid matter. Voids may be filled with air (*Air Voids*), water or binder (bitumen).

**VOID CONTENT:** ratio of volume of voids to total volume of the material, expressed as %.

**VOID RATIO:** ratio of volume of voids to the volume of solids in a material.

**VOIDFILL SEAL:** a seal for filling the voids in an existing coarse textured chipseal surface. It is a single very light application of binder, followed by a single application of fine chip designed to fit into the texture of an existing chipseal surface.

**VOLATILE SOLVENT:** a low boiling point hydrocarbon distillate used in the manufacture of cutback bitumen to produce a binder with a temporarily low viscosity which will increase again as the solvent evaporates, e.g. white spirit.

**VOLCANO:** see VAPOUR VENTING.

## WXYZ

**WALK-OVER INSPECTION:** a search for road defects carried out by inspecting the road at a walking pace.

**WATER BLASTING:** a HIGH PRESSURE WATER TREATMENT that uses a water pressure of approximately 15,000 psi at high volumes, much greater than used for WATER CUTTING.

**WATER CONTENT:** the quantity of water which can be removed from the aggregate or soil by heating at 105°C, until no further significant change in mass occurs. Usually expressed as a percentage of the dry weight. Sometimes called *Moisture Content*.

**WATER CUTTING:** a HIGH PRESSURE WATER TREATMENT that uses ultra-high pressure (up to 36,000 psi) but low volumes of water. The pressure provides the cutting action.

**WATER TABLE:** the natural level at which water would stand in an unpumped bore hole, well or other depression, under conditions of equilibrium.

**WATERPROOFING:** the process of rendering surfaces or material impervious to water.

**WATERWAY:** a channel or stream; or an area available for water to pass through or under a structure.

**WEARING COURSE:** the surface layer of a pavement on which the traffic travels. It is specifically designed for waterproofing, skid and abrasion resistance. See also SURFACING, may be called TOP COURSE.

**WEATHERING:** the changes in rock resulting from exposure to influences of the atmosphere.

**WEATHERED:** (generally of aggregates) partly decomposed or otherwise affected by exposure to weather.

**WELL GRADED:** a chip having a particle-size distribution extending over a wide range of particle

sizes without excess or deficiency of any specific sizes within the range. See also SINGLE-SIZED and GAP-GRADED Aggregates/Chips.

**WET LOCK SEAL:** a seal coat applied to another seal with a light application of binder.

**WETTING:** the process of a liquid spreading over a solid, e.g. binder over chip.

**WHEELPATH, also called *Wheel track*:** the path taken by the wheels of a vehicle using a road.

**WINDROW:** the long ridge of material formed by a grader or earth-moving machine.

**WORKABILITY:** the ability of a material to be manipulated, usually with reference to its placement and compaction.

**ZONE:** a portion of a study area, designated as such for particular land use and traffic analysis purposes.

