Eugene Public Works
Maintenance

Street Repair Terminology

Functional Classification

- **Arterial streets**
  The most heavily used streets in the street system. Major arterials are usually four or more lanes, serve as major access routes to regional destinations, and carry an average of more than 20,000 vehicles per day. Minor arterials are usually two or three lanes in width, provide intra-city connectivity, and carry between 7,500 and 20,000 vehicles per day. Eugene has approximately 28 miles of major arterials and 71 miles of minor arterials.

- **Collector streets**
  Streets that carry less traffic than arterials and provide access to neighborhoods and commercial and industrial areas. Major collectors typically carry between 2,500 and 7,000 vehicles, and neighborhood collectors typically carry between 1,500 and 2,500 vehicles per day. Eugene has approximately 28 miles of major collectors and 30 miles of neighborhood collectors.

- **Local street**
  Streets whose primary function is to provide access to individual properties. Typically, they carry fewer than 1,500 vehicles per day. Eugene has approximately 395 miles of local or "neighborhood" streets.

Other System Terms

- **Improved street**
  Streets constructed in accordance with the specifications established by the Eugene Public Works Department. Improved streets generally include engineered roadbeds and surfaces, storm drainage systems, sidewalks, street lighting and street trees. Approximately 88% of Eugene's 562-mile street system is improved.

- **Unimproved street**
  A street that is not constructed to City standards. Unimproved streets (and alleys) include gravel streets, oil mat streets, and streets that lack engineered roadbeds or drainage systems. Approximately 12% of Eugene's 562-mile street system is unimproved, with most of the unimproved streets in the local or "neighborhood" street category.

- **Travel lane**
  The portion of the street in which vehicles operate. Typically, travel lanes are 10 to 12 feet wide. The paved surface of the travel lane is called the driving course or top lift.

Street Condition Terms

The following terms are generally used to describe paving defects, ranging from least serious to most serious:

- **Raveling**
  This is the first stage of street degradation, caused by weather (UV rays, oxidation, and expansion/contraction due to heating/cooling) and/or traffic (including wear from tires and studs). Fine particles are lost from the upper layer of asphaltic concrete, loose gravel may be present, and the surface appears rough.

- **Cracking**
  This condition is typically caused by surface compression due to vehicle weight and motion. Cracks allow water to penetrate the surface, leading to more significant deterioration.

- **"Alligator" cracking**
  When longitudinal and transverse cracks intersect, an advanced state of multi-directional cracking, sometimes called block or alligator cracking occurs. This is a precursor to the formation of potholes.

- **Rutting**
  Usually caused by higher weight vehicles such as trucks and buses, which deflect the pavement surface and can compress and distort the road base by "pumping" the underlying materials and creating subsurface voids.

- **Pothole**
  If vehicle movement and/or water cause the top layer of asphalt to slough away and expose the subgrade or the roadbed, the resultant condition is commonly called a pothole. Once the subgrade or roadbed has been disturbed, the road is considered structurally failed.

Matrices

Paving condition also can be described using rating matrices:

- **Pavement Condition Index (PCI)** This is used to rate the condition of streets on a scale of 0 - "very poor" to 100 - "excellent".

- **Pavement Management System**
  The computerized system used by the City of Eugene Public Works Department to record data and generate reports about the city's streets and their condition.

Pavement Treatment Terms

Overall, street repairs tend to fall into two categories:

- **Operations and Maintenance (O&M)** The ongoing work efforts required to operate and maintain the transportation system. Examples include keeping the City's traffic signals and street lights in good working condition, responding to neighborhood and citizen traffic issues, pothole patching, sweeping (a stormwater service), pruning street trees, painting pavement markings, replacing damaged signs, maintaining median strips, and providing

the necessary technical, planning and administrative support required to provide these services.

- **Preservation**
  The work done to preserve and extend the life of transportation system components. While maintenance work does protect road surfaces, the term "preservation" usually is applied to more extensive repairs such as rehabilitation and reconstruction.

Repair Techniques

Several techniques are used to repair streets, ranging from least expensive to most expensive:

- **Crack sealing**
  The injection of hot tar or asphalt into cracks and paving seams.

- **Slurry seal**
  A thin (usually 1/2 inch or less) application of liquid asphalt with a fine aggregate additive such as sand to fill surface voids.

- **Chip seal**
  This technique uses an asphalt emulsion (liquid oil) into which rock chips are rolled to restore the driving course. Not currently used by the City of Eugene.

- **Overlay**
  The application of a surface layer of asphalt or asphaltic concrete. An overlay may be a thin layer of material (usually 1 to 2 in inches thick and limited to travel lanes) or it may be a "full overlay" which typically is thicker in depth and usually runs from curb to curb in width.

- **Rehabilitation**
  Surface repairs to streets. Examples of rehabilitation work include slurry seals (on low-volume streets) and full paving overlays.

- **Reconstruction**
  Extensive street repair work that typically involves the excavation of the existing street to the roadbed and the rebuilding of the road bed and surface layers of the street. Reconstruction generally is at least four to five times more costly per lineal foot than rehabilitation.

More Road Terms and Definitions

Additional Road Terms and Definitions

Aggregate - A substance composed of mineral crystals or mineral rock fragments, used in pavement.

Alligator Cracking (or fatigue cracking) - Cracks in an asphalt pavement surface forming a pattern that resembles an alligator's hide or chicken wire. Alligator cracking may begin with a single longitudinal crack in the wheel path. The cracks indicate failure of the surface layer generally caused by repeated traffic loadings.

Average Daily Traffic Counts - The average number of vehicles using a roadway in one day.

Bitumen - Mixtures of hydrocarbons (for example tar) occurring naturally or man-made from coal or petroleum. Used for surfacing roads and for waterproofing.

Bituminous - Of or pertaining to bitumen.

Bituminous asphalt/blacktop/pavement - A pavement comprising layers of aggregate mixed with a bituminous binder, such as asphalt, coal tars, and natural tars.

Business Loop (BL) - A business loop is a route that starts and ends at its parent Interstate route and is designated by a special green version of the Interstate route shield. Business loops usually lead into a downtown business district.

Boulevard (BLVD) - A wide street with a landscaped center island running the length of the street. Boulevards are usually found in urbanized areas.

Business Route (BR) - A business route is a route that connects to a parent US or M route and is designated by a BUSINESS banner above the US or M route shield. Business routes usually, but not always, connect to the parent route at both ends. Business routes usually lead into a downtown business district.

Business Spur (BS) - A business spur is a route that starts, but does not end, at its parent Interstate route and is designated by a special green version of the Interstate route shield. Business spurs usually lead into a downtown business district.

Capital Preventive Maintenance - Plan for cost-effective treatments to an existing road system that preserves or improves the condition of the system without (significantly) increasing structural capacity.

Check Station - See weight station.

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. This is typically used to extend the life of the pavement surface by sealing out moisture, which can cause major damage to pavement, until major repairs are made.

Cold Mill - Removal of 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 to the correct specifications. This process is also used to remove oxidized asphalt concrete.

Conflict - Traffic conflicts occur when vehicles moving in different directions interfere with each other, i.e., merging, diverging and crossing.

Context Sensitive Solutions: MDOT works with communities to identify local transportation needs, taking into account statewide priorities, including the Statewide Long Range Plan, the Five Year Program, and the environment impact. Context Sensitive Solutions encourages early and continuous involvement in the planning process so the final result is both an asset to the community and sensitive to community and environmental concerns.

Continuous Traffic Flow - A steady, unbroken stream of traffic.

Control Section (CS) - A Control Section is a number assigned to a section of state trunkline that includes the mainline segments as well as any ramps or other facilities associated with that section. The first two digits represent the county in which the control section is located.

Controller - An electrical mechanism for controlling traffic signal operation which is mounted in a cabinet.

Crack - A fracture 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 temperature changes, excess loadings, or excess deflections, which are movements in or under the pavement. (See Working Crack.)

Crack Filling - Placing materials into non-working cracks to reduce the infiltration of water and other matter, while also reinforcing the adjacent pavement. Crack filling should be distinguished from crack sealing (see below).

Crack Sealing - Placing specialized materials into working cracks in unique configurations to keep water and other matter out of the crack and the underlying pavement layers. (See Working Crack.)

Crash Potential - The relative degree of safety of a location or area.

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.

Curing - The maintenance of a satisfactory moisture content and temperature in concrete during its early stages so that desired properties may develop.

Delineators - Road markers that define lanes and shoulders; safety measures intended to guide drivers.

Design-Build (DB) - A delivery method where both the design and construction of a project are contracted with a single entity known as the design-builder. The design and construction phases usually overlap on a DB contract which can significantly reduce the overall project delivery time.

Design/Build/Finance/Maintain (DBFM) - An innovative contracting model that uses the Design-Build methodology, but transfers specific financial, operational, and maintenance responsibilities to the design-builder for a specific period of time. The DBFM team is responsible for the design and construction of the project, but also maintenance for a period between 25 to 30 years. The DBFM team has a vested interest in ensuring the project performs well in order to manage long-term risk and be paid back over time as it hits agreed upon standards. Because of this risk transfer, it is possible for the financial arm of the DBFM team to spread MDOT repayments over the term of the maintenance period. This frees up more money in the short term for MDOT to invest in other parts of transportation system.

Diamond Grinding - A process that uses a series of diamond-tipped saw blades mounted on a shaft to shave the upper surface of a pavement to remove bumps, restore pavement rideability, and improve surface friction.

Dowel - A plain round steel bar which extends into two adjoining slabs of pavement at a joint. Dowels are used to keep concrete slabs from heaving up and down.

Dowel Bar Retrofits - A rehabilitation technique used to distribute the weight of vehicles across existing joined pavements by placing dowel bars across joints and/or cracks.

Downstream - Points on a route further ahead in the direction of traffic flow.

Driver Response - Driver reaction to a message or condition on a highway such as a sign or traffic signal.

Efficient Systems - A route or network of routes on which traffic flows with minimum delay and congestion.

Emulsified Asphalt - A liquid mixture of asphalt binder, water and an emulsifying agent.

Freeway - A freeway is an access-controlled, divided highway designed for the unimpeded movement of large volumes of traffic. Characteristics of a freeway include controlled access through the use of interchanges, and use of underpasses or overpasses at intersections.

Frost Heave - A process in which the ground freezes and thaws, creating potholes.

Gaps - Breaks in the traffic stream long enough to permit vehicles or pedestrians access across or into the traffic stream.

Gore - The V-shaped area that separates through-traffic from exiting or entering traffic on freeways and highways.

Grade Separation - A crossing that uses an underpass or overpass to eliminate conflict points.

Grooving - The process used to cut slots into a pavement surface to provide channels for water to escape beneath tires. This improves skid resistance and reduces the potential for hydroplaning.

Highway (HWY) - A main road that provides direct access to buildings and intersections. Unlike a limited access freeway, a highway has intersections at grade level and signs and signals to control traffic.

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

Interchange - An interchange is the junction of a freeway and another road. Interchanges keep the traffic flowing on the freeway, but there may be some restrictions on the connecting routes. A complete interchange provides for movements in all directions; a partial interchange has some missing connections.

Interstate Routes - The Dwight D. Eisenhower National System of Interstate and Defense Highways consists of controlled-access freeways numbered within the United States and signed with an Interstate route shield. All Interstate routes within the State of Michigan are under the jurisdiction of MDOT.

Lane Miles - The number of miles of pavement going in one direction on any given road. Miles of roadway x (times) number of lanes = lane miles.

Law Observance Study - A survey designed to check effectiveness of various traffic control devices.

Limited Access - A highway or section of highway designed for travel by registered motor vehicles. Access is limited to intersections, and driveways are generally not allowed. Freeways are a common type of limited access highway.

Linear Referencing System (LRS) - Linear referencing is the method of storing geographic locations by using relative positions along a measured linear feature. Distance measures are used to locate events along the line.

Load Transfer - The ability to distribute the weight of vehicles across joined sections of pavement. This is a critical factor in extending pavement life.

M Routes - The Michigan State Highway System consists of roads numbered within the State of Michigan and signed with a M route shield. All M routes are under the jurisdiction of MDOT.

Median - A barrier, constructed of concrete, asphalt, or landscaping, that separates two directions of traffic.

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. Unlike slurry seal, microsurfacing can be used on high volume roadways to correct wheel path rutting and provide a skid resistant pavement surface.

Milling - Grinding off the top layer of pavement.

Noise Wall - See Sound Wall

Overbanding - Overfilling of a joint or crack reservoir so that a thin layer of crack or joint sealant is spread onto the pavement surface over the joint or crack.

Patch - Repair of a localized defect in the pavement surface.

Pavement miles - The number of miles of pavement in both directions of a road/freeway.

Pavement Preventive Maintenance - Planned strategy of cost-effective treatments to an existing roadway system to extend the life of the pavement, retard future deterioration, and maintain or improve the functional condition of the system (without increasing the structural capacity).

Pavement Reconstruction - 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 - Period of time that a newly constructed or rehabilitated pavement structure will perform before deteriorating.

Physical Road (PR) Number - A Physical Road Number is a part of a common linear referencing system used statewide to uniquely identify any point or section of roadway within Michigan's transportation network. The PR number is a unique value given to a section of roadway, this can then be followed by an exact mile point in order to pinpoint

a location or a beginning mile point (BMP) and ending mile point (EMP) can be listed to identify a section of roadway.

Platoon - A group of vehicles moving, more or less as a unit, along a signalized roadway system.

Potholes - A hole in the pavement surface- commonly caused by moisture.

Preserve - A project type involving rehabilitation of existing roadways and may include resurfacing or reconstruction of existing roads and bridges.

Profilameter - A computer-aided device used to measure the smoothness of the road.

Progressive Movement - Traffic moving at a constant speed with a minimum number of stops.

Reconstruct - A term used to describe a road project where the roadway is taken down to its base whereby necessary repairs can be made.

Retrofit Dowel Bars - Dowels that are installed into slots cut into the surface of an existing concrete pavement to distribute the weight of vehicles across existing joined pavements.

Rideability - A measure of the ride quality of a pavement as perceived by its users or roughness measuring equipment (See profilameter).

Right-of-Way (ROW) - Land and/or property acquired for or devoted to transportation purposes. Right-of-way is also a project phase.

Right-of-Way Assignment - The "green" phase of a stop-and-go signal when a certain movement of traffic is permitted to flow.

Route Miles - The number of miles a car travels to get from point A to point B.

Roundabout- See Traffic Circle.

Rubblize - A process where concrete is broken up into uniform size pieces, rolled flat and covered with a new surface (usually asphalt).

Sandblasting - A procedure in which compressed air is used to blow sand particles 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 used to improve the skid resistance of slippery pavements and to seal against air and water intrusion.

Scoping - The process of determining the type and size of a proposed project.

Seal Coats - See Surface Treatment

Sealant - A material that has adhesive and cohesive properties to seal joints, cracks or other various openings against the entrance or passage of water or other debris in pavements.

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.

Signal Cycle - The time required for all phases of a signal to take place - from beginning of green to beginning of green.

Signal Warrants - A set of guidelines designed to determine the need for a stop-and-go traffic signal.

Single-Point Urban Interchange (SPUI) - A single-point urban interchange is a variant on the standard diamond interchange, whereby all traffic meets at one single traffic signal in the center of the bridge over the freeway (or underneath the freeway). These interchanges can accommodate more traffic in smaller spaces, hence their appeal in urban areas.

Slurry - Mixture of a liquid and fine solid particle that together are denser than water.

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 pavement, to restore a uniform surface texture, to seal the surface to prevent moisture and air intrusion into the pavement, and to improve skid resistance.

Sound Wall - (Also called Noise Wall) A structure built alongside a roadway to reduce vehicular noise in nearby neighborhoods.

Spalling, Sliver - Chipping of concrete edge along a joint sealant usually within 12 millimeters 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.

Speed Checks - Radar studies conducted to obtain information concerning the distribution of vehicle speeds through an area.

Speed Study - The speed study determines the 85th percentile speed at that location. This means 85% of the motorists are driving at or below this speed.

State Trunkline - The State Trunkline in the State of Michigan consists of all roads under MDOT jurisdiction, including all Interstate routes, US routes, M routes, Interstate business loops and spurs, US business routes, M business routes, connector routes, and unsigned state trunkline in Michigan.

Streetscape - Equipment, such as lights, plant material or benches placed off the street to improve or enhance the appearance and usability of a street.

Superstructure - A bridge.

Surface Seal - See surface treatment.

Surface Treatment - (Also called surface seals, seal coats or chip seals) Any material applied to asphalt pavement to restore or protect the surface. Surface treatments are typically less than 25 millimeters thick.

Thin Overlay - A Hot Mix Asphalt (HMA) overlay of 38 millimeters (1.5 inches) or less.

Timing Permit - A form indicating/authorizing how a traffic signal will operate; when it will flash, how much "green time" will be allotted to each leg of the intersection, how it will operate in relation to adjacent signals, and what special provisions will be made for high-volume, peak-hour traffic.

Tine - To create grooves in the pavement for traction.

Traffic Calming - A set of street designs and traffic rules that slow and reduce traffic while encouraging walkers and cyclists to share the street. Traffic calming measures include traffic circles, raised crosswalks, sidewalk extensions speed humps and medians.

Traffic Circle - An intersection where traffic moves around a circular center island. Some traffic circles have traffic signals. Also called a roundabout.

Traffic Engineer - An experienced engineer specializing in issues associated with the safe and efficient operation of roadway facilities.

Traffic Volumes - The actual number of vehicles passing a given point.

Transportation Economic Development Fund (TEDF) - The TEDF is a fund that provides a means for state government, local agencies and businesses to work together on highway, road, and street projects that support economic growth. It was enacted by the Michigan State Legislature in 1987.

Transportation Enhancement Funds - Also known as the Transportation Enhancement Activity Fund. This federal fund sets aside a portion of Surface Transportation Funds (STP) specifically for landscaping and street improvements, bike and foot paths, mitigating highway runoff and the historic preservation of transportation-related structures.

Uniform Standards - A policy of consistent traffic control devices on all roadway systems throughout the nation.

Urban Area - An urban area is a designation defined by the U.S. Bureau of the Census as an area located outside of an urbanized area with a population over 5,000.

Urbanized Area - An area containing a city or twin cities of 50,000 or more people surrounded by a closely settled incorporated area which also meets specified criteria of population and density.

US Routes - The United States Numbered Highway System consists of roads numbered within the contiguous United States and signed with a US route shield. All US routes within the State of Michigan are under the jurisdiction of MDOT.

Weigh Station - (Also called Check Station.) A weigh station is a set of scales located alongside a freeway that verifies that trucks and buses are within the legal weight limit.

Working Crack - A crack in a pavement that changes, becoming narrower or wider under different temperature conditions. A working crack develops through movement in or under the pavement, for example, when an old expansion joint fails.

Updated: 11-17-16