



Ontario Hot Mix Producers Association

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SPECIAL BULLETIN #3

QUALITY OF ASPHALT PAVEMENT TASK FORCE

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Re: Asphalt Cement Content

This bulletin deals with asphalt cement (AC) content and how it relates to pavement performance. It is the third in a series of bulletins from OHMPA's Quality of Asphalt Pavement Task Force.

The introduction of Superpave Technology in Ontario provided us with a possibility of improved volumetric mix design methodology and enhanced quality requirements for aggregates used in HMA mixes. Superpave designs have significantly improved the performance of our pavements in terms of resisting rutting, shoving and flushing on our high volume highways, major arterial roads as well as intersections and bus lanes. However, there has been growing concern over the last several years that the AC content of many Superpave mix designs have been reduced to below optimal levels. Asphalt content or more specifically Effective Asphalt Content of HMA mixes can significantly influence pavement performance in terms of fatigue and stress cracking and therefore there have been many owner agencies throughout North America looking at ways of increasing AC in their mixes.

This Bulletin will outline the various parameters that have been explored to try and increase the effective asphalt content and give direction to finding the proper solution for Municipal owner agencies.

The Ministry of Transportation (MTO) have long recognized the benefits of increased AC contents and have been innovative in their tendering and specifying practices to achieving this goal. MTO tenders call for fixed AC values for each mix type at time of bidding. The price of the HMA is then adjusted up or down based on the actual AC content used as determined by the acceptance testing results. As well, the MTO have limited the use of coarse graded surface mixes by limiting the range on the 4.75mm sieve.

Although these measures have been somewhat effective, the AC content of MTO designs has not significantly increased. This is due to two main factors. First, Ministry projects tend to be higher traffic category roadways and therefore the gyrations rates for those designs are at the higher levels. Higher gyration levels tend to reduce the amount of space available for AC in the mixes. Secondly, although Ministry tenders allow for payment of additional AC in the designs, there have been no further incentives or changes to the specifications to encourage or allow contractors to add more AC in the mixes.

This year, MTO has taken a further step by allowing the percent of Theoretical Maximum Specific Gravity at Ninitial to be increased by 0.5% to $\leq 89.5\%$ at the Contractor's option. Although this is viewed as a hopeful step, it is unclear at this time how effective it will be in achieving the desired goal of increasing AC content.

Various other agencies in Ontario and across North America have been looking to modify their design and acceptance requirements in response to their own observed performance issues. Specifications are changing rapidly as agencies search for ways to improve durability.

The following is a list of parameters being considered when modifying specifications:

- Lowering gyration levels
- Increasing minimum VMA

- Lowering design air voids
- Lowering acceptance air voids
- Lowering gyrations + increasing VMA + lowering air voids
- Minimum film thickness
- Increasing N_{ini}
- Minimum binder content by mass
- Maximum limits for recycled materials *
- Reducing acceptance for AC content and/or air voids
- Changing the binder grade

** The next special bulletin of the Task Force will deal specifically with the responsible use of RAP/RAS*

These modifications are being made with the expectation that they may lead to higher effective asphalt contents in mixes for improved durability. However, evaluating the true cause and effect of any change can be difficult. Mixes designed to meet any new requirements may not always equate to more effective AC in the mixes.

Any change to design parameters can lead to unintended consequences. Before making any changes, agencies should consider mixture performance testing at the design stage to ensure new mixes: (1) Have good stability to resist rutting; (2) are fatigue resistant to reduce cracking potential and; (3) have good workability/constructability characteristics. There are several mix performance evaluation tools that are available for these purposes. While research continues in performance prediction modeling, local expertise should be used for selecting the appropriate tools and test methods.

Agencies should also consider the economic effects of any changes made to their specifications such as maintaining the use of local aggregates, the continued use recycled materials (RAP/RAS), and the overall cost of the HMA pavement which includes any additional production or laydown costs.

The objective of the Task Force is to achieve better pavements in Ontario. It is the consensus of the Task Force that, if done properly, increased effective asphalt content in HMA mixes will lead to more durable pavements. Over the next several months the Task Force will develop detailed recommendations for changes to specification and tendering documents that will assist agencies in accomplishing this goal.

The Quality of Asphalt Pavement Task Force

In response to concerns about the quality of asphalt pavement in Ontario, OHMPA formed the Quality of Asphalt Pavement Task Force. The purpose of this group comprised of industry experts, consultants and academics is to assess these concerns and propose workable solutions that are scientifically sound and also practical. In responding to this challenge, the task force has road owners' concerns in mind and has drawn on the expert opinions of the members of the group.

These and other findings and recommendations of the Quality of Asphalt Pavement Task Force will be published on the OHMPA website (www.ohmpa.org). For more information, please contact the OHMPA office at 905-507-3707 or by email at info@ohmpa.org.

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