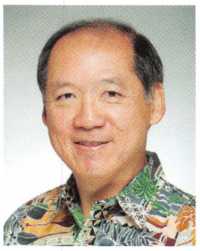

What is Stone Matrix Asphalt?

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Those in the AEC industry may see the acronym SMA and think of Special Management Area, but the abbreviation SMA also stands for "stone matrix asphalt."

Stone matrix asphalt is a gap-graded hot mix asphalt (HMA) developed in Europe to maximize rutting resistance and durability. The mix design goal is to create stone-on-stone contact within the mixture. Since aggregates do not deform as much as asphalt binder under load, this stone-on-stone contact greatly reduces rutting.

Stone matrix asphalt is cost-effective because of its increased rut resistance, improved durability and longer life.

SMA is sometimes called stone mastic asphalt because the stone skeleton is filled with a mastic of bitumen (binder). The pavement is rich with binder, making it more durable.

SMA is generally more expensive than a typical dense-graded HMA used for most roads in Hawaii because it requires more durable aggregates, more aggregate stockpiles, higher asphalt content, modified asphalt binder and fibers. In the right situations, it is cost-effective because of its increased rut resistance, improved durability and longer life.

SMA has been successfully used in Hawaii. The first use of SMA was at Hilo Harbor in early 2002 and, in the 16 years that have passed, the pavement is still in good shape. In 2004, the material was tested on a section of the Moanalua Freeway on the town side of Red Hill. That section remains in good condition today, confirming the extended life of a heavily used pavement built with this material. More recently, the resurfacing of the H-1 Freeway between Middle Street and Ward Avenue was completed using SMA in 2014. SMA was chosen because it is designed to last 10 to 15 years, instead of seven to 10 years for a dense-graded HMA.

In November 2018, I attended the first International Conference on Stone Matrix Asphalt in Atlanta, Georgia. Some 250 people from 20 countries and 32 U.S. states came together to share their experiences and learn more about the performance, economic and sustainability benefits of SMA, as well as to hear about research pushing the material in new and innovative directions.

Three major takeaways from the conference are:

- SMA is used throughout the world.

In 1968, the first SMA pavements were placed in Germany. Since then, the use of SMA has spread to other countries in Europe, and other continents such as Australia, Africa, South America and North America. The first use of SMA in the USA was in Maryland in 1992. Currently, SMA is used on a routine basis in 18 states.

• There are many applications for this product. In addition to high-traffic volume roads and highways, SMA is an excellent surface course for ports, container terminals, bridge deck overlays, airfields and racetracks. Two well-known applications are the 8,073-mile Autobahn in Germany and the Indianapolis Motor Speedway, which is the home of the Indianapolis 500.

• Many of the speakers noted that SMA is a durable product that lasts longer than dense-graded pavement. A recent study by the National Center for Asphalt Technology concluded that by using SMA, the life-extension varied from 1 to 13 years. Overlays placed on the Chicagoland area expressways in 1998 are still in service: 20 years of service life and counting.

In closing the conference, National Asphalt Pavement Association (NAPA) Senior Director of Pavement Engineering and Innovation Dr. J. Richard Willis challenged contractors and agencies not using SMA to give it a try, and for those using SMA, to use more SMA in more places.

The future of SMA in Hawaii is bright. The HDOT Highways Division is considering the use of SMA for an upcoming H-1 Freeway Resurfacing project, and hopefully many more. HAPI encourages the HDOT Airports and Harbors Divisions, as well as the counties and military, to consider the use of this excellent and proven paving material.

As part of our effort to promote the use of SMA, next April HAPI, in partnership with HDOT, plans to conduct a one-day SMA Mix Design and Construction training course in Hawaii. The instructor will be from the National Center of Asphalt Technology (NCAT).

For additional information about the class or about SMA, call (808) 754-2931 or email jon@hawaiiasphalt.org.