R&D PROJECT

Title of the project

Development of a new cooling floor to improve urban energy efficiency

Acronym

ALBEPAV

Content of the project

Heat islands are an example of intentioned climate change when urbanization changes the characteristics of the earth's surface and atmosphere.

In highly populated urban areas, pavements cover a more than significant percentage of the urban land and contribute to the development of heat islands.

Traditional pavements are heated by the sun, as they absorb between 80% and 95%, aggravating the effect of the Urban Heat Island, heating the air locally, and contributing to global warming through the radiation of heat into the atmosphere.

This project aims to provide a solution to this environmental problem and proposes a pavement which, thanks to the interaction of the different materials, helps to mitigate the effects of the heat island.

General objectives

The main objective of the project is to develop a new sustainable and more durable pavement by incorporating recycled glass aggregates, recycled asphalt mix (RAP) and the use of warm mixes, which will significantly contribute to the reduction of the phenomenon known as "heat islands".

To this end, the following technical objectives have been established:

- To establish the requirements to be met by new materials and to adapt the characterisation tests
- Optimise the design formula of the various pavement layers
- Designing a test section and a monitoring system to quantify the various benefits
- Develop a software to estimate the reduction in ambient temperature

Results and conclusions

Contrary to what might be expected, based on the technical literature, **a glass pavement tends to capture energy**. The result obtained after estimating the average value specifies that glass asphalt tends to heat up 1.0805 times more than conventional asphalt. This phenomenon can make use of energy storage in terms of the utilisation of glass-lined asphalt.

In the laboratory, it was observed that the mix without plant glass had 4% less "pass" through sieve 4 than the theoretical one, while the mix with glass had 4% more pass through the same sieve than the theoretical one (so there was a difference between the two of 8%). However, from the 2 mm sieve onwards, they were quite equal. Independently, there were no significant differences between the theoretical and final curves, even less considering the small amount of production that was done for the tests. **The mix with glass gave very low bitumen**. The temperatures leaving the plant were also different. The material with glass came out at 147°C while the material without glass came out at 168°C. Although indications in the laboratory were that the mix with glass took longer to heat up, both mixes were compacted at 155ºC.

Several conclusions were drawn from the results obtained. It is interpreted that **the coarse fraction of the glass was pulverised, resulting in a thicker mastic**. The low binder content helped to prevent further closing of the mixture, which would possibly have given a "mirror-like" texture. Also, **the mix design would have had to be sandier** so as not to leave such an open appearance as a discontinuous mix. The theoretical binder content was also excessive.

In relation to the results obtained, one of the options to be contemplated would be the development of **pavements capable of accumulating energy** in the form of heat through the incidence of solar radiation and high temperatures. Another option could be the use of **this type of mix on roads in mountainous areas or in cold climates**, as the accumulation of heat would make them more resistant to frost.

BUSSINESS AREAS
Infrastructure area
COMSA, S.A.

DURATION
2016-2019

BUDGET
834.450€

KEYWORDS
Heat islands, albedo, pavements, warm bituminous mixtures, glass aggregate, recycled asphalt aggregate, energetic efficiency

COORDINATOR
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