THE QUALITY OF ASPHALT PAVEMENTS
TASK FORCE
An Update and Where do we go from here...

Fall Asphalt Seminar 2016
Task Force History

• OHMPA Board decided to tackle the ongoing quality concerns head-on!
• Concept of setting-up a Quality of Asphalt Task Force was first discussed at October 2014 OHMPA Board meeting
• OHMPA Board Special Meeting was held on November 6, 2014
• Task Force was established and first meeting held in February 2015.
• Terms of Reference were developed to ensure proper governance in accordance with OHMPA By-laws
Mandate

• Owners as well as OHMPA members expressed serious concerns with pre-mature cracking;
• OHMPA formed the Quality of Asphalt Pavement Task Force; made up of some of the most highly regarded industry experts...
• Main objectives are to review and investigate the factors causing the cracking and
• To provide practical solutions to ensure long term pavement performance in keeping with OHMPA’s mission.

Dedicated to Excellence in Asphalt Pavements
SPECIAL BULLETIN

March 2015
Re: QUALITY OF ASPHALT PAVEMENT TASK FORCE

Since its formation in 1974, the Ontario Hot Mix Producers Association (OHMPA) has recognized and supported the need to continually improve the performance of pavements in Ontario.

In recent months, we have become acutely aware of some hot mix asphalt performance problems that are in need of our attention immediately. Specifically, both provincial and municipal road owners as well as OHMPA members have expressed serious concerns with pre-mature cracking.

In response to these concerns, OHMPA has formed the Quality of Asphalt Pavement Task Force. Made up of some of the most highly regarded industry experts from across the province, the group’s singular goal is to review and investigate the main factors impacting pavement quality in Ontario and to make recommendations to road owners, asphalt producers and road builders that will help to ensure good quality, long lasting pavements.

The Quality of Asphalt Pavement Task Force is composed of a formidable group of asphalt practitioners representing all facets of the industry including producers, contractors, consultants, asphalt cement suppliers and academics. Although only formed in early 2015, the group has already met twice with a third meeting scheduled very soon and has determined that the problems currently facing Ontario’s roads are diverse and varying with an equally diverse list of possible causes.
High Priority Factors

• An internal audit was performed and the top priorities to tackle were:
  – Asphalt Cement (AC) Quality and Specifications
  – Increasing the AC Content in Superpave mixtures
  – The Responsible Use of Recycled Materials
Special Bulletins

• Key presentations were made by TF members these included:
  ❖ Municipal Owners Perspective by Ludomir Uzarowski
  ❖ AC Research Efforts by Steve Manolis & Sandy Brown
  ❖ Increasing AC Content by Fernando Magisano
  ❖ Use of Recycled Materials by Salmam Bhutta & Steve Smith
Extensive, premature failures of asphalt pavements are due to materials problems, mainly quality of asphalt cement and other asphalt mix issues. Failures cost municipalities millions of $. Immediate action is required. Municipalities cannot afford any further failures.
- Asphalt industry is very slow or not interested at all in solving the current serious problems
- Trust in asphalt industry including foreign experts and organizations seriously shaken
AC Quality & Specifications

• Industry analysis of performance data to-date indicates poor or no correlation with new asphalt tests being proposed
• In some cases the wrong PGAC was used
• The pre-mature cracking may be attributed to a number of others factors
• Caution is warranted with making spec changes – may lead to ‘unintended consequences’
• Stakeholders need to work together to come up with practical solutions
QUALITY OF ASPHALT PAVEMENT TASK FORCE

May 2015
Re: SPECIAL BULLETIN #2 | Asphalt Cement Quality and Specifications

This bulletin focuses on asphalt cement quality and specifications as they relate to pavement cracking identified as a high priority issue in the inaugural bulletin of the Task Force (TF) released in March 2015. Presented is a summary of actual pavement cracking performance data and the corresponding correlations observed with the various tests used to assess the quality of the asphalt cement in their respective studies. It is important to note that comprehensive reviews of the latest studies and data will continue to be undertaken by the TF as they become available.

The attached matrix shows the correlation between asphalt cement properties and pavement cracking performance observed to date based on a number of Ministry of Transportation (MTO) trials. While it is acknowledged that asphalt cement quality affects cracking performance, based on the results of the studies it is clear that the asphalt cement binder properties measured in the trials are not sufficient to predict and control pavement cracking performance. In addition, the data infers that implementation of the Extended BBR does not appear to significantly enhance pavement cracking performance beyond the current specification provided that the low temperature PG rating of the binder is properly specified. In some of the studies, the low temperature of the pavement experienced during winter may have dropped below the low temperature PG rating of the binder. Moreover, the performance data shows that the rehabilitation treatment may have played a role in the distress
What are the concerns – Owners Perspective
(Magisano)

Comments from Owner agencies:

- Superpave mixes tend to have lower A.C. contents than Marshall mixes.
- HMA producers tend to purposely design lean mixes (low bid system).
- Some producers further reduce the A.C. content during production.
  - Taking advantage of OPS 310 production tolerances.
- Use of RAP further reduces the proportion of new A.C. in the mixes.
What are the concerns – Owners Perspective

Low A.C. content mixes are said to have:
- Coarser gradations
- Lower film thickness
- Minimum or low VMA
- Lower in-situ density – due to greater resistance to field compaction

Which can lead to:
- Less resistance to fatigue damage – premature cracking
- Poorer longitudinal joint performance
- Lower overall long-term durability
Summary List of Possible Solutions

1. Fixed A.C. bid values
2. Higher maximum N_{ini} requirements
3. Use fine graded mixes
4. Call for minimum A.C. content
5. Reduce the allowable acceptance for Air Voids and/or A.C. Content
6. Reduce or ban the use of RAP
7. Lowering the design Air voids
8. Reduce or cap the design gyration levels
9. Raised VMA requirements
10. Specify gyration level depending on binder type
11. Add a minimum density at N_{ini} gyrations
12. Add a minimum lab permeability requirement
13. Develop a new methodology to establish mixing & compaction temperatures
SPECIAL BULLETIN #3

QUALITY OF ASPHALT PAVEMENT TASK FORCE

June 2015
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.
1. The continued use of RAP/RST in hot-mix asphalt is environmentally responsible and offers good value and benefits to all the stakeholders.

- Proper mix design and production adjustments of the virgin PGAC grade must be made for mixes with RAP in excess of 20% as outlined in OPSS.
- Ontario mix design procedures assume that 100% of the AC in the RAP/RST is available for the mix design.
The Responsible Use of Recycled Materials in Hot Mix Asphalt (Bhutta)

• It is accepted that the recycled materials do not behave like “Black Rock” in the mix. However, the contribution of the AC in the RAP/RST needs to be re-evaluated particularly with proportions > 25% are used in HMA.

• The Recycle Binder Ratio (RBR) better reflects the contribution from the old AC in RAP/RST. This becomes a concern when RAP is fractionated into Fine RAP and Coarse RAP and Fine RAP is incorporated into the hot mix.

• Industry is more than willing to work with road owner agencies with an ‘open door’ policy to further develop appropriate controls that ensure that the proper amount of RAP/RST is being utilized by the HMA producer at all times.
SPECIAL BULLETIN #4

QUALITY OF ASPHALT PAVEMENT TASK FORCE

August 2015
Re: The Responsible Use of Recycled Materials in Hot Mix Asphalt (HMA)

This bulletin deals with fostering the responsible use of recycled materials, which includes Recycled Asphalt Pavement (RAP) and Recycled Asphalt Shingles (RAS), in hot mix asphalt (HMA).

Research has shown that the responsible use of RAP enhances pavement performance. In addition to RAP, both RAS consisting of post-industrial Recycled Shingle Tab (RST) and tear-off waste from roofs have been incorporated in HMA. In light of some recent performance issues with HMA in Ontario, the Task Force agrees that as an industry, we need to review the proper use of both RAP and RAS in HMA to ensure that quality asphalt pavements are being constructed.

The use of RAP in HMA has a long and proven track record in Ontario and around North America producing quality pavements while at the same time promoting sustainability and creating environmental benefits. In Ontario, the current specifications governing mix designs allow the use of RAP and RST in hot mix asphalt.
QUALITY OF ASPHALT PAVEMENT TASK FORCE

November 2016
Re: Optimization of Asphalt Cement Content to Improve Durability of Asphalt Mixes

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 concerns among agencies over the last several years that the asphalt cement content of many Superpave mix designs may have been reduced to below optimal levels for durability. Asphalt content or more specifically Effective Asphalt Content of HMA mixes has significant influence on pavement performance in terms of fatigue and thermal cracking. However, we have to be certain that any changes we make do not adversely affect other aspects of durability such as rutting.
SPECIAL BULLETIN 4-A

QUALITY OF ASPHALT PAVEMENT TASK FORCE

November 2016

Re: The Responsible Use of Recycled Materials in Asphalt Mixtures – Critical Look

This is a follow-up bulletin to Bulletin 4 and addresses the critical elements to be considered with the responsible use of recycled materials in asphalt mixtures. This bulletin is organized to address the following elements:

1. Review of the common best practices with recycling RAP;
2. Recycled Binder Ratio (RBR);
3. Critical look at available RAP PGAC for Asphalt Mix Designs;
4. RAP Management and Best Practices; and
5. Commitment from Asphalt Producers on Responsible Use of RAP in asphalt mixtures.

**last two bulletins were more difficult to put together. Where the TF couldn’t agree on an item, both points were included in the bulletin.**
Bulletins Available on the website: OHMPA.org
Possible Solutions?

- Increase AC Content in Superpave mixes
- Implement the Recycle Binder Ratio (RBR) for RAP Mixes
- Re-assess PGAC requirements based on RBR
- Proper inspection and testing
- Use the proper PGAC based on actual weather data
- More education – OHMPA can help!
- Resolving these concerns will require a collaborate effort between industry and owners
What’s next for QAPTF?

• It has been a successful 2 years bringing all stakeholders together to collaborate on these issues

• We will continue to talk through it through committees like the Municipal Liaison Committee and Hot Mix Technical Committee

• We will move on from the QAPTF to the creation of a Quality Committee within OHMPA to commit on tackling the issues that are at the forefront