_L0ql.png _L0ql.bb _L0ql.png height

Contribution ID: **1122** Type: **Poster**

Fundamental study of water evaporation in cold asphalt mixture

Thursday, 17 May 2018 12:15 (1h 30m)

Cold asphalt mixture (CAM) is a road materials obtained by mixing bitumen emulsion, aggregate, water and often cement at ambient temperature. When using CAM, aggregates and binder do not need to be heated during the mixing operation, which brings social, economic and environmental benefits compared to other paving materials, such as hot mix asphalt (HMA).
Like other types of asphalt materials, CAM require manufacturing operations, such as mixing, storage, laying and compaction during production, but additionally, they also need a curing stage. This fundamentally important stage, involves the evaporation of water/volatiles from the mix and the beginning of setting, which results in increased bonding among bitumen particles and between these and the other materials in the mix. Its development determines the needed time to open the road to traffic and the mechanical properties during service life.
In CAM, high portion of water remains trapped inside their structure, taking long time to evaporate completely and producing poor mechanical performance during the first stages of road service life. This problem is particularly highlighted in areas with cold and wet climate conditions. Therefore, CAM have been generally restricted to the construction of the non-structural pavement layers.
For this reasons, and in order to underpin the use of CAM, the evaporation of interstitial water must be accelerated and optimised. Since the pioneering uses of CAM to the present, many studies have aimed to improve the curing of CAM through different techniques, such as the addition of cement. Despite these attempts, CAM still presents slow mechanical development in comparison to main competitors (e.g. HMA).
This research aims to understand the dynamics of water evaporation in CAM, with without and cement additions and compare them to soil/granular unbound materials (without binder). With this purpose, dynamic water evaporation and hydraulic conductivity tests were carried out. Moreover, the pore size distribution index (n) for the different samples and its evolution over the drying time were estimated based on hydraulic conductivity tests. These results showed the relationship between the internal pore distribution and water dynamics during drying. In addition, it was seen that bitumen emulsion is the main component that delays the curing process of cold mix asphalt and the type and quantity of cement used in this research did not significantly help to accelerate it.

References

Acceptance of Terms and Conditions

Click here to agree

Primary author: SAADOON, Tahseen

Co-authors: Dr GARCIA, Alvaro (Lecturer, Faculty of Engineering, The University of Nottingham); Dr GOMEZ MEIJIDE, Breixo (Lecturer, Faculty of Engineering, The University of Nottingham)

Presenters: SAADOON, Tahseen; Dr GARCIA, Alvaro (Lecturer, Faculty of Engineering, The University of Nottingham); Dr GOMEZ MEIJIDE, Breixo (Lecturer, Faculty of Engineering, The University of Nottingham)

Session Classification: Poster 4

Track Classification: MS 1.05: Drying of porous media from pore to macro scale