Chapter 4

Glossary

1. Bituminous Binder Materials

Asphalt - A black or dark brown solid or semi-solid cementitious material which gradually liquefies when heated. The predominant constituents are bitumens which occur in the solid or semi-solid form in nature or which are obtained by refining petroleum or combinations of the bitumens mentioned with each other or with petroleum or petroleum derivatives.

Natural (Native) Asphalt - Asphalt occurring in nature, derived from petroleum by the natural evaporation of volatile fractions leaving the asphalt fractions. The native asphalts of most importance are found in the Trinidad and Bermudez Lake deposits. Asphalt from these sources is often called Lake Asphalt.

Petroleum Asphalt - Asphalt refined from crude petroleum by various processes.

Asphalt Cement - Asphalt refined to meet specifications for paving purposes. Asphalt cement has a normal penetration of 40 to 300. The term is often abbreviated AC.

Solid or Hard Asphalt - Asphalt having a normal penetration of less than 10.

Oxidized or Blown Asphalt - Asphalt treated by blowing air through it at elevated temperatures to give it characteristics required for special uses.

Liquid Asphalt - An asphaltic material having a soft or fluid consistency beyond the range of measurement by the normal penetration tests, (limit is 300 maximum). Liquid asphalts include the following:

Cut-back Asphalt - Asphalt cement which has been liquefied by blending with petroleum solvents (also called diluents), such as the RC and MC liquid asphalts. Upon exposure to atmospheric conditions the diluents evaporate leaving the asphalt cement to perform its function.

Rapid-Curing (RC) Cut-back Asphalt - Liquid asphalt composed of asphalt cement and a naphtha or gasoline type diluent of high volatility.

Medium Curing (MC) Cut-back Asphalt - Liquid asphalt composed of asphalt cement and a kerosene type diluent of medium volatility.

Emulsified Asphalt - An emulsion of asphalt cement and water which contains small amount of emulsifying agent; a heterogeneous system containing two immiscible phases (Asphalt and Water) in which the water forms the continuous phase of the emulsion and minute globules of asphalt form the discontinuous phase. Emulsified asphalts may be anionic or cationic, depending upon the emulsifying agent used and they may be rapid, medium or slow setting.

Anionic-Cationic - The term "anionic" describes emulsions in which the asphalt has a negative charge and is attracted to a positive charged surface.
The term "cationic" describes emulsions in which the asphalt has a positive charge and is attracted to a negative charged surface.

**Emulsified Cut-back Asphalt** - An emulsified asphalt in which the continuous phase is asphalt, and the discontinuous phase is minute globules of water in relatively small quantities. This type of emulsion may be anionic or cationic and either rapid, medium or slow setting.

**Asphalt Primer** - A liquid asphalt of low viscosity which penetrates into a non-bituminous surface on application.

**Asphalt Prime coat** - An application of a low viscosity liquid asphalt material to an absorbent surface preparatory to any super imposed treatment or construction. The object of priming is to penetrate the existing surface with asphalt to plug voids, to coat and bond dust and loose mineral particles and thus harden or toughen the surface and promote adhesion between it and the superimposed treatment or construction.

**Asphalt Tack Coat** - An application of asphaltic material to an existing surface to insure thorough bonding between super-imposed construction and the old surface.

**Rock Asphalt** - Porous rock such as sandstone or limestone which has become impregnated with natural asphalt through normal geologic process.

**Bitumen** - A mixture at hydrocarbons (asphalt or tar) of natural or pyrogenous origin, or a combination of both; frequently accompanied by non-metallic derivatives which may be gaseous, liquid, semi solid, or solid; and which are completely soluble in carbon disulfide.

**Tar** - A brown or black bituminous material liquid or semi-solid in consistency, in which the predominating constituents are bitumens obtained as condensates in the destructive distillation of coal.

**Coke-Oven Tar** - Coal tar produced in by-product coke ovens in the manufacture of coke from bituminous coal.

**Water Gas Tar** - Tar produced by cracking oil vapors at high temperatures in the manufacture are carbureted water gas.

**Coal Tar Cement** - A bitumen made by distilling coal at high temperatures.

**Coal Tar** - Refined coal tar fluxed with the distillates of coal tar or water gas tar or a combination of these distillates.

**Water Gas Tar** - Refined water gas tar fluxed with a distillate of water gas tar or coal tar.

**2. Mineral Aggregates** - Sand, uncrushed or crushed gravel, crushed stone or crushed slag, graded from coarse to fine to make up the solid volume and provide stability in bituminous concrete paving mixtures.

**Coarse Aggregate** -- Coarse aggregates are those having certain specified gradations between 100 mm (4 inches) and a 2.36 mm (No. 8) sieve.
**Fine Aggregate** - Fine aggregate is generally graded from a 2.36 mm (No. 8) sieve through a series to not more than 25 percent passing a 75 μm (No. 200) sieve.

**Mineral Filler** - A finely divided mineral product at least 65 percent of which will pass a 75 μm (No. 200) sieve pulverized limestone is the most commonly manufactured filler, although other stone dust, silica, hydrated lime, portland cement, fly ash and certain natural deposits of finely divided mineral matter are also used.

**Dense-Graded Aggregate** - A mineral aggregate graded uniformly from the maximum size down to and including sufficient mineral dust to reduce the void space in the compacted aggregate to exceedingly small dimensions approximating the size of voids in the dust itself.

**Open-Graded Aggregate** - A compacted aggregate containing little or no fines resulting in relatively large void spaces.

**Air Voids** - The space in a compacted bituminous mixture not filled with asphalt cement or aggregate. The air voids are required in a bituminous concrete mixture to provide for the expansion of the asphalt cement binder occasioned by changes in temperature. Air voids are usually reported as a percentage of the bulk volume of the compacted material.

**VMA** - Percent Voids in Mineral Aggregate - the total unfilled space which would exist in the compacted specimen if the aggregate was not coated with asphalt binder.

3. **Bituminous Concrete**

**Plant Mix** - The mixing of mineral aggregate and bituminous cement or liquid bituminous material in a mechanical mixer, after which the finished mixture is laid on a prepared road surface. Proportioning of aggregate constituents and asphalt binder is closely controlled and the mineral aggregate is usually dried and heated before mixing.

**Job-Mix Formula** - The aggregate gradation and asphalt content specified for a bituminous concrete paving mixture. A specified mixing temperature is usually considered as a part of the Job mix formula.

**Job-Mix Tolerance** - The maximum plus and minus percentages, set by the specifications, by which the gradation of the aggregates, and the asphalt content of the mixture can vary during the production of a bituminous paving mixture. The variation in the temperature of the mixture is usually considered part of the Job mix tolerance.

**Asphalt Concrete** - A high quality, closely controlled hot mixture of well graded, high quality mineral aggregate and bituminous cement, thoroughly compacted into a uniformly dense mass.

**Percent voids Filled with Asphalt** - The ratio, reported as a percentage, of the volume of asphalt binder to the volume of total voids (VMA) in a compacted bituminous mixture.

**Hot-Mix Bituminous Concrete** - Bituminous concrete in which the aggregates are heated and then mixed with the bitumen to produce a mixture having a controlled temperature. When asphalt cement is used as the binder, the temperature range is generally between 121 and 163 °C (250 and 325 °F). When tar cement is used as the binder the temperature is generally between 93 and 135 °C (200 to 275 °F).
Hot-Laid Mixtures - Plant mixes which must be spread and compacted while in a heated condition. The highest types of bituminous pavements are constructed with hot-laid mixtures.

Cold-Laid Mixtures - Plant mixtures which are spread and compacted at normal atmospheric temperature.

4. Pavement Structures and Courses

Pavement Structures - All courses of selected material placed on the foundation or subgrade soil, other than any layers or courses constructed on the foundation or subgrade. The term "flexible" sometimes used in connection with bituminous pavements denotes the ability of such a pavement structure to conform to settlement of the foundation.

Flexible Pavement - A pavement constructed by placing some type of bituminous paving on a flexible base.

Flexible Base - A base with low resistance to bending so that it stays in contact with the underlying structure. This type of base distributes loads to the foundation by aggregate interlock, particle friction and cohesion. Samples are macadam (wet and dry bound), dense graded aggregate, and all bituminous types (black bases).

Bituminous Macadam - A type of pavement construction using a coarse, open-graded aggregate that is usually produced by crushing and screening stone, gravel or slag. Such aggregate is called macadam aggregate. Asphalt or tar may be incorporated in macadam construction either by penetrating or by mixing.

Bituminous Base Course - A foundation course consisting of mineral aggregate bound together with bituminous material.

Bituminous Binder Course - An intermediate course between a base course and a bituminous surface course. Binder is usually a coarse-graded bituminous concrete containing little or no mineral aggregate passing the 75 μm (No. 200) sieve.

Bituminous Leveling Course - A course of variable thickness used to eliminate irregularities in contour of an existing surface prior to super-imposed treatment or construction.

Bituminous Surface Course - The top or wearing course of a bituminous pavement.

Bituminous Overlay - One or more courses, not less than 25 mm (one inch) in total thickness of bituminous construction on an existing pavement. The overlay generally includes a leveling course, to correct the contour of the old pavement, and a uniform course or courses to provide the required depth. The total compacted depth is determined by the condition of the existing pavement and the anticipated traffic type and count.

Mixed-in-Place - A bituminous course produced by mixing mineral aggregate and liquid bituminous material by means of travel plants, blade grader, drags or special road mixing equipment.
Surface Treatment - Applications of bituminous materials to any type of road or pavement surface, with or without a cover of mineral aggregate, which produces an increase in thickness of less than 25 mm (1 inch).

Multiple Surface Treatments - Commonly two or three successive applications of bituminous material and mineral aggregate. Treatments designated "Armor Coat", "Multiple Life" and "Inverted Penetration" are essentially multiple surface treatments.

Bituminous Seal Coat - A thin bituminous surface treatment applied to an existing pavement, to increase pavement life.

Resurfacing - An additional or replacement surface placed on an existing pavement to improve its riding qualities or increase its strength.

Emulsified Asphalt Slurry Seal - A mixture of slow-setting emulsified asphalt, fine aggregate and mineral filler with water added to produce slurry consistency, mixed in a traveling plant and spread through a squeegee screed.

5. Frequently Used Acronyms

AASHTO – American Association of State Highway and Transportation Officials
AC – Asphalt Cement
ADT – Average Daily Traffic
ASTM – American Society for Testing and Materials
DMM/DME – District Materials Manager/Engineer
ESAL – Equivalent Single Axle Load
F/A (ratio) – Fines to Asphalt Ratio
FDR – Full Depth Reclamation
HMA – Hot-Mix Asphalt
JMF – Job-Mix Formula
PG – Performance Graded
PTM – Pennsylvania Test Method
PWL – Percent Within Limits
RAP – Recycled Asphalt Pavement
RAS – Recycled Asphalt Shingles (manufacturer waste)
SGC – Superpave Gyratory Compactor
VFA – Voids Filled with Asphalt
VMA – Voids in Mineral Aggregate
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