
UTAH DEPARTMENT OF TRANSPORTATION

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Stone Matrix Asphalt (SMA)

Stone matrix asphalt (SMA), sometimes called stone mastic asphalt, is a gap-graded HMA originally developed in Europe to maximize rutting resistance and durability. The mix goal is to create stone-on-stone contact. Since aggregates do not deform as much as asphalt binder under load, this stone-on-stone contact greatly reduces rutting. SMA is generally more expensive than a typical dense-graded HMA because it requires more durable aggregates, higher asphalt content, modified asphalt binder and fibers. In the right situations it should be cost-effective because of its increased rut resistance and improved durability.



SMA Surface



SMA Core Sample

CASE STUDY

Project Location

West bound Salina off ramp on I-70.

Traffic Condition

There are a significant number of coal trucks exiting the freeway through this ramp.

The 2006 ADDT report shows that there are average 883 vehicles using this ramp every day including 51% (451) trucks. It is about one truck every three minutes.

Pavement history

To solve the severe rutting problem on this ramp, a new pavement constructed in 2004. 1.5" of old pavement was milled off and 3.0" of ½" SMA was placed. The asphalt content is 6.6%

Observation

The new SMA pavement has served three years. We don't see any rutting, fatigue or other pavement performance problems that we had in previous pavement.

Recommendations:

This study indicates that SMA is a good candidate for controlling rutting, resisting fatigue under heavy traffic load, and increasing the resistance to polishing and abrasion.

Due to the nature of high AC content and open grade, the storage and placement temperatures cannot be lowered to control drainage and bleeding. It is difficult to obtain the required compaction. Based on the study provide by Washington State Department of Transportation, the following practices have to be followed.

- Provide stone-on-stone contact through the selection of a proper gradation.
- Use hard, cubical, durable aggregate.
- Design at an asphalt content of at least six percent and air void content of four percent, for most mixtures.
- Design for voids in the mineral aggregate such that at least 17.0 percent is obtained during production.
- Check for and meet moisture susceptibility and draindown requirements.
- Proper design and control of SMA mixture(asphalt content, gradation, mineral filler, stabilizer, mixing temperature, and moisture).
- Maintain close control of plant stockpiles and cold feed.
- Maintain close control of plant temperatures.
- Maintain consistent paving speed and compaction effort.
- Use the necessary number of rollers to achieve a minimum density of 94 percent of maximum density.
- Avoid hand work whenever possible.
- Minimize the number and extent(size) of fat spots that appear behind the paver.
- Use good quality assurance practices including frequent monitoring of all aspects of production, paving and compaction.

Further Information

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