

Pavement Terminology

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

Cape Seal – A surface treatment that involves the application of a slurry seal to a newly constructed surface treatment or chip seal. Cape seals are used to provide a dense, waterproof surface with improved skid resistance.

Chip Seal – A surface treatment in which a pavement surface 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.

Cold In-Place Recycling (CIR) – A process in which a portion of an existing bituminous pavement is pulverized or milled, the reclaimed material is mixed with new binder and, in some instances, virgin aggregates. The resultant blend is placed as a base for a subsequent overlay. Emulsified asphalt is especially suited for cold in-place recycling. Although not necessarily required, a softening agent may be used along with the emulsified asphalt.

Cold Milling – A process of removing pavement material from the surface of the pavement either to prepare the surface (by removing rutting and surface irregularities) to receive overlays, to restore pavement cross slopes and profile, or to re-establish the pavement's surface friction characteristics.

Corrective Maintenance – Maintenance that is performed once a deficiency occurs in the pavement (i.e., loss of friction, moderate to severe rutting, extensive cracking or raveling).

Crack Filling – The placement of materials into non-working cracks to substantially reduce infiltration of water and to reinforce the adjacent pavement. Working cracks are defined as those that experience significant horizontal movements, generally greater than about 2 mm (0.1 in.). Crack filling should be distinguished from crack sealing.

Crack Sealing – A maintenance procedure that involves placement of specialized materials into working cracks using unique configurations to reduce the intrusion of incompressibles into the crack and to prevent intrusion of water into the underlying pavement layers. Working cracks are defined as those that experience significant horizontal movements, generally greater than about 2 mm (0.1 in.).

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Dense-Graded Asphalt Overlay – An overlay course consisting of a mix of asphalt cement and a well graded (also called dense-graded) aggregate. A well graded aggregate is uniformly distributed throughout the full range of sieve sizes.

Discount Rate – The rate of interest reflecting the investor's time value of money, used to determine discount factors for converting 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.

Emulsified Asphalt – An emulsion of asphalt cement and water, which contains a small amount of an emulsifying agent. Emulsified asphalt droplets, which are suspended in water, may be either the anionic (negative charge) or cationic (positive charge) type, depending upon the emulsifying agent.

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).

Fog Seal – A light application of slow setting asphalt emulsion diluted with water. It is used to renew old asphalt surfaces and to seal small cracks and surface voids.

Heater Scarification – A form of hot in-place recycling in which the surface of the old pavement is heated, scarified with a set of scarifying teeth, mixed with a recycling agent, and then leveled and compacted.

Hot In-Place Recycling (HIR) – A process that consists of softening the existing asphalt surface with heat, mechanically removing the surface material, mixing the material with a recycling agent, adding (if required) virgin asphalt and aggregate to the material, and then replacing the material back on the pavement.

Hot Mix Asphalt (HMA) – A high quality, thoroughly controlled hot mixture of asphalt cement and well-graded, high quality aggregate thoroughly compacted into a uniform dense mass.

Inflation Rate – The rate of increase in the general price levels usually caused by an increase in the volume of money and credit relative to available goods. The inflation rate is also reflective of the rate of decline in the general purchasing power of a currency.

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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 Roughness Index (IRI) – A 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). Expressed in units of meters per kilometer (inches per mile), the IRI summarizes the longitudinal surface profile in the wheel-path.

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.

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.

Net Present Value – The present value of future expenditures or costs discounted using an appropriate interest rate.

Nominal Dollars – Dollars of purchasing power in which actual prices are stated, including inflation or deflation. Hence, nominal dollars are dollars whose purchasing power fluctuates over time.

Open-Graded Friction Course (OGFC) – An overlay course consisting of a mix of asphalt cement and open-graded (also called uniformly graded) aggregate. An open-graded aggregate consists of particles of predominantly a single size.

Pavement Maintenance - *See definitions on page 7.*

Pavement Preservation – The sum of all activities undertaken to provide and maintain serviceable roadways. This includes corrective maintenance and preventive maintenance, as well as minor rehabilitation projects.

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Pavement Preventive Maintenance – Planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system (without increasing the structural capacity).

Pavement Reconstruction – Construction of the equivalent of a new pavement structure which usually involves complete removal and replacement of the existing pavement structure including new and/or recycled materials.

Pavement Rehabilitation – Work undertaken to extend the service life of an existing pavement. This includes the restoration, placing an overlay, and/or other work required to return an existing roadway to a condition of structural and functional adequacy.

Pavement Serviceability Index (PSI) – A subjective rating of the pavement condition made by a group of individuals riding over the pavement.

Periodic Costs – Costs associated with rehabilitation activities that must be applied periodically over the life of the facility.

Present Worth Method – Economic method that requires conversion of costs and benefits by discounting all present and future costs to a single point in time, usually at or around the time of the first expenditure.

Real Dollars – Dollars of uniform purchasing power exclusive of general inflation or deflation. Real dollars have a constant purchasing power over time.

Recycling Agents – Organic materials with chemical and physical characteristics selected to address binder deficiencies and to restore aged asphalt material to desired specifications.

Rejuvenating Agent – Similar to recycling agents in material composition, these products are added to existing aged or oxidized HMA pavements in order to restore flexibility and retard cracking.

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Rubberized Asphalt Chip Seal – A variation on conventional chip seals in which the asphalt binder is replaced with a blend of ground tire rubber (or latex rubber) and asphalt cement to enhance the elasticity and adhesion characteristics of the binder. This is commonly used in conjunction with an overlay to retard reflection cracking.

Salvage Value – The remaining worth of the pavement at the end of the analysis period. There are generally two components of salvage value: residual value, the net value from recycling the pavement, and serviceable life, the remaining life of the pavement at the end of the analysis period.

Sand Seal – An application of asphalt material covered with fine aggregate. It may be used to improve the skid resistance of slippery pavements and to seal against air and water intrusion.

Sandwich Seal – A surface treatment that consists of application of a large aggregate, followed by a spray of asphalt emulsion that is in turn covered with an application of smaller aggregate. Sandwich seals are used to seal the surface and improve skid resistance.

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

Slurry Seal – A mixture of slow setting emulsified asphalt, well graded fine aggregate, mineral filler, and water. It is used to fill cracks and seal areas of old pavements, to restore a uniform surface texture, to seal the surface to prevent moisture and air intrusion into the pavement, and to provide skid resistance.

Spalling – The result of water entering brick, concrete or natural stone and forcing the surface to peel, pop out or flake off. This is caused by salt in water pushing outward from the inside. Eventually, spalling can cause crumbling and destruction of a structure.

Stone Mastic Asphalt Overlay – An overlay course consisting of a mix of asphalt cement, stabilizer material, mineral filler, and gap-graded aggregate. The gap-graded aggregate is similar to an open-graded material but is not quite as open.

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

User Costs – Costs that are 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), accident costs, and user delay costs.

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Pavement Preservation is “a program employing a network level, long-term strategy that enhances pavement performance by using an integrated, cost-effective set of practices that extend pavement life, improve safety and meet motorist expectations.” *Source: FHWA Pavement Preservation Expert Task Group*

An effective pavement preservation program will address pavements while they are still in good condition and before the onset of serious damage. By applying a cost-effective treatment at the right time, the pavement is restored almost to its original condition. The cumulative effect of systematic, successive preservation treatments is to postpone costly rehabilitation and reconstruction.

During the life of a pavement, the cumulative discount value of the series of pavement preservation treatments is substantially less than the discounted value of the more extensive, higher cost of reconstruction and generally more economical than the cost of major rehabilitation.

Additionally, performing a series of successive pavement preservation treatments during the life of a pavement is less disruptive to uniform traffic flow than the long closures normally associated with reconstruction projects.

Preventive Maintenance is “a planned strategy of cost-effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system (without significantly increasing the structural capacity).” *Source: AASHTO Standing Committee on Highways, 1997*

Preventive maintenance is typically applied to pavements in good condition having significant remaining service life. As a major component of pavement preservation, preventive maintenance is a strategy of extending the service life by applying cost-effective treatments to the surface or near-surface of structurally sound pavements.

Examples of preventive treatments include asphalt crack sealing, chip sealing, slurry or micro-surfacing, thin and ultra-thin hot-mix asphalt overlay, concrete joint sealing, diamond grinding, dowel-bar retrofit, and isolated, partial and/or full-depth concrete repairs to restore functionality of the slab (e.g., edge spalls, or corner breaks).

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Pavement Rehabilitation consists of “structural enhancements that extend the service life of an existing pavement and/or improve its load carrying capacity. Rehabilitation techniques include restoration treatments and structural overlays.” *Source: AASHTO Highway Subcommittee on Maintenance*

Rehabilitation projects extend the life of existing pavement structures either by restoring existing structural capacity through the elimination of age-related, environmental cracking of embrittled pavement surface or by increasing pavement thickness to strengthen existing pavement sections to accommodate existing or projected traffic loading conditions.

Two sub-categories result from these distinctions, which are directly related to the restoration or increase of structural capacity.

Major Rehabilitation “consists of structural enhancements that both extend the service life of an existing pavement and/or improve its load-carrying capability.” *Source: AASHTO Highway Subcommittee on Maintenance Definition*

Minor Rehabilitation consists of non-structural enhancements made to the existing pavement sections to eliminate age-related, top-down surface cracking that develop in flexible pavements due to environmental exposure. Because of the non-structural nature of minor rehabilitation techniques, these types of rehabilitation techniques are placed in the category of pavement preservation.

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Routine Maintenance “consists of work that is planned and performed on a routine 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.” *Source: AASHTO Highway Subcommittee on Maintenance*

Routine maintenance consists of day-to-day activities that are scheduled by maintenance personnel to maintain and preserve the condition of the highway system at a satisfactory level of service.

Examples of pavement-related routine maintenance activities include cleaning of roadside ditches and structures, maintenance of pavement markings and crack filling, pothole patching and isolated overlays. Crack filling is another routine maintenance activity which consists of placing a generally, bituminous material into “non- working” cracks to substantially reduce water infiltration and reinforce adjacent top-down cracks.

Depending on the timing of application, the nature of the distress, and the type of activity, certain routine maintenance activities may be classified as preservation.

Routine Maintenance activities are often “in-house” or agency-performed and are not normally eligible for Federal-aid funding. Other activities in pavement repair are an important aspect of a STA’s construction and maintenance program, although they are outside the realm of pavement preservation:

Corrective Maintenance activities are performed in response to the development of a deficiency or deficiencies that negatively impact the safe, efficient operations of the facility and future integrity of the pavement section. Corrective maintenance activities are generally reactive, not proactive, and performed to restore a pavement to an acceptable level of service due to unforeseen conditions.

Activities such as pothole repair, patching of localized pavement deterioration, e.g. edge failures and/or grade separations along the shoulders, are considered examples of corrective maintenance of flexible pavements.

Examples for rigid pavements might consist of joint replacement or full width and depth slab replacement at isolated locations.

Catastrophic Maintenance describes work activities generally necessary to return a roadway facility back to a minimum level of service while a permanent restoration is being designed and scheduled. Examples of situations requiring catastrophic pavement maintenance activities include concrete pavement blow-ups, road washouts, avalanches, or rockslides.

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Pavement Reconstruction is the replacement of the entire existing pavement structure by the placement of the equivalent or increased pavement structure. Reconstruction usually requires the complete removal and replacement of the existing pavement structure.

Reconstruction may utilize either new or recycled materials incorporated into the materials used for the reconstruction of the complete pavement section. Reconstruction is required when a pavement has either failed or has become functionally obsolete.

If you need technical support or further guidance in the pavement preservation area, please contact Christopher Newman in the FHWA Office of Asset Management at (202) 366-2023 or via e-mail at Christopher.Newman@fhwa.dot.gov.

A Pavement Surface Coatings representative is available to answer questions regarding pavement terminology or any other pavement related questions you may have. Please call (866) 215-6120 for assistance.