

APPENDIX A
GLOSSARY OF TERMS

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AADT – Average annual daily traffic.

Adhesion – Adhesion is the interaction between two substrates such as the bond between a sealant material and the crack or joint sidewall or the bond between asphalt cement and aggregate. This may be physical, chemical or physiochemical in nature.

Agency Costs – *See Annual Costs*

Aggregate Interlock – The projection of aggregate particles or portions of aggregate particles from one side of a joint or crack in concrete into recesses in the other side of the joint or crack so as to affect load transfer in compression and shear and maintain mutual alignment. Aggregate interlock is the steric interaction of aggregates by which the fractured faces mesh and prevent both aggregates from moving. It is created by the aggregates moving on one or more axes until this interaction occurs.

Alligator Cracking – A series of interconnecting cracks in an asphalt pavement surface forming a pattern that resembles an alligator's hide or chicken wire. In its early stages, alligator cracking may be characterized by a single longitudinal crack in the wheel path (Alligator A Cracking). The cracks indicate fatigue failure of the surface layer generally caused by repeated traffic loadings. Hence, the term fatigue cracking is also used.

Analysis Period – The period of time used in making economic comparisons between treatment alternatives. The analysis period should not be confused with the pavement's design life (performance period).

Annual Costs – Any costs associated with the annual maintenance and repair of a pavement facility.

Application Temperature – The manufacturer's recommended temperature for use of the product. For hot-applied sealants, the application temperature is any temperature between the minimum application temperature and safe heating temperature. This also covers the application of binders (particularly emulsions) in chip seal operations, and is addressed in Caltrans Standard Specifications, sections 37 and 94.

Asphalt Cement – Fluxed or unfluxed asphalt specially prepared as to quality and consistency for direct use in the manufacture of asphalt pavements.

Asphalt Concrete – *See hot mix asphalt concrete.*

Asphalt Tack Coat (or paint binder) – A light application of asphalt, usually asphalt emulsion. It is used to ensure a bond between two bituminous pavement layers, or a bituminous layer placed over an existing portland cement concrete layer.

Asset Management – A systematic process of maintaining, upgrading, and operating physical assets cost-effectively. It combines engineering principles with sound business practices and economic theory, and it provides tools to facilitate a more organized, logical approach to decision-making. Thus, asset management provides a framework for handling both short and long-range planning.

- Backer Material** – A compressible material that is placed in joints or cracks before applying sealant to prevent bonding of the sealant on the bottom of the joint, to control sealant depth, and to prevent sagging of the sealant.
- Bituminous Pavement** – A pavement comprising an upper layer or layers of aggregate mixed with a bituminous binder such as asphalt cement, modified asphalt emulsion, or asphalt rubber. Surface treatments such as chip seals, slurry seals, sand seals, and cape seals are also considered bituminous pavement.
- Bleeding** – Movement of binder through the bituminous pavement to create a layer of binder on the surface. The bleeding creates a shiny black surface that may be tacky to the touch, especially at high temperatures. Bleeding is often found in the wheel paths on curves and in climbing lanes.
- Block Cracking** – A rectangular pattern of cracking in asphalt pavements that is often caused by hardening due to aging coupled with shrinkage due to thermal contraction of the asphalt mixture. Block cracking typically occurs at a uniformly spaced interval in pavements with low traffic volumes.
- Blow-up** – Buckling and shattering of PCC pavement resulting from thermal expansion and the resultant compressive forces exceeding the strength of the material. It generally occurs at transverse joints or cracks.
- Bond Breaker** – Any material used to prevent bonding of adjacent pavement layers. A thin bituminous layer is often used as a bond breaker between a concrete pavement and an unbonded concrete overlay.
- Bonded Concrete Overlay** – Increase in the pavement structure of a concrete pavement by the addition of a concrete overlay in direct contact with and adhering to the existing concrete surface. May be used to correct either functional or structural deficiencies.
- Break** – The process by which the globules of asphalt in an asphalt emulsion flocculate and coalesce to become separated from the water. The color of the emulsion will change from brown to black during the breaking process.
- California Profilograph** – A rolling straight edge used for evaluating pavement profile (smoothness) consisting of a 7.5m (25-ft) frame with a wheel located at the center of the frame that senses and records bumps and dips on graph paper or by a computer.
- Cape Seal** – A surface treatment where a slurry surfacing is placed over a chip seal. These may be placed on newly constructed surfaces. Cape seals are used to provide a dense, waterproof surface with improved skid resistance and ride quality. Use of polymer or asphalt rubber modified chip seals in cape seals may alleviate reflective cracking.
- Carbide Milling** – Surface removal with a milling machine equipped with carbide tipped milling teeth. The hardened carbide tips are resistant to wear and efficiently grind and pulverize concrete and asphalt surfaces.
- Chemically Curing Sealant** – A material that reaches its final properties through the reaction of the component materials when mixed.

Chip Seal – A surface treatment in which the pavement is sprayed with asphalt (generally emulsified) and then immediately covered with aggregate and rolled. Chip seals are used primarily to seal the surface of a pavement with non load-associated cracks and to improve surface friction, although they also are commonly used as a wearing course on low volume roads. Use of special binders such as asphalt rubber or polymer modified binders can make an effective crack alleviation treatment and allow significantly deflecting pavements to flex without premature cracking.

Cohesion – The internal bond within a joint sealant material. Cohesion loss is seen as a noticeable tear along the surface and through the depth of the sealant. Cohesion is the internal strength of any material. It may be physical or chemical in nature or both. This includes binders and mixes!

Cold Applied Sealant – A crack-sealing compound that is generally applied at ambient temperatures reaching final properties through a curing process.

Cold In-Place Recycling (CIR) – A process in which a portion of an existing bituminous pavement is pulverized or milled, and then the reclaimed material is mixed with rejuvenation oils or emulsions, emulsion or other new binder and, when needed, virgin aggregates (to ensure correct grading). The binder used most often is emulsified asphalt with or without a softening agent. The resultant blend is placed as a base for a subsequent overlay or surface treatment. The reclaimed material can also be mixed with rejuvenation agents without the addition of new binder.

Cold Milling – A process of removing pavement material from the surface of the pavement either to prepare the surface to receive overlays (by removing rutting, and surface irregularities) or to restore pavement cross slopes and profile. Also used to remove oxidized asphalt concrete (Also, *see carbide milling*).

Compressible Insert – Material used to separate freshly placed concrete (such as from a partial-depth or full-depth repair) from existing hardened concrete. This usually consists of a 12-mm (0.5 in) thick Styrofoam or compressed fiber material that is impregnated with asphalt.

Concrete – *See Portland Cement Concrete*

Construction Joint – A joint constructed in a transverse direction in PCC pavements to control cracking of the slab as it cures. Highway construction joints are created by sawing the concrete.

Continuously Reinforced Concrete Pavement (CRCP) – PCC pavement constructed with sufficient longitudinal steel reinforcement to control transverse crack spacings and openings in lieu of transverse contraction joints for accommodating concrete volume changes and load transfer.

Contract Maintenance – The range of contracting methods and vehicles used by public transportation agencies to accomplish maintenance programs or supplement activities that may be performed in-house. Contracts may be activity based where the agency provides specifications and compensation is either on a lump sum or unit price basis; or performance based, long-term total asset management contracting which requires the contractor to provide turnkey maintenance to an established level of service. Contract maintenance (in other areas) means contracts let to carry out routine and major maintenance on a defined set of roadways under a quality plan.

Corner Break – A portion of a concrete slab separated by a crack that intersects the adjacent transverse or longitudinal joints at about a 45° angle with the direction of traffic. The length of the sides is usually from 0.3 meters (1 ft) to one-half of the slab width on each side of the crack.

Corrective Maintenance – Maintenance performed once a distress becomes severe enough to cause pavement disintegration, excessive deformation or cracking. It is applied to the pavement (e.g., pothole filling, or spall repair) to repair the specific distress type.

Concrete Pavement Restoration (CPR) – A series of repair techniques used to preserve or improve the structural capacity or functional characteristics of a PCC pavement. CPR techniques each have a unique purpose to repair or replace a particular distress (kind of deterioration) found in PCC pavement and to manage the rate of deterioration. CPR techniques include:

- Full-depth repair
- Partial-depth repair
- Diamond grinding
- Joint and crack resealing
- Slab stabilization
- Dowel Bar Retrofit
- Cross-stitching cracks or longitudinal joints
- Retrofitting concrete shoulders
- Retrofitting edge drains

Crack – Fissure or discontinuity of the pavement surface not necessarily extending through the entire thickness of the pavement. Cracks generally develop after initial construction of the pavement and may be caused by thermal effects, excess loadings or deflections or repetitive loading at sub-fracture stresses.

Crack Filling – The placement of materials into non-working cracks to substantially reduce the intrusion of incompressibles and infiltration of water, while also reinforcing the adjacent pavement. Crack filling should be distinguished from crack sealing (*see below*).

Crack Sealing – A maintenance procedure that involves placement of specialized materials into working cracks to prevent infiltration of water into the underlying pavement layers (*See Working Crack*). Crack sealing is the introduction of materials that adhere to the crack walls, are flexible and elastomeric in nature. This allows significant strain to be absorbed by the material without fracture. Much of this strain will be recoverable. Thus the crack may open and close with thermal stresses or traffic loading and remain sealed.

- Cross Stitching** – A repair method that involves the drilling of holes diagonally across a crack in PCC pavement into which steel reinforcement bars are inserted and epoxied in place. The holes are alternated from side to side of the crack on a pre-determined spacing. This technique is generally used for longitudinal cracks that are still in no worse than fair condition. Cross-stitching increases slab integrity by adding steel reinforcement to hold the crack together.
- Cure** – A period of time following placement and finishing of a material such as concrete during which desirable engineering properties (such as strength) develop. Improved properties may be achieved by controlling temperature or humidity during curing. Also, it relates to emulsions as this is the phase during which water is lost and continuous films of asphalt cement are formed.
- Curing** – The maintenance of a satisfactory moisture content and temperature in concrete during its early stages so that desired properties may develop. *See above.*
- Curing Blanket** – A built-up covering of burlap sacks, matting, straw, waterproof paper, or other suitable material placed over freshly finished concrete.
- Curing Compound** – A liquid that can be applied as a coating to the surface of newly placed concrete to retard the loss of water, or in the case of pigmented compounds, also to reflect heat so as to provide an opportunity for the concrete to develop its properties in a favorable temperature and moisture environment. *See Curing.*
- Dense-Graded Asphalt Pavement** – An overlay or surface course consisting of a mixture of asphalt binder and a well-graded (also called dense-graded) aggregate. A well-graded aggregate is uniformly distributed throughout a full range of sieve sizes (*See Hot Mix Asphalt*).
- Depression** – Localized pavement surface areas at a lower elevation than the adjacent paved areas.
- Design Life** – The expected life of a pavement from its opening to traffic until structural rehabilitation is needed. The typical reporting of pavement life does not include the life of the pavement with the application of preventive maintenance. Design life (in mechanistic terms) is the number of ESAL's (i.e., repetitive loadings) the pavement can absorb before stiffness is reduced to 50% of the design or initial stiffness.
- Diamond Grinding** – A process that uses a series of diamond-tipped saw blades mounted on a shaft or arbor to shave the upper surface of a pavement to remove bumps, restore pavement rideability, and improve surface friction (*See also CPR*).
- Discount Rate** – The rate of interest reflecting the investor's time value of money. The discount rate is used to convert benefits and costs occurring at different times to a baseline date. Discount rates can incorporate an inflation rate depending on whether real discount rates or nominal discount rates are used. The discount rate is often approximated as the difference between the interest rate and the inflation rate.
- Dowel** – Most commonly a plain round steel bar (usually coated, such as with paint or epoxy), which extends into two adjoining slabs of a PCC pavement at a transverse joint placed parallel to the centerline so as to transfer shear loads.
- Dowel Bar Retrofit** – A rehabilitation technique that is used to increase the load transfer capability of existing jointed PCC pavements by placement of dowel bars across joints and/or cracks that exhibit poor load transfer (*See also CPR*).

- Emulsified Asphalt** – A dispersion of asphalt binder, water, and emulsifying agent. Spherical globules of asphalt 0.5-10 microns in diameter are dispersed in water by using an emulsifying agent. These asphalt globules are either anionic (negatively charged) or cationic (positively charged).
- Equivalent Uniform Annual Cost (EUAC)** – The net present value of all discounted cost and benefits of an alternative as if they were to occur uniformly throughout the analysis period. Net Present Value (NPV) is the discounted monetary value of expected benefits (i.e., benefits minus costs).
- Fatigue Cracking** – *See Alligator Cracking.*
- Faulting** – Differential vertical displacement of a slab or other member adjacent to a joint or crack. Faulting commonly occurs at transverse joints of PCC pavements that do not have adequate load transfer.
- Fiber Modified Sealant** – Generally a hot-applied sealant that is composed of unmodified or modified asphalt cement and heat resistant polymeric fibers. It is commonly used to seal cracks in asphalt concrete pavements.
- Flush Coat** – An application of a fog seal and sand cover to the surface of a newly placed chip seal.
- Fog Seal** – A light application of slow setting asphalt emulsion diluted with water and applied to the surface of a bituminous pavement. Fog seals are used to rejuvenate aged asphalt surfaces as well as to seal small cracks and surface voids. Fog seals may also be used to improve chip retention in newly applied chip seals or retard raveling in poorly compacted hot mix. Fog seals may be followed by a sand coat to allow opening to traffic without pick up of the binder on vehicle wheels.
- Free Edge** – An unrestrained pavement boundary.
- Fuel Resistant Sealant** – A joint or crack sealant compound that is resistant to and maintains serviceability after being exposed to fuel or other petroleum products.
- Full-Depth Patching** – Removal and replacement of a segment of pavement to the level of the subgrade to restore areas of deterioration in either flexible or rigid pavements.
- Functional Performance** – A pavement's ability to provide a safe, smooth riding surface. These attributes are typically measured in terms of ride quality (*see International Roughness Index*) or skid resistance (*see International Friction Index*).
- Grinding Head** – A shaft containing numerous diamond blades or carbide teeth on diamond grinding or cold milling equipment.
- Grooving** – The process used to cut slots into a pavement surface (usually, PCC pavements) to provide channels for water to escape beneath tires, improving wet pavement skid resistance and reducing the potential for hydroplaning.
- Heater Scarification** – Application of heat to a pavement surface to facilitate scarifying of the pavement surface. Heater scarification is the initial phase of a hot in-place recycling (HIR) process in which the surface of the old pavement is heated and mechanically raked before removal and recycling.

Hot Air Lance – A device that uses heated compressed air to clean, dry, and warm cracks in asphalt pavements prior to sealing.

Hot Applied Sealant – A crack or joint sealing compound that is applied in a molten state and cures primarily by cooling to ambient temperature.

Hot In-Place Recycling (HIR) – A process which involves softening of the existing asphalt surface with heat, mechanically removing the surface material, mixing the material with a recycling or rejuvenating agent, adding virgin asphalt and aggregate to the material (if required), and then returning the material to the pavement.

Hot Mix Asphalt Concrete (HMAC or HMA) – A controlled mixture of asphalt binder and well-graded, high quality aggregate compacted into a uniform layer of predetermined density. HMAC pavements may also contain additives such as anti-stripping agents and polymers.

Hydroplaning – Loss of contact between vehicle tires and the roadway surface that occurs when vehicles travel at high speeds on pavement surfaces with standing water.

Initial Costs – All costs associated with the initial design and construction of a facility, placement of a treatment, or any other activity with a cost component.

International Friction Index (IFI) – A measure of pavement macrotexture and wet pavement friction at 60 miles per hour as determined using measured friction at some test speed and macrotexture determined using ASTM E-965 or ASTM E-1845.

International Roughness Index (IRI) – A measure of a pavement's longitudinal surface profile as measured in the wheel path by a vehicle traveling at typical operating speeds. It is calculated as the ratio of the accumulated suspension motion to the distance traveled obtained from a mathematical model of a standard quarter car traversing a measured profile at a speed of 80 km/h (50 mph). The IRI is expressed in units of meters per kilometer or inches per mile and is an indication of pavement roughness.

Joint – A pavement discontinuity made necessary by design or by interruption of a paving operation.

Joint Depth – The measurement of a saw cut from the top of the pavement surface to the bottom of the cut.

Joint Deterioration – *See Spalling.*

Joint Filler – Compressible material used to fill a joint to prevent the infiltration of water or debris.

Joint Sealant – Compressible material used to minimize water and solid debris infiltration into the sealant reservoir and joint.

Joint Seal Deterioration - Break down of a joint or crack sealant, such as by adhesion or cohesion loss, which contributes to the failure of the sealant system. Joint seal deterioration permits incompressible materials or water to infiltrate into the pavement system.

Joint Shape Factor – Ratio of the vertical to horizontal dimension of the joint reservoir. The shape factor is dependent upon the type of sealant specified.

Jointed Plain Concrete Pavement (JPCP) – PCC pavement constructed with regularly spaced transverse joints to control all natural cracks expected in the concrete. Dowel bars may be used to enhance load transfer at transverse contraction joints (depending upon the expected traffic); however, there is no mid-slab temperature reinforcement.

Jointed Reinforced Concrete Pavement (JRCP) – Portland cement concrete pavement containing regularly spaced transverse joints and embedded steel mesh reinforcement (sometimes called distributed steel) to control expected cracks. Steel mesh is discontinued at transverse joint locations. Dowel bars are normally used to enhance load transfer at transverse joints. The transverse joint spacing of JRCP is typically longer than the joint spacing of JPCP.

Lane-to-Shoulder Drop off – Difference in elevation between the travel way and the shoulder surface.

Life Cycle Costing – An economic assessment of an item, system, or facility and competing design alternatives considering all significant costs of ownership over the economic life, expressed in terms of equivalent dollars. A method of determination of the cost of the pavement to the road owner over its design life.

Life Extension – The extension of the performance period of the pavement through the application of pavement treatments.

Liquid Asphalt (cutback) – Asphalt cement liquefied by blending with petroleum solvents.

Load-Transfer Assembly – Most commonly, the basket or carriage designed to support or link dowel bars in the desired alignment during jointed PCC pavement construction.

Load Transfer Efficiency – A measure of the ability of a joint or crack to transfer a portion of a load applied on one side of a joint or crack to the other side of the joint or crack.

Longitudinal Crack – A crack or discontinuity in a pavement that runs generally parallel to the pavement centerline. Longitudinal cracks may occur as a result of poorly constructed paving lane joints, thermal shrinkage, inadequate support, and reflection from underlying layers, or as a precursor to fatigue cracking. Longitudinal cracking that occurs in the wheel path is generally indicative of fatigue cracking.

Longitudinal Joint – A constructed joint in a pavement layer that is oriented parallel to the pavement centerline.

Low Modulus Sealant – A joint or crack sealing material, which exhibits elastomeric properties at low temperatures.

Map Cracking – A series of interconnected hairline cracks in PCC pavements that extend only into the upper surface of the concrete. These cracks are typically associated with alkali-silica reactivity (ASR).

Maximum Heating Temperature – The maximum temperature, as recommended by the manufacturer, to which a binder can be heated while conforming to all specification requirements and providing appropriate application characteristics.

Melter – A piece of equipment designed specifically to heat hot applied joint or crack sealant accurately and controllably to a temperature where it will flow.

- Melter Applicator** – A piece of equipment designed specifically to melt, heat accurately and controllably, and apply hot-applied sealants to pavement cracks or joints.
- Microsurfacing** – A mixture of polymer modified asphalt emulsion, mineral aggregate, mineral filler, water, and other additives, properly proportioned, mixed, and spread on a paved surface. Microsurfacing differs from slurry seal in that it is usually applied at more than a single stone thickness. Also, it has special emulsifiers for more rapid setting and, higher stiffness; it may be used for rut filling in stable pavements.
- Mineral Filler** – Mineral product with at least 70% passing the 0.075 mm (No. 200 sieve). Commonly used mineral fillers include, limestone dust, hydrated lime, portland cement, and fly ash.
- Minimum Application Temperature** – The minimum temperature, as recommended by the manufacturer, to which binder must be heated while conforming to all specification requirements and providing appropriate application characteristics.
- Modified Asphalt Chip Seal** – A variation on conventional chip seals in which the asphalt binder is modified with a polymeric material derived from a blend of ground tire rubber and natural rubber or latex rubber, or synthetic polymer modifiers to enhance the elastomeric, cohesive and/or adhesive characteristics of the binder.
- Net Present Value** – The value of future expenditures or costs discounted to today's dollars using an appropriate discount rate.
- Open-Graded Friction Course (OGFC)** – A thin HMA surface course consisting of a mix of an asphalt binder and open-graded aggregate. An OGFC helps to eliminate standing water on a pavement surface thereby reducing tire spray and hydroplaning potential.
- Overbanding** – Overfilling of a joint or crack reservoir so that a thin layer of crack or joint sealant is spread onto the pavement surface center over the joint or crack.
- Partial-Depth Patching** – Repairs of localized areas of surface deterioration of PCC pavements, usually for compression spalling problems, severe scaling, or other surface problems that are within the upper one-third of the slab depth.
- Patch** – Placement of a repair material to replace a localized defect in the pavement surface.
- Pavement Distress** – External (visible) indications of pavement defects or deterioration.
- Pavement Preservation** – The sum of all activities undertaken to provide, maintain and extend the life of roadways. This includes corrective, routine and preventive maintenance to keep the roadway in a safe and usable condition and delay the need for rehabilitation.
- Pavement Preventive Maintenance** – Planned strategy of cost-effective treatments to an existing roadway system and its appurtenances to preserve and extend the life of the system, retard deterioration, and maintain or improve the functional condition of the system without increasing the structural capacity.

Pavement Reconstruction – Replacement of an existing pavement structure by the placement of the equivalent of a new pavement structure. Reconstruction usually involves complete removal and replacement of the existing pavement structure and may include new and/or recycled materials.

Pavement Rehabilitation – Structural enhancements that extend the service life of an existing pavement and/or improve its load carrying capability. Rehabilitation techniques include restoration treatments and structural overlays.

Performance Period – The period of time that an initially constructed or rehabilitated pavement structure will perform before reaching its terminal serviceability.

Plant Mix – *See Hot Mix Asphalt.*

Point Bearing – Concentration of compressive stresses in small areas. This may occur when a partial-depth patch in portland cement concrete pavement is made without the compressible insert. Also, slab expansion in hot weather forces an adjacent slab to bear directly against a small partial-depth patch and causes the patch to fail by delaminating and popping out of place.

Polishing – Wearing away of the surface binder, causing exposure of the coarse aggregate particles. A polished pavement surface is smooth and has reduced skid resistance.

Portland Cement Concrete (PCC) Pavement – A pavement constructed of portland cement concrete with or without reinforcement. Conventional PCC pavements include JPCP, JRCP, and CRCP.

Potholes – Potholes are created by collapse of the pavement surface. This is caused by water ingress into the pavement layers reducing stiffness and increasing flexing. Loss of HMA surface fines and matrix will lead to a reduction in integrity of the top pavement layer and formation of a hole. Loss of surface material in the HMA pavement requires a patch to restore pavement rideability. Potholes are typically bowl shaped holes of various sizes.

Preformed Compression Sealant – An extruded joint sealing material for PCC pavement that is manufactured ready for installation and is supplied in rolls. Preformed sealants incorporate an internal web design so that the material, when compressed and inserted into the sealant reservoir, remains in compression against the sides of the joint.

Present Serviceability Index (PSI) – A subjective rating of the pavement condition made by a group of individuals riding over the pavement. This may also be determined during a condition survey.

Present Worth – *See Net Present Value.*

Preventive Maintenance - A planned treatment on a road in good condition that is intended to preserve the system retard future deterioration, prolong service life and delay the need for rehabilitation.

Pumping – Ejection of fine-grained material and water from beneath the pavement through joints, cracks, or the pavement edge, caused by the deflection of the pavement under traffic loadings.

- Punch Out** – A localized area of a continuously reinforced concrete pavement bounded by two transverse cracks and a longitudinal crack. Aggregate interlock decreases over time and eventually is lost, which leads to steel rupture and allows the pieces to be punched into the subbase and subgrade.
- Racked-In Seal** – An application of a small aggregate to a fresh chip seal, with or without a flush coat of binder, for the purpose of increasing shear resistance in fresh chip seals and is especially useful in intersections.
- Raveling** – Aggregate loss from the pavement surface. This may be caused by the wearing away of the pavement surface, dislodging of aggregate particles, shrinkage or insufficient adhesive and cohesive strength of the asphalt binder. Loss of cohesion may be caused by aging or incomplete cure of an emulsion.
- Reactive Maintenance** – Maintenance applied to restore a pavement to an acceptable level of service due to unforeseen conditions. Activities such as pothole repairs, performed to correct random or isolated localized pavement distresses or failures, are considered reactive. Similar to Corrective Maintenance.
- Recycling Agents** – Organic materials with specific chemical and physical characteristics that are used in pavement recycling to address binder deficiencies and to restore aged asphalt material to desired specifications. Such materials include heavy lube oil fractions or aromatic oil extracts that soften the asphalt and increase its flexibility. Some recycling agents may contain asphalt as well as polymers to improve binder rheology.
- Reflection Cracking** – Cracking that appears on the surface of a pavement above joints and cracks in the underlying pavement layer due to horizontal and vertical movement at these joints and cracks. Reflection cracking is caused by a build-up of strain below the surface layer caused by movement at cracks or joints. These strains, if not alleviated (relieved), cause crack initiation in the surface layer. This crack may then propagate to the surface. The rate is dependent on the physical characteristics and geometric properties of the pavement surface layer.
- Rejuvenating Agent** – Similar to recycling agents in material composition, these products are added to existing aged or oxidized HMA pavements to restore pavement surface flexibility and to retard cracking.
- Reservoir** – The part of a portland cement concrete pavement joint that normally holds a sealant material, usually formed by a widening saw cut above the initial saw cut. Reservoirs may also be found in HMA pavements where joints are sawed and sealed above existing PCC pavements.
- Retrofit Dowel Bars** – Dowels that are installed into slots cut into the surface of an existing concrete pavement to restore load transfer.
- Rideability** – Ride quality of a pavement as perceived by its users or quantified by longitudinal profile.
- Router** – A mechanical device, with a rotary cutting system, that is used to widen, cut, and clean cracks in pavements prior to sealing.

Routine Maintenance – Maintenance work that is planned and performed on a regular basis to maintain and preserve the condition of the highway system or to respond to specific conditions and events that restore the highway system to an adequate level of service. Examples include crack sealing, fog sealing, and repair of localized failed areas of pavement.

Rubberized Asphalt Concrete (RAC) – Similar to HMA but having a minimum 15% crumb rubber additive in the binder.

Rubberized Asphalt Sealant – A sealant, generally hot applied, that is composed of asphalt cement, various types of rubber or polymer modifiers, and other compounding ingredients used for pavement crack and joint sealing.

Rutting – Longitudinal surface depressions in the wheel path of an HMA pavement, caused by cumulative plastic deformation of the HMA mix, inadequate compaction, or abrasion from studded tires (such abrasion can also be observed on PCC pavements). There may also be associated transverse displacement.

Sandblasting – A procedure in which sand particles are blown with compressed air at a pavement surface to abrade and clean the surface. Sandblasting is a construction step in partial-depth patching and joint resealing.

Sand Seal – An application of asphalt binder, normally an emulsion, covered with a fine aggregate. It is a technique to improve skid resistance and to seal the pavement surface on low volume roadways.

Sandwich Seal – An application of a dry aggregate to a bleeding surface followed by an application of an emulsion binder and a smaller aggregate for the purpose of alleviating the bleeding surface.

Scrub Seal – An application of a polymer modified asphalt emulsion to the pavement surface followed by the broom scrubbing of the emulsion into cracks and voids, then the application of an even coat of sand or small aggregate, and a second brooming of the aggregate and asphalt mixture. This seal is then rolled with a pneumatic tire roller.

Sealant – A material that has adhesive and cohesive properties to seal joints or cracks [generally less than 76 mm (3 in) in width].

Sealant Reservoir – *See Reservoir.*

Sealing – The process of placing sealant material in prepared joints or cracks to minimize intrusion of water and incompressible materials. This term is also used to describe the application of pavement surface treatments.

Sealing Compound – *See Joint Sealant.*

Segregation – Separation of aggregate components present in asphalt or portland cement concrete mixes by particle size. Segregation may occur anytime there is movement of the material.

Serviceability – Ability of a pavement to provide a safe and comfortable ride to its users. The term commonly used to describe the functional capacity of the pavement.

Settlement – A depression at the pavement surface that is caused by deformation or erosion of underlying materials.

Shoving – Localized displacement of an HMA pavement surface, often caused by high shear stresses associated with vehicle acceleration to deceleration.

Silicone Sealant – A type of joint or crack sealant compound consisting of polymers of polysiloxane structures that cures through a chemical reaction when exposed to air.

Skid Resistance – An indication of the frictional characteristics of a pavement surface.

Slab Stabilization – Process of injecting grout or bituminous materials beneath PCC pavements to fill voids without raising the pavement.

Slippage Cracking - Cracking associated with the horizontal displacement of a localized area of an HMA pavement surface mainly due to a poor bond between layers of bituminous pavement.

Slurry – Dispersion of solid materials in a water carrier that forms a smooth and evenly distributed mixture. A slurry is a dispersion of a solid in a liquid forming an unstable suspension of particles. The technical name is sol or colloidal sol.

Slurry Seal – Slurry seal is most commonly made with a quick setting emulsion in California (CQS-1h or LMCQS-1h) which passes the ASTM (T59) slow setting specification with the exception of the cement-mixing test, well graded fine aggregate, mineral filler, and water. In California, polymer in latex form is usually added to the slurry. It is used to fill fine non-active cracks and seal areas of old or raveling pavements, to restore a uniform surface texture, to seal the surface to prevent moisture and air intrusion into the pavement, and to improve skid resistance.

Spalling, Compression – Cracking, breaking, chipping, or fraying of slab edges within 0.6 meters (2 ft) of a transverse crack.

Spalling, Sliver – Chipping of concrete edge along a joint sealant usually within 12 mm (0.5in) of the joint edge.

Spalling, Surface – Cracking, breaking, chipping, or fraying of slab surface, usually within a confined area less than 0.5 square meters (0.6 yd²).

Stone Matrix Asphalt (SMA) – A mixture of asphalt binder, stabilizer material, mineral filler, and gap-graded aggregate that provides high stone on stone contact. The high level of mineral filler forms a mortar with the binder to enhance flexibility. Fibers are often added to prevent drain down during transportation of the mix to the job site; SMAs are used as a rut resistant wearing course.

Stress-Absorbing Membrane Interlayer (SAMI) – A thin layer that is placed between an underlying pavement and an HMA overlay for the purpose of dissipating strain and stresses at a joint or crack in the underlying pavement before they create stresses in the overlay. SAMIs normally consist of a spray application of asphalt rubber as the stress-relieving material, followed by a layer of aggregate chips.

Structural Condition – The condition of a pavement as it pertains to its ability to support the anticipated loadings.

Structural Overlay – An increase in the pavement load carrying capacity by adding additional pavement layers.

Surface Texture – The microscopic and macroscopic characteristics of the pavement surface that contribute to surface friction and noise.

Surface Treatment – Any application applied to an asphalt pavement surface to restore or protect the surface characteristics. Surface treatments include a spray application of asphalt (cement, cutback, or emulsion) and may or may not include the application of aggregate cover. Surface treatments are typically less than 25 mm (1 in) thick. They may also be referred to as surface seals, seal coats or chip seals. Slurry seals, thin bonded wearing course and thin overlays are also considered surface treatments.

Swell - A hump in the pavement surface that may occur over a small area or as a longer, gradual wave; either type of swell can be accompanied by surface cracking.

Terminal Serviceability – The lowest acceptable serviceability rating before resurfacing or reconstruction becomes necessary for the particular class of highway.

Thin Overlay – A single lift HMA overlay with a thickness of 38 mm (1.5 in) or less.

Transverse Crack – A discontinuity in a pavement surface that is generally oriented perpendicular to the pavement centerline. In HMA pavements, transverse cracks often form as a result of thermal movements of the pavement or reflection from underlying layers. In PCC pavements, transverse cracks may be caused by fatigue, loss of support, or thermal movements.

Treatment Life – The period of time during which a treatment application remains effective. Treatment life is contrasted with Life Extension.

Two-Component Sealant – A sealant supplied in two components which must be mixed at a specified ratio prior to application in order to cure to final properties.

Ultra Thin Overlay – An HMA overlay over an existing HMA or PCC pavement and is less than 25 mm (1 in) in thickness. May also be called a thin bonded wearing course.

Unbonded Overlay – Increase in the pavement structure of an existing concrete or composite pavement by addition of jointed plain, jointed reinforced or continuously reinforced concrete pavement placed on a separator layer (usually an asphalt layer) designed to prevent bonding to the existing pavement.

User Costs – Costs incurred by highway users traveling on the facility, and the excess costs incurred by those who cannot use the facility because of either agency or self-imposed detour requirements. User costs typically are comprised of vehicle operating costs (VOC), crash costs, and user delay costs.

Warranty – Contractual agreement between an approved contractor/vendor and the agency soliciting bids, which uses specific performance measures to protect the agency from responsibility for repair of premature distress caused by deficiencies in material and/or workmanship.

Waterblasting – The use of a high-pressure water stream 58,000 to 69,000 kPa (8,500 to 10,000 psi) to clean PCC. It may be used in PCC joint resealing to remove sawing debris or in patching to produce a clean surface prior to placement of the sealer or patch material. This is also referred to as hydroblasting.

Whip-Off – The loss of excess aggregate due to traffic or sweeping immediately after construction of a chip seal.

Ultra-Thin White (UTW) Topping – A thin [50 to 100 mm (2 to 4 in)] PCC overlay of an existing HMA pavement. UTW is a functional overlay that provides a stable surface that is resistant to deformation from static, slow moving, and turning loads.

Working Crack – A crack in a pavement that undergoes significant deflection and thermal opening and closing movements greater than 2 mm (1/16 in), typically oriented transverse to the pavement centerline.