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THE IMPORTANCE OF PRESERVING PAVEMENTS

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Pavement preservation is a major consideration of owners and managers of streets, highways, parking lots and all types of pavements. The reason for this concern is that our pavements are steadily deteriorating due to traffic, weather and time.

This situation is a big deal. According to the National Center for Pavement Preservation, "There are nearly 4 million miles of paved public roads in the United States, valued at \$1.75 trillion." Our U.S. roads and other pavements are a huge investment and are vital for moving people and goods in an efficient manner.

In order to better understand and apply pavement preservation, this is the first in a series of articles in "ASPHALT" on the topic. This piece gives an overview, including an explanation of what pavement preservation is, a brief description of some of the types of treatments and information on resources available to those interested in more details. Future articles will cover specific preservation techniques.



THE CHIP SEAL PROVIDES CRACK SEALING WHILE THE SLURRY SEAL OR MICRO-SUREFACING IMPROVES THE RIDE QUALITY

WHAT IS PAVEMENT PRESERVATION?

A simplistic definition of pavement preservation could be "keeping the good roads good" or "taking care of our existing pavement assets." Most people have heard the catch phrase "right treatment on the right pavement at the right time."

But, pavement preservation has now reached a level of acceptance where there is wording included in federal legislation that provides a definition of the term. Wording from Public Law 112-141, "Moving Ahead for Progress in the 21st Century Act (MAP-21)" says, "The term 'Pavement Preservation Programs and Activities' means programs and activities 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 road user expectations."

The National Center for Pavement Preservation defines pavement preservation in much the same way, but replaces the indefinite phrase "meet road user expectations" with "improves...motorist

satisfaction while saving public tax dollars." So pavement preservation is applying a portion of our funds to preserving existing pavements by using recognized techniques in a timely fashion.

PAVEMENT PRESERVATION TECHNIQUES

There are many recognized techniques for preserving asphalt pavements, including:

- » crack sealing and crack filling;
- » fog seals and asphalt rejuvenators;
- » seal treatments - scrub, sand, chip, and cape;
- » slurry seal and micro-surfacing; and
- » overlays - thin, ultra-thin, and bonded wearing courses.

CRACK SEALING AND CRACK FILLING

There are two approaches to addressing cracks - crack sealing and crack filling. Crack sealing is the more involved and more permanent approach. It is intended to prevent water and foreign material from entering the pavement at the crack. Crack sealing is needed when there is movement of the pavement



at the crack, commonly referred to as a "working" crack. Crack filling requires little preparatory work and is intended to reduce the amount of water entering the pavement. Both sealing and filling extend the pavement life by reducing stripping, raveling and fatigue. The earlier the application, the better likelihood of extending the pavement life.

Medium curing (MC) cutbacks, slow setting (SS) emulsions and modified asphalt crack sealers meeting ASTM D6690, or equal, can be used to seal cracks. Other materials like CRS-2 and CRS-2P are often used locally. For numerous hairline, surface cracks, a fog, chip, sand or slurry seal may be applied to address the cracking. For large cracks (3/4-inch or more), a hot-poured sealant, a slurry seal or a fine HMA (hot mix asphalt) sand mix may be used.

FOG SEALS AND ASPHALT REJUVENATORS

A fog seal is a light application of a diluted slow setting asphalt emulsion sprayed on an existing surface. It is used to renew HMA pavements

that have become brittle with age, to address small cracks and surface defects and to lessen raveling. Rejuvenators or rejuvenating emulsions can be applied as a fog seal to improve the properties of aged asphalt by replacing some of the asphalt components (maltenes) lost during aging. Rejuvenator seals are especially effective when the distress is greater than that typically addressed by fog or chip seals.

SEAL TREATMENTS

Sand and scrub seals are sprayed applications of asphalt emulsions followed by a covering of sand or fine chips. Scrub seals use a broom or squeegee to force the emulsion into the cracks before the aggregate is applied. If rolling is done, a pneumatic (rubber tire) roller is used. These sealing operations use the same equipment as chip sealing, with the addition of a brooming mechanism for scrub seals. Sand seals typically add 3 or 4 years of pavement life and scrub seals can add 4 to 6 years of service.

Chip seals are constructed by applying liquid



Placing an ultra-thin bonded wearing course

asphalt (usually an emulsion but under some circumstances an asphalt cement or a cutback can be used) to the road surface followed immediately by cover aggregate (chips) and rolling and brooming. Chip seals are one of the most commonly used preservation techniques. Multiple applications can be used for additional protection. A cape seal is a combination treatment consisting of a single chip seal followed by a slurry seal or micro-surfacing. The chip seal provides crack sealing while the slurry seal or micro-surfacing improves the ride quality.

SLURRY SEAL AND MICRO-SURFACING

Slurry seals are a mixture of well-graded fine aggregate, mineral filler, asphalt emulsion and water. They are used as surface treatments and the application is usually the thickness of the largest aggregate particle. Slurry seals do not increase the structural capacity of a pavement but can help reduce surface distress caused by oxidation, seal non-working cracks, end raveling, and improve skid resistance.

Micro-surfacing is a designed mixture of cationic polymer-modified emulsion, aggregate, mineral filler, water and additives. It is used to fill ruts, restore skid resistance and can be applied in multiple lifts.

THIN HOT MIX ASPHALT OVERLAYS

Thin overlays constructed using hot or warm mixes (HMA or WMA) are one of the most commonly used preservation techniques. These overlays are placed at thicknesses of 1.5 inches or less and contain a top-size aggregate of 0.5 inches or smaller (usually smaller). There are several variations, including thin, ultra-thin and bonded wearing course overlays.

Thin lift overlays typically are placed 1.0 to 1.50 inches thick. Ultra-thin overlays utilize a slightly finer gradation and are usually placed at 0.6 to 1.0 inch (0.75 inches is typical). Bonded wearing course is a thin or ultra-thin, gap-graded HMA (or WMA) mix placed over a heavy application of polymer-modified emulsion tack, all applied in one pass with a special paver. The mixes are designed using current best practices and the binder grades are generally