

top10 list



WAYS TO GET MORE DURABLE HMA PAVEMENTS

#3

SPECIFY A FINER GRADATION FOR YOUR MIX TYPE

The durability of asphalt concrete mixtures is affected by the properties of the aggregates and asphalt cement (AC) used in the mixture. The gradation and volumetric properties of the mixture; all of which are addressed during mixture design, also directly impact the durability of asphalt concrete pavement. Since the introduction of the Superpave mix design procedure, considerable research has been done to refine the design procedures, so that laboratory tests and procedures used during the hot-mix asphalt (HMA) mix design process relate better to actual field performance.

The following checklist outlines the benefits of finer-graded mixtures towards more durable asphalt pavements.



BENEFITS OF FINER-GRADATION MIXTURES

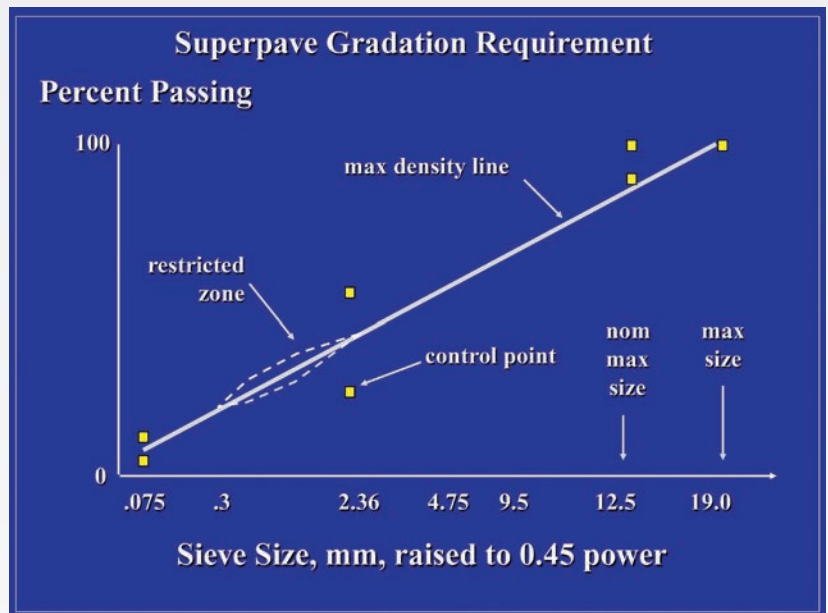
- Finer Superpave mixes will typically have higher AC content and are more durable and less prone to segregation.
- Finer gradation mixtures provide an increase in the effective binder content;
 - + Increasing the effective binder content of an asphalt concrete mixture improves the resistance to aging, moisture damage, and load-associated cracking.
- Finer gradation mixtures are less permeable at the same in-place air void content;
 - + Reduced permeability reduces binder age hardening and the potential for moisture damage.
- Finer-gradation mixes improve smoothness.
- Finer-graded mixtures present lower rut potential, with more resistance to shear deformation than the coarse gradation mixes, since coarse-graded mixes tend to have lower dynamic modulus, flexural stiffness and higher permeability and fatigue life.
- Compactibility improves with finer-gradation mixtures.

SUPERPAVE MIX GRADATION

- The figure illustrates requirements for Superpave mix gradation. As a general note, coarse aggregates are retained on the 4.75 mm sieve and fine aggregates pass through the 4.75 mm sieve.

Mixes whose gradation are bent below the maximum line of packing may be beneficial in certain circumstances, but can also lead to low asphalt cement content and permeable mixtures that can be weak and susceptible to cracking. Such practices **MUST** be avoided.

It should be noted that, many benefits realized through the use of finer mixes is linked to increased asphalt cement content and increased asphalt cement film thickness. Attention to these important contributors to durability is suggested to optimize benefits.



Superpave Gradation Requirement

Along with the benefits of finer-gradation mixtures, and an understanding of the Superpave mix gradation requirements, specifying, designing and producing finer-gradation Superpave hot mix types is recommended where possible, especially for surface applications. Asphalt concrete surfaces must resist the effects of aging and moisture, as well as the forces applied by traffic and environmental loading. A mix with smaller NMAS will have an apparent higher AC content by default. Attention to mix gradation, asphalt cement content and film thickness will result in more binder to stick the particles together, making the mix more resistant to cracking.



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