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Article



Manuchar Shishinashvili
Georgian American University
ORCID NO: 0009-0007-4432-4428
Ph.D., Associate Professor,
Informatics and Engineering School,
Georgia

Giorgi Butikashvili
Millennium Builders group LTD
Ph.D., General Director,
Georgia

USE OF (STONE MASTIC ASPHALT) SMA IN GEORGIAN REGIONS

Abstract: The paper discusses Stone mastic asphalt (SMA), which is not a new road construction material, but quite popular and strong. The main properties, composition and areas of application of Stone mastic asphalt (SMA) asphalt are listed. It is important to use them on roads with high loads. Accordingly, it is important to use this type of road construction material in the regions of Georgia, especially where heavy loads are transported on internal roads. Also, on roads that are located close to industrial zones, natural materials extraction zones, ports and timber processing regions. Despite its high cost, its service life is long.

Key words: Stone mastic asphalt, Bitumen, traffic loads, road, airfield.

Language: English

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Introduction

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Stone mastic asphalt concrete (SMA) is one of the highest quality types of asphalt, surpassing other asphalt mixtures in a number of characteristics. SMA is widely used throughout the world for the construction of surfaces that must withstand high and intensive traffic loads. Asphalted roads using SMA allows for high performance characteristics, as well as a long service life of the road surface. Due to this, this material is suitable for the construction of high-category roads, as well as for laying at airfields.

The difference between SAM and asphalt concrete mixes is that they contain more crushed stone (up to 80% by mass) and bitumen (up to 7.5% by mass). Stabilizing additive allows the material to hold more bitumen.

SMA is a relatively thin (12.5–40 mm), fine-grained, tightly compacted that is used as a surface layer in both new construction and resurfacing. It is a mixture of asphalt concrete, coarse aggregate, crushed sand, and additives.

The following components are present in the standard mixture of SMA:

- Crushed stone - 70-80% of the material consists of crushed stones of cubic shape with a size of 10-20 mm;
- sand - occupies 8-12% of the mixture, obtained by sifting during crushing of rocks;
- mineral powder – 8-12% of the material is occupied by crushed dolomite or limestone;
- petroleum bitumen – asphalt mixture contains 6-7% of binding substance;
- Additives - for stabilization, the mixture contains 0.3-0.5% cellulose fibers.

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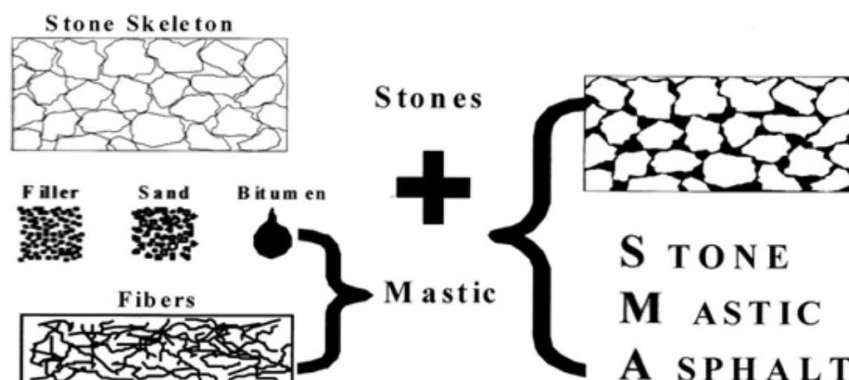
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Instead of petroleum bitumen, the composition may include a polymer-bitumen binder (PBB) - in this situation, the mixture does not need additional cellulose additives. PBB is considered a more reliable

substance than petroleum bitumen - it binds asphalt concrete better and makes the surface more resistant to external factors of destruction.



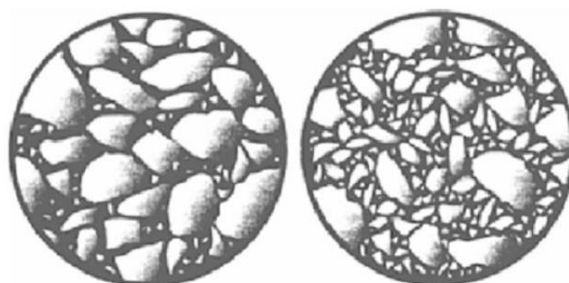
Pic.1 - Composition of Stone mastic asphalt (SMA)

In the composition of asphalt concrete mixtures, not only cellulose fiber, but also other additives can act as a stabilizer. However, it is the cellulose thread that shows the best binding properties and has an acceptable price.

The cubic form of crushed stone fractions is designed to ensure that crushed rocks form a solid base for the road surface during compaction. The high

content of such material in SMA makes the road reliable and prevents shifts from bad weather conditions.

A combination of sand, mineral powder and binder is designed to fill voids in hardening asphalt. The presence of such a filler ensures high density of the surface and a minimum level of porosity.



Pic.2 - Stone Mastic Asphalt vs Hot Mix Asphalt

Cellulose fibers in the mixture bind the components together and prevent the spread of petroleum bitumen. The fibrous additive increases the service life of the road surface, preventing delamination of the road

The components enhance each other's positive properties, providing the following advantages to the SMA road surface:

- high strength, density and hardness;
- resistance to heavy loads (for example, if it is a high-speed highway or a road frequently used by trucks);
- low sensitivity to temperature changes (cracks form less often);
- water resistance;
- good adhesion and absence of loud noise when in contact with car tires;
- durability.

The price of crushed stone mastic mixture is higher than that of other asphalt concrete materials, but the cost is justified by excellent performance characteristics. A road made of SMA lasts 2-3 times longer than roads made of other asphalt, even under high loads.

Stone mastic asphalt concrete is usually used for the construction of the following objects:

- highways - these can be both regular highways within the city limits and high-speed highways;
- runways - the surface is created by slightly adjusting the laying method;
- parking areas and parking lots;
- paths and areas for pedestrians.

It is important to note that stone mastic material is excellent for creating any kind of surface, however, in order to save money, its composition is sometimes

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adjusted. For example, high-strength asphalt is not needed for pedestrian areas, so the composition of the mixture is changed to reduce the cost of the components.

To lay a road from SMA, it is necessary to use the hot laying method with subsequent ramming using special equipment. It is important to note that when creating a road from SMA, it is important to follow the hot laying technology and not to carry out work at a temperature below +5°C. The thickness of the coating can be either 4-5 cm or more than 20 cm - it all depends on the purpose of the road.

It is important to introduce the use of stone mastic asphalt in Georgia, especially in the regions.

stone mastic asphalt will significantly increase the service life of roads. It is worth noting that axle loads are not strictly controlled on roads of internal and local importance, and this type of asphalt will improve the existing condition of the roads.

Natural mineral extraction zones, forestry zones and access roads to agricultural zones require the construction of roads with high service life, which is possible with the asphalt we have considered. Along with the development of tourism, modern infrastructure is needed that will allow the country to develop its economy. A well-functioning road network is the basis for economic development.

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